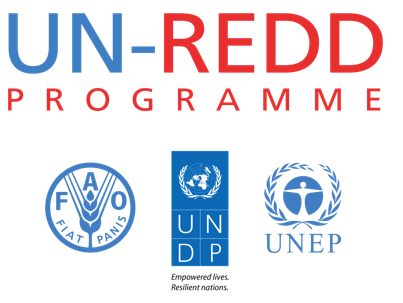
****

**Office of the Inspector General of Forests**

**Ministry of Climate Change**

**Government of Pakistan**

**August 2015**

**Action Plan for the implementation of the National Forest Monitoring System of Pakistan**

Action Plan for the implementation of the National Forest Monitoring System of Pakistan

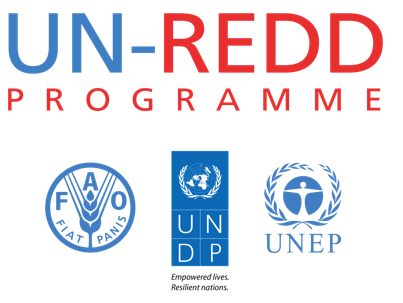
Office of the Inspector General of Forests

Ministry of Climate Change

Government of Pakistan

***August 2015***

Prepared with the support of the Food and Agriculture Organization of the United Nations (FAO) through the Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation (The UN-REDD Programme) and with the support of the World Wild Fund (WWF) for Nature - Pakistan

****

**CONTACT INFORMATION**

|  |  |
| --- | --- |
| **National Focal Point** | Syed Mahmood Nasir |
| **Title** | Inspector General of Forests |
| **Organization** | Ministry of Climate Change |
| **Address** | LG&RD Complex, G-5/2 Islamabad |
| **Website** | http://www.mocc.gov.pk/gop/ |

**NFMS AP DEVELOPMENT TEAM**

|  |  |
| --- | --- |
| **Name** | **Designation and organization** |
| **Lead authors** |  |
| Dr. Shahzad Jehangir | DIG (Forest), MoCC, GoP |
| Muhammad Ibrahim Khan | Senior Manager Conservation, WWF- Pakistan |
| Muhammad Afrasiyab | Senior Project Officer REDD+, WWF Pakistan |
| Kamran Hussain | SDFO, Gilgit Baltistan Forest Department (FD) |
| Anwar Ali | Mensuration Officer, PFI |
| **Contributing authors** |  |
| Atif Shahzad | Assistant Manager , SUPARCO |
| Urooj Saeed | Manager GIS unit, WWF Pakistan |
| Abdul Sattar Khatri | Conservator Forests, Sindh FD |
| Irfan Akhtar Iqbal | Assistant Manager, SUPARCO |
| Muhammad Aslam Buzdar | Conservator Forests, Balochistan FD |
| Muhammad Imran | Assistant Manager, SUPARCO |
| Riaz Ahmad | Representative, SAFI |
| Mazhar Iqbal | Central Silviculturist PFI |
| Ali Haider | DFO KP FD |
| Susanne Wallenoeffer | GIZBKP |
| Abdul Basit | Conservator Forests, Punjab FD |
| Dr. M. Mohsin Iqbal | Head, Agriculture & Coordination Sections, *GCISC* |
| Sana Ilyas | Urban Unit |
| Muhammad Arif Gouheer | Senior Scientist, *GCISC* |
| **Technical Support, editing and review** |  |
| Quentin Renard | MRV Technical Advisor, UNREDD/FAO |
| Ben Vickers | Regional Programme Officer, UNREDD/FAO |

# Table of contents

[List of figures IV](#_Toc425429564)

[List of tables IV](#_Toc425429565)

[List of Annexes IV](#_Toc425429566)

[Acronyms VI](#_Toc425429567)

[Executive summary 1](#_Toc425429568)

[1. INTRODUCTION 1](#_Toc425429570)

[2. OBJECTIVES 3](#_Toc425429571)

[3. ACTION PLAN DEVELOPMENT METHODOLOGY 5](#_Toc425429572)

[4. NATIONAL CIRCUMSTANCES 6](#_Toc425429573)

[4.1. Introduction 6](#_Toc425429574)

[4.2. The forestry sector 7](#_Toc425429575)

[4.2.1. Forested area 7](#_Toc425429576)

[4.2.2. Biodiversity 9](#_Toc425429577)

[4.2.3. Forestry policy 10](#_Toc425429578)

[4.3. Drivers of deforestation and forest degradation 12](#_Toc425429579)

[4.4. REDD+ policies and measures 15](#_Toc425429580)

[4.5. NFMS development 17](#_Toc425429581)

[4.5.1. Institutional arrangements 17](#_Toc425429582)

[4.5.2. NFMS development phases 18](#_Toc425429583)

[4.5.3. Funding 20](#_Toc425429584)

[5. CAPACITY ASSESSMENT 21](#_Toc425429585)

[5.1. MRV function 22](#_Toc425429586)

[5.1.1. Satellite Land Monitoring System 22](#_Toc425429587)

[5.1.2. National Forest Inventory 26](#_Toc425429588)

[5.1.3. Greenhouse Gas Inventory 32](#_Toc425429589)

[5.1.4. Summary 34](#_Toc425429590)

[5.2. Monitoring function 36](#_Toc425429591)

[6. IMPLEMENTATION OF THE NATIONAL FOREST MONITORING SYSTEM 38](#_Toc425429592)

[6.1. Institutional framework 39](#_Toc425429593)

[6.2. MRV function 43](#_Toc425429594)

[6.2.1. Satellite Land Monitoring System 43](#_Toc425429595)

[6.2.2. National forest inventory 48](#_Toc425429596)

[6.2.3. Greenhouse gas inventory 56](#_Toc425429597)

[6.3. Monitoring function 61](#_Toc425429598)

[7. LOGICAL FRAMEWORK 67](#_Toc425429599)

[8. BUDGET AND WORK PLAN 79](#_Toc425429600)

[8.1. Institutional framework 79](#_Toc425429601)

[8.2. Satellite Land Monitoring System 81](#_Toc425429602)

[8.3. National Forest Inventory 83](#_Toc425429603)

[8.4. Greenhouse Gas Inventory 86](#_Toc425429604)

[8.5. Monitoring function 88](#_Toc425429605)

[8.6. Summary 90](#_Toc425429606)

[9. REFERENCES 91](#_Toc425429607)

[10. ANNEXES 93](#_Toc425429608)

# List of figures

[Figure 1. Land Cover Atlas of Pakistan(PFI, 2012) 9](#_Toc425345100)

[Figure 2. Institutional arrangements for implementing the NFMS in Pakistan 18](#_Toc425345101)

[Figure 3. NFMS development phases 20](#_Toc425345102)

# List of tables

[Table 1. Drivers of deforestation and forest degradation (Source: WWF Pakistan and ICIMOD, 2013) 14](#_Toc425345377)

[Table 2. Trends in extent of forests of Pakistan from 1990 to 2010 15](#_Toc425345378)

[Table 3. Policies and measures to address drivers of deforestation and forest degradation 16](#_Toc425345379)

[Table 4. Existing and needed data for the SLMS 26](#_Toc425345380)

[Table 5. Existing and needed equipment for the SLMS 26](#_Toc425345381)

[Table 6. Existing and needed skills/trainings for the SLMS 26](#_Toc425345382)

[Table 7. Ongoing NFI-related projects 29](#_Toc425345383)

[Table 8. Existing and needed data for the NFI 30](#_Toc425345384)

[Table 9. Existing and needed equipment for the NFI 32](#_Toc425345385)

[Table 10. Existing skills and needed trainings for the NFI 32](#_Toc425345386)

[Table 11. Existing and needed data for the GHG-I 34](#_Toc425345387)

[Table 12. Existing and needed equipment for the GHG-I 34](#_Toc425345388)

[Table 13. Existing and needed skills/trainings for the GHG-I 34](#_Toc425345389)

[Table 14. Summary of the capacity assessment for the MRV function 35](#_Toc425345390)

[Table 15. Improvements needed for the implementation of the monitoring function 38](#_Toc425345391)

# List of Annexes

[[Annex I. History of Forest Inventories in Pakistan 83](#_Toc425345101)](#_Toc425345817)

[[Annex I-A. Satellite-based forest inventories in Pakistan 83](#_Toc425345101)](#_Toc425345818)

[[Annex I-B. Field-based forest inventories in Pakistan 85](#_Toc425345101)](#_Toc425345819)

[[Annex II. Capacity assessment of the provinces regarding SLMS 86](#_Toc425345101)](#_Toc425345820)

[[Annex II-A. Existing capacities of provincial forest departments regarding data availability and accessibility for SLMS for REDD+ 86](#_Toc425345101)](#_Toc425345821)

[[Annex II-B. Existing provincial capacities and identified gaps regarding technical capabilities related to SLMS 86](#_Toc425345101)](#_Toc425345822)

[[Annex II-C. Existing provincial human capacity and gaps to process and analyse information related to SLMS 89](#_Toc425345101)](#_Toc425345823)

[[Annex II-D. Existing provincial capacities and gaps identified regarding human capacity for preparation of reports from SLMS 90](#_Toc425345101)](#_Toc425345824)

[[Annex II-E. Exiting provincial capabilities and identified gaps regarding data verification 90](#_Toc425345101)](#_Toc425345825)

[[Annex II-F. Existing provincial capacities and identified gaps regarding training facilities on SLMS for REDD+ MMRV 91](#_Toc425345101)](#_Toc425345826)

[[Annex III. Capacity assessment of the provinces regarding NFI 93](#_Toc425345101)](#_Toc425345827)

[[Annex III-A. Existing provincial capacities regarding NFI data availability 93](#_Toc425345101)](#_Toc425345828)

[[Annex III-B. Existing technical capabalities and identified gaps related to NFI 94](#_Toc425345101)](#_Toc425345829)

[[Annex III-C. Existing human capacities and identified gaps for NFI 94](#_Toc425345101)](#_Toc425345830)

[[Annex III-D. Existing provincial capacities and identified gaps regarding human capacity for prep of reports from NFI 96](#_Toc425345101)](#_Toc425345831)

[[Annex III-E. Existing provincial capacities and identified gaps regarding capabilities related to data verification for NFI 97](#_Toc425345101)](#_Toc425345832)

[[Annex III-F. Existing provincial capacities and identified gaps regarding training facilities for NFI 98](#_Toc425345101)](#_Toc425345833)

[[Annex IV. Capacity Assessment of PFI and potential partner Institutions for REDD+ MMRV 100](#_Toc425345101)](#_Toc425345834)

[[Annex V. Checklist for CBNA for NFMS for REDD+ MMRV 103](#_Toc425345101)](#_Toc425345835)

[[Annex VI. Needed equipment to implement the SLMS 115](#_Toc425345101)](#_Toc425345836)

[[Annex VII. Needed equipment to implement the NFI 116](#_Toc425345101)](#_Toc425345837)

[[Annex VIII. Needed equipment to implement the GHG-I 118](#_Toc425345101)](#_Toc425345838)

[[Annex IX. Needed equipment to implement the monitoring function 119](#_Toc425345101)](#_Toc425345839)

[[Annex X. Potential indicators to monitor REDD+ activities implementation 130](#_Toc425345101)](#_Toc425345840)

Annex XI. Validation statement of the Pakistan NFMS AP validation workshop…………………………………....131

# Acronyms

AD Activity Data

ADP Annual Development Plan

AFN All Foresters Network

AJK Azad Jammu o Kashmir

ALGAS Asia Least-Cost Greenhouse Gas Abatement Strategy

AWG-LCA Ad hoc Working Group on Long Term Cooperative Actions

C & I Criteria and Indicators

CCD Climate Change Division

CDA Capital Development Authority

CEGD Community Extension and Gender Development

CIFOR Centre for International Forestry Research

CKNP Central Karakorum National Park

COP Conference of Parties

DBH Diameter at Breast Height

DFO Divisional Forest Officer

DGPS Differential Global Positioning System

EPA Environmental Protection Agency

FAO Food and Agriculture Organization of United Nations

FATA Federally Administered Tribal Areas

FCPF Forest Carbon Partnership Facility

FD Forest Department

FRA Forestry Resource Assessment

FSMP Forestry Sector Master Plan

GB Gilgit-Baltistan

GCISC Global Change Impact Studies Centre

GEF Global Environmental Facility

GFRA Global Forest Resource Assessment

GHG-I Green House Gas Inventory

GIS Geographical Information System

GLCF Global Land Cover Facility

GPS Global Positioning System

HKH Hindu Kush Himalayan

HRD Human Resource Development

ICIMOD International Centre for Integrated Mountain Development

INGO International Non-Governmental Organization

IPCC Intergovernmental Panel on Climate Change

ISESCO Islamic Educational, Scientific and Cultural Organization

IUCN International Union for Conservation of Nature and Natural Resources

JPE Joint Program on Environment

KPK Khyber Pakhtunkhwa

LCCS Land Cover Classification System

LULUCF Land Use Land Use Change and Forestry

MMRV Monitoring and Measurement, Reporting and Verification

MMU Minimum Mapping Unit

MoCC Ministry of Climate Change

MoE Ministry of Environment

NARC National Agriculture Research Council

NESPAK National Engineering Services of Pakistan

NFI National Forest Inventory

NFMS National Forest Monitoring System

NFRRAS National Forest and Rangelands Resource Assessment Study

NLUP National Land Use Planning

NPP Net Primary Productivity

NRM Natural Resource Management

OBIA Object Based Image Analysis

OIGF Office of Inspector General of Forests

PFI Pakistan Forest Institute

PFRI Pakistan Forestry Research Institute

PKR Pakistani Rupee

RELs Reference Emissions Levels

REDD+ Reducing Emissions from Deforestation, Forest Degradation; and the Role of Conservation, Sustainable Management of Forest and Enhancement of Forest Carbon Stocks in Developing Countries

RLs Reference Levels

RPP Readiness Preparation Proposal

SDPI Sustainable Development Policy Institute

SFM Sustainable Forest Management

SLMS Satellite Land Monitoring System

SoP Survey of Pakistan

SUPARCO Space and Upper Atmosphere Research Commission

UNFCCC United Nations Framework Convention on Climate Change

UNDP United Nations Development Program

USGS United States Geological Survey

WG Working Group

WWF World Wide Fund for Nature

MoCC Ministry of Climate Change

# Executive summary

The forest resources of Pakistan are depleting both quantitatively (at annual rate of deforestation of 2.1%) and qualitatively with only 5.01 % of the land-cover as forests. There is a serious threat of further acceleration to the rate of deforestation with rising population and associated wood demands; lavish use of wood for decoration, encroachments and adverse impacts of climate change. Except an informal compilation of reports from provinces, there has been no formal national level forest monitoring system in Pakistan to monitor forest resources and their sustainable management. In the past, Pakistan has lacked a clear institutional arrangement, associated roles and responsibilities and a mechanism for reporting to the international conventions.

Pakistan joined the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries (UN-REDD Programme) in June 2011 and has taken steps to start implementing REDD+ readiness activities. Through the UN-REDD Programme, Pakistan has received technical capacity building support from FAO in the form of Targeted Support Funds to achieve the REDD+ readiness goals. The support is focused on the development of national capacities and strategies for the National Forest Monitoring System (NFMS) of Pakistan.

Pakistan’s NFMS Action Plan (AP) was developed through a participatory approach of establishing a Working Group (WG) representing members from key stakeholders and engaging them in drafting of relevant sections of the AP in the light of detailed capacity based need assessment of the relevant implementing institutions. The NFMS AP has been designed for the monitoring of REDD+ interventions and other national forestry policies and values, such as biodiversity, soil and water conservation, as well as social, environmental and economic roles of forests.

The NFMS AP will guide through all the activities required to operationalize the systems/tools described in the MRV section of R-PP. In order to develop clarity on the institutional arrangements, the NFMS AP has a framework of conducting workshops and meetings among the representatives of the provincial Forest Departments (FDs), the Office of the Inspector General of Forests (OIGF) and officials from the Pakistan Forest Institute (PFI). The NFMS will consist of five main components: (i) Institutional Framework, (ii) Satellite Land Monitoring System (SLMS), (iii) National Forest Inventory (NFI), (iv) Greenhouse Gas Inventory (GHG-I) and (v) the Monitoring function. For these different tasks, PFI will be supported by the provincial FDs for the NFI, the Space and Upper Atmosphere Research Commission (SUPARCO) for SLMS and the Global Change Impact Studies Centre (GCISC) for GHG-I. Pakistan will follow the phased approach proposed by the UNFCCC for the implementation of the REDD+ and the development of the NFMS.

A budget of USD 4.089 million is estimated for the implementation of the NFMS Action Plan for the first four years of implementation. A set of activities have also been highlighted in the action plan to secure funding for the NFMS on the long-term.

# INTRODUCTION

Forest monitoring has become a key issue in international environmental policy processes and information provided by forest monitoring activities plays a key role in many international agreements, such as the Rio Conventions. At the same time, national information needs on forests have grown considerably in recent years. These needs have evolved from forest area and growing stock information to cover other key aspects of sustainable forest management, such as biodiversity conservation, provision of multiple environmental services, socio-economic aspects and governance.

While the forest sector faces an increasingly large diversity of information needs on forest and land use, the capacity to collect, compile and analyze data and to generate and disseminate information and knowledge needs straightening in many countries. Also, the need for improved forest monitoring has been increasingly demanded in recent years, e.g. in decisions of the United Nations Framework Convention on Climate Change (UNFCCC) that request country Parties aiming to undertake REDD+ activities to develop *“robust and transparent national forest monitoring systems”* for monitoring and reporting REDD+ activities.

The concept of REDD+ emerged from the international negotiations in the UNFCCC and refers to the role of forests to reduce global greenhouse gas emissions. Under the REDD+ mechanism compensation will be provided to developing countries for actions taken to Reduce Emissions from Deforestation and forest Degradation (REDD) below an established reference level. It aims to incentivize forest protection over forest destruction (Global Witness, 2010). According to the Cancun decision (Decision 1/Conference Of arties (COP). 16, Par. 70, 2010) following activities are eligible for the REDD+ mechanism: (i) Reducing emissions from deforestation, (ii) Reducing emissions from forest degradation; (iii) Conservation of forest carbon stocks, (iv) Sustainable management of forests, (v) Enhancement of forest carbon stocks. According to the Warsaw Framework (COP 19) for REDD+ the participating countries are required to have (i) National strategy or action plan, (ii) National Forest Monitoring System, (iii) Reference Levels and (iv) a Safeguard Information System.

This action plan has been developed to fulfill the requirements of the UNFCCC through development and implementation of a robust and transparent national forest monitoring system. The purpose of the NFMS is to identify and develop processes that supports strategic decision making by systematic and repeated measurement and observation of forest resources, their management, uses and users; and periodic delivery of valid, representative and relevant information on status and trends for the country as a whole (H. L. Alice 2000). In other words the purpose of the NFMS is to develop a robust and transparent national level forest monitoring system using standardized methods and tools for data collection, analysis, processing and reporting of the results.

Except an informal compilation of reports from provinces, there has been no formal national level forest monitoring system in Pakistan. Moreover a national level NFMS is the prerequisite for REDD+ programmes. All these necessitated the development of the NFMS that could both meet the needs for forest monitoring for REDD+ as well as other ecological services and products. The NFMS will therefore improve forest management and will also enable Pakistan to qualify for initiating REDD+ programmes.

An NFMS has two functions: a ‘monitoring’ function and a ‘Measurement, Reporting and Verification (MRV)’ function. The “monitoring” function of the NFMS is primarily a domestic tool to allow countries to assess a broad range of forest information, including in the context of REDD+ activities. The MRV function for REDD+, on the other hand, refers to the estimation and international reporting of national-scale forest emissions and removals. It is based on three main components, or ‘pillars’ i.e. 1) the satellite land monitoring system (SLMS), 2) the national forest inventory (NFI), and 3) the national GHG inventory. The SLMS and the NFI pillars are used to provide inputs into the third pillar – the forest sector component of the GHG inventory. Under the NFMS development Pakistan will progressively develop and operationalize these three pillars over the three phases of REDD+, and align them with the monitoring function, so that by the third phase of REDD+ Pakistan has a fully functional NFMS (UN-REDD Programme 2013).

The overall objective of this Action Plan (AP) is to describe activities that Pakistan has to undertake to develop a robust and transparent National Forest Monitoring System for REDD+. The NFMS AP consists of chapters on action plan development methodology, national circumstances, capacity assessment, implementation of the NFMS, logical framework, budget and work plan.

The NFMS AP was developed through a participatory approach of establishing a Working Group (WG) representing members from key stakeholders and engaging them in drafting of relevant sections of the AP. Following reviews from stakeholders and inputs UN-REDD Programme experts, the Action Plan was finally validated through a national workshop of relevant stakeholders.

This Action Plan consists of eight main chapters whose details are as under:

* Chapter 1 is about the introduction to the REDD+ NFMS and the action plan,
* Chapter 2 deals with goal and objectives of the NFMS as well as the action plan,
* Chapter 3 is about the methodologies followed for the development of this action plan,
* Chapter 4 explains the national circumstances about forestry sector, drivers of deforestation and degradation, existing REDD+ policies and measures and the NFMS development phases and institutional arrangements for NFMS.
* Chapter 5 details the assessment of the existing capacities of provincial and federal departments related to SLMS, NFI and GHG-I.
* Chapter 6 describes the implementation framework of Institutional arrangements and various components of the National Forest Monitoring System (NFMS).
* Chapter 7 and 8 consists of a logical framework of the NFMS AP and respective budget detailed into activities and sub activities.

# OBJECTIVES

The goal of national forest monitoring is to generate reliable data and information to formulating, monitoring and adjusting national forest policies, to inform interested stakeholders on the forest status and to report to international conventions, such as the Rio Conventions. Also, the ultimate objective of the NFMS is to monitor progress towards sustainable forests management in Pakistan.

The National Forest Monitoring System will be used to monitor a wide range of biophysical and socio-economic parameters. In addition to the measurement of forest carbon stocks and forest cover, the NFMS will provide information on parameters such as forest health, biodiversity, socio-economic and environmental functions of forests and relevant legal frameworks.

In the REDD+ context, the NFMS will be designed to estimate forest-related GHG emissions and removals following Intergovernmental Panel on Climate Change (IPCC) guidelines. The NFMS will also be aimed at monitoring the implementation and results of REDD+ policies and measures in Pakistan according to the country’s existing circumstances.

The main objectives of the present Action Plan for the implementation of the NFMS of Pakistan are presented below.

Objective 1: To adopt and implement institutional arrangements with clear roles and responsibilities for the implementation of the NFMS

In Pakistan, forestry is a provincial subject and all matters regarding forest management and regulation are dealt with by the provincial forest departments through provincial forest acts.

At the national level, the OIGF, under the Federal Ministry of Environment, has the mandate of formulating national policies, inter-provincial coordination, donors’ negotiation, meeting international obligations under the Multilateral Environmental Agreements (MEAs), national level forest surveys, assessment and reporting.

For the implementation of the NFMS there is need for further clarification on who will do what. This AP is also aimed at coming up with agreed institutional arrangements to deal with different responsibilities for the NFMS implementation.

Objective 2: To monitor the forest resources of Pakistan for their sustainable management

The NFMS is mainly aimed at providing information on overall parameters such as forest cover, forest growing stocks, forest carbon stocks, forest health, biodiversity, socio-economic and environmental functions of forests and legal frameworks related to forests. The regular collection of forest-related data and the monitoring of relevant indicators will enable to define and adapt national strategies and policies for the sustainable management of forests in Pakistan.

Objective 3: To develop and establish a transparent NFMS for REDD+ according to the COP’s decisions and IPCC guidelines

Pakistan will implement COP’s decisions related the monitoring of REDD+ activities by designing a NFMS that can simultaneously perform two functions: (i) a monitoring function to monitor REDD+ policies and measures and (ii) a “MRV” function to “Measure, Report and Verify” GHG emissions/removals from the forestry sector. By implementing such NFMS, Pakistan will meet the requirements of the UNFCCC and respect the "Warsaw Framework” for REDD + (COP 19) that sets the conditions to receive results-based payments.

The monitoring function will provide periodic information on the results achieved by the national REDD+ policies and measures against the defined and agreed criteria and indicators. In short, the monitoring function will assess whether REDD+ activities are working effectively and are resulting in positive Outputs. For this purpose, the following tools will be used: (i) Satellite Land Monitoring System (SLMS) for monitoring large areas of forests; (ii) Web-GIS portal to share data transparently; (iii) Community based monitoring for bottom-up validation of satellite data and incorporation of local knowledge into national monitoring; (iv) Forest inventories to build on existing systems and collect biophysical and socio-economic data.

The MRV function will focus on Pakistan’s commitment to measure, report and verify its actions taken under REDD+ program for the forestry sector and assess whether they are resulting in measurable climate change mitigation. The specific components to be considered under the MRV function are: (i) Satellite Land Monitoring System (SLMS) to collect and assess the Activity Data (AD) related to forest land; (ii) National Forest Inventory to collect information on forest carbon stocks and changes (Emission Factors - EF); (iii) GHG Inventory for reporting on anthropogenic forest-related GHG emissions by sources and removals by sinks to the UNFCCC Secretariat.

Objective 4: To establish a national database and web portal for ensuring quality, transparency and accessibility of information related to the forest sector

Pakistan Forest Institute (PFI) used to get data about the forestry sector from all the provinces and compile the data in the form of a report titled “Forestry Statistics of Pakistan”. This practice has now been discontinued for more than a decade, and needs revival with further improvement. Under the NFMS a national database and web portal will be established to ensure quality, transparency and accessibility of information related to the forest sector in Pakistan.

Objective 5: To report to international conventions

The NFMS of Pakistan will be used to facilitate discussions and the development of agreements at the international level and to report to international conventions and processes that request the signatory nations to report on a regular basis using pre-defined questionnaires.

# ACTION PLAN DEVELOPMENT METHODOLOGY

The AP for the implementation of the NFMS is placed in the overall context of REDD+ policy of the country. The activities in the AP are based on the guidelines set out in Component 4a of the R-PP document. Specifically, the AP describes in detail all the activities required to operationalize the systems/tools described in the R-PP.

This AP has been developed in accordance with the three steps outlined below.

Step 1: Establishment of a national NFMS working group

Following the NFMS awareness raising and consultation workshop held in March 2014, the NFMS working group was established, ensuring participation of all relevant stakeholders, with the main objective of supporting the development of the AP for the implementation of the NFMS.

The terms of reference of the NFMS working group, the roles and responsibilities of its members and the operational modalities were discussed, refined and validated in close consultation with the members during its first meeting held in November 2014.

Step 2: Drafting of the AP

The working group began drafting the NFMS AP during a workshop held on 3-4 December 2014 in Islamabad. The draft was then improved during the subsequent workshops of the working group held from January to May 2015. The working group members assessed the elements provided under Component 4 of the R-PP (mandate and scope of the NFMS and each of its components) and reviewed the Capacity Based Need Assessment (CBNA) and other background reports prepared under the project “Preparation of Action Plan and Capacity Building for a National Forest Monitoring System (NFMS) for REDD+”. The working group also discussed and evaluated the AP template proposed by the UN-REDD Programme. To work on the specific components and sections the working group was split into four sub-groups based on individual interests and capacities of the members. Each sub-group was helped by a facilitator to compile and write the information shared by each member. In between the working group meetings, members of the sub-groups were in contact through emails.

In addition to the working group meetings, a focused meeting was held in February 2015 consisting of the OIGF, Khyber Pakhtunkhwa (KPK) Environment Department, PFI and WWF-Pakistan to discuss and give formal approval to the draft proposal regarding the Institutional Arrangements developed by the NFMS Working Group.

Step 3: Validation of the AP

After incorporating stakeholders’ comments and following a review by the UN-REDD Programme experts, a national AP validation workshop was conducted on August 26th, 2015 where all REDD+ and forestry sector stakeholders were brought together to discuss and validate the AP.

# NATIONAL CIRCUMSTANCES

## Introduction

Pakistan is a forest deficient country having around 5% of area under forests, mostly situated on the northern mountainous slopes. These forests, however, have got significant role keeping in view their diversity, ecological importance and livelihood security of millions of local populations. Due to a number of reasons and drivers these forests are under extreme pressure of over exploitation and face treats of degradation and deforestation.

Forests in Pakistan are managed and regulated by the provincial forest departments through provincial forest acts. Each provincial forest department has its forestry planning and monitoring unit with mandate to carryout forest inventories, prepare forest working/management plans and monitor the implementation of these plans as well as other projects. At the federal level, the ministry of climate change has the mandate to develop national policies, inter-provincial coordination, negotiate with donors, meet international obligations under Multilateral Environmental Agreements (MEAs) and organize national level forest surveys, assessment and reporting.

Pakistan started REDD+ initiatives in 2010. The REDD+ initiatives were started with the inclusion of REDD+ in the Climate Change Policy of Pakistan, followed by the development of a Project Identification Form (PIF) by the Ministry of Climate Change (MoCC) for tapping Global Environment Facility (GEF) grant and undertake the REDD+ mechanism development process. Soon after the introductory phase, capacity building workshops were started at national level in collaboration and financial assistance of national and international Non-Government Organizations (NGO’s). The Office of the Inspector General of Forests (OIGF), designated as the National REDD+ Focal Point, has been building inter-provincial coordination and inter-institutional linkages on REDD+ implementation.

A National REDD+ Steering Committee has been established in 2010 and provincial REDD+ focal points from respective forest departments have been designated. Pakistan also developed Voluntary REDD+ Database (VRD) and joined REDD+ Partnership that was formed in Oslo in May 2010 and serves as an interim platform for its partner countries to scale up actions and finance for REDD+ initiatives. Pakistan joined the UN-REDD Programme as a partner in 2011 and is set to operationalize and mainstream REDD+ in its forest management practices. Pakistan also succeeded in securing funds through GEF allocation of worth US$ 10 million under Clean Development Mechanism (CDM) which also addresses REDD+ Leader ship for Environment and Development-Pakistan (LEAD Pakistan), 2011). Pakistan formally became member of the Forest Carbon Partnership Facility (FCPF) of the World Bank in July 2013. Due to heavy costs involved and limited availability of public funds to run REDD+ initiatives, Pakistan submitted its REDD+ Readiness Preparation Proposal (RPP) to the FCPF that was approved in December 2013, enabling Pakistan to secure USD 3.4 million for the next five years.

In 2012-2013, the Forestry Wing of the Climate Change Division, International Center for Integrated Mountain Development (ICIMOD) and Worldwide Fund for Nature - Pakistan (WWF-Pakistan) jointly implemented a project titled “REDD+ Preparedness Phase in Pakistan”. The project was funded by the One UN Joint Program on Environment and the UN-REDD Programme providing USD 200,000 and USD 57,500, respectively. The project had three objectives of (i) capacity building, (ii) development of a road map for preparing a national REDD+ strategy and (iii) developing a national REDD+ project proposal enabling the Climate Change Division to seek additional funding for the REDD+ processes. A series of consultative workshops were organized jointly in all provinces to identify the drivers of deforestation and forest degradation.

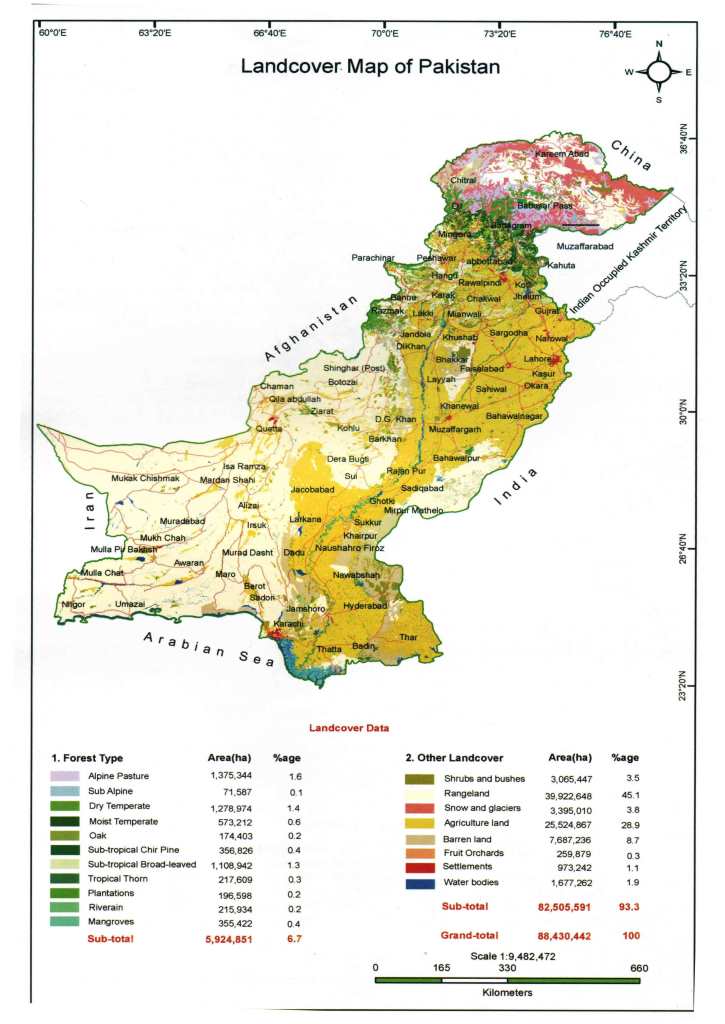
In 2013 and 2014, the UN-REDD Programme provided technical and financial support through a targeted support for the development of REDD+ Roadmap/Readiness Preparation Proposal (R-PP), the preparation of a National Forest Monitoring System (NFMS) Action Plan and capacity building in Satellite Land Monitoring System (SLMS) and Greenhouse Gas Inventory (GHG-I).

## The forestry sector

### Forested area

Due to its harsh climatic and divers ecological conditions, Pakistan is comparatively poor in vegetation cover and the forests are mostly limited to its northern parts, in the provinces of Khyber Pakhtunkhwa (KP), Gilgit Baltistan (GB) and Azad Jammu and Kashmir (AJK). Regarding Pakistan’s total forest area different figures have been quoted by different sources. According to Forestry Sector Master Plan (FSMP, 1992), Pakistan has 4.8% of its total land area under forests (with 95% natural forests and 5% plantations). Siddiqui (1996) puts the total forest area of Pakistan as 4.2% (with about 97% natural forests and 3% plantations). Bukhari et al (2012) have estimated the total area under forests as 5.1% (96% natural forests and 4% plantations). The latest ones are based on a GIS and RS study conducted by the PFI titled “Land Cover Atlas of Pakistan” (Figure 1.).

The forests of Pakistan are classified into various types, mainly based on climatic variations. These climatic variations support the growth of different tree species in different climatic regions and divide Pakistan into nine distinct ecological zones, that is, Littoral and Swamp Forests (mangroves), Arid Sub-Tropical Forests, Dry Sclerophylous and Dry Deciduous Forests, Tropical Thorn Forests, Sub-Tropical Pine Forests, Moist Temperate Forests, Dry Temperate Forests, Steppe Forests and Alpine Dry Steppe, Sub-Alpine Scrub and Alpine Meadows (Khan & Akbar, 2005). Most of these forests are naturally regenerated and almost 80% are located in the northern highland watersheds of Khyber Pakhtunkhwa, Gilgit Baltistan region and independent parts of Kashmir (i.e. Azad Jammu-o-Kashmir) The 20% remaining are planted forests, including irrigated plantation, farm plantation, linear plantation and road side and railway plantations and mangroves found in coastal areas of Karachi and Balochistan (FAO, 2010).



1. Land Cover Atlas of Pakistan (PFI, 2012)

From the tenure and legal point of view these forests can be divided into two main categories, i.e. state-owned forests and private forests. Regarding the state-owned forests, there are five legal sub-categories, i.e. State, Reserved, Protected, Un-classed and Resumed lands while the private forests have been sub-categorized as Guzara Forests, Communal Forests, Chos Act Areas and Farm Forests Areas (MoE 2005, WWF-P, 2007). The details are described below.

#### State-owned forests

* State Forests: A state forest is a forest that is administered or protected by some agency of a sovereign or federated state, or territory; These are in Balochistan and Azad Jammu and Kashmir;
* Reserved Forests: These are Public Forests, free of all rights except those admitted in the settlement process and recorded in revenue books;
* Protected Forests: These forests are open to all uses except those which may have been prohibited by special notification. In these forests people have customary rights and are entitled to 60% to 80% share;
* Un-classed Forests: Public forestlands under the control of the Forest Departments, which are neither Reserved Forests nor Protected Forests;
* Resumed Lands: Lands surrendered by larger owners following the fixing of a ceiling on the extent of land ownership under the Land Reforms Act of 1959. Concerned landowners retained cultivated lands but surrendered wooded lands in excess of the ceiling.

#### Private forests:

* Guzara (subsistence) Forests: Sizeable patches of wooded land close to habitation, which were set aside to meet the domestic needs of local communities. They were designated when government forests were reserved at the first land ownership settlement in Hazara, North West Frontier Province (NWFP), 1872. Ownership is vested in local people either individually, or communally as ‘village shamilat’;
* Communal Forests: Communal forests are a sub-category of Guzara Forests. However, communal forest is essentially owned by the entire village. Communal Forests are mostly found in the Rawalpindi Civil Division of Punjab Province;
* Chos Act Areas: Privately owned lands subject to erosion hazard endangering vital public installations or structures and taken over by the Government under the Chos Act, 1900. These areas may be returned to their original owners after stabilization;
* Farm Forest Areas: Farm Forests are linear or compact plantings of trees on private farmlands owned individually or by a family. Farm forest areas are found throughout the rain-fed (arid areas) and irrigated farming areas of Pakistan.

### Biodiversity

Due to its diverse landscape and ecological zones, Pakistan has rich and unique biodiversity. According to the Biodiversity Action Plan (1999), Pakistan has 174 species of mammals, 668 species of birds, over 177 species of reptiles, 198 species of freshwater fish, over 5,000 species of insects, about 5,721 species of plants and 191 species of plant parasitic nematodes.

As a result of a number of threats and issues such as loss of habitats due to deforestation, forest degradation, climate change and illegal hunting and poaching, declining trends have been noticed in populations of various species. According to the IUCN’s red data list six mammal species have gone extinct from Pakistan over the last 400 years. At present 72 species (37 mammals, 25 birds and 10 reptiles) are threatened in Pakistan (IUCN, 1999).

To overcome threats and issues regarding biodiversity conservation, the Government of Pakistan first developed the National Conservation Strategy in 1992, followed by the provincial conservation strategies. These strategies focused on examining state of Pakistan’s environment, assessment of development and economic issues and development of long-term programmes and targets. Furthermore the GoP developed the Biodiversity Action Plan (BAP) in 1999. The Pakistan BAP provides a brief assessment of the status and trend of the nation’s biodiversity, outlines strategic goals and objectives, and identifies actions that include coordination arrangements and implementation measures (IUCN, 1999). Moreover in KP, a provincial biodiversity strategy and action plan is currently being developed to support and facilitate implementation of UNCBD and Aichi targets.

### Forestry policy

The forest policies in Pakistan are being implemented through forest legislation (Hasan, 2008). However, most of the forest policies lack consistency in their implementation due to non-participatory approach, duplication of past authoritarian policies setting impractical and aggressive targets (Shahbaz et. al., 2006).

The current forest laws/acts are mostly out-dated (Javed, 2012) and lack modern management requirements of changed scenarios in forestry sector such as REDD+, Carbon Trade (CT), or resulting Access and Benefit Sharing Mechanism (Pakistan’s RPP, 2013), community participation, social institutionalization, research and planning, innovative technologies and programmed approach to address the forestry based livelihood demands without compromising the social and environmental integrity (Hussain, 2013; Asia Pacific Forestry Outlook, 2009).

Except for Forest Departments, forests monitoring and assessment is not a regular mandated function of any organization. There is no regular authority for the national forest cover assessment on regular basis. The institutional arrangements at federal level for forest inventories are only limited to the role of coordination and policy advise after the 18th amendment in constitution of Pakistan, in 2012.

Pakistan’s national forest policy developed in 2010 is still a draft waiting to be approved by the federal cabinet. Its aim is “to provide guidelines to the federal and provincial agencies for restoration, development, conservation and sustainable management of forests and allied natural resources to ensure sustainability of ecosystem functions, services and benefits for present and future generations of Pakistan.” Though the policy covers most of the aspects regarding REDD+, still it needs to elaborately mention revision and updating of various legal and intuitional instruments for future REDD+ mechanism.

Punjab and KP provinces have their approved provincial forest policies while the others have prepared drafts and are in the process of approval from their respective cabinets.

In KP the forests are managed under the KP Forest Ordinance 2002; in GB, Punjab, Sindh and Islamabad Capital Territory forests are managed under the Forest Act 1927; in Balochistan under the Balochistan Forest Regulation 1890 (amended in 1974) as well as the Forest Act 1927 while in AJK they are managed under the Jammu and Kashmir Forest Regulation 2 of 1930. In addition to these there are Provincial Wildlife Acts and Ordinances like Balochistan Wildlife Protection Act, 1974, Pakistan Environmental Protection Act, 1997. Except in the revised forest and wildlife acts, aspects related to climate change, REDD+, NFMS and other REDD+ requirements are not covered.

In addition to the forest policies and legal instruments, there are various strategies and action plans relevant to REDD+ such as National Conservation Strategy, National Sustainable Development Strategy (draft), Biodiversity Action Plan, Forestry Sector Master Plan and Pakistan Forest Program. These documents can provide useful information for the development and implementation of the NFMS.

Regarding forest resources management, mostly traditional forest working plans are being used except in KP and GB where revised and improved management plans have been developed but not implemented. The forest working plans are prepared according to the working plan code, which is out-dated and need revision (WWF-Pakistan, 2007). This presents a tremendous opportunity to revise the code for forest working/management plans and to include all REDD+ relevant aspects and requirements.

In addition to these, there are specialized forestry programs and projects such as watershed management, social forestry, farm forestry etc. The Government of KP has recently launched the Billion Tree Tsunami Afforestation Programme under its Green Growth Initiative in which the KP Forest Department also aims to assess the carbon stocks of the forest resources in the province.

In KP there are two sub-national level projects on REDD+ and carbon stock assessment being implemented by PFI and the KP Forest Department, respectively. Under these projects the PFI has so far developed carbon stock estimates for six forest types (Sub-alpine, dry temperate, moist temperate, sub-tropical Chir and sub-tropical thorn), biomass maps for four districts, forest cover change assessment for four districts and developed allometric equations for major tree species. Moreover the PFI has trained 100 forest field officers in carbon stock assessment.

A national definition of forest has been agreed during a national workshop on REDD+ in March 2012 to fulfil the UNFCCC requirement for REDD+. The definition adopted is “Forests are the areas which cover at least an area of 0.5 hectares, with at least 10% of tree cover and with trees not less than 2 meters high”. None of the above mentioned policies, legal instruments and strategies cover this definition to give it formal and legal recognition. Moreover the definition needs to be clarified keeping in view the national circumstances and technical capabilities (i.e. considering remote sensing capacities and operational monitoring system requirement) through national consensus and technical expert opinion. The status of forest plantations either to be included in national forest definition for REDD+ also needs clarification.

## Drivers of deforestation and forest degradation

Different studies have analysed the drivers of deforestation and forest degradation in Pakistan. A review of various studies is given below:

#### Pakistan Forest Program, 2007

WWF-Pakistan carried out a detailed process of consultation and situational analysis from July 2005 to June 2006 to develop the “Pakistan Forest Program”. The document was duly endorsed by the provincial forest departments and the OIGF, and was formally launched in 2008 by the Federal Minster for Environment.

The document gives a detailed account on forest cover losses and on drivers of deforestation and forest degradation. “During the last two decades Pakistan has lost 25% of its natural forests with an annual rate of forest land use change of almost 2%. The most affected and threatened forest ecosystems are Mangrove Forests, Coniferous Forests and Riverine Forests […]. This situation has resulted in rapid decline in Pakistan’s woody biomass at a rate of 4-6% per year” (WWF-P, 2007).

Major causes of forest depletion identified in this document are (WWF-P, 2007):

1. **Gaps in policy and legislation**: Forest policies are developed in isolation, setting unrealistic and over ambitious targets. Moreover there has been inconsistency in policies and their action plans.
2. **Weak forestry organisations and institutions**: At the federal level, the IGF office has limited role in the monitoring of forest policies implementation.
3. **Conventional timber-based management system**: Forest Management Plans still use the conventional approach, based on timber production. Concerns on community benefits, wider ecosystem services and biodiversity conservation are neglected under traditional management plans. Similarly, non-timber forest products, which are an important source of livelihood for some local communities, are also neglected.
4. **Unsustainable forest harvesting**: Due to influence of powerful timber dealers, premature revision of working plans is a common practice. Working plans prescriptions for tree marking and exploitation are not properly followed in the field. Moreover out-dated methods of timber cutting and conversion result in loss of wood and damage to the regeneration.
5. **Inconsistency and lack of reliable data on forest resources**: Information and statistics provided by the Forest Departments are not authentic and reliable. Moreover, a national level data compilation and dissemination is missing.
6. **Lack of support to promote forestry**: Except a few forestry and conservation projects, comprehensive support is lacking in the forestry sector for promotion of forestry.
7. **Limited forestry research and communication gap between research organisations and forest managers**: Forest research is carried out by the Pakistan Forest Institute (PFI), which lacks proper communication and feedback between researchers and forest managers. In the past the PFI used organize annual research review attended by representatives of the provincial forest departments and other relevant organisations. This practice has now been abandoned for a long time.

#### District Level Consultation Workshops for REDD+, 2013

Detailed assessment of the drivers of deforestation and forest degradation has been done in 2012-2013 through a consultative process under the project titled “Reducing Emissions from Deforestation and Forest Degradation (REDD+): Preparedness Phase in Pakistan". These drivers are also reflected in Pakistan’s R-PP document.

In total 14 direct and 22 indirect drivers were indicated and ranked by the participants (Table 1). The drivers have also been ranked according to a subjective scoring of 1-10 with 1 as least severe and 10 as the most severe driver (Khan et al, 2013; Pakistan’s R-PP, 2014).

1. Drivers of deforestation and forest degradation (Source: WWF Pakistan and ICIMOD, 2013)

|  |  |  |
| --- | --- | --- |
| **Forest type** | **Indirect drivers** | **Direct drivers** |
| Dry temperate | Scarcity of water, lack of funds, natural calamities, poverty, unemployment, political influence, nomads, lack of funds, lack of staff | Demand of fuel wood, fodder and timber, drought, grazing and browsing pressure |
| Moist temperate and Chir Pine Forests | Poverty, unemployment, population pressure, lack of alternatives, Unwise use of timber, Revenue based management, lack of awareness, Political influence, unplanned urbanization, lack of human and financial resources, legal constraints, lack of monitoring, Issues of land tenure, non-execution of management plans, weak execution of laws, law and order situation, shortage of energy, land tenure issues, urbanization, lack of alternatives | Demand for fodder, fuel wood and timber,  Conversion of forest land to agricultural land and infrastructure (roads and buildings).  Flood, landslides, forest fire, diseases, timber smuggling, overgrazing |
| Scrub | Poverty, unemployment, population pressure, lack of alternatives, lack of awareness, bad governance and policy making, political influence, Urbanization on forest lands | Demand for fuel wood, fodder and timber, conversion to agricultural land, forest fires especially during summer, land sliding and soil erosion, diseases and drought, leasing of mining sites within the forest area, over grazing, over exploitation by timber contractors |
| Riverine | Poverty, Political influence, population pressure, unemployment, scarcity of water (excessive taping of underground water), upstream barrages and dams leaving less water for downstream riverine forests, lack of facilities, lack of funds, lack of awareness, lack of research, lack of education, shortage of staff, lack of alternatives, natural hazards, bad law and order, misuse of forest land lease policy, grazing pressure by nomads | Demand for timber, fuel wood and fodder, charcoal making, overgrazing, diseases, forest fire, drought, lease, Illegal use of forest land for agriculture, agriculture expansion |
| Mangroves | Absence of rights of communities (mangroves are state own forests), increase in salinity, sea intrusion, sea pollution, lack of ownership, less regeneration activities, lack of fresh water flow, increase population (migration towards delta and coastal areas) | Demand for fuel wood, fodder, browsing and trampling especially by camels, algal growth, conversion of forests to agriculture land |

#### Report on CBNA for NFMS, 2014

Under the project titled “Preparation of Action Plan and Capacity Building for a National Forest Monitoring System (NFMS) for REDD+”, background studies, reviews and assessments were conducted in 2014 to assess the capacity needs of the federal and provincial forest administrations and other relevant organizations for developing and implementation of the National Forest Monitoring System in Pakistan.

The studies report gives an overview of the status of forests, deforestation and forest degradation in Pakistan. According to the CBNA report, “the ecological status of Pakistan’s natural forests has been deteriorating because of massive deforestation and degradation during the last few decades. These forests were destroyed at an alarming rate of 27,000 hectares per annum from 1990 to 2010, placing Pakistan at 2nd among the countries with highest deforestation rates in the world (FAO, 2010).

The alarming trends in the extent of Pakistan’s forests during the last two decades can be seen in the table 2.

1. Trends in extent of forests of Pakistan from 1990 to 2010

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Forest Area (1000 ha)** | | | | **Mean Annual Change Rate (1000 ha/year and %)** | | | | | |
|  | | | | 1990-2000 | | 2000-2005 | | 2005-2010 | |
| 1990 | 2000 | 2005 | 2010 | 1000 ha/year | % | 1000 ha/year | % | 1000 ha/year | % |
| 2527 | 2116 | 1902 | 1687 | -41000 ha | -1.36 | -43000 ha | -2.11 | -43000 ha | -2.37 |

Source: FAO Global Forest Resource Assessment 2010

## REDD+ policies and measures

To address the above mentioned drivers of deforestation and forest degradation Pakistan has planned to develop it’s REDD+ strategy containing formal actions. Readiness Preparation Proposal (R-PP) has been approved by the FCPF for USD 3.48 million, which contains various measures to be included in the REDD+ strategy. The table 3 presents the recommended policies and measures to address the drivers of deforestation and forest degradation. These activities will further be refined in the REDD+ strategy to be developed during the R-PP implementation.

1. Policies and measures to address drivers of deforestation and forest degradation

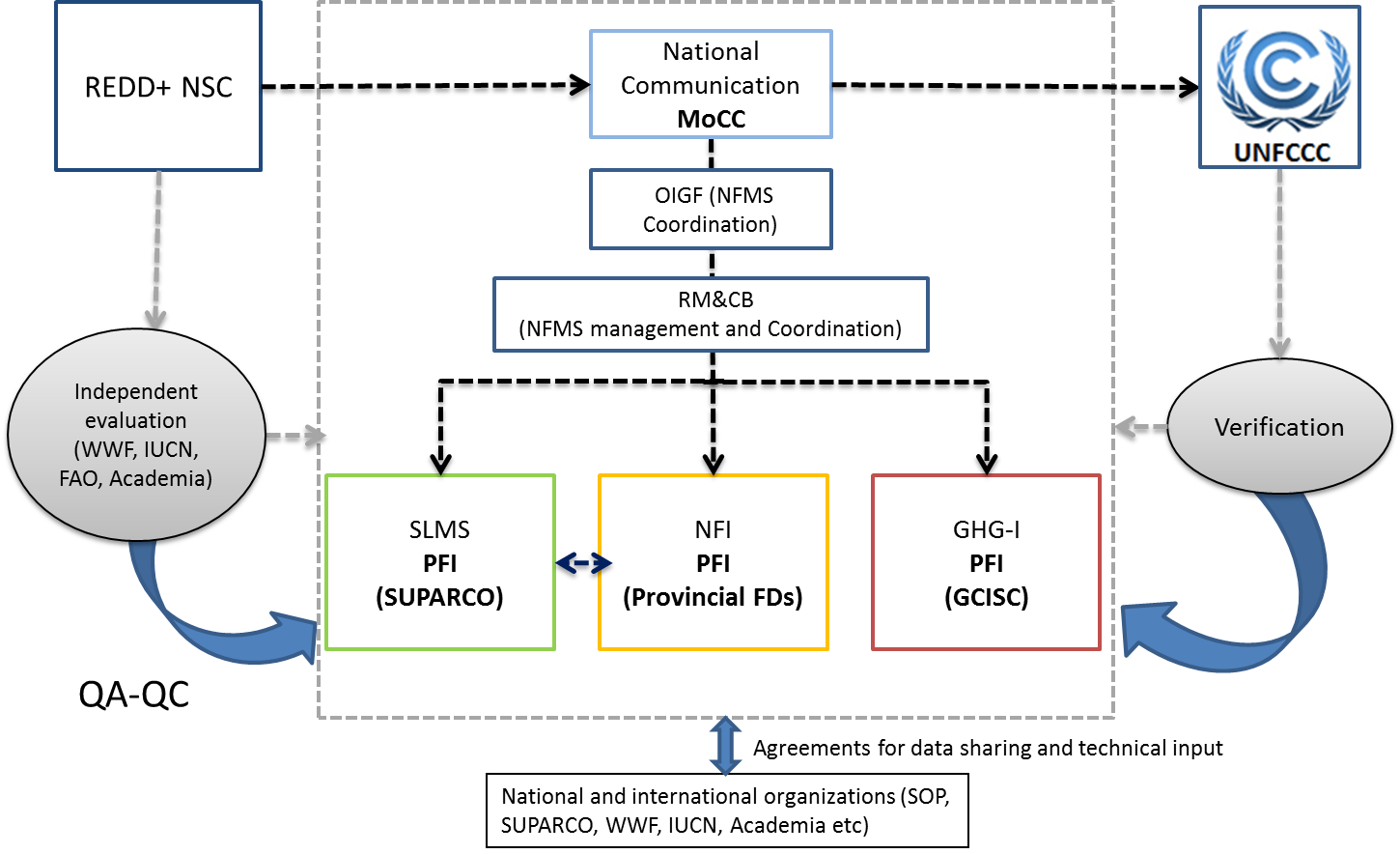
| **Drivers** | **Existing policies and measures** | **Proposed/planned policies and measures** |
| --- | --- | --- |
| Poverty and lack of livelihood activities | Integrated livelihoods and conservation projects both by the provincial governments and NGOs;  Projects by Pakistan Poverty Alleviation Fund (PPAF). | Develop alternative livelihoods for people dependent on forest resources to supplement their income;  Implement activities with the involvement of local communities. |
| Population pressure & intensification of agriculture, extension of housing colonies, settlements and industries | Environmental Impact Assessments (EIAs) and Strategic Environmental Impacts Assessment (SEIAs) of projects under the Environment Protection Act.;  Revised Wildlife and Forest acts in some provinces banning conversion of forest land to other land uses. | Update and harmonize forest and forest-related policies, and ensure synchronization and coordination between sector development policies, such as agriculture and energy policies;  Capacity building of field forestry officers, other law enforcement officers and the judiciary to strengthen forest law enforcement and coordination;  Develop land use plans and alternative housing programmes and other development work according to these plans;  Relevant agencies coordinate development of an optimum forest land zoning system that excludes forests of high conservation value from forest areas for tourism development;  Develop forest certification and chain of custody standards. |
| |  |  | | --- | --- | | Pests and diseases |  | | Studies and research on pest and disease control by PFI only (but not adopted by forest managers). | Conduct research and implement programmes to control forest pests and diseases on regular basis. |
| Migrations | Plantation programs for Afghan Refugees in the past;  Currently a UNDP project on rehabilitation of affected areas by Afghan Refugees. “Refugees Affected and Hosting Areas Program (RAHA). | Study reasons of migration and initiate programme to contain drivers of migration |
| Construction of roads and other physical infrastructure | / | Land use planning, Social & Environmental Impact Assessment (SEIA). |
| Mining | / | Land use planning, SEIA, Land zoning. |
| Lack of proper harvesting and transportation techniques in mountainous areas | Ban on commercial harvesting of green trees;  Projects on NWFPs especially medicinal plants and pine nuts by WWF-Pakistan, USAID and others in KP and Balochistan. | Capacity building and trainings on improved harvesting techniques and marketing of wood and non-wood forest products. |
| Climate change | Approved national Climate Change policy | Assessment of Climate change;  Climate change awareness programs;  Climate change adaptation and mitigation measures. |
| Illegal logging mostly for firewood, fodder and timber | Protection and controlling measures by the provincial forest departments;  Forest staff declared as a force under the revised acts in KP. | Law enforcement;  Improve aerial surveillance using GIS & RS;  Develop forest certification and chain of custody standards;  Income generation activities implementation. |
| Lack of land use planning | Village land use planning introduced under the social forestry project in KP. But not replicated to other districts;  In AJK a land use planning department is working with GIS facilities and has the mandate to develop land use plans. | Provincial, district and local level land use planning ;  Introduce the village land use planning model of the social forestry project at village level. |
| Land sliding and erosion | Plantations, slope stabilization projects (KP and AJK). | Bioengineering in collaboration with local communities;  Integrated slope stabilization. |
| Salinity and water-logging | Sustainable Land Management Project (SLMP) by UNDP and MoCC. | Launch programmes to control salinity and water-logging with the involvement of local communities (CBOs of both male and female) |
| Droughts and floods | Glacial Lake Outburst Floods (GLOF) project by UNDP in KP and GB;  Slopes and streams stabilization projects in KP and AJK. | Early warning System, Monsoon preparation, Plantation, Water resource management. |
| Overgrazing and livestock pressure | National Rangelands Policy 2010 (draft) | Controlled grazing practices, Grazing management plans,  Capacity building of both male and female |
| Forest fires | Projects on forest fires control by Punjab Forest Department and Capital Development Authority | Develop management plans  Capacity building |
| Invasive species | / | Promote indigenous species through incentives and capacity building |

## NFMS development

### Institutional arrangements

A sustainable institutional framework is crucial to implement the NFMS effectively and to ensure that the specific monitoring project will contribute to the national forest management plans and to the accomplishment of Pakistan’s long term strategic objectives. The establishment of a clear and well-recognized institutional framework is also mandatory to ensure the sustainability of the NFMS.

In order to develop clarity on the institutional arrangements, the NFMS Working Group had elaborate discussions during its meetings and separate focused meetings were held with the representatives of the provincial FDs, Secretary Environment KP, IGF and officials from the PFI and the capacities of potential institutions were assessed ([Annex IV](#_Annexe_II-M._Checklist)). As a result a broad institutional framework was agreed in principle with PFI having the lead role to implement the NFMS AP. Each unit shown in the figure 2 below (i.e. the monitoring unit, NFI, SLMS and GHG-I) will develop their further structures and arrangements for their functioning.



1. Institutional arrangements for implementing the NFMS in Pakistan

The **Federal Ministry of Climate Change (MoCC)**: The MoCC being responsible for the national communication on climate change will have the role as a National Communication Agency on REDD+ as well.

The **National Steering Committee on REDD+ (NSC REDD+)**: The NSC is already established and represented by all the provincial secretaries of forests/environment, OIGF, relevant NGOs and academia. The NSC is headed by the Federal Secretary Climate Change. The NSC being responsible for the overall decision on REDD+ will also make the overall decisions about the NFMS related issues.

The **Office of the Inspector General of Forests (OIGF, MoCC)**: The OIGF is the focal point for REDD+ and will be responsible for overall coordination and communication regarding NFMS. A **REDD Management and Coordination Board** (RM&CB) with representatives from all provinces (FDs and other associated government and non-government organizations), territories and MoCC with rotating chair from provincial forest departments including territories i.e. AJK, GB and FATA will be established as an additional body. The OIGF will act as a secretariat of the RM&CB with REDD coordinator as its secretary. The RM&CB will ensure effective coordination among the federal and provincial level institutions and organizations and will make decisions regarding implementation of NFMS.

The **Pakistan Forest Institute (PFI)**: The PFI, though controlled administratively by the Khyber Pakhtunkhwa Forestry, Wildlife and Environment Department, has the national mandate for forest education and research. As mentioned in the CBNA report, 2014, the PFI has a comparative advantage over other institutions to be the national focal institution for the Satellite Land Monitoring System (SLMS), the National Forest Inventory (NFI) and the Greenhouse Gas Inventory (GHG-I). For these different tasks, PFI will be supported by the provincial forest departments for the NFI, Space and Upper Atmosphere Research Commission (SUPARCO) for SLMS and Global Change Impact Studies Centre (GCISC) for GHG-I.

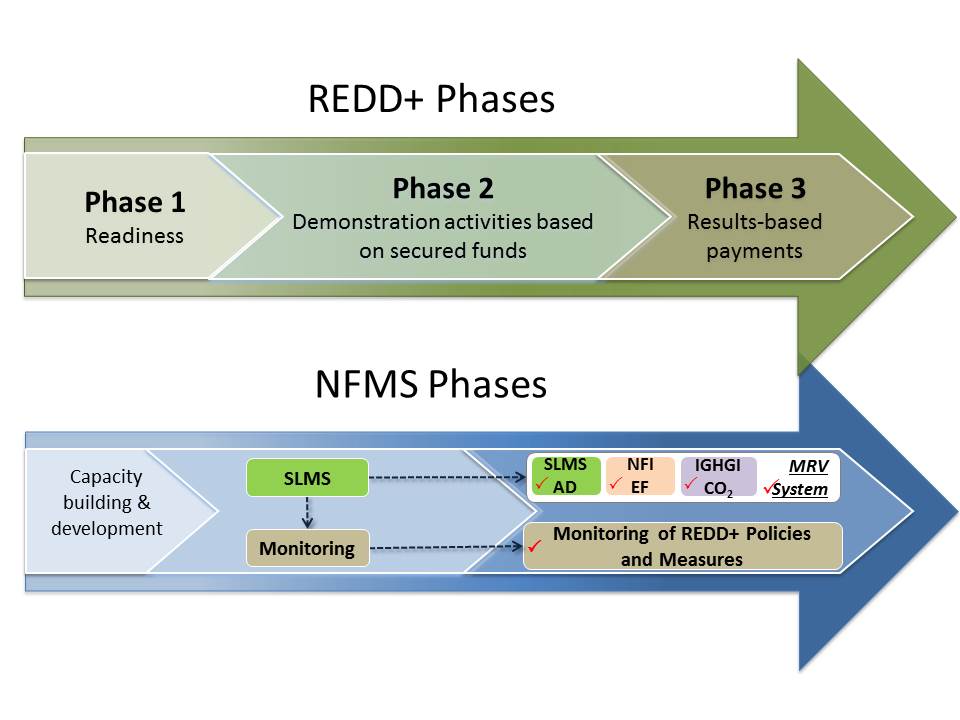
The **Provincial Forest Departments (Provincial FDs)**: These include Forest Departments in all provinces including Gilgit Baltistan and Azad Jammu & Kashmir. As NFI requires a lot of field surveys, data collection and verifications will mainly be done by the FDs in their respective provinces. FDs will then supply their data/reports to PFI for national level compilation, analysis and preparation of consolidated reports. The forest departments will establish the provincial REDD Steering Committees and REDD cells with secretariats in respective Forest Departments planning units.

**National and international organizations** (SUPARCO, SOP, WWF, IUCN, FAO, etc.): It is important to establish arrangements (formal or informal) with different national and international organizations to benefit from the experiences and data available with them for development of the NFMS. In this regard, national and international organizations that owned GHG-related data (e.g. satellite data, maps, forest inventory data, activity data, emission factors, allometric equations, etc.) will be solicited to develop clear agreements to share their available data with PFI, OIGF and other concerned institutions for the NFMS.

**Independent non-government organizations** (WWF-P, IUCN, Universities and research centers, etc.): These organizations will evaluate different aspects of the NFMS according to their respective strengths. They will conduct independent internal evaluation of the process, tools, methods and results of the NFMS. More epically and through appropriate contracts, they will be in charge of the Quality Assessment (QA) and Quality Control (QC) of the data, analysis and reports produced, before the submission of national communications to UNFCCC.

### NFMS development phases

As illustrated in the figure 3, Pakistan will follow the phased approach proposed by the UNFCCC for the implementation of the REDD+ and the development of the NFMS. At present Pakistan is going through the readiness phase. During 2012-13 R-PP document was developed and approved for funding. The NFMS AP will be implemented as part of the R-PP project.



1. NFMS development phases

Phase1 - Readiness

This phase includes necessary planning and preparations for developing the NFMS during the first two years of the NFMS AP. This includes (but not limited to):

* Identification and selection of suitable methods, tools and techniques according to the UNFCCC and IPCC guidelines;
* Synchronization and adjustment of these methods, tools and techniques according to the existing ones;
* Capacity building and technology transfer regarding recommended/selected methods, tools and techniques for the NFMS;
* Defining policies, legal measures and institutional arrangements for the implementation of the NFMS.

Phase 2 - Results-based demonstration activities (piloting phase)

During this phase the monitoring methods, tools and techniques identified and selected during phase 1 will be tested in the REDD+ pilot sites, most probably at the provincial level. The monitoring function will also provide information on land use and land use changes in areas where demonstration activities are implemented and allow the SLMS to be tested and refined before full national level implementation. This phase will also include capacity building to prepare for phase 3. Phase-2 will be completed during year 2 and 3 of the NFMS AP.

Phase 3 - Extension of NFMS to national level

During this phase tested methods, tools and structures will be finalized and extended to monitor the REDD + activities at national level i.e. throughout the whole country to assess whether national policies and measures are results-based. Like previous phases capacity building will also be going to keep the respective professionals ready for the coming assignments. This phase will be implemented during the year-3 and 4 of the NFMS AP.

### Funding

The total estimated cost of the NFMS AP implementation is US$ 4.089 million out of which 0.183 million are for the institutional arrangements, 1.266 million are for the SLMS, 1.703 million are for the NFI, 0.464 million are for the GHG-I and 0.474 million are for the monitoring function of the NFMS. Out of these a total of US$ 0.606 million have been budget under the R-PP document funded by the World Bank FCPF and other donors. For the remaining US$ 3.483 million following sources will be explored;

1. Funding from the federal government’s developmental budget;
2. Funding from the provincial developmental budget;
3. In kind contribution in terms of office rents, staff salaries and vehicles etc.
4. International donor agencies such as GCF, GEF etc.

As suggested under various activities a national consultant will be engaged to assess various sources of funding and then develop a strategy to raise sufficient resources for the implementation of the NFMS AP as well as its future sustainability.

# CAPACITY ASSESSMENT

This chapter presents the capacity assessment that has been done at national and provincial level for the implementation of (i) a Satellite Land Monitoring System (SLMS), (ii) a National Forest Inventory (NFI), (iii) a Greenhouse Gas Inventory (GHGI) and (iv) a monitoring function of the NFMS.

For each of the NFMS pillars, this section presents the available data as well as the available technical, human and hardware capabilities to implement the NFMS. Secondly, the section presents the gaps and the resources needed to implement the NFMS of Pakistan in a sustainable way.

In order to ensure that the NFMS builds on existing systems and capacities and brings together all relevant stakeholders, meetings with all relevant stakeholders were conducted at provincial and national levels. A targeted group, including federal (PFI) and provincial organizations (forest, wildlife, environment, planning), forestry/GIS&RS experts and researchers, gathered information for all possible sources.

The process of Capacity Building Needs Assessment (CBNA) included the following steps:

1. Desk Review

A desk review of available literature was conducted to assess the information regarding capacity gaps/issues in NFMS for REDD+ at national, provincial and local levels.

1. Development of Questionnaire

Based on the quick review of above mentioned documents, a questionnaire ([Annex-V](#_Annex_V._Checklist)) was developed to assess the existing capacities, gaps and needs of the relevant government institutions to implement the NFMS. The questionnaire was shared with the OIGF and NFMS working group for feedback.

1. Consultative Meetings

After finalizing the questionnaire, provincial consultative meetings were held from 18th August to 2nd September 2014. For this, a list of relevant government institutions and experts was prepared with the help of WWF-Pakistan’s REDD+ working team and the OIGF. The consultation process helped significantly to generate insights into the realities and needs in capacity building on NFMS for REDD+.

1. Qualitative Assessment Based on UN-REDD Template

The capacity gaps were identified by summarizing different performance indicators for different assessment categories. These assessment categories were taken from the guiding criteria for components and elements of capacity assessment provided in UN-REDD NFMS Action Plan Template, 2013. For qualitative capacity assessment, a simple approach has been used as following: *1* - *Low capacity* (expertise, systems and tools in the country do not exist and/or are not well developed or used regularly), *2* - *Average capacity* (Human and/or technical capacity exists but does not correspond to the real needs for an NFMS and an update and/or enhancement of the existing capacities is required), *3* - *Advanced capacity* (adequate capacity is available and can be used with minimal updating and/or additional work).

## MRV function

### Satellite Land Monitoring System

#### Overview

There is no existing Satellite Land Monitoring System in Pakistan. Remote Sensing Survey at national level was conducted for the first time in Pakistan with the development of Forestry Sector Master Plan (FSMP) in 1992. Forest cover maps of Pakistan were developed at a scale of 1:250,000 using 30m and 80m resolution Landsat Images.

The FSMP was followed by few national and some micro-level studies including National Forest and Range Land Resource Assessment Study (NFRRAS) in 2004 and District Wise Forest Cover Assessment of Pakistan by PFI in 2013.

Beside the national studies, there are several Land Cover/Land Use mapping/carbon stock assessment and change analysis conducted by different government and non-government organizations (SUPARCO, ICIMOD, WWF, IUCN) and researchers (Nizami, 2010). Most of the studies have been conducted at micro level, covering a valley, wetland, protected area or any other small area of interest (District and sub-district).

PFI is considered to be the most capable institution at government level to conduct the SLMS with support of SUPARCO ([Annex IV](#_Annexe_II-M._Checklist)). Recently the PFI has published the Forest Atlas for Pakistan, which is a GIS-based forest cover assessment using on screen digitization method (Figure 1).

For the land use/forest cover mapping, different approaches and methods have been used and there are differences in forest classification between studies. This is mainly due to the lack of national definition of forest, no systematic approaches and methods making the data non consistent, non comparable and unreliable for international reporting. A detailed description is summarized in the [Annex I-A](#_Annex_I-A._Satellite-based).

#### Data availability

Satellite based forest inventory has been conducted in Pakistan for the last two decades. The data that is currently in use by a few government institutions include medium to high resolution satellite images (30m-0.5m), topographic sheets (1:250,000; 1:50,000), aerial photographs and land use/forest cover maps developed by various departments. Assessment of data availability at PFI and SUPARCO is highlighted in [Annex IV](#_Annex_IV._).

Most of the land use/forest cover maps have been developed using medium resolution satellite images at regional/provincial/district level with a few high resolution images at local level. The temporal window of the images varies from 1972 to 2014 in case of Landsat and 2006 to 2014 in case of high resolution imagery.

There is no proper archiving system and the data is scattered, inconsistent and incomplete among the provincial forest departments. So far, the studies and inventories conducted in the country by different organizations are not harmonized in terms of use of forest definition, land use classification scheme, methodology, interpretation procedures and final results. The existing capacities of provincial forest departments regarding data availability and accessibility for SLMS for REDD+ are highlighted in [Annex II-A.](#_Annexe_II-A.Existing_capacities)

#### Hardware capabilities

The capabilities (equipment and logistics) for SLMS are not well developed. However, several measures are being taken both at federal and provincial levels to comply with the requirements of a NFMS for REDD+ ([Annex IV](#_Annex_IV._)).

The capabilities for remote sensing and associated tools (high definition computer machines, high speed internet connection, licensed software, web hosting service, web domain, high accuracy handled GPS system, field equipment for ground truthing, etc.) partially exist within the forest departments of some of the provinces. The provincial departments have GIS laboratories being funded by different projects, but the annual budgets of the forest departments (except GB and KPK) do not incorporate the cost of the satellite images. Once the project is over, the effective use of the equipment and man power cannot be sustained due to lack of funds.

Globally, latest software and equipment are available with only few organizations and departments due to the expensive licenses. The existing provincial capacities and identified gaps regarding technical capabilities related to SLMS are highlighted in [Annex II-B](#_Annex_II-A.Existing_capacities).

#### Human capacity

##### Processing and Analysing Information

Current human capacities within the forest departments for analysis of satellite imagery, forestry information management and socio-economic analysis are partially available but none of these is specific to the development of a SLMS (see [Annex IV](#_Annex_IV._)).

At provincial level, human capacity with the knowledge and understanding of IPCC guidance and REDD+ relevant national and international negotiations and decisions is very limited. The expertise and human resources on accessing, processing and interpretation of multi-data remote sensing imagery for forest changes (GIS/RS experts), dealing with technical challenges of image interpretation (cloud cover, geo referencing, missing data, topographic and elevation factors etc.) are either scarce or unavailable within the forest departments. However, the expertise to use GPS for ground truthing is adequate.

At government level, the institutional capacities to conduct such studies are only limited to PFI and SUPARCO.

The existing provincial human capacity and gaps to process and analyze information related to SLMS is given in [Annex II-C](#_Annex_II-C.Existing_provincial).

##### Preparation of Reports

The capacities for preparation of reports from SLMS are also limited and available only with the organizations that have been involved in similar inventories such as by SUPARCO and PFI ([Annex IV](#_Annex_IV._Capacity)). The Provincial forest departments lack such expertise. The existing provincial capacities and gaps identified regarding capacity for preparation of reports from SLMS is also highlighted in [Annex II-D](#_Annex_II-D.Existing_provincial).

##### Capabilities related to Data Verification

Capabilities related to data verification are also limited. There is no mechanism for public or any other expert review and feedback. Most of the provinces, except few (i.e. GB, KP and Punjab) have no expertise on the application of statistical methods to quantify and analyze uncertainties for all relevant information (i.e. area change, change in carbon stocks, etc.). The exiting national and provincial capabilities and identified gaps regarding data verification is highlighted in [Annex IV](#_Annex_IV._) and [ANNEX II-E](#_Annex_II-E.Exiting_provincial).

#### Training facilities

There are very few short term/on job or long term training courses available in PFI for the capacity enhancements of professionals working in the field of RS/GIS. Training to the right persons is an issue so far (Proceedings of NFMS Consultative Workshop, 2014).

Recently three officials from Gilgit-Baltistan, AJK and Baluchistan have been trained on Brazilian SLMS (i.e. Terra Amazon) through FAO’s financial support.

The existing provincial capacities and identified gaps regarding training facilities on SLMS are highlighted in [ANNEX II-F](#_Annex_II-F.Existing_provincial).

#### On-going projects

There are few on-going projects related to the Satellite Forest Monitoring system at provincial level such as RS/GIS-based mapping of major forests of Punjab for REDD+ Readiness. PFI is currently working on *Carbon Stock Assessment of Forests of KP.* However*,* Federal Ministry dealing with the forest itself is not involved in any national level SLMS activity.

SUPARCO is working on the hierarchical classification of land cover of Pakistan (i.e. Land Cover Classification System (LCCS)), using high-resolution SPOT imagery of 5m. There are 13 classes which could be expanded to 37 sub-classes. Classification of Sindh and Punjab has been completed and published and are available online (<http://www.glcn.org/activities/pak_lc_en.jsp>). In addition, SUPARCO is also working in collaboration with PFI in a pilot project of Carbon stock assessment of District Mansehra.

WWF-Pakistan has conducted micro level studies on GIS/RS based forest cover monitoring and developed forest cover maps for 52 districts. WWF-Pakistan has also conducted forest cover change assessment for KP, GB and Federally Administered Tribal Areas (FATA) on 10 years interval.

#### Gap analysis

1. Existing and needed data for the SLMS

| **Activities** | **Existing data** | **Needed data** |
| --- | --- | --- |
| Deforestation/Afforestation/  Reforestation | Landsat (1972 to 2014; whole country);  SPOT, Quickbird, Pleiades (2006-2014, few provinces to selected project sites); [Annex IV](#_Annex_IV._) | High resolution satellite images for the verification and validation of results and for the monitoring of hotspots of deforestation;  The data need to be centralized |
| Forest degradation/Sustainable forest management/Enhancement of forest carbon stocks | Landsat (1972 to 2014; whole country)  SPOT, Quickbird, Pleiades (2006-2014, few provinces to selected project sites); [Annex IV](#_Annex_IV._), | High resolution images (SPOT, Quickbird, IKONOS, GeoEye, etc.) of demonstration plots and areas for future monitoring;  Field data to assess different levels of degradation;  The data needs to be centralized |

1. Existing and needed equipment for the SLMS

| **Activities** | **Existing equipment** | **Needed equipment** |
| --- | --- | --- |
| All | Following equipment is available in some of the provinces: Computers, Licensed image processing software, Single frequency Global Positioning System (GPS), Differential GPS (DGPS) and total stations;  Space for lab also available | Web hosting, Servers, Data management/archive system, high definition computer machine, Single frequency GPS, DGPS and total stations, Drones with high definition cameras for monitoring of forest activities, equipment for Fixed Point Photography monitoring, plotters, scanners, Softwares (Open source for image processing as well as licensed software);  See [Annex VI](#_Annex_VI._Needed) |

1. Existing and needed skills/trainings for the SLMS

| **Activities** | **Existing skills** | **Needed trainings** |
| --- | --- | --- |
| Deforestation/Afforestation/  Reforestation | Very limited;  Basics in RS/GIS | Training on dealing with technical challenges of image interpretation (cloud cover, geo referencing, missing data, atmospheric corrections, topographic and elevation factors, etc.), land cover/land use mapping, spatial and temporal analysis, land use monitoring tools (See [Activity 1.3](#_Activity_1.3:_Train)) |
| Forest degradation/Sustainable forest management/Enhancement of forest carbon stocks | Very limited;  Basics in RS/GIS | As above and methodology to assess forest degradation (See [Activity 1.3](#_Activity_1.3:_Train)) |

### National Forest Inventory

#### Overview

Forest inventories have been carried out in Pakistan since 1948 for designated forests. They are mainly done on the basis of compartments² allotted to specific working circles³ (FAO, 2007).

The forests departments in the respective provinces conduct continuous forest inventories of state and private forests having commercial value, in various forest types, for preparation of forest working schemes⁴ and forest working plans⁵. These inventories are aimed at estimation of growing stocks in the existing forests and projecting these stocks for the coming years for economic purposes. The sampling design most commonly used in these inventories is systematic random sampling with different sampling intensities varying among provinces.

#### Data availability

As forest management has been a provincial subject in Pakistan, forest inventory has never been carried out at national scale in the country. However, provincial forest administrations conduct forest inventories in the provinces mostly confined to state owned forest areas. Moreover, these inventories are aimed at estimating timber in the forests and thus focused on commercially important forest areas. Information is often limited to specific diameter classes of interest and to the following variables: DBH, tree height, tree volume and forest density (number of trees per diameter class).

The forest inventory information is collected and reported in the form of working schemes and working plans, which are prepared every ten or more years depending on the availability of funds (FAO, 2007). Most of the data is available in paper format (i.e. working plans and/or working schemes) except for few provinces that have digital formats. Unfortunately, the working plans are not being updated and Forest Departments have limited capacity and facilities to undertake forest monitoring on regular basis.

Carbon based forest inventories have never been carried out (except for few academic research studies at micro level). However, local volume tables have generally been developed for each species. Allometric equations and biomass expansion factors have not been developed in the country. However, Standard and local volume tables have been developed for almost all tree species by PFI. Similarly basic wood densities of different forest tree species have been determined by PFI which can be used in biomass estimation.

Projects are underway in Khyber Pakhtunkhwa and Gilgit Baltistan provinces to collect data on carbon stocks and develop local allomteric equations.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

²A permanent, geographically recognizable unit of forest land forming the basis of prescription and permanent record of all forest operations.

³One or more parts of a working plan area, not necessarily adjoining, having the same objectives, silvicultural system and prescriptions (FAO definition, <http://www.fao.org/docrep/w8212e/w8212e07.htm>).

⁴A Working Scheme is a document which specifies scientific measures for management of a forest on short term basis (Gilgit Private Forest Regulation, 1970).

⁵A Working Plan is a document which specifies scientific measures for management of a forest on long term basis (Gilgit Private Forest Regulation, 1970).

#### Hardware capabilities

The capacity regarding technical equipment and logistics to carry out forest inventories varies among the provinces. Logistically KP and GB have improved capacity as compared to other provinces.

Equipment for forest carbon inventories is very limited or missing, both at national and provincial levels. Though, the conventional equipment (wooden calipers, diameter measuring tapes, GPS, ranging rods, clinometers prism, etc.) are available in some provinces. Modern equipment (i.e. High Accuracy Handled GPS, Vertex, Relascope, Densiometers, Digital Callipers, etc.) are not available in the forest departments.

#### Human capacity

Human capacity for NFI at national and provincial level is inadequate. PFI has few professionals who have the requisite skills for conducting NFI but it is not sufficient to effectively implement a complete forest inventory in all provinces. Same is the case with provincial forest departments who will be responsible for data collection for NFI. The capacity for data analysis and reporting as per IPCC guidelines is also limited. Thus there is a need to provide additional human resources for NFI both to PFI as well as provinces and properly train them for effective implementation of NFMS.

The internal verification (Quality Control) of the forest inventory data follows a hierarchical order by the authorities of the respective forest departments. The final approval of the working plan/working scheme is given by the Secretary to the Government, with the recommendation of Chief Conservator of Forests. The Conservator Forest Working plan Division also verifies the field inventory data through random cross-checking of field sampled plots before his approval. There exists no mechanism for public or any other expert review and feedback. However, for NFI there is a need to evolve a mechanism for incorporating the public feedback and subsequent improvement with passage of time.

#### Training facilities

A lack of technical capacity within government agencies, in terms of quality and quantity, and a tendency for short-term planning constrain the implementation of forestry inventories. Keeping in view these constrains, the Pakistan Forest Institute (PFI), located in Peshawar, was established in 1964 for forestry research, training and education in the country with a mission to improve the quality of life through providing support of effective research and trained manpower for scientific management of forests, rangelands, wildlife, watersheds, environment protection, and biodiversity conservation in Pakistan. Moreover there are forestry schools for capacity building of lower carrier field staff in some of the provinces. There are some other academic institutions offering forestry education in the country (i.e. University of Arid Agriculture Rawalpindi, University of Agriculture Faisalabad and Shaheed Benazir Bhtto University Shiringal). The training facilities for forest inventories in some provincial forest departments (i.e. KPK, Punjab, AJK) are quite satisfactory.

#### On-going projects

The ongoing projects related to forest inventories and carbon stocks assessments are listed in table 7.

1. Ongoing NFI-related projects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Province** | **Project** | **Duration** | **Budget (PKR)** | **Implementing**  **Organization** | **Donor Agency** |
| GB | REDD+ Readiness Preparation in GB | 2013-2015 | 30 million | GB FD | Government of GB |
| Revised Working Plan for Private Forests of Diamer District | 2015-2016 | 10.5 million | GB FD | Government of GB |
| KPK | “Billion Tree Tsunami Afforestation Project in KPK” | 2014-2018 | 12 billion | KPK FD | Government of KPK |
| “Development of Designated Forest Carbon Stock Assessment for REDD+ and Promotion of Carbon Credit Marketing in KPK” | 2013-2015 | 40 million | KPK FD | Government of KPK |
| Carbon Stock Assessment of forests of KPK | 2013-2015 | 25.8 million | PFI | Government of KPK |
| AJK | Preparation of Scientific Forest Management Plans in AJK | 2009-2015 | 176 million | AJK FD | Government of AJK |
| Punjab | Satellite GIS Based Mapping of Major Forests of Punjab for REDD+ Readiness | 36 months (2013-14 to 2015-16) | 84.930 million | Punjab FD | Government of Punjab |

#### Gap analysis

1. Existing and needed data for the NFI

| **Data type** | **Existing data** | **Observations** | **Needed data/improvements** |
| --- | --- | --- | --- |
| **Forest stratification** | National Forest and Land Use Maps. Generally the country forests are divided into 8 strata based on climatic (rainfall, temperature, etc.) variation. However, the provinces have further stratified their forests according to local climatic conditions, forest types and management practices. | The existing data do not follow IPCC guidelines regarding “Consistent Representation of Land”. | The existing data need to be improved and integrated with IPCC guidelines on “Consistent Representation of Land”. |
| **Deforestation and forest degradation** | Data of the drivers of Deforestation and forest degradation have been identified both at provincial and national levels.  Data on harvested wood products and NTFPs is available. | The estimates of deforestation and forest degradation vary in different studies.  Accurate data on drivers (i.e. grazing, firewood collection, natural disasters etc) is not available.  Baselines scenarios (e.g. FREL/FRL) are missing to monitor deforestation trends. | Improvements are required to assess annual deforestation and forest degradation rates.  Data on drivers are needed.  Baseline scenarios need to be established both at national and provincial levels to monitor deforestation and forest degradation trends. |
| **Forest inventories** | The information is limited to specific diameter classes of interest.  The information is limited to DBH, tree height, tree volume and forest area density based on number of trees of different diameter classes [(Annex III-A).](#_Annex_III-A._Existing) | Data on carbon pools are not available. | The current conventional forest inventories need to be improved to allow carbon stocks assessment. |
| **Above ground biomass** | Not available | / | Methodology and data needed |
| **Below ground biomass** | Not available | / | Methodology and data needed |
| **Dead wood** | Not available | / | Methodology and data needed |
| **Soil organic carbon** | Not available | / | Methodology and data needed |
| **Litter** | Not available | / | Methodology and data needed |
| **Species list** | Available in working plans | The species lists are available only for the specific forest areas covered under working plans. | Species lists need to be developed at Provincial and national level for all forest types in the country. |
| **Species density** | Partially available | / | The current conventional forest inventories need to be improved to identification and counting of all species. |
| **Allometric equations** | Not available | Allometirc equations are not available for any forest type or species. | Allometirc equations and BCEFs need to be developed for each forest type and species. |
| **Wildlife and NTFP** | Available | The information on Wildlife and NTFPs is scattered. | The information need to be collected and validated through a consultative process. A list of NTFPs need to developed for each forest type at provincial and national levels. |
| **Socioeconomic** | Available in working plans and reports | The data is scattered | The data need to be consolidated. |
| **Accessibility** | Available | The information is limited to specific forest areas covered under working plans | The information need to be improved and consolidated for all the forest types both at provincial and national level |
| **Topography** | Available | High resolution DEMs are not available | High resolution DEMs need to be developed for all the forest types both at provincial and national level. |
| **Administrative boundaries** | Available | / | / |
| **Climatic** | Available | / | / |
| **Soil map** | Not available | / | The information is available with other relevant organizations nut need to collected and consolidated through data sharing agreements. |
| **Demography** | Available | Information available is outdated. | Data need to be updated. |

1. Existing and needed equipment for the NFI

| **Activity** | **Existing equipment** | **Needed equipment** |
| --- | --- | --- |
| Field Survey for Forest Inventory | At national level PFI has the core responsibility to train and compile the NFI data from the provinces. The Equipment and logistics in PFI are limited to training purposes only. The existing equipment available with the provincial forest departments and PFI is given in [Annex III-B](#_Annex_III-B._Existing) and [Annex IV](#_Annex_IV._). | Equipment needed at national and provincial level is listed in [Annex VII](#_Annex_VII.Needed_equipment) |

1. Existing skills and needed trainings for the NFI

| **Existing skills** | **Needed trainings** |
| --- | --- |
| At national level, PFI is the leading research, education and training institution that offers field oriented bachelor and master’s degree in forestry discipline and conducts research in various disciplines of forestry. Almost all the forestry professionals in the country are graduates of PFI. PFI has also established field stations in various ecological zones of the country. However, existing capacities and resources are limited.  The expertise currently available in PFI are Forest Mensurationist, Silviculturist, Forest Botanist, Forest Economist, Forest Statistician, Forest Biologist, Forest Taxonomists, Forestry Researchers, Forest Engineer, Forest Ecologist, Forest Products Specialists, GIS/RS Technicians, Forest Rangers, Field Assistants.  At provincial level the existing skills are limited to conventional forest inventories being carried out for commercial purposes. | Inventory design and field sampling techniques for forest carbon inventory;  Plot design, configuration and data collection from carbon pools;  Use of latest equipment (i.e. vertex, densitometer, high accuracy handled GPS);  Transforming field data into standardised reporting tables;  Identifying and reducing data uncertainties and error propagation;  Statistical procedures to give accurate estimates;  GIS/RS techniques;  Forest growth Modelling;  Carbon fluxes modelling. |

### Greenhouse Gas Inventory

#### Overview

No formal Green House Gas Inventory (GHG-I) for Land Use, Land Use Change and Forestry (LULUCF)/Agriculture, Forestry and Other Land Use (AFOLU) sector has ever been carried out in Pakistan, except the one that was prepared during the period 1999-2003 for the initial National Communication to UNFCCC in 2003.

The Global Change Impact Studies Center (GCISC) is the relevant agency under the MoCC to support PFI and compile the GHG Inventory. The capacities assessed during the CBNA are provided in [Annex IV](#_Annex_IV._). The role of OIGF will be to facilitate the coordination with the provinces and the UNFCCC secretariat (Figure 2.0).

#### Data availability

According to the information collected from national and provincial organizations, no data specific to GHG-I for the LULUCF/AFOLU sector is currently available.

However, the provincial forest departments have working plans for most of state-owned forests. These working plans are based on standing volume of forests, which could potentially be converted to carbon stock assessments, particularly with complimentary remote sensing based studies.

#### Hardware capabilities

PFI has no or very limited capacity in terms of equipment to address GHG-I. GCISC also requires capacity building.

#### Human capacity

The MoCC, WWF-P and the UN-REDD Programme recently conducted a training on GHG-I. Participants from different organizations (including Provincial FDs, PFI and GCISC) have been trained on estimation of emission factors and GHG-I for the AFOLU/LULUCF sector.

Despite this short training, capacity remains limited and more training sessions are required.

#### Training facilities

There is currently no training facility for GHG-I in Pakistan.

#### On-going projects

The GCISC has developed a proposal for conducting the second national communication on climate change, which is yet to be submitted to MoCC.

Also, PFI has recently started a project to determine emission factors from deforestation and forest degradation using permanent plots approach, coupled with satellit data. Similarly PFI is also working on estimation of carbon sequestration through measuring the forest growth in KP.

#### Gap analysis

1. Existing and needed data for the GHG-I

| **Data** | **Existing data** | **Needed data** |
| --- | --- | --- |
| Activity data | Partial availability of Landsat TM, ETM+ (30 m), SPOT (2.5 m); See [Annex II-A](#_Annexe_II-A.Existing_capacities) | Landsat TM, ETM+ and SPOT images from 1992 to date for entire Pakistan |
| Emission factors | Working Plans for government managed protected and reserved forests | Land cover under private forests, forest inventory data of privately managed forests; Allometric equations, data on carbon pools |

1. Existing and needed equipment for the GHG-I

| **Activities** | **Existing equipment** | **Needed equipment** |
| --- | --- | --- |
| Logistics equipment | None | [Annex VIII](#_Annex_VIII._Needed) |
| Laboratory-based research and inventory | None | FOSS |
| Field Based research and inventory | See NFI | See NFI |
| RS/GIS | See SLMS | See SLMS |

1. Existing and needed skills/trainings for the GHG-I

| **Activities** | **Existing skills** | **Needed trainings** |
| --- | --- | --- |
| GHG-I trainings | 25 people trained on greenhouse gas inventories and estimation of emission factors for LULUCF/AFOLU. | Advanced trainings of the trainers (Professionals and experts for conducting trainings on GHG-I)([Activity 1.3 in GHG section](#_Greenhouse_gas_inventory_1)) |

### Summary

The following table presents a synthesis of Pakistan’s capacity to implement a MRV system based on the three technical pillars proposed by the UN-REDD programme. This evaluation was conducted by independent consultants in close collaboration with relevant government structures. Each relevant capacity needed to implement the NFMS was evaluated according to three levels:

* **Low capacity:** Expertise, systems and tools in the country do not exist and/or are not well developed or used regularly;
* **Average capacity**: Human and/or technical capacity exists but does not correspond to the real needs for an NFMS and an update and/or enhancement of the existing capacities is required;
* **Advanced capacity**: Adequate capacity is available and can be used with minimal updating and/or additional work.

1. Summary of the capacity assessment for the MRV function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CAPACITY** | **SLMS** | **NFI** | **GHG-I** | **COMMENTS** |
| **Data availability** | Average | Low | Low | SLMS: Archived data are available at PFI but limited;  A bulk of medium and high resolution data will be made available through SUPARCO. |
| NFI: (i) The existing data has no information on carbon pools, emission factors;  (ii) The data mostly represent commercial forest areas; limited or no information on protected natural forests (e.g. the forests of GB);  (iii) The data are limited to specific diameter classes of interest and the measurements taken during the inventory are mostly limited to specific variables (i.e. DBH, height and density);  (iv) Allometric equations and/or biomass expansion factors are not available for any forest type or tree species. However, KPK and GB provinces are currently developing their allometric equations. |
| GHG-I: GHG-I for the LULUCF/AFOLU sector is not embedded in the current forest management systems of the country; No consistent database. |
| **Hardware capabilities** | Average | Low | Low | SLMS: An advanced hardware capability and lab facility is required with computers (Z820 workstations)/plotters (full size)/printers; See details in [Annex VI](#_Annexe_5._Formations). |
| NFI: The latest equipment (vertex, high accuracy handled GPS, field weighing machines, densiometers) required for forest carbon inventories are missing in almost all provinces and in PFI; See details in [Annex VII](#_Annex_VII.Needed_equipment) |
| GHG-I: The forest departments and PFI have no facilities to compile GHG-I. |
| **Human capacity** | Average | Average | Low | SLMS: PFI has skilled human resources in forestry but limited resources in the field of RS/GIS;  SUPARCO has skilled human resources in RS&GIS. |
| NFI: PFI and provinces forest departments (except Baluchistan and FATA) have adequate human capacity for conventional forest inventories. However, their capacity and understanding on carbon-based inventories and carbon stocks assessment need to be enhanced developed. |
| GHG-I: At present minimum human resource is available in the country to address GHG-I. |
| **Training facilities** | Average | Average | Low | SLMS: PFI is the only institution that conducts forestry-related trainings at national level;  SUPARCO has high class training facilities related to RS/GIS. |
| NFI: At national level, the PFI has required training facilities (resource persons, training halls, training equipment, field sites for demonstration);  At provincial level (except KP and GB) no such facilities are available. |
| GHG-I: There is no facility for GHG-I trainings. However, PFI has training facilities that can be used for that purpose. |

## Monitoring function

#### Overview

The monitoring function of the NFMS will be a domestic tool to monitor a vast range of forest-related indicators. Such indicators will be designed to go beyond the monitoring of forest carbon stocks, in including other parameters such as forest uses, Non Timber Forest Products (NTFPs), forest health, biological diversity, productive, protective and socio-economic functions of forests, implementation of legal and policy frameworks, forest governance, etc.

In the REDD+ framework, the monitoring function of the NFMS will be the tool to monitor REDD+ demonstration activities during Phase 2 and national REDD+ Policies and Measures (PAMs) during Phase 3. The indicators that will be monitored will be defined in a participatory way. Such indicators could be, for instance, forest area, number of trees planted, extent of protected areas, forest area or number of logging concessions under forest certification, annual extracted volumes, etc. The monitoring system will deal with drivers of deforestation and forest degradation and will also be linked to the Safeguards Information System (SIS).

In Pakistan, forest monitoring is done by the provincial forest departments through their regular field forest inventories, and with RS/GIS tools in some provinces like KP. At national level, PFI used to get information from the provincial forest departments, and compile and publish them in the form of a journal named “Forestry Statistics of Pakistan”. This practice has now stopped.

#### Data availability

At national level, the required information for forests monitoring is scattered and there is no centralized database.

At provincial level, though information on growing stocks is available for specific forest areas, there is no regular monitoring of a wide range of forest-related indicators. Furthermore, the available data lack consistency because different approaches are used for data collection.

#### Hardware capabilities

Globally, the technical capabilities (equipment and logistics) for the implementation of the monitoring system are not well developed (see sections 5.1.1 and 5.1.2). PFI has limited and out-dated hardware and software ([Annex IV](#_Annex_IV._)).

#### Human capacity

Human capacities for the monitoring function do not exist.

#### Training facilities

Training facilities regarding forestry and forest monitoring at national level are very limited. PFI is the only institution that offers on-job trainings for in-service forestry professional from time to time on different forestry-related issues.

#### On-going projects

There is no on-going project specifically related to the monitoring of REDD+ related activities in Pakistan. However, ICIMOD has developed a Mountain Geo-portal for the Himalayan Karakorum and Hindu Kush (HKH) regions, including Pakistan ([http://apps.geoportal.icimod.org/PKLandcover/#](http://apps.geoportal.icimod.org/PKLandcover/)). The forest cover maps of 1990, 2000 and 2010 (the real time data) and forest cover change statistics for the last two decades in GB, KPK and AJK can easily be accessible.

WWF-Pakistan has conducted micro level studies on GIS/RS based forest cover monitoring and developed forest cover maps for 52 districts. WWF-Pakistan has also conducted forest cover change assessment for KP, GB and Federally Administered Tribal Areas (FATA) on 10 years interval.

SUPARCO has published ‘atlas’ of Sindh and Punjab provinces with forest cover assessment at district level using LCCS methodology and Spot 5m satellite imagery . The Land cover maps have published at a scale of 1:50,000. The atlas of KPK province is in publishing phase. The Land cover comprises of 37 classes that can be reduced to 13 Land cover classes in the context of REDD+.

#### Gap analysis

The following table presents the improvements needed for the implementation of the monitoring function.

1. Improvements needed for the implementation of the monitoring function

| **Capacity** | **Improvements needed** |
| --- | --- |
| **Data availability** | Develop a national level database;  Standardization and consistency in the procedures and methods for forest monitoring among provinces and national level institutions. |
| **Human capacity** | Full time GIS and RS experts for forest monitoring;  Training on web geo-portals management. |
| **Equipment** | Updated GIS Lab for PFI and Provincial FDs (with high definition computers and GPS units). |
| **Training facilities** | Furniture and renovation of training facilities at PFI. |

# IMPLEMENTATION OF THE NATIONAL FOREST MONITORING SYSTEM

The activities described in this chapter are proposed to address needs and gaps identified in the previous section. The activities were jointly defined and validated by the NFMS working group, the experts of the UN-REDD Programme and all stakeholders involved in the REDD + mechanism in Pakistan.

In the REDD+ framework, Pakistan’s NFMS is aimed to estimate the forest related GHG emissions and removals following the IPCC guidelines. But Pakistan’s NFMS will also monitor a wide range of other bio-physical and socio-economic parameters such as forest health, biodiversity, socio-economic and environmental functions of forests and relevant legal frameworks. In other words the NFMS will not be limited to the monitoring of forest carbon stock but will also monitor other ecological, environmental and social parameters related to the forests. The NFMS will consist of five main components that are described below.

**Component 1:** [**Institutional Framework**](#_INSTITUTIONAL_FRAMEWORK): This component is actually about identification of relevant institutions and defining their roles and responsibilities in the implementation of the NFMS. This also involves defining structures, TOR’s, legal enactments and capacity building of different units being responsible for operating various components of the NFMS such as NFI, SLMS, GHG-I and Monitoring.

**Component 2:** [**Satellite Land Monitoring System**](#_Satellite_land_monitoring): The SLMS is actually a Remote Sensing and GIS based monitoring tool used to collect data on land use and land use changes resulting from human activities i.e. Activity Data (AD). This component has been designed to establish an SLMS laboratory (consisting of GIS and Remote Sensing hardware and software including satellite and ancillary data), hiring of required technical staff, their capacity building and operationalizing of the Satellite Land Monitoring System.

**Component 3:** [**National Forest Inventory**](#_National_forest_inventory): This component has been designed to establish an NFI unit in PFI and establishing coordination with the provincial forest departments, hiring of required technical staff, their capacity building and operationalizing of the NFI unit

**Component 4:** [**Greenhouse Gas Inventory**](#_Greenhouse_gas_inventory): This component consists of establishment of a permanent GHG-I unit at PFI, hiring and placement of staff, capacity building, design and development of the quality assurance and quality control system and regular functioning of the GHG-I unit (data compilation, reports generation and submission to OIGF for national communication).

**Component 5:** [**Monitoring Function**](#_Monitoring_function): This component consists of establishing of the overall monitoring unit through hiring and placement of staff, development of monitoring methodologies, quality assurance and quality control, capacity building of the staff and establishment of an NFMS web portal (to share periodic monitoring reports).

## Institutional framework

The first step in the development of the NFMS will be to enact the institutional arrangements that have been discussed during the Action Plan development process (see section 4.5.1). This process will require close consultation and coordination with all stakeholders at national and provincial level.

The establishment of institutional arrangements, including clear definition of the roles and responsibilities of various stakeholders and clarification of financial arrangements, is essential to develop a sustainable NFMS.

Output 1: The institutional framework is established

The institutional framework for the NFMS has been broadly explained under section 4.5.1. These arrangements form the backbone and will be further elaborated and refined through definition of different units within the responsible institutions. Technical units will be operationalized and mandate, responsibilities, composition of technical units and lines of communication will be defined. Also, official institutional arrangements will be legally enacted. As a result of the 18th constitutional amendment all matters pertaining to forest and forest management have been delegated to provinces. The OIGF has only the mandate of dealing with development of national policies, coordinating between the provinces for the implementation of the national policies, liaison with international organizations and agencies and dealing with multi-national environmental agreements and conventions. Under this arrangement the national level coordination and reporting on REDD+ will rest with the OIGF while physical implementation will be done by the provincial forest departments. Moreover under the 18th amendment the PFI has been given a dual role i.e. for administration purpose it has been brought under the KP forest, Environment and Wildlife department while its mandate regarding forestry education and research has been kept at national level. Keeping in view this situation the working group as well as the OIGF and provincial forest departments agreed to establish the NFI, SLMS and GHG-I units within the PFI in close collaboration with the OIGF. The overall coordination of the NFMS implementation will be done by the OIGF.

Activity 1.1: Establishment of the technical units

This activity will be based on the institutional arrangements and on the structures presented in section 4.5.1. Concretely, the following structures and technical units will be established and operationalized (exact naming to be discussed with OIGF, PFI, provincial forest departments and other relevant stakeholders): *REDD+ National Steering Committee, National communication Unit, NFMS Unit, SLMS Unit, NFI Unit, GHG-I Unit, Structure(s) and responsible institution(s) for the QA-QC.*

***Sub-activities:***

* Develop TORs for the REDD/ NFMS management and coordination board and notify
* Formalization of the board through formal notification
* Stakeholders consultation
* Identification of mandate and responsibilities of the technical units
* Enact institutional arrangements
* Operationalization of the technical units (including regular meetings)

This process will possibly require the support of a legal expert in order to ensure that the technical units are legal, appropriate, legitimate, recognized and economically viable. Once identified, the mandate and responsibilities of the technical units will be enacted through appropriate channels.

The NFMS implementation will need to be coordinated with other forestry programs in order to ensure that the NFMS provides the necessary information to implement national programs and improve forest resources management. In this regard, organization of regular meetings will ensure coordination between the different programs.

*The budget allocated to this activity includes the support of legal experts, the organization of national workshops for consultation and validation of institutional arrangements, the official promulgation of arrangements and the organization of coordination meetings for each technical unit. All activities are scheduled for the first year of implementation, except coordination meetings that will be organized on a monthly basis.*

Activity 1.2: Setting up of participatory process

For the operationalization of the technical units (i.e. NFMS, SLMS, NFI and GHG-I), participatory process and collaboration between different stakeholders is very important to ensure ownership, sustainability and efficiency. Strong involvement of provincial FDs and local communities will be ensured in the National Forest Inventory. Similarly for the GHG-I, strong collaboration will be ensured between different government agencies such as the PFI, OIGF and GCISC.

***Sub-activities:***

* Stakeholders mapping (at provincial level)
* Identification of roles and responsibilities
* Implication of young professionals
* Setting up of the participatory process

In order to better apprehend the partners and their potential roles and involvements in the implementation of the different NFMS pillars, this activity will start with a mapping of all stakeholders involved in the forestry and LULUCF/AFOLU sector (e.g. government structures, national and international NGOs, universities and research centers, civil society organizations, forest communities, private sector, etc.). However, this does not mean that all stakeholders have to participate in all activities. Depending on the results of the stakeholders mapping process, the participatory process will then be discussed, defined and set up in order to adequately involve interested stakeholders in the NFMS implementation. Particular attention will be given to young professionals whose involvement is crucial for the sustainability of the NFMS.

*The budget allocated to this activity includes the stakeholders mapping, the organization of national workshops to discuss the potential roles and responsibilities of the different stakeholders and the setting up of the participatory process, including the organization of regular meetings with stakeholders representatives. All activities are scheduled for the first year of implementation, except meetings with stakeholders’ representatives that will be organized on a regular basis.*

Activity 1.3: Clarification of mandates within the technical units

Under this activity, clear mandate will be given to each Unit/Division/Institution within each technical unit.

***Sub-activities:***

* Identification of mandates to implement the NFMS
* Definition of lines of communication
* Promulgation of mandates and lines of communication

This includes (but is not limited to) the following activities: Design, planning, data collection (remote sensing), data collection (field data), data management and analysis (including uncertainty analysis), QA/QC, data reporting, improvement plan, archiving and documentation.

*The budget is allocated to discuss and identify mandates and lines of communication within each technical unit, in a participatory way. All activities are scheduled for the first year of implementation.*

Activity 1.4: Promulgation of institutional arrangements

Proper legal enactments will be issued by competent authorities to make these institutional arrangements legal.

Output 2: The funding arrangements are defined

It is critical to carry out a detailed assessment of the funding available and needed to ensure the long-term sustainability of the NFMS.

Activity 2.1: Inventory of available and needed funding

All domestic and international sources of funding will be inventoried to assess which components of the NFMS are covered and where gaps exist. This funding analysis will serve as a domestic tool to support requests for national government funding and as a tool for requesting international support on specific work areas.

***Sub-activities:***

* Identification of necessary resources to implement the NFMS
* Inventory of available funding
* Gap analysis

Activity 2.2: Development of a resources mobilization strategy

Keeping in view the above assessment and inventory, a detailed strategy will be developed with clear needs and timeline to fill in the financing gaps (i.e. amount required and expected source of funds). Also, the expected period of financing will be thoroughly assessed and determined in consultation with the NFMS stakeholders. The financial strategy will focus on the transition between external funding (as it is now) and government or domestic funding. It will be ensured that the federal and provincial governments allocate sufficient resources to sustain the NFMS implementation. The strategy will then be shared with GoP and possible donors.

***Sub-activities:***

* Development of a resources mobilization strategy
* Identify donors
* Strategy implementation

Activity 2.3: Clarification of financial arrangements

To the extent that REDD+ mechanism would result in results-based payments, thought should be given to ensure the self-financing of the NFMS and the fair allocation of available funds (to the different technical units, equipment maintenance, security of jobs, staff training, etc.). The funding allocation mechanism for operating and maintaining the NFMS will have to be discussed with all relevant stakeholders.

***Sub-activities:***

* Assess the process required for a transition to a sustainable self-financing arrangement and develop a timeline for its implementation
* Stakeholders consultation for the funding allocation mechanism
* Proposal of funding allocation mechanism and proposal for its implementation

Activity 2.4: Promulgation of financial arrangements

After sharing the proposal for funding allocation mechanism with the different stakeholders, the proposal will be subject to a national validation workshop. Also, proper legal enactments will be issued by competent authorities to make these financial arrangements are legal.

***Sub-activities:***

* Organization of a validation workshop to formally adopt the funding allocation mechanism
* Official enactment of financial arrangements

## MRV function

The MRV system of Pakistan will be based on the three “pillars” proposed by the UN-REDD-Programme (i.e. SLMS, NFI and GHG-I). The MRV system will enable Pakistan to produce accurate estimates of GHG emissions and removal related to the LULUCF/AFOLU sector and to report back to the UNFCCC.

### Satellite Land Monitoring System

**Global Objective: To measure land use changes and forest cover changes and to collect activity data**

The SLMS is the tool within the NFMS used to collect Activity Data (AD) (i.e. data on land use and land use changes resulting from human activities).

The use of remote sensing data will offer Pakistan a way to assess historical changes in land use, which will be useful to establish the Reference Emission Level (REL)/Reference Level (RL), one of the requirements under the Warsaw Framework in order to be eligible for REDD+ results-based payments. The use of remote sensing also facilitates the reduction of the quantity and therefore the cost of ground-based measurements (e.g. for validation) for the assessment of AD.

SLMS unit in PFI will be responsible for all the activities at national level and the provincial forest departments will be communicated for any field verification and accuracy assessment of the final map products.

The implementation of the SLMS will produce (i) a forest cover map of the reference year (validated at national level), (ii) a change in forest cover map between the base year and the current year and (iii) the accuracy estimates (comparison between results obtained in the laboratory and field observations).

In terms of reporting requirements, the main results of the SLMS will be an annual conversion matrix that accounts for annual land use and forest cover changes. The technical tools needed to implement the SLMS will be assessed, with a focus on *open source* tools.

Output 1: The technical capacities are reinforced

Activity 1.1: Establish a SLMS laboratory

Existing facilities in Pakistan Forest Institute will be enhanced for the establishment of SLMS laboratory. The details of existing and required facilities at PFI is available in [Annex IV](#_Annex_IV._) and Annex VI) respectively.

***Sub-activities:***

* Allocation (renovation) of office space for SLMS laboratory
* Purchase of office supplies and equipment

*The budget allocated to this activity includes the renovation of office space and the purchase of needed equipment for SLMS laboratory at PFI. The expected cost required is 329600 USD. All the sub activities will be completed in the first quarter of year one.*

Activity 1.2: Select and recruit technical staff

The call for applications will be done at national level for candidates having M.Sc. (sixteen years of education) in RS and GIS, with preferably work experience in forestry.

***Sub-activities:***

* Call for applications
* Test candidates and recruit staff
* Retain staff for 4 years

Given the decentralized organization of the forestry sector in Pakistan, at least one person will be responsible for coordination, data collection, data processing and management of each province. The staff will be based in the SLMS laboratory at PFI. At national level two officers will be responsible SLMS reporting.

*The staff will be responsible for image acquisition, processing, field validation and other SLMS related tasks. The cost of this activity is at higher end as it contains salaries of 9 resource persons over a period of four years i.e. 2,59,200 USD.*

Activity 1.3: Train technical staff

Although the existing staff is trained on basic satellite image processing (See Annex II-C), they however need customised technical trainings for the SLMS implementation. For details of needed trainings see [table 6.0](#_Gap_analysis).

***Sub-activities:***

* Training on UNFCCC’s requirements for reporting on land use changes
* Training on basic RS/GIS techniques
* Training on satellite image corrections, enhancement and interpretation
* Training on open source software (e.g. Collect Earth, Geospatial toolkit and Terra Amazon) to assess land use and forest cover changes
* Training on land cover classification and forest stratification
* Training on monitoring afforestation, deforestation and forest degradation using RS techniques

Technical capacity of the existing and newly recruited staff will be enhanced through trainings on technical challenges of image interpretation (cloud cover, geo-referencing, missing data, atmospheric correction, topographic correction, etc.), land cover/ land use mapping, spatial and temporal analysis of land use and forest cover changes and land use/forest cover monitoring.

*The cost of this activity includes trainings that had been identified during the training need assessment. The expected cost for this activity is 25700 USD.*

Activity 1.4: Centralization of existing data

Despite the substantial amount of data collected in the field and the work done by several national institutions, weaknesses remain to ensure that are integrated and harmonized in a robust database.

***Sub-activities:***

* Facilitate data sharing agreement between relevant institutions
* Harmonization of all existing remote sensing and field data
* Development of a robust database management system

The result of this activity will be the establishment of a centralized and secured database gathering all existing information (e.g. remote sensing and field data) related to forest resources. All the data gathered, procured, processed and analyzed will be part of the main centralized dabase including AD from SLMS, EF from NFI and emissions and removals from GHG-I.

Data sharing agreements with PFI/Government of Pakistan and data holders (Academia, researchers and relevant institutions etc), identified relevant data will be acquired and stored in a server. Also, a mechanism for data visualization and sharing (web portal, intranet system) will be discussed and identified.

*The budget allocated to this activity includes coordination (travel, meetings, phone calls etc.) and Collection of data and its storage in a standardized format for the all units. The expected cost required is 4800 USD. All the sub activities will be completed in the first quarter of year two.*

Activity 1.5: Characterize satellite images for forest monitoring

Appropriate satellite imagery will be selected for analysis of historical land use and forest cover changes.

***Sub-activities:***

* Assess the impact of available images for forest stratification, monitoring of deforestation and forest degradation
* Recommendations for the development of forest stratification, the monitoring of deforestation and forest degradation and for the monitoring of REDD+ activities
* Purchase very high resolution imagery according to needs

Medium resolution freely available Landsat images will be used for national level, whereas high resolution satellite images of 10% area of each province will be used for the verification and validation of results on demonstration plot and for the monitoring of identified hotspots of deforestation and forest degradation. In addition to these datasets, images (SPOT, QuickBird, GeoEye etc.) will be acquired from other departments/organizations through MoU’s will also be part of the system.

Activity 1.6: Stratification of forest cover

The objective of this activity will be to update and detail the forest stratification of Pakistan in improving the spatial resolution of forest cover map. This will be done through remote sensing tools and field observations made during the NFI. Major vegetation types will be divided into strata or more detailed and homogeneous sub-strata.

***Sub-activities:***

* Consultative meeting in each province for the further categorisation of forest types and LCCS classes
* Presentation and approval of the LCCS legend
* Stratification of forest cover

These improvements in spatial resolution and more detailed definitions of forest strata will best reflect the diversity of the forests of Pakistan and significantly increase the accuracy of the MRV system.

Activity 1.7: Produce a guidance document on the methodology to monitor land use and forest cover changes

Following the capacity building on remote sensing tools for forest monitoring and taking into account the use of *open source* tools, the recommended methodology to assess land use and forest cover changes will be documented.

***Sub-activities:***

* Definition of intact, fragmented and degraded forest
* Development of a methodology for the monitoring of land use and forest cover changes (including the tools to be used)
* Development of QA/QC procedures
* Ppublication of methodology and guidelines for data collection, analysis, QA/QC, reporting and dissemination

This will lead to a standardized approach for land use and forest cover changes at national level.

Output 2: The SLMS is operational (Land use and forest cover changes are measured)

Activity 2.1: Historical analysis of land use and forest cover changes

This activity requires the validation of the reference year and the historical analyses of land use and forest cover changes, following the SLMS methodology developed under activity 1.7. This will lead to an analysis of forest cover changes, including the recording of the types of changes (e.g. deforestation, forest degradation and land use changes, instead of only land conversion).

***Sub-activities:***

* Validation of the reference year (T0)
* Assessment of historical land use and forest cover changes
* QA/QC
* Projection of the FREL/FRL (according to national circumstances)

Deforestation and forest degradation will be analysed and measured periodically at a time step of 5 years, from 1990 to 2015. The historical evolution of the forest cover (1990-2015) will provide the basic data to compile the FREL/FRL of Pakistan. Thereafter and from 2015 onwards, annual statistics of deforestation and forest degradation will be compared to the projected FREL/FRL, or the level of deforestation that would have been reached in the absence of REDD + policies and measures.

Activity 2.2: Monitoring of land use and forest cover changes

The monitoring of land use and forest cover changes is the main objective of the SLMS. This activity will assess activity data on an annual or biennial basis, with the use of *open* source software. Biennial monitoring of hotspots (10% of the forest area of each province) is recommended.

***Sub-activities:***

* Pre-processing of satellite images
* Assessment of land cover changes
* Assessment of forest cover changes
* Results publication in the form of a comprehensive report

Following the definition of more detailed forest strata and improvement of spatial resolution of forest cover maps, land use change (e.g. forest land to crop land) and forest cover changes within forest land(e.g. primary forest to secondary forest or primary forest to plantation forest) will be measured on an annual basis.

Activity 2.3: Elaboration and validation of the global report of the SLMS

The general report will present a technical component, a financial component as well as a summary report. After quality control, all statistics and results produced by the SLMS will be automatically published on the web portal of the NFMS.

***Sub-activities:***

* Drafting of SLMS report
* Stakeholders review
* Publication on the NFMS web portal

### National forest inventory

**Global Objective: To assess and monitor forest resources in the different forest types of Pakistan**

The national forest inventory is the core component of the NFMS that is designed to collect the ground based multipurpose forest inventory data from different forest types of Pakistan. The main objective of the NFI is to compile the forest carbon inventory data at national level in a scientific and participatory manner to support the national/ provincial policy and management decisions and create synergies with global efforts to address climate change through carbon emission reductions in forestry sector.

Pakistan is signatory of several environment related international agreements including UNFCCC and Millennium Development Goals (MDGs) and committed to protect and increase its forest cover to 6% by the end of 2015. Unfortunately, Pakistan has been lacking forest inventory data at national level in the past because continuous forest inventories have never been carried out at national level due to lack of financial, technical and human resources. The forest inventory data provided in previous reports is based on estimates and lacks consistency and scientific monitoring. The NFI will thus help Pakistan to ensure the availability of improved and scientific based centralized forest inventory data, enhance the institutional and human technical capacities on national forest inventory through establishment of national and provincial NFI laboratories, continuous monitoring of its forests through repeated measurements over time and improvement and development of integrated and inclusive forest policies.

The NFI activities are designed keeping in view the Pakistan’s existing capacities (institutional, technical, human, financial etc) and will be implemented over a period of four years (2015 – 2019) with a phased approach starting from institutional strengthening and capacity building, centralization of the existing data, validation of national forest definition, development of field training manual, piloting and finally establishment of NFI and dissemination of the information.

The total cost estimated for NFI to be operational is USD 1689000. However, in order to reduce costs and optimize the accuracy of assessments, the NFI will be based on a system of forest stratification to identify homogeneous forest populations. From a statistical point of view, the definition of homogeneous populations reduces the number of ground plots per population and thereby produces a more financially efficient inventory. Stratification will also help identify predominant land uses and intensify field sampling efforts accordingly.

In the REDD+ framework, the NFI will be an important tool for measuring forest carbon stocks and changes (Emissions Factors - EF) and thereby to estimate and report GHG emissions and removals associated with forests. The NFI will involve ground-based measurements at sites strategically and statistically identified through forest stratification. Filed measurements will be carried out to estimate carbon stocks in different carbon pools and forest types.

By assessing forest carbon stocks and in combination with the SLMS data, the NFI data will be used to increase the precision of GHG inventory of the forest sector.

Output 1: The technical capacities are strengthened

Strengthening Pakistan’s technical capacities for forest monitoring is a priority because it will determine the sustainability of the NFI and the efficiency of activities to be implemented.

Activity 1.1: Establish and equip national and provincial laboratories

Given the extent of the country, the difficulties of communication within the country and the decentralized organization of the NFI, the acquisition of additional equipment is needed at national and provincial levels before any deployment of field teams.

***Sub-Activities:***

* Selection and retention of competent team
* Identify office space for national and provincial NFI labs
* Purchase of equipment for the national laboratory (PFI)
* Strengthening of the existing laboratories in provincial forest departments
* Maintenance of the equipment

Particular attention will be paid to the quality, durability and performance of the equipment. In addition, maintenance and security of all equipment will be a priority in national and provincial offices. These measures will include, among others, the maintenance of a local in a suitable physical environment, cooling of the room, the presence of consistent extinguishers, etc.

*The acquisition of additional hardware is expensive and represents a substantial part of the budget. These purchases are nevertheless essential and are justified in part by the extent of the field campaign and secondly by the decentralization process in provinces where each of the latter must be equipped. As a guide, the list of materials needed to operationalize the NFI is presented in* [*Annex VII*](#_Annex_VII.Needed_equipment)*.*

Activity 1.2: Capacity building

This key activity will focus on reinforcing the technical capacities of all entities involved in the implementation of the NFI, according to their roles, responsibilities and needs. Also, in the sake of sustainability and consistency, a special attention will be paid to building the capacities of young professionals and to linking the capacity building sessions with national and international research activities. The trainers should be identified and retained in the respective divisions/ departments to ensure sustainability.

***Sub-activities:***

* Technical trainings on tools for forest monitoring (including field-based inventories and satellite monitoring systems)
* Technical trainings on the use of remote sensing for NFI
* Capacity building on geospatial data processing and database management
* Trainings on descriptive statistics
* Training on the processing and analysis of inventory data (including the use of open source software)
* Trainings on errors propagation, uncertainty assessment, Quality Assurance and Quality control
* Capacity building on international reporting (UNFCCC, CBD, FAO, etc.)
* Trainings on the development of allometric equations
* Strengthening of young professionals capacities and links to research activities

The NFI will be multi-purpose, and technical capacities will not focus exclusively on biomass assessment. Capacity building activities will consider monitoring of volume, biomass, carbon stocks, biodiversity, non-timber forest products and socio-economic aspects, with a particular emphasis on remote sensing tools that can be efficiently used to support NFI and NFMS. Also, national stakeholders will be strengthened with proper technical knowledge in data processing, capture, analysis and management.

Activity 1.3: Centralization of existing data

Despite the substantial amount of data collected in the field and the work done by several national institutions, weaknesses remain to ensure that are integrated and harmonized in a robust database. Standardization of the data and methodology should be ensured, according to IPCC guidelines.

***Sub-activities:***

* Design centralized and provincial database system
* Identify all data holders
* Facilitate data sharing agreement between relevant institutions
* Collection and harmonization of all existing remote sensing and field data
* Development of a robust database management system

The result of this activity will be the establishment of a centralized and secured database gathering all existing information (e.g. remote sensing and field data) related to forest resources. This activity will be joined with the activity 1.4 in SLMS.

Following data sharing agreements with PFI/Government of Pakistan and data holders, identified relevant data will be acquired and stored in a server. Also, a mechanism for data visualization and sharing (web portal, intranet system) will be discussed and identified.

Output 2: The NFI is designed

Activity 2.1: Validate the national definition of forest

A national definition of forest appropriate for REDD+ has been proposed during national consultation workshop on “Modalities and procedures for REDD+ Safeguards” in 2011, and discussed at various meetings and trainings afterwards. However, although the definition has been agreed by all the provinces, it has not been yet officially adopted.

***Sub-activities:***

* Develop criteria and indicators easily measurable in the field
* Organize a validation workshop for the definition of forest
* Legally adopt the national definition of forest

Beyond the validation of the national definition of forest, this activity will establish and validate a set of easily measurable criteria and indicators to identify forest in the field.

Activity 2.2: Conceptualize the multipurpose NFI

This activity will specify the objectives of the multipurpose NFI.

***Sub-activities:***

* Identify the global and specific objectives of the NFI
* Identify the criteria and indicators to monitor
* Identify the bio-physical and socio-economic variables of interest. (For socio-economic variables, REDD+ safeguards should be followed)
* Identify the frequency of field measurements

An integrated and participative approach will be adopted to identify the objectives of the NFI, the variables to be measured and the criteria and indicators to be monitored.

Activity 2.3: Develop the multipurpose NFI methodology

All activities related to the NFI methodology, including preliminary assessment of forest areas, sampling design, measurement protocols and financial implications will be presented to relevant stakeholders in order to reach consensus and commitments.

This activity will possibly require consultation and/or recruitment of international staff to ensure technical consistency of the methodology with international standards and ensure compliance with IPCC recommendations.

***Sub-activities:***

* Assessment of forest areas (through remote sensing tools)
* Develop the sampling design (sampling methodology, number and distribution of sample plots, design and layout of sample plots)
* Develop the measurement protocols
* Draft the multipurpose NFI methodology, including financial proposal
* Share methodology with all partners for comments and improvements
* Pilot study the methodology in the field
* Implement a national workshop to validate the methodology

Also, given the importance to reach a consensus on the methodology and to obtain the support of all stakeholders, the methodology will be discussed and validated during a specific national workshop.

*The substantial costs associated with this activity are mainly related to the consultancy costs of international experts and to the field work costs. A budget has also been allocated for the organization of the national workshop to validate the methodology.*

Activity 2.4: Develop the field manual

This activity will develop the field manual based on the NFI methodology. Sample plots design and field measurement protocols will be published in a didactical manual, for technicians in charge of the field operations implementation.

***Sub-Activities:***

* Review of literature
* Draft the field manual
* Test the field manual in the field
* Formally adopt the field manual

Since many methodology and field manuals already exist in the literature, the actual need to develop a new one will be assessed. Also, an important effort will be made to assess regional practices for assessing forest carbon stocks.

Methodology and field manual will be tested in the field before final approval and publication.

Depending on the approach (using an existing manual or development of a new manual), the hiring of a graphic artist or designer may be required to illustrate the various field protocols.

Output 3: The NFI is implemented

Implementing the NFI is the central and possibly most important tool of the NFMS. It is also the most challenging, costly and time-consuming component of the NFMS. Direct forest measurements and socio-economic investigations will be used to assess forest resources and uses, land use and land use changes and to estimate carbon stocks in the different forest types of Pakistan.

The following activities will be undertaken in order to implement the NFI.

Activity 3.1: Train technical staff on NFI methodology

The training of trainers and technical staff will be a continuous process for enhancing the capacities of the national NFI unit and provincial forest departments for an effective implementation of the NFI.

***Sub-Activities:***

* Identification of trainers from provincial forest departments and other related departments
* Training of trainers on NFI methodology, including field protocols for the development of allometric equations (The trainers will mainly include officials forest departments)

Activity 3.2: Operational planning

In order to ensure that the NFI is as much as possible cost-efficient and robust, adequate planning and preparation are needed.

***Sub-activities:***

* Field work planning
* Purchase and security of needed equipment ([Annex VII](#Annex VII. Needed equipment to implement the NFI))

The NFI Unit, in close collaboration with PFI, provincial forest departments will develop the field work planning and coordinate all field activities. In the provinces, the Field Coordinators will be the first point of contact for field teams. The Field Coordinators will be stationed in forest departments.

Given the extent of the work to be accomplished and the number of field teams, the acquisition of additional equipment will be essential to properly and efficiently implement the NFI. Particular attention will be paid to the quality of the equipment. In addition, maintenance and security of all equipment will be a priority in all decentralized NFI stations. These measures will include, among others, the maintenance of a local in a suitable physical environment, cooling the room, the presence of consistent extinguishers, etc.

The acquisition of additional equipment represents a substantial part of the total budget. These purchases are nevertheless essential to properly implement the NFI in a timely and efficient manner. As a guide, the list of needed equipment is presented in [Annex VII](#_Annex_VII.Needed_equipment).

Activity 3.3: Recruitment and training of field teams

The implementation of a national forest inventory cannot be done without the recruitment of specialized personnel, at both national and local levels. Team leaders will be selected, trained and evaluated with the goal of enabling them to independently conduct field operations.

***Sub-activities:***

* Identification of team leaders
* Recruitment of field teams
* Training of field teams

Based on experiences in the provinces of Khyber Pakhtunkhwa and Gilgit-Baltistan, the total number of people per field team is 6 including one technical expert, one data recorder, two data readers and two helpers.

*The cost for this activity is estimated to be USD 3200.*

Activity 3.4: Collection of field data

This activity is one of the most costly and time-consuming of the NFI. However, the simultaneous deployment of all field teams should contribute to complete the work on a timely manner.

The NFI unit will be responsible for coordinating and executing data collection in the field. Field coordinators will monitor, supervise and provide backstopping support to the fieldwork, including field report checks, in order to ensure timely completion for field work, data quality and homogeneity among field teams. Collection of data will preferably be carried out through existing forestry field staff.

Field Coordinators will also facilitate the procurement and maintenance of field tools and equipment for field teams, and provide immediate response and support to field teams in case of emergency.

To ensure smooth operations, contacts with local authorities will be taken in advance to assess road conditions and accessibility of sites. If necessary, adapted vehicles will be used to ensure access to sites. Finally, in addition to their strong mechanical skills, drivers recruited for deployment on sites will have to ensure proper condition of vehicles and availability of spares.

*According to the recent experience in the provinces of Khyber Pakhtunkhwa and Gilgit-Baltistan, one field team can collect only 2 - 3 sample plots per day depending on the time required to reach the forest area. The average time required per plot to measure and record the data is 1.5 to 2.5 hours based on number of trees and topography of the plot area. The average cost per plot varies from USD 250 to USD 300 per plot. The cost per plot is based on number of people per team; travel to and from forest, labor and food charges etc. 2000 sample plots have been estimated to cover all the provinces as per expert opinions.*

Activity 3.5: Data processing

After deploying field teams throughout the country, the data collected will be centralized and analyzed to assess carbon stocks in the different forest types.

***Sub-activities:***

* Centralization and data encoding
* Analysis of samples of soil and litter
* Data processing

Field Coordinators will control and coordinate the data collection process, the transfer of field forms to the NFI unit, and the validation of field forms in preparation for data entry.

Quantification of the carbon content in the soil is a particularly important issue in the context of REDD +. A representative soil sampling in the framework of the NFI will improve the accuracy of estimates and enable Pakistan to be in a better position in any negotiation related to carbon market.

Output 4: The data are analysed and the results are disseminated

The data of the NFI will be analyzed and used to compile the greenhouse gases inventory of the forestry sector. The results of the NFI will be published through different media. The search for international recognition through scientific publications is also planned and desirable.

Activity 4.1: Data analysis and report

Calculation procedures require adequate data preparation. Indeed, experience has shown that most of the time for data analysis is spent on data preparation.

In order to be as efficient as possible, modern data management system will be developed and quality control procedure will be operationalized.

***Sub-activities:***

* Development of data management system
* Development and implementation of quality control
* Documentation of the data analysis system
* Final report writing
* Publication and dissemination of the results

Also, data analysis system will be documented in order to ensure continuity and improvement of the system implemented.

Results from the NFI will be provided into a final report in addition to the manual and the field inventory protocol. Results will be disseminated as appropriate to support decision makers and support national forest policies related to forest management, management of natural resources, and to mitigate the adverse effects of climate change.

Activity 4.2: Dissemination of information

Dissemination of information is crucial to ensure the improvement of the NFMS and to allow access to information to support the various policies related to forest and other natural resources management.

***Sub-activities:***

* Documentation of methods and data collection for forest monitoring
* Development of a template for data sharing agreement
* Development of a web-based platform for data sharing among national stakeholders
* Publication of the results on the NFMS web portal

This activity will support the development of data sharing agreement to ensure that implementing institution have access to the necessary information to achieve their mandated duties.

This activity will also support the development of a web-based platform for data sharing among national and international stakeholders and to share and update information on forest and natural resources management.

### Greenhouse gas inventory

**Global Objective: To measure and report GHG emissions and removals for the LULUCF/AFOLU sector**

A complete, transparent and periodically updated GHG inventory is essential to understand emission trends and meet the requirements of the UNFCCC. GHG inventories are also used to make long term emissions projections and to identify sectors for cost-effective emission reduction opportunities as well as to evaluate mitigation options and assess their effectiveness.

When reporting to international conventions and participating in voluntary performance-based mechanisms like REDD+, the consistency of the provided information is a key principle. The quality of the GHG inventory depends not only on the credibility of the estimates, but also on the methods used to gather and present the data and information.

Input data is divided in:

* + - Activity Data (AD), may show significant change year by year according with changes in the activity e.g. area subject to a specific management activity, as no-tillage, or amount of harvested wood
    - Emissions (or Carbon-Stock-Change) factors (EF – CSCF) allow the inference of emissions/removals from the activity data and tend not to change significantly year by year

The simplest method for estimating GHG fluxes from a source/sink is:

* Activity Data \* Emission Factor = annual GHG flux

IPCC Guidelines provides default methods for each source/sink category (So-called tier 1 methods). An IPCC default method is based on assumptions and inferences considered quite robust and able to produce GHG estimates in any region of the World, with an acceptable level of uncertainties (deemed at producing accurate assessment of trends). However an IPCC method does not set a standard. It is rather built on good practices, as it provides an option, as robust as possible. The best method to be applied (Tiers 1, 2 and/or 3) is the one that provides GHG estimates: 1) with the highest accuracy 2) at a level of resource-needs compatible with country’s financial and technical capability.

Potentially, there are no limits to options applicable to methods for preparing GHG estimates. However, the methods to be used for GHG flux estimations for UNFCCC reporting should have some characteristics. Also, in the early years, Pakistan might have to report back to the UNFCCC a Tier 1 level of precision. And, little by little, while implementing SLMS and NFI, move towards Tiers 2 and 3.

The reporting requirements involve submission of BUR’s and National Communications on regular basis. Pakistan Forest Institute (PFI) will submit the required reports to OIGF whereas the process is explained in section 4.5.1.

Output 1: The technical capacities are strengthened

Activity 1.1: Establishment of the GHG-I national laboratory

***Sub-Activities:***

* Identify office space for national GHG-I labs
* Purchase of equipment for the national laboratory (GHG-I)
* Maintenance of the equipment

A GHG-I lab will be established in PFI. Particular attention will be paid to the quality, durability and performance of the equipment. In addition, maintenance and security of all equipment will be a priority. A list of needed equipment is available in [Annex VIII](#_Annexe_11._Indicateurs).

Activity 1.2: Recruitment of the technical staff

The call for applications will be done at national level for candidates having relevant work experience.

***Sub-activities:***

* National-level call for applications
* Screen and test of candidates
* Select and recruit most appropriate candidates

In order to fill the gaps mentioned in the chapter 5 (i.e. Human capacity assessment and need for GHG-I) the technical staff will be hired and include one GHG-I Unit Coordinator, two Data/Statistical Analysts and two GIS Analyst. The staff will be responsible for the coordination with the GCISC and the SLMS and NFI units for the data compilation and the GHG-I for AFOLU/LULUCF sectors, as well as for the generation of reports to be submitted to the OIGF for further reporting and verification process.

Activity 1.3: Capacity building

***Sub-activities:***

* Training on GHG Inventory methodologies and use of advanced equipment
* Training on GHG-I data management and estimates preparation from AD and EF (data quality, data gaps, data consistency, data sources, quality control and assurance)
* Training on reporting

Training on GHG-Inventory and estimation of emission factors has already been conducted at national level, in which 2 individuals from PFI and 4 individuals of GCISC have been trained. They will be used as resource persons in the training of the newly hired technical staff. Also, an international resource person will be requested to lead for the updated basic and advanced training modules.

Trainings will cover the following technical fields:

* IPCC guidance and guidelines for GHG inventory of the LULUCF/AFOLU sector
* Use of GHG inventory tools and software (including the US Environmental Protection Agency’s ‘Agriculture and Land Use’ (ALU) software)
* Collection, compilation and analysis of GHG-related data
* Estimation of uncertainties and gaps
* Designing Quality Assurance and Quality Control (QA/QC) procedures
* Reporting to the UNFCCC

Output 2: The GHG-I is compiled

Activity 2.1: Develop the GHG-I methodology

The guidance material in the trainings of technical staff and updated modules of GHG-I by UN-FAO will be adopted to develop the national GHG-I methodology. GCISC will be consulted by PFI to develop the GHG-I methodology.

***Sub-activities:***

* Draft the GHG-I methodology
* Comments and improvements from stakeholders
* National workshop to validate the methodology

Activity 2.2: Data centralization and estimation of GHG emissions/removals

Data available with government and non-government organisations/departments will be acquired and processed by the SLMS and NFI units and the AD and EF generated data will be transferred and stored in a server in GHG-I unit. A mechanism (intranet system, database) will be established for data sharing/visualization. The adopted GHG-I methodology will be used to estimate the GHG emissions and removals.

***Sub-activities:***

* Collect AD and EF
* Data entry in the LULUFC/ALU (or other related) software
* Preliminary analysis and evaluation of results
* Estimation of GHG emissions/removals

Activity 2.3: Quality assurance and quality control

Quality management will be planned in a national level workshop and participation of all the relevant stakeholders including Government as well as non-governmental organizations will be ensured. QA will be done externally by an independent organization such as an NGO or academic institution having relevant experience and capacity. The GHG-I unit in consultation with all the stakeholders will first assess which procedures will be necessary for establishing an independent viewpoint that will form the basis of QA in order to comply with the IPCC recommendations. Then it will hire an independent QA organization which will assess how far those procedures were followed.

***Sub-activities:***

* Plan Quality Management
* Perform Quality assurance
* Control Quality

QC will be done internally by the GHG-I unit in PFI and GCISC. The GHG-I unit will ensure that all the methods, procedures and techniques used during data collection, compilation, analysis and preparation of results are uniform and according to the agreed standards. The GHG-I unit will first assess the required internal procedures for gradually establishing the QC in order to comply with the IPCC recommendations. Then it will ensure that these QC are followed.

*Budget under this activity includes cost of a National Workshop on Quality management, cost of Independent third party organization for QA and cost of consultants/experts for assessment and development of QC measures and protocols.*

Activity 2.4: Assess uncertainties of GHG estimates

Uncertainty estimates are an essential element of a complete inventory.

***Sub-activities:***

* Evaluation of uncertainties and verification of representative sample of field measurements
* Approaches to estimate uncertainties

Uncertainties should be addressed to avoid the potentially severe consequences of inaccurate information and ensure the monitoring against targets (i.e. accurate and comparable). When focusing efforts to reduce uncertainty, priority should be given to those inputs that have the most impact on the overall uncertainty of the inventory but also a relevant contribution.

The IPCC 2006 Guidelines define two approaches to estimating uncertainties:

* Approach 1: Error propagation equations
* Approach 2: Monte Carlo simulations

Source of Uncertainty in generation of AD may include gaps in time series, use of surrogate or proxy variables or Lack of references (calculation or estimation methods, representativeness at local or national level). In the emission factors sources of uncertainty include Scarcity of quantitative information (measurements, sample representativeness)

GCISC will provide the technical input and will be communicated by PFI for review of the estimated emissions.

Activity 2.5: Development and finalization of the national GHG-I report

The GHG-I unit in PFI will develop the draft report of national communication on GHG-I in assistance with GCISC for the LULUCF/ AFOLU sector in Pakistan. Once finalized after internal review in GCISC, the draft report will be shared with the office of IGF in MoCC for independent review from UNFCCC. The latest UNFCCC guidelines and manuals will be used to develop National Communications (NCs) and Biennial Update Reports (BURs).

***Sub-activities:***

* Develop and share draft report on GHG-I (with stakeholders for their comments)
* Incorporate the stakeholders comments
* Share the improved draft for independent review
* Incorporate the independent reviewer’s comments and finalize the report

(<http://unfccc.int/national_reports/non-annex_i_natcom/guidelines_and_user_manual/items/2607.php>).

Activity 2.6: Submit the national GHG-I report

PFI will finally submit the national GHG-I to OIGF, MoCC. The GHG-I report should include the following key sections:

* Information on the types of land use sub-categories and sub-divisions and detailed emissions and removals for each sub-division
* Information on the methods used to calculate emissions and removals
* List of the activity data used to calculate emissions and removals, including the values, units and years and references of this data
* List of emission and removals factors used to calculate emissions and removals in each category/sub-division, including the values, units and reference data
* Specify the year for which emission and removal estimates are made, and the associated error

## Monitoring function

The monitoring function is the core component of the NFMS and can actually be seen as the complete NFMS, since it largely builds on the other tools, such as the SLMS and the NFI. The NFMS will include the assessment, evaluation, interpretation and reporting of data, the derivation of information as well as the monitoring of their changes and trends over time.

The key goal of the monitoring function will be to generate reliable information to (i) support formulating, monitoring and adjusting policies related to forest and forest landscapes, (ii) inform interested stakeholders about the status of forests and (iii) report to international conventions and processes on a regular basis.

Although the specific objectives of the monitoring function and the related criteria and indicators to be monitored will be discussed and identified in a participatory way, the sustainability of forest management and forest policies is a core objective of the monitoring function. In that sense, the criteria of sustainable forest management will define the framework for national forest monitoring of Pakistan, and the indicators of sustainable forest management will define the core set of attributes to be surveyed, assessed and monitored in national forest monitoring. In this context of sustainable forest management, the NFMS of Pakistan will take into account not only the biophysical dimension of forests, but also the dimension of economy and society.

A web portal will be developed for the monitoring of the related activities. In the context of REDD+, the purpose of the monitoring function will be to assess the performance of REDD+ activities (demonstration activities in Phase 2 and national policies and measures in Phase 3). Depending on the REDD+ policies and measures that will be identified in the national REDD+ strategy of Pakistan, specific indicators will be discussed, identified and monitored by the NFMS (e.g. forest cover loss, volume of extracted timbers, number of trees planted, area of certified forests, etc.)

Output 1: The scope and objectives of forest monitoring are identified

Activity 1.1: Identify the scope and objectives of forest monitoring

Following the stakeholders mapping and the setup of a participatory process, global scope and specific objectives of the forest monitoring will be discussed and identified in a participatory way. All relevant bodies in government, non-government, research and private sectors and society will be involved

***Sub-activities:***

* Participatory discussion on the scope and objectives of forest monitoring
* Identification of expected outcomes of forest monitoring
* Identification of variables to be recorded
* Identification of responsibilities to be assigned

Scope and objectives can first be defined in terms of expected Outputs and then broken down into more concrete elements, including sectors to be involved, variables to be recorded and responsibilities to be assigned.

Activity 1.2: Identification of information needs

This activity will focus on the identification of priority information needs at the provincial and national level, in order to support forest policies and programmes development but also to efficiently support international reporting commitments.

***Sub-activities:***

* Assessment of available information and information needs
* Translation of information needs into indicators to be monitored

Analysis of how the information needs can be translated into indicators that can feasibly be observed in a monitoring process will be carry out.

Activity 1.3: Identification of indicators to be monitored

Criteria and indicators for sustainable forest management will define the core attributes of the NFMS. Criteria and indicators will be used as the tools to define, assess and monitor periodic progress towards sustainable forest management on a regular basis.

***Sub-activities:***

* Identification of indicators to monitor progress towards sustainable forest management
* Identification of indicators to monitor results of REDD+ policies and measures

Based on thematic elements for sustainable forest management recognized by FAO (i.e. extent of forest resources, forest biological diversity, forest health and vitality, productive functions of forest resources, protective functions of forest resources, socio-economic functions of forests and legal, policy and institutional framework) and in consultation with relevant stakeholders and through a participatory process, relevant criteria and indicators will be identified and monitored with the NFMS.

Depending on the REDD+ policies and measures that will be defined in the REDD+ national strategy, a special attention will be paid to the identification of indicators for the monitoring of REDD+ policies and measures (e.g. e.g. deforestation rate, timber volumes, network of protected areas, certified and non-certified forest concessions, reforestation areas, natural regeneration, etc.).

Output 2: The methodology and tools for forest monitoring are defined

The satellite land monitoring system and the national forest inventory will be the primary and main data sources of the NFMS. However, depending on the criteria and indicators that will be monitored, other tools might possibly be needed for the monitoring purpose, such as community-based approaches.

This output will develop the complete NFMS methodology for data collection and analysis in paying a special attention to the specific methods and tools needed for the monitoring of REDD+ policies and measures.

Activity 2.1: Identify monitoring methods and tools

Forest monitoring is presently carried out at provincial level according to existing information needs and monitoring methods.

***Sub-activities:***

* Identify approaches to forest monitoring (remote sensing, field approaches, community-based approaches, etc.)
* Assess what forest monitoring tools already exist at the national and provincial level
* Define the tools needed to monitor identified criteria and indicators of sustainable forest management
* Define the tools needed to monitor identified criteria and indicators for REDD+ policies and measures
* Assess synergies between existing and new tools (SLMS, NFI, etc.)
* Harmonize existing and new tools in a comprehensive methodology for forest monitoring

This activity will assess the existing monitoring methods and tools at provincial level as well as the need to develop new monitoring methods and tools in order to monitor relevant criteria and indicators for sustainable forest management and for REDD+ policies and measures.

This activity will be crucial for the development and implementation of the NFMS. It will include deliberation on what Pakistan wishes to monitor through the system, in order to get feedback on the effectiveness of the implementation of its national forestry policies and selected REDD+ activities. It will also be critical to discuss and agree upon what the monitoring function can generate on the REDD+ safeguards, as part of the national system for providing information on safeguards. The NFMS unit will take the lead role in chairing these discussions and in bringing together diverse stakeholders, from local to national and government to non-government.

Activity 2.2: Formally adopt monitoring methods and tools

Following results of previous activities, this activity will come up with a proposal that defines methods, tools and responsibilities for forest monitoring.

***Sub-activities:***

* Report on forest monitoring methods and tools
* Assign responsibilities for forest monitoring
* Formally adopt forest monitoring methods, tools and responsibilities

The proposal will be submitted to all stakeholders for comments and amendments and will then be officially adopted by relevant government representatives.

Output 3: The technical capacities are reinforced

Activity 3.1: Hire technical staff for the monitoring unit

As explained under output 1, a monitoring unit will be established through mutual consultation of the OIGF, PFI, provincial forest departments and other key stakeholders. Once the monitoring unit is established, full time qualified staff (Unit In charge, data Analyst, statistitions and web portal operator) will be hired to take over the monitoring work.

***Sub-activities:***

* Develop TORs of the required staff
* Hire or post full time staff through an open competitive process

*The cost of this activity is at higher end as it contains recruitment and salaries of 4 resource persons over a period of four years i.e. 216,550 USD.*

Activity 3.2: Capacity building

***Sub-activities:***

* Establish and equip national lab(Annex IX)
* Development of a robust database management system
* Technical capacity building

This activity will be implemented in synergy with the related activities described for the SLMS and the NFI. Typically, the development of a robust and centralised database management system will be common, as well as part of the trainings described for the SLMS and NFI.

For the specific monitoring purpose, once the required personnel are engaged, their capacity will be built through specialised trainings, including (but not limited to):

* Trainings on the objectives of forest monitoring, overall functions of the monitoring unit and specific tools to be used for forest monitoring
* Trainings on collection and processing of data and on maintenance of the NFMS web-portal;
* Trainings on requirements for reporting to international conventions and partners (e.g. UNFCCC, CBD, FAO FRA, etc.)

*Budget for this activity includes cost of establishing a lab and capacity building of the technical staff*

Activity 3.3: Develop and launch the NFMS web portal

***Sub-activities:***

* Design web portal (layout, functions, data, etc.)
* Train web portal operators
* Define technical parameters for server device (server, internet connection, logistics, server room power) and procure
* Conduct a national workshop to present the web portal
* Consider/incorporate public comments and adjust/set parameters for the web interface

A web portal will be developed to ensure transparency and accessibility of information related to forest resources, including REDD+ policies and measures.

The NFMS web portal will be developed in cooperation with ICIMOD, SUPARCO or any other suitable organization having such experience and is ready to extend support in this regard. The NFMS web portal will be hosted by the NFMS unit (in OIGF or PFI).

In order to reduce cost and time and to capitalize on existing experience, ICIMOD and WWF-P can be approached for this task. A provincial forest monitoring system can first be developed in one pilot province and extended to national level after adjustments. The selection of the pilot province will be based on the existing capacities, capabilities and forest cover.

To make the web portal operational necessary technical staff will be hired and trained. A consultant will also be hired to design the web portal with details of information and data to be uploaded.

*Budget for this activity includes cost of development and design of web portal, procurement and installation of equipment, and other operational cost.*

Output 4: The NFMS is operational

One operational, the NFMS will generate reliable information to support the development and adjustment of forest policies, to inform stakeholders about the status of forests, and to report to international conventions and processes on a regular basis.

Quality Control (QC) and Quality Assurance (QA) will be implemented to determine the quality of data collection, compilation and analysis. This process will result in recommendations for the system improvement.

Activity 4.1: Forest monitoring

This will be the regular function of the NFMS. The NFMS unit will collect, analyse and evaluate data according to the identified scope and methodology. Results of the monitoring process will then be published on a regular basis. The forest monitoring will include the periodic monitoring of criteria and indicators defined for the sustainable forest management. In the REDD+ framework, monitoring will focus on REDD+ demonstration activities during phase 2 (local scale) and on REDD+ national policies and measures during phase 3 (national scale).

***Sub-activities:***

* Data collection and analysis
* Information generation, reporting and dissemination
* Publication of information on the NFMS web portal
* Report to international conventions and commitments

The data and results will go through a review process. The independent evaluation of the monitoring system will be linked with quality assurance and quality control of the MRV system and done by either international or national NGOs or academia as explained in the section on institutional arrangements.

Activity 4.2: Quality control by the NFMS Unit

QC will be done internally by the NFMS unit. The NFMS unit will ensure that all the methods, procedures and techniques used during data collection, compilation, analysis and preparation of results are uniform and according to the agreed standards. The NFMS unit will first assess the required internal procedures for gradually establishing the QC in order to comply with the IPCC recommendations. Then it will ensure that these QC are followed.

***Sub-activities:***

* Develop QC protocols
* Implement QC protocols

*Budget for this activity includes cost of consultants/experts for assessment and development of QC measures and protocols and holding of training workshops on the QC.*

Activity 4.3: Quality assurance by an independent third party

QA is done externally by an independent organization such as an NGO or academic institution having relevant experience and capacity. The NFMS unit in consultation with all the stakeholders will first assess which procedures will be necessary for establishing an independent viewpoint that will form the basis of QA in order to comply with the IPCC recommendations. Then it will hire an independent QA organization which will assess how far those procedures were followed.

***Sub-activities:***

* Develop QA protocols
* Identify and hire relevant third party for the QA
* Implement QA protocols

*Budget under this activity includes cost of experts for assessment and development of procedure for the QA, training workshops and cost of Independent third party organization for QA.*

Activity 4.4: Periodic revisions and adjustments of the NFMS design

The NFMS design needs to be able to integrate emerging issues, such as changes in national policies or new international and/or scientific concerns. The flexibility of the design will therefore be important element of the strategic and long-term orientation of the NFMS.

Integration of new emerging issues or technical approaches will require technical and organizational flexibility as well as intensive communication between the involved stakeholders.

Periodic revisions and adjustments might also be necessary when the NFMS is used to report to international conventions and commitments, since concepts and definitions used can be subject to changes.

# LOGICAL FRAMEWORK

| **Results chain** | **Performance indicators** | | | **Means of verification** | **Risks/Mitigations measures** |
| --- | --- | --- | --- | --- | --- |
| **Indicators** | **Reference** | **Target** |  |  |
| **Global objective: To implement the NFMS of Pakistan** | | | | | |
| **Impact: Forest resources are monitored and results of REDD+ policies and measures are assessed** | | | | | |
| **Component 1: Institutional framework** | | | | | |
| **Output 1: The institutional framework is established** | | | | | |
| ***Activity 1.1: Establishment of the technical units*** | The technical units are operational | 0 | 6 technical units are operational (see chapter 6) | Meetings reports | Ambiguity about the mandate and administrative control of PFI/Conduct joint meetings and develop clarities prior to any decision |
| ***Activity 1.2: Setting up of participatory process*** | List of stakeholders;  Number of consultative meetings | A draft list of stakeholders;  consultative meetings | A complete list of stakeholders;  consultative meetings | List of stakeholders;  Meetings reports | Participation of the local communities and young professionals/Develop an elaborate process and approach to reach out most of the stakeholders |
| ***Activity 1.3: clarification of mandates within the technical units*** | Mandates and lines of communication and defined for each technical unit | 0 | 7 technical units (as for activity 1.1 + QA/QC unit) | TORs | Weak coordination between federal and provincial institutes may result in delays/Process of regular and proactive consultation between technical units will be adopted. |
| ***Activity 1.4: Promulgation of institutional arrangements*** | Legal notification | Proposal as described in section 4.5.1 | Legal notification | Legal notification | Delay in notification, slow process /  DO letter from the MoCC to relevant departments |
| **Output 2: The funding arrangements are defined** | | | | | |
| ***Activity 2.1: Inventory of available and needed funding*** | Inventory available | Budgets as detailed in the R-PP and NFMS Action Plan | Detailed inventory of available and needed funding | Report of the inventory and of the gap analysis | Coordination among different departments involved; Lack of understanding and interest of high level authorities; challenges in collecting the information regarding funding opportunities/  Constitute a special task force with representatives from all relevant departments to urgently deal with this matter. Also involve relevant NGOs. |
| ***Activity 2.2: Development of a resources mobilization strategy*** | The resource mobilization strategy is available | 0 | A detailed strategy with clear needs and timelines | Report | Government may not understand the importance of an NFMS and may not allocate sufficient funds for the implementation of NFMS./ an awareness raising campaign specifically designed for Gov. representatives to explain the importance and utility of the NFMS and the potential benefits of the REDD+ mechanism |
| ***Activity 2.3: Clarification of financial arrangements*** | A funding allocation mechanism is available | 0 | Proposal for Funding allocation mechanism | Proposal for Funding allocation mechanism available | Conflicts between institutions or administrative levels; lack of clarity regarding REDD+ funding mechanism/ Arrange presentations for higher management to develop clarity about REDD+ funding mechanism |
| ***Activity 2.4: Promulgation of financial arrangements*** | The financial arrangements are enacted | 0 | The financial arrangements are enacted | Legal notification | Slow procedures, Lack of interest of high level authorities, Conflicts between national and provincial levels/ hold special meetings to speed up the process. Organize regular coordination meetings between relevant provincial and federal level institutions. |

| **Results chain** | **Performance indicators** | | | **Means of verification** | **Risks/Mitigations measures** |
| --- | --- | --- | --- | --- | --- |
| **Indicators** | **Reference** | **Target** |  |  |
| **Global objective: To implement the NFMS of Pakistan** | | | | | |
| **Impact: Forest resources are monitored and results of REDD+ policies and measures are assessed** | | | | | |
| **Component 2: Satellite Land Monitoring System (SLMS)** | | | | | |
| **Intermediate outcome 2: Forest and land cover changes are measured** | | | | | |
| **Output 1: The technical capacities are reinforced** | | | | | |
| ***Activity 1.1: Establish a SLMS laboratory*** | The SLMS Lab is operational | Equipment available in PFI’s GIS Lab (see Annex IV) | Fully equipped SLMS Lab  (see Annex VI for needed equipment) | Pictures, Invoices, etc. | Slow and lengthy procedures/  Involve WWF Pakistan/SUPARCO in establishment of the SLMS lab |
| ***Activity 1.2: Select and recruit technical staff*** | Staff appointed and/or posted | 2 | 9 | Appointment letters, Transfer letters, signed contracts | Government procedures of hiring can take longer time than estimated/Instead of hiring as regular government staff, recruitments on annual basis will be done;  Brain drain/Attractive and stable contracts |
| ***Activity 1.3 : Train technical staff*** | Number of trainings;  Number of persons trained | 1 training on SLMS (UN-REDD targeted support) | Six (activity 1.3 in 6.2.1) | Pictures, Training proceedings, Attendance sheets | Trainers of SLMS not available in Pakistan /International experts will have to be requested |
| ***Activity 1.4 : Centralisation of existing data*** | Database is available | 0 | Robust database management system | Invoices, pictures ;  Signed data sharing agreements;  Availability of data | Difficulties in collecting the data, lack of coordination and cooperation with partners/negotiations of fair data sharing agreements |
| ***Activity 1.5 : Characterize satellite images for forest monitoring*** | Satellite images(High and medium resolution) | 0 | Landsat data; Very high resolution images | Availability of data | Future availability of the satellite images from the same sensor/ Keep searching for other compatible sensors |
| ***Activity 1.6 : Stratification of forest cover*** | Meetings conducted to finalize forest stratification | 1, PFRI/Forest Atlas of PFI | Seven Meetings,  Detail multi-level Legend using LCCS software | Maps; technical report presenting the methodology used for forest stratification; | Delay due to longer process due to presence of different reference strata /efficient coordination and thorough review through a specialized organization |
| ***Activity 1.7 : Produce a guidance document on the methodology to monitor land use and forest cover changes*** | The guidance document on the methodology to monitor land use and forest cover changes is available | 0 | Methodology to assess deforestation and forest degradation for each forest type | Activities report ; publication of guidance document ; monitoring of degradation in a pilot area | Lack of experts in remote sensing to monitor forest degradation/Look at international support |
| **Output 2 : The SLMS is operational (Land use and forest cover changes are measured)** | | | | | |
| **Activity 2.1 : Historical analysis of land use and forest cover changes** | FREL available | 0 | FREL available | FREL submitted the UNFCCC | Non-availability of data due to no coverage area, clouds and other atmospheric conditions; Accuracy of mapping/National space agency of Pakistan (SUPARCO) will be consulted for analysis and mapping support |
| **Activity 2.2: Monitoring of land use and forest cover changes** | Activity Data available | 0 | Activity Data (AD) on annual basis | SLMS reports;  Matrix of annual forest and land cover changes | Delays in timely completion of mapping activities due to late submission of field reports by NFI unit. /efficient coordination among various NFMS units. |
| **Activity 2.3 : Elaboration and validation of the global report of the SLMS** | Report available | 0 | Publication of Report on the  Web portal | Hard and soft copy of the report; Web portal | Delays due to late submission of comments by the verifying authorities/ Ensure timely initiation of the process. Regular follow up with the reviewing authorities |

| **Results chain** | **Performance indicators** | | | **Means of verification** | **Risks/Mitigations measures** |
| --- | --- | --- | --- | --- | --- |
| **Indicators** | **Reference** | **Target** |
| **Global objective: To implement the NFMS of Pakistan** | | | | | |
| **Impact: Forest resources are monitored and results of REDD+ policies and measures are assessed** | | | | | |
| **Component 3: National Forest Inventory (NFI)** | | | | | |
| **Intermediate outcome 3: Forest resources and carbon stocks of the different forest types are assessed** | | | | | |
| **Output 1: The technical capabilities are strengthened** | | | | | |
| ***Activity 1.1: establish and equip national and provincial laboratories*** | National and provincial laboratories are functional | Existing facilities ([Annex III-F](#_Annex_III-F._Existing)) | Updated NFI Labs at PFI and Provincial FDs. Based on equipment described in [Annex VII](#_Annex_VII._Needed). | Purchase vouchers; equipment available in the laboratories; pictures of the labs | Ambiguity regarding office space among PFI and Provincial FDs/Agreements with PFI and Provincial FDs regarding office space and staff |
| ***Activity 1.2: Capacity Building*** | Number of trainings | Existing trained staff in provinces and PFI ([Annex III-C](#_Annex_III-C._Existing)) | 8 trainings ([Activity 1.2](#_National_forest_inventory_1)) | List of participants, attendance sheets, training certificates | Nomination of inappropriate or unqualified staff/develop clear and concrete TORs and requirements for the nominations of most suitable officers |
| ***Activity 1.3: Centralization of existing data*** | Database is available | Field based forest inventories as listed in [Annex I-B](#_Annex_I-B._Field-based) | Robust database management system | Invoices, pictures ;  Signed data sharing agreements;  Availability of data | Difficulties in collecting the data, lack of coordination and cooperation with partners/negotiations of fair data sharing agreements |
| **Output 2 : The NFI is designed** | | | | | |
| ***Activity 2.1: validate the national definition of forest*** | The national definition of forest is available | 1, Proceedings of National Consultation Workshop on Modalities and procedures for REDD+ Safeguards” in 2011 | National definition of forest adopted | Validation document; Government note | Ambiguity about the forest stratification /Develop consensus on the national circumstances and forest stratification |
| ***Activity 2.2: conceptualize the multipurpose NFI*** | Global and specific objectives of NFI are identified; bio-physical and socioeconomic variables are defined. | Proceedings of the District wise/Provincial/ National REDD+ awareness raising workshops | One Workshop | Workshop report | Inappropriate nominations/ develop clear TOR’s and requirements for the nomination of suitable participants |
| ***Activity 2.3: Develop the multipurpose NFI methodology*** | NFI methodology is designed, validated and published | Existing provincial and/or local methodologies | NFI methodology is designed, validated and published | NFI methodology is published | Difficulties in harmonizing and integrating existing methodologies and data sources/Request for international technical assistance |
| ***Activity 2.4: Develop the field manual*** | Field manual is published | 0 | Field manual is published | Field manual | Local communities and forest department staff may not understand various terminologies/ publish the field manual in local languages. Organize on-job trainings. |
| **Output 3 : The NFI is implemented** | | | | | |
| ***Activity 3.1: Train technical staff on NFI methodology*** | Training completed | 0 | 1 | List of participants, attendance sheets | Inappropriate nominations/ develop clear TOR’s and requirements for the nomination of suitable participants |
| ***Activity 3.2: Operational planning*** | The operational planning is available | [Annex III-B](#_Annex_III-B._Existing) & [Annex VII](#_Annexe_11._Indicateurs) | Work plan and purchase of needed equipment | Minutes of the meetings; Purchase of equipment; work plan for field operations | Lack of involvement of provincial FDs in the planning process/ efficient coordination and participation of provincial FDs in the planning process. |
| ***Activity 3.3: Recruitment and training of field teams*** | Field teams trained | 0 | Seven Trainings | Contracts | Inappropriate nominations/ develop clear TOR’s and requirements for the nomination of suitable staff |
| ***Activity 3.4: Collection of field data*** | Field data are available | Database developed in activity 1.3 | Field data collected | Field data sheets ;  Database | Inaccessibility of remote field sites, Lack of accuracy in operation planning, hostile situation of some areas/ verification by field experts. involve local people |
| ***Activity 3.5: Data processing*** | Data are processed and integrated in the database | 0 | Database with processed data | Database | Vague data, use of inappropriate software/ ensure the use of most recommended software |
| **Output 4: The data are analysed and the results are disseminated** | | | | | |
| ***Activity 4.1: Data analysis and report*** | NFI report is available | 0 | NFI report is available | Report | Delays due to late submission of comments by the verifying authorities/ Ensure timely initiation of the process. Regular follow up with the reviewing authorities |
| ***Activity 4.2: Dissemination of the information*** | NFI results are published on the web portal | 0 | NFI results are published on the web portal | NFI results are published on the web portal | Non-functional web portal/ Ensure an efficient intra national web portal for the sharing of reports. |

| **Results chain** | **Performance indicators** | | | **Means of verification** | **Risks/Mitigations measures** |
| --- | --- | --- | --- | --- | --- |
| **Indicators** | **Reference** | **Target** |
| **Global objective: To implement the NFMS of Pakistan** | | | | | |
| **Impact: Forest resources are monitored and results of REDD+ policies and measures are assessed** | | | | | |
| **Component 4: Greenhouse Gas Inventory (GHG-I)** | | | | | |
| **Intermediate outcome 4: GHG emissions and removals are assessed and reported** | | | | | |
| **Output 1: The technical capacities are strengthened** | | | | | |
| ***Activity 1.1: Establishment of the GHG-I national laboratory*** | The GHG-I Lab id functional | 0 | Up-to-date GHG-I Lab at PFI ([Annex VIII](#_Annexe_11._Indicateurs)) | Pictures, Invoices | Slow and lengthy procedures/  Involve GCISC in establishment of the GHG-I lab |
| ***Activity 1.2: Recruitment of the technical staff*** | Staff appointed and/or posted | 0 | 4 members (see activity 1.2 in section 6) | Appointment letters | Government procedures of hiring can take long time/Recruitments of consultants on annual basis |
| ***Activity 1.3: Capacity Building*** | Number of trainings | 1 | 3 | Pictures, Training proceedings, Attendance sheets | Trainers on advanced software’s are not available in Pakistan/Support from international experts |
| **Output 2 : The GHG-I is compiled** | | | | | |
| ***Activity 2.1 : Develop the GHG-I methodology*** | The GHG-I methodology is available and published | 0 | Guidance document on GHG-I methodology | The GHG-I methodology is available and published | Unavailability of national experts in GHG-I/Look at international support |
| ***Activity 2.2 : Data centralization and estimation of GHG emissions/removals*** | GHG emissions/  removals are assessed | 0 | GHG emissions/  removals are assessed | Report on GHG emissions/  Removals is available | Data redundancy, Data Errors/Ensure quality of the processed data |
| ***Activity 2.3: Quality assurance and quality control*** | QA-QC protocols defined and implemented | 0 | Regular implementation of QA-QC protocols | QA-QC protocols;  QA reports by third party; | Hiring of a real third party may not happen/Ensure fair and transparent hiring procedures |
| ***Activity 2.4: Assess uncertainties of GHG estimates*** | Documentation of Uncertainties | 0 | Any reference information | Estimates of uncertainties are available | AD: Gaps in time series, Lack of references, EF: Scarcity of quantitative information (measurements, sample representativeness)/ ensure alternate strategies |
| ***Activity 2.5: Compilation of the national GHG-I report*** | Hard and soft versions of the report | 1, First National Communication on GHG-Inventory | National GHG-I report | Hard and soft versions of the report | Delays due to late submission of comments by the verifying authorities/ Ensure timely initiation of the process. Regular follow up with the reviewing authorities |
| ***Activity 2.6: Submit the national GHG-I report*** | The GHG-I is submitted | 0 | Reporting the GHG emissions/removals to UNFCCC | The GHG-I is submitted to the UNFCCC | Weak coordination among OIGF and PFI/ Ensure efficient coordination |

| **Results chain** | **Performance indicators** | | | **Means of verification** | **Risks/Mitigations measures** |
| --- | --- | --- | --- | --- | --- |
| **Indicators** | **Reference** | **Target** |
| **Global objective: To implement the NFMS of Pakistan** | | | | | |
| **Impact: Forest resources are monitored and results of REDD+ policies and measures are assessed** | | | | | |
| **Component 5: Monitoring function** | | | | | |
| **Intermediate outcome 1: Results of REDD+ policies and measures are assessed** | | | | | |
| **Output 1: The Scope and objectives of forest monitoring are identified** | | | | | |
| ***Activity 1.1: identify the scope and objectives of forest monitoring*** | Scope and objectives of the NFMS are published | FAO’s voluntary guidelines on NFMS;  UN-REDD’s background information document on NFMS for REDD+ | Scope and objectives of the NFMS are identified | Concept note identifying scope and objectives of the NFMS;  ToRs of the NFMS technical unit | The provincial forest departments may take time to become used to the new system/suitable capacity building plan will be developed |
| ***Activity 1.2: identification of information needs*** | List of information needs available | 0 | The information needs are identified | List of information needs | Lack of understanding and over estimation of needs/ Cross checking and triangulation |
| ***Activity 1.3: Identifications of indicators to be monitored*** | The list of indicators is available | Different existing sets of C&I for SFM (e.g. FAO, forest certification schemes, etc.) | The indicators are identified and described | List of indicators validated and published | Limited knowledge and understanding of indicators/ organize lecture and presentations, develop guidelines on monitoring indicators |
| **Output 2: The methodology and tools for forest monitoring are defined** | | | | | |
| ***Activity 2.1: Identify monitoring methods and tools*** | Number of consultative workshops | 0 | 4 | Workshop reports;  Proposal of monitoring methods and tools | Nomination of irrelevant and unqualified persons / Develop proper guidelines regarding nomination of suitable candidates |
| ***Activity 2.2: Formally adopt monitoring methods and tools*** | A technical manual for the monitoring of forests is available | 0 | A technical manual for the monitoring of forests is validated and published | Technical manual for the monitoring of forests of Pakistan | Lack of coordination among provincial and federal level organizations/ regular coordination meetings and sessions |
| **Output 3 : The technical capacities are reinforced** | | | | | |
| ***Activity 3.1: Hire technical staff for the monitoring unit*** | Fulltime qualified staff is in place in the NFMS technical unit | 0 | Number of technical assistants to be defined | Contracts | Staff turnover/Attractive and multiyear contracts |
| ***Activity 3.2: Capacity building*** | Number of trainings | 0 | 10 | Training reports | Limited in-country expertise/ UNREDD will be requested for the services of an international consultant |
| ***Activity 3.3: Development and launching of the NFMS Web Portal*** | Web portal is online | 0 | Develop the NFMS web portal;  Launch, maintain and update the web portal | Web portal functioning and regularly updated | Staff turnover and transfers/ Full time staff will be hired |
| **Output 4: The NFMS is operational** | | | | | |
| ***Activity 4.1: Forest Monitoring*** | NFMS report is available;  Updated NFMS Web Portal | 0 | Regular forest monitoring | Report of the NFMS;  Web portal regularly updated;  Report to FAO’ FRA;  Report to UNFCCC | Delays in data sharing between technical units, administrative levels and other stakeholders /Regular coordination meetings and appropriate communication |
| ***Activity 4.2: Quality Control by the NFMS unit*** | QC protocol is available;  QC report is available | 0 | Development of QC procedures and protocols;  Establish a QC sub-unit within the monitoring unit;  Quality Control by the sub-unit; | QC procedures and protocols;  QC reports by the sub-unit; | Limited capacity and expertise of staff/ Develop capacity building plan and organize regular trainings |
| ***Activity 4.3: Quality assurance by an independent third part*** | Protocol for QA of monitoring methods and results is available;  QA report is available | 0 | QA of monitoring methods and results is regularly implemented | QA procedures and protocols;  QA reports by third party | Hiring of a real third party may not happen/Ensure fair and transparent hiring procedures |
| ***Activity 4.4: Periodic revision and adjustments of the NFMS design*** | Number of technical meetings | 0 | 6/year | Meetings reports | Rapidly changing requirements of the UNFCCC/ Identify a penal of experts in the country and get them connected with the IPCC for updating the methods and systems |

# BUDGET AND WORK PLAN

## Institutional framework

| **Outputs and activities** | | **Year** | **I** | | **II** | | **III** | | **IV** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **1** | **2** | **1** | **2** | **1** | **2** | **1** | **2** |
| **budget (k$)** | | | | | | | | |
| **Output 1: The institutional framework is established** | | **97.7** | **86.1** | | **3.8** | | **3.8** | | **3.8** | |
| **1.1** | **Establishment of the technical units** | **52.9** | **47.1** | | **1.9** | | **1.9** | | **1.9** | |
| 1.1.1 | Legal preparedness | 16.0 | 16.0 |  |  |  |  |  |  |  |
| 1.1.2 | Stakeholders consultation | 14.1 | 14.1 |  |  |  |  |  |  |  |
| 1.1.3 | Identification of mandate and responsibilities of the technical units | 14.1 |  | 14.1 |  |  |  |  |  |  |
| 1.1.4 | Enact institutional arrangements | 1.0 |  | 1.0 |  |  |  |  |  |  |
| 1.1.5 | Operationalization of the technical units | **7.7** | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| **1.2** | **Setting up of participatory process** | **42.2** | **36.4** | | **1.9** | | **1.9** | | **1.9** | |
| 1.2.1 | Stakeholders mapping | 10.4 | 10.4 |  |  |  |  |  |  |  |
| 1.2.2 | Identification of roles and responsibilities | 14.1 |  | 14.1 |  |  |  |  |  |  |
| 1.2.3 | Implication of young professionals | 10.0 |  |  | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.4 | Setting up of the participatory process | 7.7 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| **1.3** | **Clarification of mandates within the technical units** | **2.6** | **2.6** | | **0.0** | | **0.0** | | **0.0** | |
| 1.3.1 | Identification of mandates to implement the NFMS | 0.8 |  | 0.8 |  |  |  |  |  |  |
| 1.3.2 | Definition of lines of communication | 0.8 |  | 0.8 |  |  |  |  |  |  |
| 1.3.3 | Promulgation of mandates and lines of communication | 1.0 |  | 1.0 |  |  |  |  |  |  |
| **1.4** | **Promulgation of institutional arrangements** | **0.0** | **0.0** | | **0.0** | | **0.0** | | **0.0** | |
| **Output 2: The funding arrangements are defined** | | 84.8 | **0.0** | | **47.6** | | **37.2** | | **0.0** | |
| **2.1** | **Inventory of available and needed funding** | **16.8** | **0.0** | | **16.8** | | **0.0** | | **0.0** | |
| 2.1.1 | Identification of necessary resources to implement the NFMS | 4.8 |  |  | 4.8 |  |  |  |  |  |
| 2.1.2 | Inventory of available funding | 5.0 |  |  | 5.0 |  |  |  |  |  |
| 2.1.3 | Gap analysis | 7.0 |  |  | 7.0 |  |  |  |  |  |
| **2.2** | **Development of a resources mobilization strategy** | **30.8** | **0.0** | | **30.8** | | **0.0** | | **0.0** | |
| 2.2.1 | Development of a resources mobilization strategy | 11.7 |  |  |  | 11.7 |  |  |  |  |
| 2.2.2 | Identify donors | 14.1 |  |  |  | 14.1 |  |  |  |  |
| 2.2.3 | Strategy implementation | 5.0 |  |  |  | 5.0 |  |  |  |  |
| **2.3** | **Clarification of financial arrangements** | **22.1** | **0.0** | | **0.0** | | **22.1** | | **0.0** | |
| 2.3.1 | Assess the process required for a transition to a sustainable self-financing arrangement and develop a timeline for its implementation | 4.0 |  |  |  |  | 4.0 |  |  |  |
| 2.3.2 | Stakeholders consultation for the funding allocation mechanism | 14.1 |  |  |  |  | 14.1 |  |  |  |
| 2.3.3 | Proposal of funding allocation mechanism and proposal for its implementation | 4.0 |  |  |  |  | 4.0 |  |  |  |
| **2.4** | **Promulgation of financial arrangements** | **15.1** | **0.0** | | **0.0** | | **15.1** | | **0.0** | |
| 2.4.1 | Organization of a validation workshop to formally adopt the funding allocation mechanism | 14.1 |  |  |  |  |  | 14.1 |  |  |
| 2.4.2 | official enactment of financial arrangement | 1.0 |  |  |  |  |  | 1.0 |  |  |
| **Annual budget (k$)** | | **182.5** | **86.1** | | **51.4** | | **41.0** | | **3.8** | |
| **Total budget (k$)** | | **182.5** | | | | | | | | |

## Satellite Land Monitoring System

| **Outputs and activities** | | **Year** | **I** | | **II** | | **III** | | **IV** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **1** | **2** | **1** | **2** | **1** | **2** | **1** | **2** |
| **budget (k$)** | | | | | | | | |
| **Output 1 : The technical capacities are reinforced** | | **1,247.8** | **591.6** | | **368.2** | | **146.4** | | **141.9** | |
| **1.1** | **Establish a SLMS laboratory** | **329.6** | **330.0** | | **0.0** | | **0.0** | | **0.0** | |
| 1.1.1 | Allocation (renovation) of office space for SLMS laboratory | 10.0 | 10.0 |  |  |  |  |  |  |  |
| 1.1.2 | Purchase office supplies | 76.9 | 77.0 |  |  |  |  |  |  |  |
| 1.1.3 | Purchase of equipment | 242.7 | 243.0 |  |  |  |  |  |  |  |
| **1.2** | **Select, recruit and retain technical staff** | **259.8** | **65.4** | | **64.8** | | **64.8** | | **64.8** | |
| 1.2.1 | Call for applications | 0.1 | 0.1 |  |  |  |  |  |  |  |
| 1.2.2 | Screen, test and recruit candidate skills in remote sensing and GIS | 0.5 | 0.5 |  |  |  |  |  |  |  |
| 1.2.3 | Retain staff for four year project duration (9 resource persons x (salary +12% increment/year) | 259.2 | 32.4 | 32.4 | 32.4 | 32.4 | 32.4 | 32.4 | 32.4 | 32.4 |
| **1.3** | **Train technical staff** | **363.4** | **145.3** | | **218.0** | | **0.0** | | **0.0** | |
| 1.3.1 | Trainings on basic RS/GIS techniques | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 1.3.2 | Training on satellite image correction, enhancement and interpretation | 72.7 |  | 72.7 |  |  |  |  |  |  |
| 1.3.3 | Trainings on open source software to assess land use and forest cover changes | 72.7 |  | 72.7 |  |  |  |  |  |  |
| 1.3.4 | Training on land cover classification and forest stratification | 72.7 |  |  | 72.7 |  |  |  |  |  |
| 1.3.5 | Training on monitoring forest degradation using RS techniques | 72.7 |  |  | 72.7 |  |  |  |  |  |
| 1.3.6 | Training on UNFCCC’s requirements for reporting on land use changes | 72.7 |  |  |  | 72.7 |  |  |  |  |
| **1.4** | **Centralisation of existing data** | **12.3** | **12.3** | | **0.0** | | **0.0** | | **0.0** | |
| 1.4.1 | Facilitate data sharing agreement between relevant institutions | 3.8 |  | 3.8 |  |  |  |  |  |  |
| 1.4.2 | Harmonization of all existing remote sensing and field data | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 1.4.3 | Development of a robust database management system | 8.5 |  | 8.5 |  |  |  |  |  |  |
| **1.5** | **Characterize satellite images for forest monitoring** | **270.0** | **38.6** | | **77.1** | | **77.1** | | **77.1** | |
| 1.5.1 | Assess the impact of available images for forest stratification, monitoring of deforestation and forest degradation | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 1.5.2 | Recommendations for the development of forest stratification, the monitoring of deforestation and forest degradation and for the monitoring of REDD+ activities | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 1.5.3 | Purchase very high resolution imagery according to needs | 270.0 |  | 38.6 | 38.6 | 38.6 | 38.6 | 38.6 | 38.6 | 38.6 |
| **1.6** | **Stratification of forest cover** | **1.3** | **0.0** | | **1.3** | | **0.0** | | **0.0** | |
| 1.6.1 | Consultative meeting in each province for the further categorisation of forest types and LCCS classes | 1.1 |  |  | 1.1 |  |  |  |  |  |
| 1.6.2 | Presentation and approval of the LCCS legend | 0.2 |  |  |  | 0.2 |  |  |  |  |
| 1.6.3 | Stratification of forest cover | 0.0 |  |  |  | 0.0 |  |  |  |  |
| **1.7** | **Produce a guidance document on the methodology to monitor land use and forest cover changes** | **11.5** | **0.0** | | **7.0** | | **4.5** | | **0.0** | |
| 1.7.1 | Definition of intact, fragmented and degradaed forest | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 1.7.2 | Development of a methodology for the monitoring of land use and forest cover changes | 7.0 |  |  |  | 7.0 |  |  |  |  |
| 1.7.3 | Development of QA/QC procedures | 0.0 |  |  |  |  | 2.0 |  |  |  |
| 1.7.4 | Publication of methodology and guidelines for data collection, analysis, QA/QC, reporting and dissemination | 2.5 |  |  |  |  |  | 2.5 |  |  |
| **Output 2 : The SLMS is operational (Land use and forest cover changes are measured)** | | **17.5** | **0.0** | | **5.0** | | **7.5** | | **5.0** | |
| **2.1** | **Historical analysis of land use and forest cover changes** | **7.5** | **0.0** | | **0.0** | | **7.5** | | **0.0** | |
| 2.1.1 | Validation of the reference year (T0) | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 2.1.2 | Assessment of historical land use and forest cover changes | 0.0 |  |  |  | 0.0 | 0.0 |  |  |  |
| 2.1.3 | QA/QC | 0.0 |  |  |  |  | 0.0 |  |  |  |
| 2.1.4 | Projection of the FREL/FRL (according to national circumstances) | 7.5 |  |  |  |  |  | 7.5 |  |  |
| **2.2** | **Monitoring of land use and forest cover changes** | **5.0** | **0.0** | | **2.5** | | **0.0** | | **2.5** | |
| 2.2.1 | Pre-processing of satellite images | 0.0 |  |  | 0.0 |  |  |  | 0.0 |  |
| 2.2.2 | Assessment of land cover changes | 0.0 |  |  | 0.0 | 0.0 |  |  | 0.0 | 0.0 |
| 2.2.3 | Assessment of forest cover changes | 0.0 |  |  | 0.0 | 0.0 |  |  | 0.0 | 0.0 |
| 2.2.4 | Results publication in the form of a comprehensive report | 5.0 |  |  |  | 2.5 |  |  |  | 2.5 |
| **2.3** | **Elaboration and validation of the global report of the SLMS** | **5.0** | **0.0** | | **2.5** | | **0.0** | | **2.5** | |
| 2.3.1 | Drafting of SLMS report | 0.0 |  |  | 0.0 | 0.0 |  |  | 0.0 | 0.0 |
| 2.3.2 | Stakeholders review | 0.0 |  |  |  | 0.0 |  |  |  | 0.0 |
| 2.3.3 | Publication on the NFMS web portal | 5.0 |  |  |  | 2.5 |  |  |  | 2.5 |
| **Annual budget(k$)** | | **1265.3** | **591.6** | | **373.2** | | **153.9** | | **146.9** | |
| **Total budget (k$)** | | **1265.7** | | | | | | | | |

## National Forest Inventory

| **Outputs and activities** | | **Year** | **I** | | **II** | | **III** | | **IV** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **1** | **2** | **1** | **2** | **1** | **2** | **1** | **2** |
|  |  | **budget (k$)** | | | | | | | | |
| **Output 1 : The technical capacities are strengthened** | | **1008.9** | **977.4** | | **19.0** | | **6.0** | | **6.0** | |
| **1.1** | **Establish and equip national and provincial laboratories** | **981.5** | **963.0** | | **6.0** | | **6.0** | | **6.0** | |
| 1.1.1 | Identify office space for national and provincial NFI labs | 0.0 | 0.0 |  |  |  |  |  |  |  |
| 1.1.2 | Purchase of equipment for the national laboratory (PFI) | 133.2 | 133.0 |  |  |  |  |  |  |  |
| 1.1.3 | Strengthening of the existing laboratories in provincial forest departments | 827.3 | 827.0 |  |  |  |  |  |  |  |
| 1.1.4 | Maintenance of the equipment | 21.0 |  | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| **1.2** | **Capacity building** | **23.4** | **10.4** | | **13.0** | | **0.0** | | **0.0** | |
| 1.2.1 | Technical trainings on tools for forest monitoring (including field-based inventories and satellite monitoring systems) | 2.6 |  | 2.6 |  |  |  |  |  |  |
| 1.2.2 | Technical trainings on the use of remote sensing for NFI | 2.6 |  | 2.6 |  |  |  |  |  |  |
| 1.2.3 | Capacity building on geospatial data processing and database management | 2.6 |  | 2.6 |  |  |  |  |  |  |
| 1.2.4 | Trainings on descriptive statistics | 2.6 |  | 2.6 |  |  |  |  |  |  |
| 1.2.5 | Training on the processing and analysis of inventory data (including the use of open source software) | 2.6 |  |  | 2.6 |  |  |  |  |  |
| 1.2.6 | Trainings on errors propagation, uncertainty assessment, Quality Assurance and Quality control | 2.6 |  |  | 2.6 |  |  |  |  |  |
| 1.2.7 | Capacity building on international reporting (UNFCCC, CBD, FAO, etc.) | 2.6 |  |  | 2.6 |  |  |  |  |  |
| 1.2.8 | Trainings on the development of allometric equations | 2.6 |  |  | 2.6 |  |  |  |  |  |
| 1.2.9 | Strengthening of young professionals capacities and links to research activities | 2.6 |  |  | 2.6 |  |  |  |  |  |
| **1.3** | **Centralization of existing data** | **4.0** | **4.0** | | **0.0** | | **0.0** | | **0.0** | |
| 1.3.1 | Identification of mandates to implement the NFI | 4.0 |  | 4.0 |  |  |  |  |  |  |
| 1.3.2 | Identify all data holders | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 1.3.3 | Facilitate data sharing agreement between relevant institutions | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 1.3.4 | Collection and harmonization of all existing remote sensing and field data | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 1.3.5 | Development of a robust database management system | 0.0 |  | 0.0 |  |  |  |  |  |  |
| **Output 2 : The NFI is designed** | | **57.5** | **15.3** | | **42.2** | | **0.0** | | **0.0** | |
| **2.1** | **Validate the national definition of forest** | **8.2** | **8.2** | | **0.0** | | **0.0** | | **0.0** | |
| 2.1.1 | Develop criteria and indicators easily measurable in the field | 1.1 | 1.1 |  |  |  |  |  |  |  |
| 2.1.2 | Organize a validation workshop for the definition of forest | 7.1 | 7.1 |  |  |  |  |  |  |  |
| 2.1.3 | Legally adopt the national definition of forest | 0.0 | 0.0 |  |  |  |  |  |  |  |
| **2.2** | **Conceptualize the multipurpose NFI** | **7.1** | **7.1** | | **0.0** | | **0.0** | | **0.0** | |
| 2.2.1 | Identify the global and specific objectives of the NFI | 7.1 |  | 7.1 |  |  |  |  |  |  |
| 2.2.2 | Identify the criteria and indicators to monitor | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 2.2.3 | Identify the bio-physical and socio-economic variables to be measured | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 2.2.4 | Identify the frequency of field measurements | 0.0 |  | 0.0 |  |  |  |  |  |  |
| **2.3** | **Develop the multipurpose NFI methodology** | **33.2** | **0.0** | | **33.2** | | **0.0** | | **0.0** | |
| 2.3.1 | Assessment of forest areas (through remote sensing tools) | 15.0 |  |  | 15.0 |  |  |  |  |  |
| 2.3.2 | Develop the sampling design (sampling methodology, number and distribution of sample plots, design and layout of sample plots) | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 2.3.3 | Develop the measurement protocols | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 2.4.4 | Draft the multipurpose NFI methodology, including financial proposals | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 2.4.5 | Share methodology with all partners for comments and improvements | 0.6 |  |  | 0.6 |  |  |  |  |  |
| 2.4.6 | Test the methodology in the field | 7.0 |  |  | 7.0 |  |  |  |  |  |
| 2.4.7 | Implement a national workshop to validate the methodology | 10.6 |  |  | 10.6 |  |  |  |  |  |
| **2.4** | **Develop the field manual** | **9.0** | **0.0** | | **9.0** | | **0.0** | | **0.0** | |
| 2.4.1 | Review of literature | **0.0** |  |  |  | **0.0** |  |  |  |  |
| 2.4.2 | Draft the field manual | 2.0 |  |  |  | 2.0 |  |  |  |  |
| 2.4.3 | Test the field manual in the field | 7.0 |  |  |  | 7.0 |  |  |  |  |
| 2.4.4 | Formally adopt the field manual | 0.0 |  |  |  | 0.0 |  |  |  |  |
| **Output 3: The NFI is implemented** | | **612.5** | **0.0** | | **252.5** | | **240.0** | | **120.0** | |
| **3.1** | **Train technical staff on NFI methodology** | **6.1** | **0.0** | | **6.1** | | **0.0** | | **0.0** | |
| 3.1.1 | Identification of trainers from provincial forest departments | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 3.1.2 | Training of trainers on NFI methodology, including field protocols for the development of allometric equations | 6.1 |  |  | 6.1 |  |  |  |  |  |
| **3.2** | **Operational planning** | **3.2** | **0.0** | | **3.2** | | **0.0** | | **0.0** | |
| 3.2.1 | Field work planning | 3.2 |  |  | 3.2 |  |  |  |  |  |
| 3.2.2 | Purchase and security of needed equipment | 0.0 |  |  | 0.0 |  |  |  |  |  |
| **3.3** | **Recruitment and training of field teams** | **3.2** | **0.0** | | **3.2** | | **0.0** | | **0.0** | |
| 3.3.1 | Identification of team leaders | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 3.3.2 | Recruitment of field teams | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 3.3.3 | Training of field teams | 3.2 |  |  | 3.2 |  |  |  |  |  |
| **3.4** | **Collection of field data** | **600.0** |  | | **240.0** | | **240.0** | | **120.0** | |
| 3.4.1 | Collection of field data | 600.0 |  |  | 120.0 | 120.0 | 120.0 | ### | 120.0 |  |
| **3.5** | **Data processing** | **0.0** | **0.0** | | **0.0** | | **0.0** | | **0.0** | |
| 3.5.1 | Centralization and data encoding | 0.0 |  |  |  |  |  |  |  |  |
| 3.5.2 | Analysis of samples of soil and litter | 0.0 |  |  |  |  |  |  |  |  |
| 3.5.3 | Data processing | 0.0 |  |  |  |  |  |  |  |  |
| **Output 4: The data are analysed and the results are disseminated** | | **24.2** | **0.0** | | **15.4** | | **3.7** | | **5.0** | |
| **4.1** | **Data analysis and report** | **22.2** | **0.0** | | **13.5** | | **3.7** | | **5.0** | |
| 4.1.1 | Development of data management system | 10.4 |  |  | 10.4 |  |  |  |  |  |
| 4.1.2 | Development and implementation of quality control | 6.2 |  |  |  | 3.1 | 3.1 |  |  |  |
| 4.1.3 | Documentation of the data analysis system | 0.6 |  |  |  |  |  | 0.6 |  |  |
| 4.1.4 | Final report writing | 0.0 |  |  |  |  |  |  | 0.0 |  |
| 4.1.5 | Publication and dissemination of the results | 5.0 |  |  |  |  |  |  | 5.0 |  |
| **4.2** | **Dissemination of information** | **1.9** | **0.0** | | **1.9** | | **0.0** | | **0.0** | |
| 4.2.1 | Documentation of methods and data collection for forest monitoring | 0.0 |  |  |  | 0.0 |  |  |  |  |
| 4.2.2 | Development of a template for data sharing agreement | 1.9 |  |  |  | 1.9 |  |  |  |  |
| 4.2.3 | Development of a web-based platform for data sharing among national stakeholders | 0.0 |  |  |  | 0.0 |  |  |  |  |
| 4.2.4 | Publication of the results on the NFMS web portal | 0.0 |  |  |  |  |  |  | 0.0 |  |
| **Annual budget(k$)** | | **1703.1** | **992.7** | | **329.1** | | **249.7** | | **131.0** | |
| **Total budget (k$)** | | **1702.6** | | | | | | | | |

## Greenhouse Gas Inventory

| **Outputs and activities** | | **Year** | **I** | | **II** | | **III** | | **IV** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **1** | **2** | **1** | **2** | **1** | **2** | **1** | **2** |
| **budget (k$)** | | | | | | | | |
| **Output 1 : The technical capacities are strengthened** | | **344.0** | **141.7** | | **78.8** | | **66.7** | | **66.7** | |
| **1.1** | **Establishment of the GHG-I national laboratory** | **53.4** | **51.1** | | **0.7** | | **0.7** | | **0.7** | |
| 1.1.1 | Identify office space for national GHG-I labs | 10.0 | 10.0 |  |  |  |  |  |  |  |
| 1.1.2 | Purchase of equipment for the national laboratory (GHG-I) | 40.4 | 40.4 |  |  |  |  |  |  |  |
| 1.1.3 | Maintenance of the Lab | 3.0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| **1.2** | **Recruitment of the technical staff** | **264.6** | **66.6** | | **66.0** | | **66.0** | | **66.0** | |
| 1.2.1 | National-level call for applications | 0.1 | 0.1 |  |  |  |  |  |  |  |
| 1.2.2 | Screen and test the skills of candidates | 0.5 | 0.5 |  |  |  |  |  |  |  |
| 1.2.3 | Select recruit and retain most appropriate candidates | 264.0 | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 |
| **1.3** | **Capacity building** | **36.1** | **24.0** | | **12.0** | |  | |  | |
| 1.3.1 | Training on basic GHG-I training modules | 12.0 |  | 12.0 |  |  |  |  |  |  |
| 1.3.2 | Training on GHG-I data management and estimates preparation from AD and EF (data quality, data gaps, data consistency, data sources, quality control and assurance) | 12.0 |  | 12.0 |  |  |  |  |  |  |
| 1.3.3 | Training on reporting | 12.0 |  |  |  | 12.0 |  |  |  |  |
| **Output 2 : The GHG-I is compiled** | | **110.4** | **8.0** | | **52.6** | | **22.1** | | **27.7** | |
| **2.1** | **Develop the GHG-I methodology** | **19.9** | **8.0** | | **11.9** | | **0.0** | | **0.0** | |
| 2.1.1 | Draft the GHG-I methodology | 16.0 |  | 8.0 | 8.0 |  |  |  |  |  |
| 2.1.2 | Comments and improvements from stakeholders | 0.0 |  |  | 0.0 |  |  |  |  |  |
| 2.1.3 | National workshop to validate the methodology | 3.9 |  |  | 3.9 |  |  |  |  |  |
| **2.2** | **Data centralization and estimation of GHG emissions/removals** | **2.6** | **0.0** | | **1.3** | | **0.0** | | **1.3** | |
| 2.2.1 | Collect AD and EF | 0.0 |  |  | 0.0 |  |  |  | 0.0 |  |
| 2.2.2 | Data entry in the LULUFC/ALU (or other related) software | 0.0 |  |  | 0.0 |  |  |  | 0.0 |  |
| 2.2.3 | Preliminary analysis and evaluation of results | 2.6 |  |  |  | 1.3 |  |  |  | 1.3 |
| 2.2.4 | Estimation of GHG emissions/removals | 0.0 |  |  |  | 0.0 |  |  |  | 0.0 |
| **2.3** | **Quality assurance and quality control** | **79.4** | **0.0** | | **35.1** | | **22.1** | | **22.1** | |
| 2.3.1 | Plan Quality management | 8.3 |  |  |  | 8.3 |  |  |  |  |
| 2.3.2 | Perform Quality assurance by third part | 66.4 |  |  | 22.1 |  | 22.1 |  | 22.1 |  |
| 2.3.3 | Control Quality | 4.7 |  |  |  | 4.7 |  |  |  |  |
| **2.4** | **Assess uncertainties of GHG estimates** | **7.9** | **0.0** | | **4.0** | | **0.0** | | **4.0** | |
| 2.4.1 | Evaluation and assessment of collected data with the representative samples for identifying the uncertainties | 4.0 |  |  |  | 2.0 |  |  |  | 2.0 |
| 2.4.2 | Communicating the techniques to the relevant authorities for correct data mining and evaluation. | 3.9 |  |  |  | 2.0 |  |  |  | 2.0 |
| **2.5** | **Development and finalization of National GHG-I report** | **0.6** | **0.0** | | **0.3** | | **0.0** | | **0.3** | |
| **2.5.1** | Develop and share draft report on GHG-I (with stakeholders for their comments) | 0.0 |  |  |  |  |  |  |  |  |
| **2.5.2** | Incorporate the stakeholders comments | 0.0 |  |  |  |  |  |  |  |  |
| **2.5.3** | Share the improved draft with national focal person (NFP) for independent review from UNFCCC | 0.0 |  |  |  |  |  |  |  |  |
| 2.5.4 | Incorporate the independent reviewer’s comments and finalize the report. | 0.6 |  |  |  | 0.3 |  |  |  | 0.3 |
| **2.6** | **Submit the national GHG inventory** | **0.0** | **0.0** | |  | |  | |  | |
| **2.6.1** | Submit the national GHG inventory | 0.0 |  |  |  | 0.0 |  |  |  | 0.0 |
| **Annual budget (k$)** | |  | **149.7** | | **131.4** | | **88.9** | | **94.4** | |
| **Total budget (k$)** | | **464.4** | | | | | | | | |

## Monitoring function

| **Outputs and activities** | | **Year** | **I** | | **II** | | **III** | | **IV** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **1** | **2** | **1** | **2** | **1** | **2** | **1** | **2** |
| **Output 1 : The scope and objectives of forest monitoring are identified** | | **49.6** | **49.6** | | **0.0** | | **0.0** | | **0.0** | |
| **1.1** | **Identify the scope and objectives of forest monitoring** | **23.0** | **23.0** | | **0.0** | | **0.0** | | **0.0** | |
| 1.1.1 | Participatory discussion on the scope and objectives of forest monitoring | 23.0 | 23.0 | |  | |  | |  | |
| 1.1.2 | Identification of expected Outputs of forest monitoring |
| 1.1.3 | Identification of variables to be recorded |
| 1.1.4 | Identification of responsibilities to be assigned |
| **1.2** | **Identification of information needs** | **16.0** | **16.0** | | **0.0** | | **0.0** | | **0.0** | |
| 1.2.1 | Assessment of available information and information needs | 16.0 | 16.0 | |  | |  | |  | |
| 1.2.2 | Translation of information needs into indicators to be monitored |
| **1.3** | **Identification of indicators to be monitored** | **10.5** | **10.5** | | **0.0** | | **0.0** | | **0.0** | |
| 1.3.1 | Identification of indicators to monitor progress towards sustainable forest management | 10.5 | 10.5 | |  | |  | |  | |
| 1.3.2 | Identification of indicators to monitor results of REDD+ policies and measures |
| **Output 2 : The methodology and tools for forest monitoring are defined** | | **28.0** | **28.0** | |  | |  | |  | |
| **2.1** | **Identify monitoring methods and tools** | **23.0** | **23.0** | | **0.0** | | **0.0** | | **0.0** | |
| 2.1.1 | Identify approaches to forest monitoring (remote sensing, field approaches, community-based approaches, etc.) | 23.0 | 23.0 | |  | |  | |  | |
| 2.1.2 | Assess what forest monitoring tools already exist at the national and provincial level |
| 2.1.3 | Define the tools needed to monitor identified criteria and indicators of sustainable forest management |
| 2.1.4 | Define the tools needed to monitor identified criteria and indicators for REDD+ policies and measures |
| 2.1.5 | Assess synergies between existing and new tools (SLMS, NFI, etc.) |
| 2.1.6 | Harmonize existing and new tools in a comprehensive methodology for forest monitoring |
| **2.2** | **Formally adopt monitoring methods and tools** | **5.0** | **5.0** | | **0.0** | | **0.0** | | **0.0** | |
| 2.2.1 | Report on forest monitoring methods and tools | 5.0 |  | 5.0 |  |  |  |  |  |  |
| 2.2.2 | Assign responsibilities for forest monitoring | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 2.2.3 | Formally adopt forest monitoring methods, tools and responsibilities | 0.0 |  | 0.0 |  |  |  |  |  |  |
| **Output 3 : The technical capacities are reinforced** | | **304.5** | **129.1** | | **67.4** | | **54.0** | | **54.0** | |
| **3.1** | **Hire technical staff for the monitoring unit** | **216.6** | **54.6** | | **54.0** | | **54.0** | | **54.0** | |
| 3.1.1 | Develop TORs of the required staff | 0.1 | 0.1 |  |  |  |  |  |  |  |
| 3.1.2 | Hire or post full time staff through an open competitive process | 0.5 | 0.5 |  |  |  |  |  |  |  |
| 3.1.3 | Retain staff for four years | 216.0 | 54.0 | | 54.0 | | 54.0 | | 54.0 | |
| **3.2** | **Capacity building** | **64.9** | **51.5** | | **13.4** | | **0.0** | | **0.0** | |
| 3.2.1 | Establish and equip national lab | 41.3 | 41.3 |  |  |  |  |  |  |  |
| 3.2.2 | Development of a robust database management system (budget provided under the 1.3 of SLMS) | 0.0 |  | 0.0 |  |  |  |  |  |  |
| 3.2.3 | Technical capacity building | 15.3 | 5.1 | 5.1 | 5.1 |  |  |  |  |  |
| 3.2.4 | Development of future training plans | 8.3 |  |  | 8.3 |  |  |  |  |  |
| **3.3** | **Develop and launch the NFMS web portal** | **23.1** | **23.1** | | **0.0** | | **0.0** | | **0.0** | |
| 3.3.1 | Design web portal (layout, functions, data, etc.) | 3.5 | 3.5 |  |  |  |  |  |  |  |
| 3.3.2 | Train web portal operators | 6.3 | 6.3 |  |  |  |  |  |  |  |
| 3.3.3 | Define technical parameters for server device (server, internet connection, logistics, server room power) and procure | 5.0 |  | 5.0 |  |  |  |  |  |  |
| 3.3.4 | Conduct a national workshop to present the webportal | 8.3 |  | 8.3 |  |  |  |  |  |  |
| 3.3.5 | Consider/incorporate public comments and adjust/set parameters for the web interface. | 0.0 |  | 0.0 |  |  |  |  |  |  |
| **Output 4:Quality control (QC) and quality assurance (QA) of NFM ensured** | | **91.7** | **73.0** | | **17.4** | | **0.6** | | **0.6** | |
| **4.1** | **Forest Monitoring** | **2.6** | **2.6** | | **0.0** | | **0.0** | | **0.0** | |
| 4.1.1 | Data collection and analysis | 2.6 | 2.6 |  |  |  |  |  |  |  |
| 4.1.2 | Information generation, reporting and dissemination |  |  |  |  |  |  |  |  |  |
| 4.1.3 | Publication of information on the NFMS web portal |  |  |  |  |  |  |  |  |  |
| 4.1.4 | Report to international conventions and commitments |  |  |  |  |  |  |  |  |  |
| **4.2** | **Quality control by the NFMS Unit** | **13.0** | **13.0** | | **0.0** | | **0.0** | | **0.0** | |
| 4.2.1 | Develop QC protocols | 4.7 |  | 4.7 |  |  |  |  |  |  |
| 4.2.2 | Implement QC protocols | 8.3 |  | 8.3 |  |  |  |  |  |  |
| **4.3** | **Quality assurance by an independent third party** | **73.6** | **56.8** | | **16.8** | | **0.0** | | **0.0** | |
| 4.3.1 | Develop QA protocols | 16.8 |  | 16.8 |  |  |  |  |  |  |
| 4.3.2 | Identify and hire relevant third party for the QA | 40.0 |  | 40.0 |  |  |  |  |  |  |
| 4.3.3 | Implement QA protocols | 16.8 |  |  | 16.8 |  |  |  |  |  |
| **4.4** | **Periodic revisions and adjustments of the NFMS design** | **2.6** | **0.6** | | **0.6** | | **0.6** | | **0.6** | |
| **Annual budget(k$)** | | **473.8** | **279.7** | | **84.8** | | **54.6** | | **54.6** | |
| **Total budget (k$)** | | **473.8** | | | | | | | | |

## Summary

|  |  |  |
| --- | --- | --- |
| **Components** | **Expected costs** | |
| **(k$)** | **(%)** |
| *1. Institutional framework* | 182.5 | 4.5 |
| *2. Satellite land monitoring system* | 1265.7 | 31.0 |
| *3. National forest inventory* | 1702.6 | 41.6 |
| *4. Greenhouse gas inventory* | 464.4 | 11.4 |
| *5. Monitoring function* | 473.8 | 11.6 |
| **Total** | **4088.9** | **100** |

# REFERENCES

1. Abdul Raqeeb, Syed Moazzam Nizami, Aamir Saleem, Mohammad Hanif. 2014. Characteristics and Growing Stocks Volume of Forest Stand in Dry Temperate Forest of Chilas Gilgit-Baltistan. Open Journal of Forestry.,  4: 231-238 (IF; 0.288)
2. Adnan Ahmad, Sarwat N. Mirza and S. M. Nizami. 2014. Assessment of biomass and carbon stocks in coniferous forest of Dir Kohistan, KPK. Pak. J. Agric. Sci., 51(2): 35-350. ( IF; 1.29)
3. Ahmad S.S, Abbasi. Q (2011), Assessment of Forest Cover Decline in Pakistan: A GIS Perspective, International Journal of Environmental Science, Volume 2, No.1.
4. Ashraf, M. (1992a) Forest Policy, Tenure, and Legislation. Background Paper for Forestry Sector Master Plan of Pakistan. Government of Pakistan, Islamabad.
5. Babar et.al (2006), A Critical Analysis of Forest Policies of Pakistan: Implications for Sustainable Livelihoods, Mitigation and Adaptation Strategies for Global Change.
6. Erika et.al (2012), Assessing capacities of non-Annex I countries for national forest monitoring in the context of REDD+, Environmental Science and Policy, Science Direct, Pp 33 – 48, 2012.
7. FAO. (2006). Global Forest Resources Assessment 2005 – Progress towards sustainable forest management. FAO Forestry Paper 147. Food and Agriculture Organization, Rome, Italy.
8. FAO. (2007). Brief on National Forest Inventory of Pakistan, Forest Resource Development Service, MAR-SFM Working Paper 25/ 2007, Food and Agriculture Organization of United Nations, June 2007, Rome Italy.
9. FAO. (2009). Asia Pacific Forestry Outlook. Outlook of Pakistan’s Forest, 2009
10. FAO. (2010). Global Forest Resources Assessment 2010. FAO Forestry Paper 163. Food and Agriculture Organization, Rome, Italy
11. GoP. (2013). Pakistan’s REDD+ Readiness Preparation Proposal (RPP), 2013, Forest Carbon Partnership Facility (FCPF), World Bank.
12. GoP. (2004). National Forest and Range land Resource Assesment Study (NFRRAS), 2004, Pakistan Forest Institute, Peshawar.
13. GoP. (2012) Land Cover Atlas of Pakistan, 2012. Syed Said Badshah Bukhari, Ali Hider, Mohd. Tahir Laeeq, Pakistan Forest Institute Peshawar.
14. Hussain, K., (2013). Understanding Policy and Institutional Setup in Context of Pakistan’s REDD+. Proceedings of the meeting on International Expert Group Meeting on Geospatial Information Systems for Multi Scale Forest Biomass Assessment and Monitoring of the Hindu Kush-Himalayan Region. International Centre for Integrated Mountain Development Kathmandu Nepal, December, 2013.
15. WWF-Pakistan. (2014). Capacity Based Need Assesment (CBNA) for the National Forest Monitoring System for REDD+ M&MRV in Pakistan. World Wide Fund for Nature Pakistan, 2014.
16. Khurshid Alam and Syed Moazzam Nizami. 2014. Assessing Biomass Expansion Factor of Birch Tree Betula Utilis D. DON.Open Journal of Forestry., 4:181-190 (IF; 0.288)
17. Mehreen Abbas, S. M. Nizami, Aamir Saleem, Saeed Gulzar and Irshad A. Khan.2011. Biomass expansion factors of *Olea ferruginea* (Royle) in sub tropical forests of Pakistan. African Journal of Biotechnology.,10(9):1586-1592.
18. Nizami S.M. (2010). Estimation of Carbon Stocks in Subtropical Managed and Unmanaged Forests of Pakistan. Retrieved from <http://prr.hec.gov.pk/Thesis/609S.pdf>
19. Nizami, S.M., S.N. Mirza, S. Livesly, S. Arndt, J.C. Fox, I.A. Khan and T. Mahmood. 2009. Estimating carbon stocks in sub tropical pine (*Pinus roxburghii*) forests of Pakistan. Pak.J.Agric. Sci., 46(4): 266-270. (IF: 1.240).
20. PFI. (2007). Evaluation of Forest Monitoring, Assessment and Reporting Systems in Pakistan, Pakistan Forest Institute, 2007
21. Proceedings of National Consultation Workshop on SEPC for REDD+ Safeguards, 2012.
22. Proceedings of 1st Working Group Meetings on NFMS, 2013
23. Proceedings of 2nd Working Group Meetings on NFMS, 2013
24. Proceedings of national consultation workshop in NFMS, 2014
25. Proceedings of the Validation meeting on NFMS Institutional arrangements, 2015
26. Qamer F.M., Abbas, S., Saleem, R., Shehzad, K., Iqbal. A., (2010). Forest Cover Change Assessment using Satellite Images in Swat and Shangla Districts, NWFP, Pakistan. WWF – Pakistan, Lahore.
27. Qamer et.al. (2010). Land Cover Change Analysis of Selected HKH Regions of Pakistan. International Centre for Integrated Mountain Research (ICIMOD), Nepal and World Wide Fund for Nature (WWF), Pakistan, 2010.
28. Nizami, S. M. (2012). Assessment of the carbon stocks in sub tropical forests of Pakistan for reporting under Kyoto protocol. J.For.Res. 23(3): 377-384 (IF:0.882)
29. UNFCCC. (2003). Pakistan’s Initial National Communication on Climate Change November, 2003.
30. UNFCCC. (2009). Methodological guidance for activities relating to 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. Decision 4/CP.15. Available at: http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf#page=11.
31. Wani, B.A. (2005). National Forest Policy Review, Ministry of Environment Pakistan.
32. WWF – P. (2013). Draft Report, District Wise Forest Cover Assessment of Pakistan. International Centre for Integrated Mountain Research (ICIMOD), Nepal and World Wide Fund for Nature (WWF), Pakistan, 2010.
33. WWF – P. (2013). Land Cover Change Analysis of Murree Forest Division. World Wide Fund for Nature (WWF), Pakistan, 2013.
34. Yusuf. M. (2009), Legal and Institutional Dynamics of Forest Management in Pakistan

# ANNEXES

Annex I. History of Forest Inventories in Pakistan

Annex I-A. Satellite-based forest inventories in Pakistan

| **Name of Inventory** | **Time that the data represents** | **Methodology Used** | **Output Document** | **Source** |
| --- | --- | --- | --- | --- |
| Forestry Sector Master Plan -FSMP (1992) | 1990 - 1991 | * Used 54 Land satellite images of scale 1:250000 * Assessment was carried out by using one time (1990-1991) satellite data using on screen digitization method. * The land use classes were divided into two broad categories i.e. Forest land and Other Land which were further sub-divided into different categories. | Forest cover maps of Pakistan | Government of Pakistan |
| National Land Use Plan - NLUP (2004) | 1998 – 1999 | * Used satellite images of Land Sat – 5 TM * Assessment was carried out by using one time (1998-1999) satellite data using on screen digitization method. * This study divided whole country into ten land use classes. | Land Use Maps |  |
| National Forest and Range Land Resource Assessment Study – NFRRAS (2004) | 1997 – 2001 | * Used satellite images of Land sat 30 metre resolution. * Assessment was carried out by using bi-temporal satellite data (1997-2001) using on screen digitization method. | Land and forest cover maps | Pakistan Forest Institute (PFI) |
| Land Cover Mapping of Central Karakorum National Park (2007) | 2006 | * Used ASTER satellite images of 15 meter spatial resolution of the year 2006 * Object based Image Analysis (OBIA) method was adopted * LCCS standards were developed and used with extensive field surveys (57 sample plots) * This was the first ever application of OBIA in Pakistan and was found to be very efficient and highly reliable (WWF, 2014). | Land Cover map of central Karakorum national park | WWF-P |
| Forest Cover Change Assessment in Swat and Shangla Districts (2010) | 2001 - 2009 | * Used satellite images with different spatial and spectral resolution i.e. Land sat (30 meter spatial resolution) and SPOT (2.5 meter spatial resolution) * Assessment was carried out by using bi-temporal satellite data (2001-2009) using on screen digitization method. * Object based Image Analysis (OBIA) method was adopted | Forest cover change maps of Swat and Shangla districts | WWF-P |
| Time series (1990 – 2000 - 2010) forest cover assessment for GB, KPK an AJK (2011) | - | * Bi-temporal Land sat TM and ETM+ images have been used * Object based Image Analysis (OBIA) method was adopted | Land cover change maps of Hindukush Himalayan Regions in Pakistan i.e. (GB, AJK and KPK) | ICIMOD |
| Forest Atlas of Pakistan (2012) | 2007- 2008 | * Spot – 5 images of 2007 - 2008 (for KPK, GB and AJK) with 2.5 meter spatial resolution and Google Earth Images (for Sind, Baluchistan and Punjab) were used. * On screen digitization method was adopted followed by ground truthing with stratified random sampling. | Forest Atlas of Pakistan | Pakistan Forest Institute (PFI) |
| Land Cover Change Analysis of Murree Forest Division (2013) | - | * Used satellite images of SPOT - 5 with varying temporal and spatial resolutions * Aerial photographs and Geo eye data was also used in classification * OBIA method was adopted | 60 years Land Cover Change Maps of Murree | WWF-Pakistan |
| District Wise Forest Cover Assessment of Pakistan (2013) | 2009 – 2010 | * FAO’s Land Cover Classification System (LCCS) is used * Satellite data of 30 meter spatial resolution Land sat Thematic Mapper (TM) of 2009-2010. * Pixel based classification scheme i.e. 30 X 30 meter and a block of 3 x 3 pixels has been used to achieve ~ 1ha Minimum Mapping Unit (MMU) for forest mapping * Consultative sessions and ground truthing with provincial forest departments were carried out (not in KPK) | District Wise Forest Cover Maps of 52 districts | WWF-Pakistan |
| Patterns and processes of forest cover change in the Upper Indus Basin, western  Himalaya, Pakistan (2014) | 1990 – 2000 – 2010 | * Level-one-terrain corrected product (L1T) temporal Landsat data from USGS EROS (http://eros.usgs.gov/) were chosen for the land cover assessment. * Images were selected to represent the years 1990, 2000 and 2010, using the best image from within two years (±2) of the given date. * A minimum mapping unit (MMU) of ~1ha (3x3 pixels) was chosen to quantify the forest cover. * The land cover was classified into 13 classes * Transition from forest to non-forest was taken as deforestation and from dense forest to sparse forest was taken as degradation. | The time series forest cover maps (1990-2000- 2010) disintegrated at sub-district level for UIB of Pakistan. | ICIMOD (Qamer et.al., 2014) |

Annex I-B. Field-based forest inventories in Pakistan

| **Type of Inventory** | **Location** | **Collected variables** |
| --- | --- | --- |
| Working plans for reserved and protected forests managed by the government (provincial forest departments) | Respective Divisional Forest Offices in the provinces | Diameter at breast height and height of trees, Stock tables, standing volume, |
| Forestry Sector Master Plan | Pakistan Forest Institute | Diameter, height, satellite images, spatial data with slope |
| District wise forest inventory of Balochistan | WWF Pakistan GIS lab, Lahore | Forest Cover, Non-forest cover |

Annex II. Capacity assessment of the provinces regarding SLMS

Annex II-A. Existing capacities of provincial forest departments regarding data availability and accessibility for SLMS for REDD+

| **Province** | **Data Type** | **Spatial Resolution** | **Spatial Availability** | **Temporal Availability** |
| --- | --- | --- | --- | --- |
| **Gilgit-Baltistan** | Landsat | 30 | Whole GB | 1972 – 2014 |
| **Khyber Pakhtunkhwah** | SPOT 5, Landsat, | 2.5, 10, 30 | Whole KPK | 2006 – 2007, 2010 – 2012 |
| **AJK** | Quick Bird Eye, SPOT 5, Landsat | 0.5, 2.5. 30 | Whole AJK | - |
| **Punjab** | Pleiades, SPOT 5, Landsat | 0.5, 2.5, 30 | 0.5 for specific areas, 2.5 and 30 for whole Punjab | 2010 - 2014 |
| **Baluchistan** | Not available | - | - | - |
| **Sindh** | Not Available | - | - | - |
| **FATA** | Not Available | - | - | - |
| **Federal Teriitory** | Not Available | - | - | - |

Annex II-B. Existing provincial capacities and identified gaps regarding technical capabilities related to SLMS

| **Province/ Territory** | | **Existing Capacity** | **Gaps Identified** | **Ranking** |
| --- | --- | --- | --- | --- |
| Gilgit-Baltistan | | * A GIS Lab established with in the forest department (Gilgit) with required GIS/ RS facility and is currently functional * Relevant Forest Policies, Laws and Rules are being revised to mainstream SLMS procedures for regular forest monitoring. * The lab has a high definition computer machines but low internet speed * All the relevant equipment for field data collection including high accuracy handled GPS system is available * WWF and Karakorum International University are the potential government and private sector organizations respectively with relevant technical capabilities. | * An Archive system has not yet been developed * The storage capacity of the computers need to be enhanced * Licensed software not available * Web hosting service is not developed | 2 |
| Khyber Pakhtunkhwa | | * Two GIS/ RS labs established one each in the Planning and Monitoring Circle of KP Forest Department (Peshawar) and Pakistan Forest Institute. * Both labs have high definition computer machines to store heavy data and high internet speed. * Both labs have licensed software of Arc View and Erdas Imagine * All the relevant equipment for field data collection including GPS system are available but outdated. * Wildlife Department, Environmental Protection Agency, SUPARCO and Geology and Geography Department of University of Peshawar are the potential private sector organizations with relevant technical capabilities | * Web hosting service not developed * GPS system is outdated * Legal procedures for satellite based regular forest monitoring are not defined | 2 |
| Azad Jammu o Kashmir | | * GIS Lab has been established in Forest department (Muzaffarabad) but it is not functional. * Strong coordination has been established with Planning and Development Department of AJK. Currently, the technical capabilities are being provided by Land Use Planning unit of Planning and Development Department of AJK. | * Web hosting service not developed * All the relevant equipment for field data collection including GPS system are available but outdated * The GIS/ RS experts lack understanding of forestry and REDD+ concepts. There are no foresters working in the unit. * Legal procedures for satellite based regular forest monitoring are not defined * No internet connection * Licensed software not available | 1 |
| Punjab | | * A GIS Lab has been established in Forest department (Lahore) and is currently functional. * The lab has high definition computer machines (core i 7) and high speed (4 mb) internet connection * Licensed software (Arc GIS 10.1) is available * Web hosting service developed * All the relevant equipment for field data collection including high accuracy handled GPS system (2D GPS) available. * Strong coordination has been developed with other potential institutions like Urban Unit, SUPARCO, PITB, WWF, University of Punjab and University of Engineering and Technology Lahore having relevant technical capabilities. | * Legal procedures for satellite based regular forest monitoring are not defined | 2 |
| Baluchistan | | * GIS Lab has been established in Forest department (Quetta) but it is not functional. * Strong coordination has been developed with other potential institutions like IUCN having relevant technical capabilities. The technical capabilities are being provided by IUCN on project need basis. | * Web hosting service not developed * The relevant equipment for field data collection including GPS system is not available * Legal procedures for satellite based regular forest monitoring are not defined * No internet connection * Licensed software not available | 1 |
| Sindh | | * GIS Lab has been established in Forest department (Hyderabad) but it is not functional. * Strong coordination has been developed with other potential institutions like WWF, IUCN and SUPARCO having relevant technical capabilities. The technical capabilities are being provided on project need basis. | * Web hosting service not developed * The relevant equipment for field data collection including GPS system are not available * Legal procedures for satellite based regular forest monitoring are not defined * No internet connection * Licensed software not available | 1 |
| FATA | | * Technical capabilities do not exist | * Technical capabilities for SLMS do not exist | 1 |
| Federal | CCD (Forestry wing) | * Technical capabilities do not exist | * Technical capabilities for SLMS do not exist | 1 |
| CDA | * Technical capabilities do not exist. | * Technical capabilities for SLMS do not exist | 1 |
|  |  |  |  |  |

Annex II-C. Existing provincial human capacity and gaps to process and analyse information related to SLMS

| **Province/ Territory** | | **Existing Capacity** | **Gaps Identified** | **Ranking** |
| --- | --- | --- | --- | --- |
| Gilgit-Baltistan | | * Very limited i.e. one non-forester GIS expert hired on contract basis and placed at GIS lab | * Expertise on dealing with technical challenges of image interpretation (cloud cover, geo referencing, missing data, topographic and elevation factors etc) is missing * Limited knowledge of IPCC guidelines/ UNFCCC decisions on SLMS for REDD+ MMRV * No forestry background | **1** |
| Khyber Pakhtunkhwa | | * Adequate relevant human capacity with expertise in spatial and temporal analysis and use of modelling tools available both in forest department and PFI. * Expertise on dealing with technical challenges of image interpretation (cloud cover, geo referencing, missing data, topographic and elevation factors etc) is available | * Limited knowledge of IPCC guidelines/ UNFCCC decisions on SLMS for REDD+ MMRV | **2** |
| Azad Jammu and Kashmir | | * Very limited i.e. one forest official with GIS expertise | * Expertise on dealing with technical challenges of image interpretation (cloud cover, geo referencing, missing data, topographic and elevation factors etc) is missing * The Land Use Planning Unit established in the Planning and Development Department does not have any forester. | **1** |
| Punjab | | * Not available within forest department. However, services are acquired from external sources (WWF, Urban Unit etc) on project need bases. | * Expertise in spatial and temporal analysis and use modelling tools not available | **1** |
| Baluchistan | | * Not available within forest department. However, services are acquired from external sources (WWF, IUCN etc) on project need bases. | * Expertise in spatial and temporal analysis and use of modelling tools not available | **1** |
| Sindh | | * Not available within forest department. However, services are acquired from external sources (WWF, IUCN etc) on project need bases. | * Expertise in spatial and temporal analysis and use of modelling tools not available | **1** |
| Fata | | * Not available | * Expertise in spatial and temporal analysis and use of modelling tools not available | **1** |
| Federal | CCD (Forestry Wing) | * One GIS expert having PhD degree in GIS currently serving as DIG forest |  | **1** |
| CDA | * Not available | * Expertise in spatial and temporal analysis and use of modelling tools not available | **1** |

Annex II-D. Existing provincial capacities and gaps identified regarding human capacity for preparation of reports from SLMS

| **Province/ Territory** | | **Human resource with professional report writing skills** | **Capacity to review consolidate and integrate data and information on SLMS into reports** | **Understanding of UNFCCC and IPCC reporting requirements** | **Ranking** |
| --- | --- | --- | --- | --- | --- |
| Gilgit-Baltistan | | Adequate i.e. 10 and above in numbers | Limited i.e. 4-6 in numbers. | Very Limited i.e. 1-3 in numbers | 1 |
| Khyber Pakhtunkhwa | | 6-9 in numbers | 4-6 in numbers | Not available | 2 |
| Azad Jammu and Kashmir | | Limited i.e. 4-6 in numbers | Not available | Not available | 1 |
| Punjab | | Adequate i.e. 10 and above in numbers | Currently not available | 4-6 in numbers | 1 |
| Baluchistan | | Not available | Not available | Not available | 1 |
| Sindh | | Adequate i.e. 10 and above in numbers | Not available | Very Limited i.e. 1-3 in numbers | 1 |
| FATA | | Not available | Not available | Not available | 1 |
| Federal | CCD (Forestry Wing) | Limited i.e. 4-6 in numbers | Limited i.e. only 1 GIS expert | Limited i.e. 4-6 in numbers | 2 |
| CDA | Adequate i.e. 10 and above in numbers | Not available | Not available | 1 |

Annex II-E. Exiting provincial capabilities and identified gaps regarding data verification

| **Province/ Territory** | | **Capabilities related to Data Verification** | | | **Ranking** |
| --- | --- | --- | --- | --- | --- |
| **Expertise on the application of statistical methods and understanding of error sources and uncertainties in assessment process** | **Internal and/ or public review system** | **External Review System (If any)** |
| Gilgit-Baltistan | | Very Limited i.e. 1-3 persons/professionals | Not established yet | Not Established Yet | 1 |
| Khyber Pakhtunkhwa | | Limited i.e. 4-6 persons/professionals | Not established yet | Not Established Yet | 1 |
| Azad Jammu and Kashmir | | Not available | Not established yet | Not Established Yet | 1 |
| Punjab | | Very limited i.e. 1-3 persons/professionals | Not established yet | Not Established Yet | 1 |
| Balochistan | | Not available | Not established yet | Not Established Yet | 1 |
| Sindh | | Not available | Not established yet | Not Established Yet | 1 |
| FATA | | Not available | Not established yet | Not Established Yet | 1 |
| Federal | CCD (Forestry Wing) | Very Limited i.e. 1-3 persons/professionals | Not Established Yet | Not Established Yet | 1 |
| CDA | Not available | Not established yet | Not Established Yet | 1 |

Annex II-F. Existing provincial capacities and identified gaps regarding training facilities on SLMS for REDD+ MMRV

| **Province/ Territory** | | **Existing Capacity** | **Gaps Identified** | **Ranking** |
| --- | --- | --- | --- | --- |
| Gilgit-Baltistan | | * Training hall and training equipment is available | * No training unit/ cell * Local experts/ trainers on SLMS are very limited i.e. 1-3 in numbers * Lack of budget allocations for staff training | **2** |
| Khyber Pakhtunkhwa | | * Human Resource Development Unit within the forest department and Pakistan Forest Institute are providing trainings on SLMS on project need basis. * Training hall and training equipment are available | * Local experts/ trainers on SLMS are very limited i.e. 1-3 in numbers * Lack of budget allocations for staff training | **2** |
| Azad Jammu o Kashmir | | * Not available | * No training unit/ cell * Local experts/ trainers on SLMS are very limited i.e. 1-3 in numbers * Lack of budget allocations for staff training * training equipment are available but non-functional | **1** |
| Punjab | | * Training hall and training equipment are available | * No training unit/ cell * Lack of local experts/ trainers * Lack of budget allocations for staff training | **1** |
| Baluchistan | | * Not available | * No training unit/ cell * Local experts/ trainers on SLMS are not available * Lack of budget allocations for staff training * training equipment are available but non-functional | **1** |
| Sindh | | * Not available | * No training unit/ cell * Local experts/ trainers on SLMS are not available * Lack of budget allocations for staff training * Training equipment are available but non-functional | **1** |
| Fata | | * Not available | * No training unit/ cell * Lack of local experts/ trainers on SLMS. * Lack of budget allocations for staff training * Lack of training equipment. | **1** |
| Federal | CCD (Forestry Wing) | * OIGF being a coordinating body arranges resources to organize tranings on SLMS in different organizations with relevant training facilities | * No training unit/ cell * Lack of training equipment | **1** |
| CDA | * Not available | * No training unit/ cell * Lack of experts and trainers on SLMS. * Lack of budget allocations for staff training * Lack of training equipment. | **1** |

Annex III. Capacity assessment of the provinces regarding NFI

Annex III-A. Existing provincial capacities regarding NFI data availability

| **Institution (Forest Department)** | **Inventory Type** | **Location** | **Collected Variables** | **Contact** |
| --- | --- | --- | --- | --- |
| Gilgit-Baltistan | Forest Working Plan (2000) Revised 2014 | Commercial Forests of District Diamer | DBH, Tree Height, Tree Volume | Conservator of Forest, Gilgit Circle, Gilgit |
| Khyber Pakhtunkhwa | Forest Working Plan/ Forest Management Plan developed at ten years interval | Whole KPK except FATA | DBH, Height, Tree Volume, Basal Area and Tree Crown Cover | Chief Conservator of Forests, Khyber Pakhtunkhwah, Peshawar |
| Azad Jammu Kashmir | Forest Working Plans (1883 - 1997) | (Rawlakot and Bagh, 1983 – 1985; Shadra and keran 19987-1989; Muzaffarabad Division, 1993; Jehlum Division, 1994; Mirpur, Kotli and Bimbur Division,1996 – 1997) | DBH, Height, Tree Volume, and Tree Crown Cover | Chief Conservator of Forests, AJK, Muzaffarabad |
| Punjab | Forest Regeneration and Afforestation Plan | Murree, | DBH, Height and Density based on number of trees. | Conservator Working Plan, Punjab, Lahore. |
| Baluchistan | Forest inventories never carried out | - | - | Conservator Working Plan Baluchistan, Quetta |
| Sindh | Forest Working Plans (2000) | Whole Sindh | DBH, tree volume, age and density | Conservator Working Plan, Sindh, Hydarabad. |
| FATA | Forest inventories never carried out |  |  | Conservator of Forests, FATA, Peshawar. |
| Federal | Forest Management Plan | Margallah Hills National Park |  | Regional Environment Directorate of CDA, Islamabad |

Annex III-B. Existing technical capabalities (i.e. equipment and logistics) and identified gaps related to NFI

| **Province/ Territory** | | **Existing Capacity (Numbers)** | | | | | | **Gaps Identified**  **Annex VII** | **Ranking** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Vehicles** | **GPS** | **Vertex** | **Relascope** | **Calipers** | **Diameter Measuring Tapes** |
| Gilgit-Baltistan | | 30 | 02 | 02 | 01 | 02 | 02 |  | 2 |
| Khyber Pakhtunkhwa | | 10 | 08 | 00 | 05 | 35 | 10 |  | 2 |
| Azad Jammu o Kashmir | |  |  |  |  |  |  |  |  |
| Punjab | | 06 | 50 | 00 | 00 | 00 | 12 |  | 1 |
| Baluchistan and FATA | | 30 | 05 | 00 | 00 | 00 | 10 |  | 1 |
| Sindh | | 02 | 05 | 00 | 00 | 00 | 12 |  | 1 |
| Federal | CCD |  |  |  |  |  |  |  |  |
| CDA |  |  |  |  |  |  |  |  |

Annex III-C. Existing human capacities and identified gaps for NFI

| Province/ Territory | Existing Capacity | Gaps Identified | Ranking |
| --- | --- | --- | --- |
| Gilgit-Baltistan | * All the professional forestry staff of recently created working plan circle is being trained in conventional forest inventories and adequate in numbers | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is very limited. * Expertise on forest carbon stock assessment is very limited i.e. 1-2 in numbers * 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 very limited. | 2 |
| Khyber Pakhtunkhwa | * All the professional forestry staff of working plan circles and working plan divisions/ units are well trained in conventional forest inventories and adequate in numbers | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is limited. * Expertise on forest carbon stock assessment is very limited i.e. 1-2 in numbers * 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 missing. | 2 |
| Azad Jammu o Kashmir | * All the professional forestry staff of working plan circles and working plan divisions are **not** well trained in conventional forest inventories and limited in numbers | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is limited. * 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 missing. * Human capacity for in-situ data collection of all required parameters is limited | 1 |
| Punjab | * All the professional forestry staff of working plan circles and working plan divisions/ units are well trained in conventional forest inventories and adequate in numbers | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is **limited.** * 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.** |  |
| Baluchistan | * The professional forestry staff of recently created research circle are **being** trained in conventional forest inventories and very limited in numbers | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is **limited.** * 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 **missing.** * Human capacity for in-situ data collection of all required parameters is **limited** | 1 |
| Sindh | * All the professional forestry staff of working plan circles and working plan divisions/ units are well trained in conventional forest inventories and adequate in numbers | * Knowledge about carbon pools and 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.. | 2 |
| FATA | * The professional forestry staff has knowledge of conventional forest inventories but never involved in practice of such inventories. | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is **limited.** * 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 **missing.** * Human capacity for in-situ data collection of all required parameters is **limited** | 1 |
| Federal Territory | * The professional forestry staff of **CDA** has knowledge of conventional forest inventories but never involved in practice of such inventories. | * Knowledge about carbon pools and understanding of processes influencing terrestrial carbon stocks is **limited.** * Expertise on forest carbon stock assessment is **missing** * The knowledge and understanding of IPCC guidance and REDD+ relevant national and international negotiations and UNFCCC decisions is **missing.** * Human capacity for in-situ data collection of all required parameters is **limited** | 1 |

Annex III-D. Existing provincial capacities and identified gaps regarding human capacity for preparation of reports from NFI

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Province/ Territory** | **Human resource with professional report writing skills** | **Capacity to review consolidate and integrate the field inventory data and information into forest inventory reports** | **Understanding of UNFCCC and IPCC reporting requirements** | **Ranking** |
| Gilgit-Baltistan | Adequate i.e. 10 and above persons/ prefessionals | Limited i.e. 4-6 persons/ prefessionals | Very Limited i.e. 1-3 persons/ prefessionals | 2 |
| Khyber Pakhtunkhwa | 6-9 persons/ professionals | 6-9 persons/ prefessionals | Not available | 2 |
| Azad Jammu o Kashmir | Limited i.e. 4-6 | Not available | Not available | 1 |
| Punjab | Adequate i.e. 10 and above persons/ prefessionals | Adequate i.e. 10 and above persons/ prefessionals | 4-6 persons/ prefessionals | 2 |
| Baluchistan | Not available | Not available | Not available | 1 |
| Sindh | Adequate i.e. 10 and above persons/ prefessionals | Very Limited i.e. 1-3 persons/ prefessionals | Very Limited i.e. 1-3 persons/ prefessionals | 2 |
| FATA | Not available | Not available | Not available | 1 |
| Federal Territory  (CCD, CDA) | Adequate i.e. 10 and above persons/ prefessionals | Very Limited i.e. 1-3 persons/ professionals in CCD | Very Limited i.e. 1-3 persons/ professionals in CCD | 1 |
|  |  |  |  |  |

Annex III-E. Existing provincial capacities and identified gaps regarding capabilities related to data verification for NFI

| **Province/ Territory** | **Capabilities related to Data Verification** | | | **Ranking** |
| --- | --- | --- | --- | --- |
| **Expertise on the application of statistical methods and understanding of error sources and uncertainties in assessment process** | **Internal and/or public review system** | **External Review System** |
| Gilgit-Baltistan | Very Limited i.e. 1-3 persons/ professionals | Internal verification within the department is done by the high ranked officials in an hierarchical order but not available for public review | Not Established | 1 |
| Khyber Pakhtunkhwa | Very Limited i.e. 1-3 persons/ professionals | Internal verification within the department is done by the high ranked officials in an hierarchical order but not available for public review | Not Established | 1 |
| Azad Jammu o Kashmir | Not available | Internal verification within the department is done by the high ranked officials in an hierarchical order but not available for public review | Not Established | 1 |
| Punjab | Limited i.e. 4-6 persons/ professionals | Internal verification within the department is done by the high ranked officials in an hierarchical order but not available for public review | Not Established | 2 |
| Baluchistan | Not available | Not available | Not Established | 1 |
| Sindh | Limited i.e. 4-6 persons/ professionals | Internal verification within the department is done by the high ranked officials in an hierarchical order but not available for public review | Not Established | 2 |
| FATA | Not available | Not available | Not Established | 1 |
| Federal Territory | Limited i.e. 4-6 persons/ professionals | Internal verification of relevant reports within the CCD, CDA and EPA is done by the high ranked officials in an hierarchical order but not available for public review | Not Established | 1 |

Annex III-F. Existing provincial capacities and identified gaps regarding training facilities for NFI

| **Province/**  **Territory** | **Existing Capacity** | **Gaps Identified** | **Ranking** |
| --- | --- | --- | --- |
| Gilgit-Baltistan | * A REDD+ Cell and working plan circle has recently been established within the forest department and being equipped with required facilities for forest inventories * Local Experts/ Trainers on conventional forest inventories are adequate i.e. 10 and above. * Training Hall/ Conference Room with all required facilities (Multimedia, sound system etc) available * Field training equipment is also available * Normally the training budgets are allocated in regular and development projects on need bases. | * Local trainers/ experts on forest carbon accounting are very limited i.e. 1-3 in numbers * Training to the right person and retention of trained person due to transfer and postings is a big issue * REDD+ relevant trainings are being delivered to non-regular project staff (hired on Adhoc basis) and future availability and sustainability of the relevant experts and trainers could be an issue. | 2 |
| Khyber Pakhtunkhwa | * The Forest Department has created two units i.e. Human Resource Directorate (HRD) and Community Extension and Gender Development Directorate (CEGD) for capacity building and social mobilization * Local Experts/ Trainers on conventional forest inventories are adequate i.e. 10 and above in numbers * PFI and Thai Forest School with mandate of training forest managers and technicians are available. * Training Hall/ Conference Room with all required facilities (Multimedia, sound system etc) available * Field training equipment is also available * Normally the training budgets are allocated in regular and development projects on need bases. | * Local trainers/ experts on forest carbon accounting are very limited i.e. 1-3 in numbers * Training to the right person and retention of trained person due to transfer and postings is a big issue | 2 |
| Azad Jammu o Kashmir | * A forestry training school has been established at Muzaffarabad which is being used to train the lower staff on conventional forest inventories. * Local Experts/ Trainers on conventional forest inventories are available in adequate numbers i.e. more than 35 * Normally the budgets are allocated in regular and development projects on need bases. * Field training equipment is available | * Local trainers/ experts on forest carbon accounting are not available * Training to the right person and retention of trained person due to transfer and postings is a big issue | 2 |
| Punjab | * Punjab Forest **Research** Institute (PFRI), headed by the Punjab Forest department, established in 1986 is being used as training unit that promotes sustainable forest management and the optimal use of forest resources through the knowledge and technology generated from the various researches conducted. It has two sub-research enters at Bahawalpur and Ghora Gali. * Local Experts/ Trainers on conventional forest inventories are available in adequate numbers i.e. more than 35 * Normally the budgets are allocated in regular and development projects on need bases. * Field training equipment is available | * Local trainers/ experts on forest carbon accounting are not available * Training to the right person and retention of trained person due to transfer and postings is a big issue | 2 |
| Baluchistan | * Normally the training budgets are allocated in regular and development projects on need bases. | * Field training equipment is not available * Training Hall/ Conference Room is not available * Local trainers/ experts on forest carbon accounting are not available * Training to the right person and retention of trained person due to transfer and postings is a big issue | 1 |
| Sindh | * Local experts/ trainers are adequate i.e. the professional forestry staff of working plan circle * Normally the budgets are allocated in regular and development projects on need bases. * Field training equipment is available | * Local trainers/ experts on carbon accounting are not available * Training to the right person and retention of trained person due to transfer and postings is a big issue | 2 |
| FATA | * Not Available | * Field training equipment is not available * Training Hall/ Conference Room is not available * Local trainers/ experts on forest carbon accounting are not available * Mostly ignored at national level relevant trainings | 1 |
| Federal Territory | * Normally the training budgets are allocated in regular and development projects on need bases * Training Hall/ Conference Room with all required facilities (Multimedia, sound system etc) available in CDA Training Academy and in OIGF at CCD | * Field training equipment is not available * Local trainers/ experts on forest carbon accounting are not available * Training to the right person and retention of trained person due to transfer and postings is a big issue |  |

Annex IV. Capacity Assessment of PFI and potential partner Institutions for REDD+ MMRV

| **Institution** | **Capacity** | **Satellite Land Monitoring System** | **National Forest Inventory** | **Green House Gas Inventory** |
| --- | --- | --- | --- | --- |
| PFI | DAC | **Average.** (Landsat (30 m ) and SPOT (2.5 m) covering whole Pakistan | **Low.** (Only small scale research based studies are available in analogue form) | Do not exist |
| TC | **Average.** A GIS Lab in PFI is established with basic equipment and logistics required to start Satellite based inventories. | **Average**. (Equipment and logistics are limited to training purposes only. PFI does not conduct forest inventory on large scales). | Do not exist |
| HR - T | **Average.** | **Low.** (Adequate for conventional forest inventories and limited for carbon based forest inventories) | Do not exist |
| HR - R | **Low.** Limited Knowledge of UNFCCC Decision/ IPCC reporting guidelines | **Low.** Limited Knowledge of UNFCCC Decision/ IPCC reporting guidelines | Do not exist |
| TF | **Average.** Training facilities related to SLMS are being provided on request of provinces or project need basis. | **Average.** PFI is the only academic and training institution is the country that offers field oriented bachelor and master’s degree courses in forestry. Almost all the professional forestry staff in the country is graduated from PFI. | Do not exist |
| EPA | DA | **Average.** EPA prepared Environmental Atlas of Pakistan in 2014. Land use/ land cover maps are developed for Pakistan and provinces/ regions which included forests, agriculture land, snow and ice, rocky and sandy areas and water logging and salinity. The principle data set for this atlas were LANDSAT satellite imageries (30 m) of the year 2000, 2005 and 2010. The data is available both in digital and analogue form with in the office of DG EPA. | Do not Exist | **Low. (**Limited to Air Quality Monitoring) |
| TC | **Average.** GIS lab has been established at Office of DG EPA Islamabad with current following capacity:   * desktop computers * Two plotters * One scanner * Two printers * Heavy server machine to store heavy data. | Do not Exist | Do not Exist |
| HR - T | **Low.** The Lab is currently not functional due to lack of technical human capacity | Do not Exist | **Low** |
| HR - R | **Low.** Limited Knowledge of UNFCCC Decision/ IPCC reporting guidelines | Do not Exist | Do not exist |
| TF | **Low**. (The GIS can be used for training purposes if strengthened) | Do not Exist | Do not exist |
| WWF – Pakistan | DA | **Average.** (The data currently available with WWF-P is attached as annexure VI). | Do not exist | Do not Exist |
| TC | **Advance**. (A well-equipped GIS lab has been established in 2001 with the following current capacity.   * desktop computer * Plotters * Scanners * Printers * Photo copier Machines * MB Internet * Heavy Server Machine | Do not Exist | Do not Exist |
| HR - T | **Advance** | Do not Exist | Do not Exist |
| HR - R | **Low.** (Limited Knowledge of UNFCCC Decision/ IPCC reporting guidelines) | Do not exist | Do not exist |
| TF | **Average.** (WWF – P has been working in very close coordination with the provincial forest departments on capacity building and technical support related to Satellite based land monitoring since 1997-1998. Currently 4 high professional trainers to impart trainings on SLMS are available ) | Do not exist | Do not Exist |
| GCISC | DA | Do not exist | Do not exist | **Average**. (GCISC has conducted GHG-I for emissions by sources and removals by sinks in specific areas. The data was collected from IPCC land use categories following the IPCC GPG for LULUCF and 2006 Guidelines. The inventory was carried out using Gain and Loss method for three gases i.e. Carbon dioxide, Methane and Nitrous Oxide The data is accessible within the department published in the form of papers, reports etc. |
| TC | Do not exist | Do not exist | **Average** |
| HR-T | Do not exist | Do not exist | **Average** |
| HR-R | Do not exist | Do not exist | **Low.** (Limited Knowledge of UNFCCC Decision/ IPCC reporting guidelines) |
| TF | Do not exist | Do not exist | Do not exist |
| SUPARCO | DA | **Advance** (The satellite data available with SUPARCO is SPOT (2.5m – 10m) and Pleiades (0.6 m). Land use/ forest cover maps were developed which is accessible within the institution published in the form of papers, reports etc) |  |  |
| TC | **Advance** | Do not exist | Do not exist |
| HR-T | **Advance** | Do not exist | Do not exist |
| HR - R | **Average** (Limited knowledge of UNFCCC decisions and IPCC guidelines) | Do not exist | Do not exist |
| TF | * **Advance** * Presently, a fully fledged [Institute of Space Technology (IST)](http://www.ist.edu.pk/" \t "_blank) is functioning at Islamabad for providing training in space related fields at national level. IST currently conducts degree programmes and training courses in fields related to space technology, with the long term objective of becoming a world class graduate and post graduate institute in space technology. | Do not exist | Do not exist |
| ICIMOD | **DA** | **Average** | **Average** | **Average** |
| **TC** | **Average** | **Average** | **Average** |
| **HR-T** | **Average** | **Average** | **Average** |
| **HR-R** | **Average** | **Average** | **Average** |
| **TF** | **Average** (ICIMOD - Nepal introduced  [SERVIR-Himalaya initiative](http://geoportal.icimod.org/NAE/NewsDetail.aspx?NewsID=249" \t "_blank), based in ICIMOD Head office Nepal  to improve environmental decision-making in [the Hindu Kush-Himalaya (HKH) region](http://www.icimod.org/v2/bull3/index.php/cms2/magic/view_old?page=43)through dissemination and analysis of earth observation information to strengthen ICIMOD’s capabilities as an established regional resource center on geospatial information and earth observation applications for the HKH region) | **Average** (Expert trainers are available for carbon based forest inventories) | **Average** |

Annex V. Checklist for CBNA for NFMS for REDD+ MMRV

***Component 1: Satellite Land Monitoring System (SLMS)***

***Sub-component 1.1: Data Availability and Accessibility***

**Q. 1 Is the data regarding satellite based forest monitoring available in the province/ territory?**

1. Yes 2. No

(If your answer is “Yes” then go to 1.1 - 1.8)

**1.1 What type of data is currently available (please tick and give additional required details)?**

(i) GT Sheets (ii) Satellite Images

Scale: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Sensor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Year: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Temporal Resolution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Format (digital or analogue):\_\_\_\_\_\_\_\_\_\_\_\_ Spatial Resolution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Spectral Resolution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Spatial Coverage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interpretation Procedure (Pixel or object based):

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(iii) Aerial Photographs (iv) Land use/ Forest Cover Maps

Year: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Year: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Format (Digital or analogue): \_\_\_\_\_\_\_\_\_\_\_ Format (Digital or analogue): \_\_\_\_\_\_\_\_\_\_

Scale: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Land use Classification Scheme: \_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(v) Other (Please specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.2 How the above data is acquired?**

(i) Acquired from freely available web domains at global level (please specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) Procured from national institutions having requisites (please specify the name of institution and costs incurred to acquire the data): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(iii) Procured from international institutions having requisites (please specify the name of institution and costs incurred to acquire the data): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.3 Is there any definitions on forest or other land use were followed for SLMS?**

1. Yes (if yes then tick the relevant box below) 2. No

* Country specific definitions (please give details with justification in a separate paper)
* IPCC Definitions (please provide reference?)
* Others (FAO, World Bank etc) please specify?

**1.4 Has any methodological standards followed?**

1. Yes (if yes then please tick the relevant box and give details) 2. No

* IPCC standard methodology (19996 2000 GPG LULUCF 2006Guidelines )
* Others (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.5 Is there any agreement at national or provincial level on the standard methodology used for SLMS?**

1. Yes (if yes, please specify either national or provincial) 2. No

**1.6 Are the uncertainties addressed and/or reduced?**

1. Yes (if yes then tick which uncertainty parameters are addressed) 2. No

* Data pre-processing
* Ground truthing
* Verification of accuracy through error matrix

**1.7 Is the data accessible?**

1. Yes (if yes then tick the relevant box below) 2. No

* The data is accessible within the department in digital format
* The data is accessible within the department published in the form of papers, reports etc
* The data is accessible with other organization in digital format

(Please specify the name of institution): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* The data is accessible with other institution published in the form of papers, reports etc

(Please specify the name of institution): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.8 How would you rank your organization regarding data availability and accessibility?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-Component 1.2: Technical Capabilities (Equipment and Logistics)***

**Q. No. 2 Do you have the technical capabilities required for the satellite based forest monitoring system?**

1. Yes 2. No

(If “Yes” then go to 2.1 – 2.5)

**2.1 Have you made any institutional arrangements for Satellite based forest monitoring system?**

1. Yes 2. No

(if yes please give separate details about institutional arrangements with roles and responsibilities)

**2.2 Is there any digital lab with GIS/ RS facility established in your organization?**

1. Yes 2. No

(If yes please tick which equipments and tools are available at the lab)

* High definition computer machine to store heavy data
* High speed internet connection
* Licensed Software
* Web hosting service
* Web domain
* High accuracy handled GPS system
* Field equipment for ground truthing

**2.3 Are there other potential institutions (Govt., NGO’s, academic etc) with relevant technical capabilities?**

1. Yes 2. No

(if yes please specify the names of the relevant institutions)

1. Government 2. NGO’s 3. Academia

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2.4 Is there any system of networking with other relevant institutions?**

1. Yes 2. No

(if yes please give separate details)

**2.5 How would you rank your organization regarding technical capabilities?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub – Component 1.3: Human Capacity to Process (analyse) Information Related to SLMS***

**Q.No.3 Do you have the human capacity to process (analyse) information related to SLMS?**

1. Yes 2. No

(If “Yes” then answer 3.1, 3.2 and 3.3)

**3.1 Do you have the adequate human resource with the knowledge and understanding of relevant national/ international negotiations and decisions?**

1. Yes 2. No

(If “Yes” then tick the appropriate box)

* Knowledge of International UNFCCC negotiations and decisions relevant to REDD+ MRV
* Knowledge and understanding of IPCC guidelines and guidance (GPG-LULUCF 2003, and 2006 guidelines)
* Knowledge of national REDD+ implementation strategy and objectives

**3.2 Do you have the expertise in spatial and temporal analysis and use of modelling tools?**

1. Yes 2. No

(If “Yes” then tick the appropriate box)

* Understanding of DD drivers and factors
* Expertise and human resources accessing, processing and interpretation of multi-data remote sensing imagery for forest changes (GIS/ RS experts)
* Approach for dealing with technical challenges of image interpretation (cloud cover, geo referencing, missing data, topographic and elevation factors etc)
* Expertise to use GPS system in the field for ground truthing

**3.3 How would you rank your organization regarding human capacity to process (analyse) information related to SLMS?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.4: Human capacity for the preparation of reports from the SLMS***

**Q.No.4 Do you have the adequate human capacity for the preparation of reports from SLMS?**

1. Yes 2. No

(If “Yes” then answer 4.1and 4.2)

**4.1 Which capacities and human resource currently available?**

* Professional report writing skills

Non 1-3 4-6 6-9 10 and above

* Capacity to review, consolidate and integrate the existing data and information on SLMS

Non 1-3 4-6 6-9 10 and above

* Understanding of UNFCCC and IPCC reporting requirements (prescribed guidelines, formats and procedures of reporting to designated organizations

non 1-3 4-6 6-9 10 and above

* Capacity to review, consolidate and integrate the existing data and information on SLMS

Non 1-3 4-6 6-9 10 and above

* Capacity to transform image analysis into reports

Non 1-3 4-6 6-9 10 and above

**4.2 How would you rank your organization regarding human capacity for the preparation of reports from the SLMS?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.5:******Capabilities related to data verification (quality control and quality assurance)***

**Q.No.5 Do you have the capabilities related to data verification (quality control and quality assurance)**

1. Yes (If “Yes” then answer 5.1and 5.2) 2. No

**5.1 Specify which capabilities are currently available?**

* Expertise on the application of statistical methods to quantify, report and analyze uncertainties for all relevant information (i.e. area change, change in carbon stocks etc.) using, ideally, a sample of higher quality information.
* Understanding of error sources and uncertainties in the assessment process
* Data infrastructure, information technology (suitable hard/software) and human resources to maintain and exchange data and quality control

**5.2 How would you rank your organization regarding Capabilities related to data verification (quality control and quality assurance)?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.6: Training Facilities***

**Q. No. 6 Are training facilities available in the province?**

1. Yes 2. No

(If “Yes” then answer 6.1, 6.2 and 6.3)

**6.1 What training facilities are currently available?**

* Any training unit/ cell
* Local Experts/ Trainers on SLMS (please provide number \_\_\_\_\_)
* Budget allocations for staff training
* Relevant Training Equipments

**6.2 Are there other institutions with relevant training facilities in the province?**

1. Yes 2. No

(If “Yes” then please specify the names of the institutions)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.3** **How would you rank your organization regarding training facilities?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.7: Areas of Improvement***

**Q.No. 7 Based on the information provided above, please specify the areas of improvement.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data availability and accessibility | Technical capabilities (equipment and logistics) | Human capacity for processing (analysis) information related to SLMS | Human capacity for the preparation of reports fro SLMS | Capabilities relating to data verification (quality control and quality assurance) | Training facilities |
| □ 1. -------------  □ 2. -------------  □ 3. -------------  □ 4. -------------  □ 5. -------------  □ 6. ------------ | □ 1. -----------------  □ 2. -----------------  □ 3. -----------------  □ 4. -----------------  □ 5. -----------------  □ 6. ----------------- | □ 1. ---------------------  □ 2. ---------------------  □ 3. ---------------------  □ 4. ---------------------  □ 5. ---------------------  □ 6. --------------------- | □ 1. ----------------------  □ 2. ----------------------  □ 3. ----------------------  □ 4. ----------------------  □ 5. ----------------------  □ 6. ---------------------- | □ 1. -------------------  □ 2. -------------------  □ 3. -------------------  □ 4. -------------------  □ 5. -------------------  □ 6. ------------------- | □ 1. ---------------  □ 2. ---------------  □ 3. ---------------  □ 4. ---------------  □ 5. ---------------  □ 6. --------------- |

**Q. No. 8 Do you need the support to fulfil the gaps regarding SLMS?**

1. Yes 2. No

(If “Yes” then tick the type of support needed and expand in each option the sub-component for which the support is required)

1. Financial 2. Administrative 3. Technical

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.1 What mechanisms do you require by which the support could be delivered? Also specify the sub-component of SLMS)**

1. Specific expertise 2. Guidelines 3. Workshop

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Direct funding 5. Other (specify)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.2 Do you have an estimation of the funding required? Also specify the sub-component of SLMS against each option.**

1. Yes (provide estimate for each sub-component below) 2. No 3. Require support to estimate the funding

* Data available and accessible \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Technical capabilities (equipment and logistics) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Human capacity for processing (analysis) of the information related to the SLMS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Human capacity for the preparation of reports from the SLMS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Capabilities related to data verification (quality control and quality assurance) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Training facilities \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.3 Who will be the beneficiaries from the support?**

1. Indigenous/ local communities/ people 2. Civil Societies 3. Government Institution

4. Others (specify

***Component 2: National Forest Inventory (NFI)***

***Sub-component 2.1: Data Availability and Accessibility***

**Q. 1 Is the data on provincial/ national forest inventory available in the province/ territory?**

1. Yes 2. No

(If your answer is “Yes” then go to 1.1 - 1.8)

**1.1 What was the purpose of forest inventory?**

1.Biomass estimation for the whole forest areas in the province/ territory

2. Biomass estimation for specific forest types (please specify the types of forest) ---------------------------

3. Carbon estimation for the whole forest areas in the province/ territory

4. Carbon estimation for specific forest types (please specify) --------------------------------------------------

5. Others (please specify) -----------------------------------------------------------------------------------------------------

**1.2 What data collection methods/ techniques were used?**

1. Complete forest inventory measuring different parameters of all the trees

2. Sampling (Simple Random Stratified Systematic )

3. Plot configuration for measuring the trees of specific variable (diameter, height) class . Please also specify the plot design (rectangular , circular or square )

4. Plot configuration for measuring the trees of all variable (diameter, height) class . Please also specify the plot design (rectangular , circular or square )

**1.3 What parameters or variables were measured during the inventory?**

* Diameter at breast height
* Height of the tree
* Tree Volume
* Basal area
* Tree crown cover
* Carbon stock of a tree
* Other (please specify)

**1.4 Does the forest inventory follow the required UNFCCC/ IPCC guidance related to NFI?**

1. Yes 2. No

(If your answer is “Yes” then specify and tick the guidance criteria followed)

* Division of forest land into sub categories of “forest land remaining forest land” and “other land converted to forest land”
* Stratification of sub-categories based on forest type, specie, ecological zone, topography etc
* Agreement on definitions, reference units, monitoring variables, inventory methods and framework (please provide details separately if available)
* Details on forest area and carbon stock change with its link to the drivers of change (deforestation and degradation)
* Data on different carbon pools (above ground biomass, below ground biomass, dead organic matter, litter and soil) and consideration of impact on these different pools.
* Data on firewood removals, timber harvesting, harvested wood products.
* Detailed inventory in areas of forest change for REDD+ actions

**1.5 Are allometric equations and expansion factors available for specific forest areas and/ or tree species of province/ territory?**

1. Yes 2. No

(If your answer is “Yes” then specify forest type and/ or specie for which allometric equations and BEFs/ BCEFs are available)

* Forest Types:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Species: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.6 Have the uncertainties been reduced by considering UNFCCC and IPCC guidelines?**

1. Yes 2. No

(If your answer is “Yes” then specify and tick which uncertainties have been addressed)

* Uncertainties during the design and configuration of field sample plots
* Uncertainties during the taking measurements with equipments
* Uncertainties during compilation of data and application of statistical procedures
* Uncertainties related to data propagation from plot to strata and whole area

**1.7 Is the relevant data accessible?**

1. Yes (if yes then tick the relevant box below) 2. No

* The data is accessible within the department in digital format
* The data is accessible within the department published in the form of papers, reports etc
* The data is accessible with other organization in digital format

(Please specify the name of institution): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* The data is accessible with other institution published in the form of papers, reports etc

(Please specify the name of institution): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.8 How would you rank your organization regarding data availability and accessibility?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-Component 1.2: Technical Capabilities (Equipment and Logistics)***

**Q. No. 2 Do you have the technical capabilities required for the Forest Inventory System?**

1. Yes 2. No

(If “Yes” then go to 2.1 – 2.5)

**2.1 Have you made any institutional arrangements for forest inventories?**

1. Yes 2. No

(if yes please give separate details about institutional arrangements with roles and responsibilities)

**2.2** **Are field equipments/ tools required for forest inventory available?**

1. Yes 2. No

(If “Yes” then tick the appropriate box)

* GPS
* Base maps
* Measurement units
* Field equipment to establish permanent sample plots, Collect leaf, litter and herbs/ grass, collect soil sample and measure tree parameter (diameter, height, etc)

**2.3 Are there other potential institutions (Govt., NGO’s, academic etc) with relevant technical capabilities?**

1. Yes 2. No

(if yes please specify the names of the relevant institutions)

1. Government 2. NGO’s 3. Academia

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2.4 Is there any system of networking with other relevant institutions?**

1. Yes 2. No

(if yes please give separate details)

**2.5 How would you rank your organization regarding technical capabilities?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub – Component 1.3: Human Capacity to Process (analyse) Information Related to NFI***

**Q.No.3 Do you have the human capacity to process (analyse) information related to *NFI?***

1. Yes 2. No

(If “Yes” then answer 3.1, 3.2 and 3.3)

**3.1 Do you have the adequate human resource with the knowledge and understanding of relevant national/ international negotiations and decisions?**

1. Yes 2. No

(If “Yes” then tick the appropriate box)

* Knowledge of International UNFCCC negotiations and decisions relevant to REDD+ MRV
* Knowledge and understanding of IPCC guidelines and guidance (GPG-LULUCF 2003, and 2006 guidelines)
* Knowledge of national REDD+ implementation strategy and objectives

**3.2 Do you have the expertise in forest inventories?**

1. Yes 2. No

(If “Yes” then tick the appropriate box)

* Understanding of processes influencing terrestrial carbon stocks
* Understanding of DD drivers and factors
* Expertise and human resources for in-situ data collection of all required parameters and data processing
* Approach for dealing with technical challenges of sample designs and plot configuration in the field
* Expertise to use GPS system in the field

**3.3 How would you rank your organization regarding human capacity to process (analyse) information related to NFI?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.4: Human capacity for the preparation of reports from the NFI?***

**Q.No.4 Do you have the human capacity for the preparation of reports from NFI?**

1. Yes 2. No

(If “Yes” then answer 4.1and 4.2)

**4.1 Which capacities and human resource currently available?**

* Professional report writing skills

Non 1-3 4-6 6-9 10 and above

* Capacity to review, consolidate and integrate the existing data and information on NFI

Non 1-3 4-6 6-9 10 and above

* Understanding of UNFCCC and IPCC reporting requirements (prescribed guidelines, formats and procedures of reporting to designated organizations

non 1-3 4-6 6-9 10 and above

* Capacity to review, consolidate and integrate the existing data and information on NFI

Non 1-3 4-6 6-9 10 and above

* Capacity to transform field data and information into reports

Non 1-3 4-6 6-9 10 and above

**4.2 How would you rank your organization regarding human capacity for the preparation of reports from the NFI?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.5:******Capabilities related to data verification (quality control and quality assurance)***

**Q.No.5 Do you have the capabilities related to data verification (quality control and quality assurance)?**

1. Yes 2. No

(If “Yes” then answer 5.1and 5.2)

**5.1 Specify which capabilities are currently available?**

* Expertise on the application of statistical methods to quantify, report and analyze uncertainties for all relevant information (i.e. plot configuration, use of equipment, data compilation, error estimation and data propagation) etc.) using, ideally, a sample of higher quality information.
* Understanding of error sources and uncertainties in the assessment process
* Data infrastructure, information technology (suitable hard/software) and human resources to maintain and exchange data and quality control

**5.2 How would you rank your organization regarding Capabilities related to data verification (quality control and quality assurance)?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.6: Training Facilities***

**Q. No. 6 Are training facilities available in the province?**

1. Yes 2. No

(If “Yes” then answer 6.1and 6.3)

**6.1 What training facilities are currently available?**

* Any training unit/ cell
* Local Experts/ Trainers on NFI (please provide number \_\_\_\_\_)
* Budget allocations for staff training
* Relevant Training Equipments

**6.2 Are there other institutions with relevant training facilities in the province?**

1. Yes 2. No

(If “Yes” then please specify the names of the institutions)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.3** **How would you rank your organization regarding training facilities?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 1.7: Areas of Improvement***

**Q.No. 7 Based on the information provided above, please specify the areas of improvement.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data availability and accessibility | Technical capabilities (equipment and logistics) | Human capacity for processing (analysis) information related to SLMS | Human capacity for the preparation of reports fro SLMS | Capabilities relating to data verification (quality control and quality assurance) | Training facilities |
| □ 1. -------------  □ 2. -------------  □ 3. -------------  □ 4. -------------  □ 5. -------------  □ 6. ------------ | □ 1. -----------------  □ 2. -----------------  □ 3. -----------------  □ 4. -----------------  □ 5. -----------------  □ 6. ----------------- | □ 1. ---------------------  □ 2. ---------------------  □ 3. ---------------------  □ 4. ---------------------  □ 5. ---------------------  □ 6. --------------------- | □ 1. ----------------------  □ 2. ----------------------  □ 3. ----------------------  □ 4. ----------------------  □ 5. ----------------------  □ 6. ---------------------- | □ 1. -------------------  □ 2. -------------------  □ 3. -------------------  □ 4. -------------------  □ 5. -------------------  □ 6. ------------------- | □ 1. ---------------  □ 2. ---------------  □ 3. ---------------  □ 4. ---------------  □ 5. ---------------  □ 6. --------------- |

**Q. No. 8 Do you need the support to fulfil the gaps regarding NFI?**

1. Yes 2. No

(If “Yes” then tick the type of support needed and expand in each option the sub-component for which the support is required)

1. Financial 2. Administrative 3. Technical

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.1 What mechanisms do you require by which the support could be delivered? Also specify the sub-component of NFI)**

1. Specific expertise 2. Guidelines 3. Workshop

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Direct funding 5. Other (specify)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.2 Do you have an estimation of the funding required? Also specify the sub-component of NFI against each option.**

1. Yes (provide estimate for each sub-component below) 2. No 3. Require support to estimate the funding

* Data available and accessible \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Technical capabilities (equipment and logistics) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Human capacity for processing (analysis) of the information related to the NFI \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Human capacity for the preparation of reports from the NFI \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Capabilities related to data verification (quality control and quality assurance) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Training facilities \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.3 Who will be the beneficiaries from the support?**

1. Indigenous/ local communities/ people 2. Civil Societies 3. Government Institution

4. Others (specify

***Component 3: Green House Gas (GHG) Inventory***

***Sub-Component 3.1 Data Availability and Accessibility***

**Q.1 Are green house inventories ever conducted in the province/ territory?**

1. Yes 2. No

(If your answer is “Yes” than answer 1.1 to 1.9)

**1.1 The GHG inventory was carried out for:**

* Emissions by sources
* Removals by sink categories
* Both emissions by sources and removals by sinks
  1. **Which gases were reported in the inventory?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.3 Identify the Land Use Categories for which GHG inventory data were collected?**

* IPCC Land use categories (Forest Land, Crop Land, Grass Land, Wetland, Settlements, Other Land)
* Others (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.4 Are there any standard definitions (forest, land use categories etc) adopted for GHG Inventory?**

1. Yes (if yes then tick the relevant box below) 2. No

* Country specific definitions (please give details with justification in a separate paper)
* IPCC Definitions (please provide reference?)
* Others (FAO, World Bank etc) please specify?

**1.5 Has any methodological standards followed?**

1. Yes (if yes then please tick the relevant box and give details) 2. No

* IPCC standard methodology (19996 2000 GPG LULUCF 2006Guidelines )
* Others (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  1. **Has Key Category been identified?**

1. Yes (if yes then please give details) 2. No

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**1.7 Which method has been used for GHG inventory?**

* + Gain Loss Method (please justify the reason to choose the method) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Stock Difference Method (please justify the reason to choose the method) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.8 Is the data accessible?**

1. Yes (if yes then tick the relevant box below) 2. No

* The data is accessible within the department in digital format
* The data is accessible within the department published in the form of papers, reports etc
* The data is accessible with other organization in digital format

(Please specify the name of institution): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* The data is accessible with other institution published in the form of papers, reports etc

(Please specify the name of institution): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.9 How would you rank your organization regarding data availability and accessibility?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-Component 3.2 Technical Capabilities***

**Q.No.2 Are there institutional, legal and procedural arrangements made for GHG inventory?**

1. Yes 2. No

(If yes than answer 2.1 to 2.6)

* 1. **Is National/ Provincial single entity designated to deal with GHG inventory?**

1. Yes (if yes, please specify) 2. No

* 1. **Are roles and responsibilities allocated to all relevant entities/ organizations to perform specific functions of Planning, Preparation and Management for National Inventory System**

1. Yes 2. No

(If yes, please mention the entities with allocated responsibilities in a separate paper)

* 1. **Are MoUs, Laws, Decrees and/ or Agreements have been made between entities to give legal authority to perform specific functions (please provide details if any)**

1. Yes 2. No

(If yes, please provide relevant details)

**2.4 Is there any agreement at national and/ or provincial level on the standard methodological procedures to be followed for GHG inventory?**

1. Yes 2. No

(If yes, please provide relevant details)

**2.5** **Are the financial resources, facilities and required equipments available with the designated entity to perform the GHG inventory?**

1. Yes 2. No

(If yes, please provide relevant details)

**2.6 How would you rank your organization regarding technical capabilities?**

1. (Low) 2. (Average)

3. (Advanced)

**Note: The rest of the sub-components i.e. Q.No 3 to Q.No.7 are also relevant to component 1(SLMS) and component 2 (NFI). However, the need assessment for the first two sub-components of GHG inventory could be responded by answering the following questions.**

**Q. No. 8 Do you need the support to fulfil the gaps regarding GHG?**

1. Yes 2. No

(If “Yes” then tick the type of support needed and expand in each option the sub-component for which the support is required)

1. Financial 2. Administrative 3. Technical

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.1 What mechanisms do you require by which the support could be delivered? Also specify the sub-component of GHG)**

1. Specific expertise 2. Guidelines 3. Workshop

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Direct funding 5. Other (specify)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.2 Do you have an estimation of the funding required? Also specify the sub-component of GHG against each option.**

1. Yes (provide estimate for each sub-component below) 2. No 3. Require support to estimate the funding

* Data available and accessible \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Technical capabilities (equipment and logistics) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Human capacity for processing (analysis) of the information related to the GHG \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Human capacity for the preparation of reports from the GHG \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Capabilities related to data verification (quality control and quality assurance) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Training facilities \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.3 Who will be the beneficiaries from the support?**

1. Indigenous/ local communities/ people 2. Civil Societies 3. Government Institution

4. Others (specify

***Component 4: National Communication (NC)***

***Sub-component 1: Preparation Method and Regularity***

**Q.No.1 Are national/ provincial arrangement in place for the preparation of NC?**

1. Yes 2. No

(If yes, give details of national arrangements)

**1.1 Since Pakistan submitted its first NC in 1993, is there any regularity in the preparation of NC?**

1. Yes 2. No

(If yes, give details how regular the NC is prepared)

**1.2 How would you rank your organization regarding preparation methods and regularity?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 2: Task Force***

**Q.No.2 Is there any task force established with specific roles and responsibilities for the preparation of NC?**

1. Yes 2. No

(If Yes, give details about human and financial resources available with the task force)

(If No, than give information if relevant experts are identified and available in the country in government organizations, NGOs, universities and/ or individuals)

**2.1 How would you rank your organization regarding task force on NC?**

1. (Low) 2. (Average)

3. (Advanced)

***Sub-component 3: Analysis of Areas for Improvement***

**Q.No.3 Identify the areas of improvement for the preparation of NC.**

**1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Q. No. 4 Do you need the support to fulfil the gaps regarding NC?**

1. Yes 2. No

(If “Yes” then tick the type of support needed and expand in each option the sub-component for which the support is required)

1. Financial 2. Administrative 3. Technical

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4.1 What mechanisms do you require by which the support could be delivered? Also specify the sub-component of NC)**

1. Specific expertise 2. Guidelines 3. Workshop

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Direct funding 5. Other (specify)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4.2 Do you have an estimation of the funding required? Also specify the sub-component of NC against each option.**

1. Yes (provide estimate for each sub-component below) 2. No 3. Require support to estimate the funding

* Preparation method and regularity \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Task force \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Other (if any) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4.3 Who will be the beneficiaries from the support?**

1. Indigenous/ local communities/ people 2. Civil Societies 3. Government Institution

4. Others (specify

Annex VI. Needed equipment to implement the SLMS

| **Equipment** | **PFI** | **Provinces** | **Total** | **Unit price (USD)** | **Total price (USD)** |
| --- | --- | --- | --- | --- | --- |
|
|  |
| High definition computer machine | 12 | 14 | 26 | 1200 | 31200 |
| Single frequency Global Positioning System (GPS | 6 | 14 | 20 | 500 | 10000 |
| Differential GPS (DGPS) and Total Stations | 2 | 7 | 9 | 15000 | 135000 |
| Drones with high definition cameras for monitoring of forest activities | 4 | 14 | 8 | 6000 | 48000 |
| Plotters | 2 | 7 | 9 | 1500 | 13500 |
| Scanners | 2 | 7 | 9 | 500 | 4500 |
| Webhosting Servers | 2 | 0 | 2 | 5000 | 10000 |
| Camera | 2 | 7 | 9 | 1000 | 9000 |
| Generator | 1 | 7 | 8 | 4000 | 48000 |
| UPS | 1 | 7 | 8 | 2300 | 18400 |
| Laptop and Printers | 6 | 7 | 13 | 1000 | 13000 |
| Photocopier | 2 | 7 | 9 | 1500 | 13500 |
| ArcGIS software | 1 | licences | 1 | 12000 | 12000 |
| Erdas Imagine | 1 | licences | 1 | 10500 | 10500 |
| Ecognition | 1 | licences | 1 | 14000 | 14000 |

Annex VII. Needed equipment to implement the NFI

| **Equipment** | **PFI** | **Provinces** | **Total** | **Unit price (USD)** | **Total price (USD)** |
| --- | --- | --- | --- | --- | --- |
|
|  |
| **Hardware** | | | | | |
| Laptop | 0 | GB = 07;KPK = 10;AJK = 06; Punjab = 06; Sindh = 05; Baluchistan = 06 | 40 | 1000 | 40000 |
| Computer | 0 | GB = 07; KPK = 10; AJK = 06; Punjab = 06  Sindh = 05; Baluchistan = 06 | 40 | 1000 | 40000 |
| Server | 0 | GB = 01; KPK = 01; AJK = 01; Punjab = 01  Sindh = 01; Baluchistan = 01 | 6 | 5000 | 30000 |
| Scanner | 0 | GB = 04; KPK = 09; AJK = 04; Punjab = 06  Sindh = 05; Baluchistan = 06 | 39 | 500 | 19500 |
| Printer | 0 | GB = 04; KPK = 09;AJK = 04;Punjab = 06  Sindh = 05; Baluchistan = 06 | 39 | 500 | 19500 |
| Generator | 01 | GB = 02; KPK = 02; AJK = 02;Punjab = 02  Sindh = 02;Baluchistan = 02 | 13 | 5000 | 65000 |
| Software Database | 01 | 06 | 07 | 1000 | 7000 |
| Plotter | 03 | GB = 03; KPK = 03; AJK = 03; Punjab = 02  Sindh = 02; Baluchistan = 02 | 18 | 5000 | 90000 |
| **TRANSPORT** | | | | | |
| Pick up (with working plan circles) | 04 | GB = 03; KPK = 03; AJK = 03; Punjab = 03  Sindh = 03; Baluchistan = 03 | 22 | 25000 | 550000 |
| **OTHER** | | | | | |
| Camera | 03 | GB = 04; KPK = 05; AJK = 04; Punjab = 06  Sindh = 04; Baluchistan = 06 | 32 | 1000 | 32000 |
| Tent | 06 | GB = 04; KPK = 04; AJK = 04; Punjab = 04  Sindh = 04; Baluchistan = 04 | 30 | 150 | 4500 |
| Laser vertex | 04 | GB = 06; KPK = (09); AJK = (06);  Punjab = 06; Sindh = 06; Baluchistan = 06 | 43 | 100 | 4300 |
| Clinometer | 05 | GB = 04; KPK = (04); AJK = (04);  Punjab = 04; Sindh = 04; Baluchistan = 04 | 29 | 300 | 8700 |
| Lensatic Compass | 03 | GB = 04; KPK = 04; AJK = 04;Punjab = 04  Sindh = 04; Baluchistan = 04 | 27 | 150 | 4050 |
| Auger | 05 | GB = 08; KPK = 10; AJK = 08; Punjab = 12  Sindh = 10; Baluchistan = 12 | 65 | 25 | 1625 |
| Densiometers | 05 | GB = 08; KPK = 08; AJK = 08; Punjab = 08  Sindh = 08; Baluchistan = 08 | 53 | 100 | 5300 |
| Callipers | 05 | GB = 10; KPK = 10; AJK = 10; Punjab = 10  Sindh = 10; Baluchistan = 10 | 65 | 50 | 3250 |
| Increment Borer | 05 | GB = 10; KPK = 10; AJK = 10; Punjab = 10  Sindh = 10; Baluchistan = 10 | 65 | 150 | 90750 |
| Oven | 02 | GB = 03; KPK = 03; AJK = 03; Punjab = 03  Sindh = 03; Baluchistan = 03 | 20 | 150 | 3000 |
| Weighing Machines | 05 | GB = 05; KPK = 05; AJK = 05; Punjab = 05  Sindh = 05; Baluchistan = 05 | 35 | 100 | 3500 |
| Muffle Furnace | 02 | GB = 02; KPK = 02; AJK = 02  Punjab = 02; Sindh = 02; Baluchistan = 02 | 14 | 1000 | 14000 |
| TOC Analyzer | 01 | 06 | 01 | 1500 | 1500 |

Annex VIII. Needed equipment to implement the GHG-I

| **Equipment** | **PFI** | **Provinces** | **Total** | **Unit price (USD)** | **Total price (USD)** |
| --- | --- | --- | --- | --- | --- |
|
|  |
| Hardware | | | | | |
| Laptop and Printer | 4 | 0 | 4 | 1000 | 4000 |
| Photo copier machine | 1 | 0 | 1 | 1500 | 1500 |
| Scanner | 2 | 0 | 2 | 500 | 1000 |
| Multimedia and Screen | 1 | 0 | 1 | 1,000 | 1,000 |
| Software | | | | | |
| Free & Open source | 1 | 0 |  | 0 | 0 |

Annex IX. Needed equipment to implement the monitoring function

| **Equipment** | **PFI** | **Provinces** | **Total** | **Unit price (USD)** | **Total price (USD)** |
| --- | --- | --- | --- | --- | --- |
|
|  |
| Hardware | | | | | |
| Laptop and Printer | 4 | 0 | 4 | 1000 | 4000 |
| Photo copier machine | 1 | 0 | 1 | 1500 | 1500 |
| Scanner | 2 | 0 | 2 | 500 | 1000 |
| GPS | 6 | 0 | 6 | 250 | 1500 |
| Cameras | 2 | 0 | 2 | 1000 | 2000 |
| Multimedia and Screen | 1 | 0 | 1 | 1,000 | 1,000 |
| Softwares | | | | | |
| specialized monitoring tools |  |  | 1 | 1000 | 1000 |
| FOSS tools | 1 | 0 | 1 | 0 | 0 |

Annex X. Potential indicators to monitor REDD+ activities implementation

|  |  |  |
| --- | --- | --- |
| **ACTIVITY** | **EXPLANATION** | **USEFUL INDICATORS** |
| **Reducing emissions from deforestation** | Deforestation is the conversion from forest land use to another land use (e.g. forest land to crop land) | Reduced rate of forest loss |
| **Reducing emission from forest degradation** | Degradation is the human-induced loss of carbon stocks within forest land that remain forest land | Reduced rate and volume of timber extraction |
| **Conservation of forest carbon stocks** | Is an effort to decrease the threat that forests and to ensure permanence by establishing long-term commitments to preserve forest | Strengthening and expansion of protected area network |
| **Sustainable management of forests** | Generally refers to bringing the rate of extraction in line with the rate of natural growth or increment | Increased land under sustainable management (e.g. CFM, SFM) |
| **Enhancement of forest carbon stocks** | Refers to 1) non-forest land becoming forest land, and 2) the enhancement of carbon stocks in forest land remaining forest land | Increase in reforestation  Degraded forests allowed to regenerate  Enrichment planting |

ANNEX XI Validation statement of the Pakistan NFMS AP validation workshop

Today, 26 August 2015, 40 individuals from a wide range of national stakeholders met for the Pakistan National Forest Monitoring System Action Plan (hereafter, “NFMS AP”) Validation Workshop in FAO Conference hall, Islamabad to be consulted on the NFMS AP document. Participants comprised senior officials from government, members of non-governmental organizations and civil society, academic experts, researchers, members of development partners and donors, among others.

In preparation for the validation workshop, the NFMS AP document was distributed to stakeholders on 30 July 2015, posted on the WWF Pakistan website on 30 July 2015, and circulated through emails. The document was open for comments until the day of the validation workshop. These comments were delivered to Muhammad Ibrahim Khan, Sr. Manager Conservation and Muhammad Afrasiyab, Sr. Project Officer, WWF Pakistan by email.

Workshop participants were presented with brief presentations of the NFMS AP institutional mechanism, development process, and the outcomes and results framework agreed through consultations between 20 March 2014 and 23 July 2015. After the presentations, participants engaged in discussion in break-out groups to which they were self-assigned, discussing namely the following;

Component 2 (Satellite Land Monitoring System)

Component 3 (National Forest Inventory)

Component 4 (Greenhouse Gas Inventory)

Components 1&5 (Institutional framework and Monitoring function)

The groups were self-facilitated and rapporteurs presented the outcomes of discussions using the template provided. Individuals from the NFMS AP development team were present at each of the break-out groups as resource persons.

Based on the presentations and following plenary discussions, the recommendations for the finalization of the document are as follows (for outputs and outcomes where no comments were made or revision proposed, these are not mentioned in the matrix below). Sign it sheet of the workshop participants validating the NFMS AP is attached.

|  |  |  |  |
| --- | --- | --- | --- |
| **Outputs and activities** | **Type of comments (correction, addition, deletion, amendment)** | **Comments** | **Response by the NFMS team** |
| **Component 1 and 5: Institutional framework and Monitoring function** | | | |
| **Institutional framework for NFMS AP implementing (page 17 and 18)** |  |  |  |
|  | Addition on page 17 in the organogram and in the text | REDD Management and coordination board (as an additional body in the list of institutions – paragraph 2, page 18) with representatives from all provinces (FDs and other associated Government and Non-Government Organizations), and MoCC with rotating chair from provincial FDs including territories (AJK, GB and FATA). The OIGF will act as secretariat of the board with REDD Coordinator as secretary. | Incorporated |
|  | Agreed with the rest of institutional framework of NFMS implementation with PFI having the lead role |  | Maintained |
|  | Addition on page 18 | Develop provincial REDD Steering Committees and REDD cells with secretariats in respective Forest Departments. Add this under the text of Provincial FDs on page 18. | Incorporated |
| **Output 1: The institutional framework is established (Page 39-42)** |  |  |  |
| ***Activity 1.1: Establishment of the technical units*** | Addition (as a new activity) | Develop TORs for the REDD/ NFMS management and coordination board and notify. Add as a new activity. | Added |
|  | Correction | Formalisation instead of legal preparedness | Corrected |
| ***Activity 1.2: Setting up of participatory process*** | Addition | Stakeholders mapping (at provincial level) | Added |
| **Component 2: Satellite Land Monitoring System (SLMS)** | | | |
| **Output 1: The technical capacities are reinforced (Page 43-46)** |  |  |  |
| ***Activity 1.2: Select and recruit technical staff*** | Replace | Replace ‘MS degree’ with Minimum requirement M.Sc. (sixteen years of education) | Replaced |
| ***Activity 1.4 : Centralisation of existing data*** | Addition | Add to last paragraph: Academia, researchers and relevant institutions etc | Added |
| ***Activity 1.5 : Characterize satellite images for forest monitoring*** | Addition | Add at the end of the second paragraph:  In addition to these datasets, images (SPOT, QuickBird, GeoEye etc.) acquired from other departments/organisations through MoU will also be part of the system | Added |
| **Output 2 : The SLMS is operational (Land use and forest cover changes are measured) (Page 46-47)** |  |  |  |
| ***Activity 2.1 : Historical analysis of land use and forest cover changes*** | Addition | Please add in the brackets at the end of first paragraph: Deforestation, forest degradation and land use changes, instead of only land conversion | Added |
| ***Activity 2.2: Monitoring of land use and forest cover changes*** | Addition | Add at the end of first paragraph: Biennial monitoring of hotspots (10% of the forest area of each province) | Added |
| **Component 3: National Forest Inventory (NFI)** | | | |
| **Output 1: The technical capabilities are strengthened (Page 48-55)** |  |  |  |
| ***Activity 1.1: establish and equip national and provincial laboratories*** | Addition – first in sub-activity box | Selection and retention of competent team is required before the selection of office space | Added |
| ***Activity 1.2: Capacity Building*** | Addition – end of paragraph 1 | The trainers should be identified and retained in the respective divisions/ departments to ensure sustainability | Added |
| ***Activity 1.3: Centralization of existing data*** | Addition – end of paragraph 1 | Standardisation of the data and methodology should be ensured, according to IPCC guidelines | Added |
| **Output 2 : The NFI is designed (Page 50-52)** |  |  |  |
| ***Activity 2.2: conceptualize the multipurpose NFI*** | 2.2 (S.A 3) addition | For socio-economic variables, REDD+ safeguards should be followed | Added |
| ***Activity 2.3: Develop the multipurpose NFI methodology*** | Agreed | Rephrasing of word «  test » with « Pilot study ». (SA 6) | Rephrased |
| **Output 3 : The NFI is implemented (Page 52-54)** |  |  |  |
| ***Activity 3.1: Train technical staff on NFI methodology*** | Addition 3.1 (SA 1) | Add ‘and other related departments’ | Added |
|  | Addition 3.1 (SA 2) | The trainers should be from forest departments as well | Added |
| ***Activity 3.2: Operational planning*** | Addition (3.2) para. | The word « academia » may be added to the first sentence of the 2nd paragraph | Added |
| ***Activity 3.4: Collection of field data*** | Add to end of second paragraph | Collection of data should be carried out through existing forestry field staff. | Added |

