ICIMOD Proceedings 2014/1

Learning on Reducing Emissions from Deforestation and Forest Degradation

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The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalayas – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.

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Learning on Reducing Emissions from Deforestation and Forest Degradation

Proceedings of the Regional Workshop held 24 to 27 July 2012 in Kathmandu, Nepal

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Acronyms and Abbreviations

AGB	above ground biomass
ANP	Ayubia National Park
ANSAB	Asia Network for Sustainable Agriculture and Bioresources
ARET	alternative rural energy technologies
BDS	benefit distribution system
BEF	biomass expansion factor
BGB	below ground biomass
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CHEA	Central Himalayan Environment Association
COP	Conference of the Parties
dbh	diameter at breast height
EFCS	enhancement of forest carbon stocks
FCPF	Forest Carbon Partnership Facility
FCTF	Forest Carbon Trust Fund
FECOFUN	Federation of Community Forest Users Nepal
GHG	greenhouse gas
GIS	geographical information system
ICFRE	Indian Council for Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change
JFM	joint forest management
JFPM	joint forest planning and management
K:TGAL	Kyoto: Think Global, Act Local
MOFSC	Ministry of Forests and Soil Conservation
MRV	measuring, reporting and verification
NGO	non-governmental organization
NFCP	Natural Forest Conservation Programme
NFI	national forest inventory
PDD	project design document
PES	payment for environmental services
PFE	permanent forest estate
PSM	propensity score matching
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REL	reference emissions level
RL	reference level
R-PIN	readiness plan idea note
RPP	readiness preparation proposal
RSFFP	Return Slope Farmland to Forestland Programme
SEPC	social and environmental principles and criteria
SES	social and environmental standard
SESA	strategic environmental and social assessment
SFM	sustainable forest management
SOC	soil organic carbon
t	tonne
TAL	Terai Arc Landscape
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States dollar
VCS	voluntary carbon standards

Note: Approximate conversions of values in local currency to USD have been provided to facilitate understanding. The conversion rates used are for July 2012:

1 USD = 6.36 CNY; 56.02 INR; 94.45 PKR

Executive Summary

A four-day workshop on 'Learning on reducing emissions from deforestation and forest degradation (REDD+) in South Asia' was organized from 24 to 27 July 2012 at ICIMOD's headquarters in Kathmandu, Nepal. The workshop started with a two-day field visit to Kayar Khola watershed – one of the REDD pilot sites in Nepal – which was followed by two days of presentations and discussions. It brought together REDD+ researchers and practitioners in a regional learning forum to help improve understanding of the different national strategy and policy options for developing a REDD+ framework; consolidate regional knowledge and common issues in order to facilitate policy development; and set a trajectory for regional policies, practices, financing, and operational standards on REDD+. The 59 participants from outside ICIMOD included experts on REDD+; government officials, focal points, and forestry officials from most of ICIMOD's regional member countries (Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan); and representatives of civil society and non-governmental organizations. They joined with ICIMOD experts to present and share accounts of country-specific national policy and strategic progress, progress in technical matters (baseline and reference scenarios, inventory methodology, measuring, reporting, and verification (MRV), and others), REDD financing arrangements, and bottlenecks and other issues for REDD, and to share their outlooks on the immediate future and long-term prospects for REDD+ initiatives. The workshop provided insights that will be valuable to both policy makers and practitioners as REDD+ programmes evolve in each country. The regional learning helped to identify areas that require further impetus and collaborative work to promote a common MRV approach in the region along with sustainable and equitable REDD+ strategies that will benefit local communities. It also helped ICIMOD to identify bottlenecks and potential solutions for implementing REDD+ in the region. This publication contains an account of the proceedings and the contributions on country level policies, case studies, and technical methods.

Introduction and Opening of the Workshop

Introduction

Sustainable protection and management of forests, and the resulting increase in biological sequestration of carbon in terrestrial ecosystems, provides one of the best solutions for mitigation and adaptation to climate change. Thus reducing emissions from deforestation and forest degradation (REDD) and its expanded successor REDD+ have been recognized as an effective and efficient ways to combat climate change. Due to the unique role of forests in climate change, the importance of REDD/REDD+ is likely to increase in the coming years. However, global agreement on REDD+ under the United Nations Framework Convention on Climate Change (UNFCCC) framework has yet to be finalized. The preparation for REDD+ was initiated under the Bali Action Plan of the 13th UNFCCC Conference of the Parties (COP 13) in 2007, when nations pledged their commitment to 'policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries'. The Copenhagen Climate Conference in 2009 endorsed the five activities that define REDD and REDD+. In 2010, the Cancun Climate Conference highlighted the need for the inclusion of social and environmental safeguards in future REDD negotiations.

Progress made at the Durban Climate Conference in 2011 dealt with how to set reference emission levels and how to conduct monitoring, reporting, and verification. The need to highlight effective social and environmental safeguards was again stressed. Sources of financing and how the REDD+ global financing mechanism will work will hopefully be addressed in a timely manner by the UNFCCC negotiations.

As an incentive-based mechanism, REDD+ defines a new paradigm for forest management. In theory, REDD+ is a smart strategy that can reduce deforestation and land degradation as well as enhance ecosystem-based adaptation strategies in forest dependent communities.

The co-benefits of REDD+ activities can include poverty reduction and biodiversity conservation, which are also recognized by the Convention on Biological Diversity (CBD).

Developing countries are in the process of formulating their national REDD/REDD+ strategies. They are at different stages along the economic growth curve with varying economic development trajectories, and have different forest resources and a wide range of drivers of deforestation and forest degradation. It is already clear that a 'one size fits all' REDD+ approach will not work. This is a major reason why reaching a global agreement has been so difficult. In South Asia, a few Clean Development Mechanism (CDM) afforestation and reforestation activities are already being implemented; but there are only a small number of REDD+ initiatives in the pilot stage. Countries need to learn from each other – recognizing their different circumstances – and to take stock of how REDD+ is developing in each country. Regional sharing and exchange are important for sharing and distilling learning and increasing understanding and awareness of what is happening at national and regional levels as the REDD+ processes unfold at the community level.

Some pilot initiatives on forest-based CDM and REDD+ projects have been implemented in South Asia in recent years, including a groundbreaking REDD+ initiative in Nepal in the Hindu Kush Himalayas by ICIMOD in partnership with the Federation of Community Forestry Users Nepal (FECOFUN) and Asia Network for Sustainable Agriculture and Bioresources (ANSAB). This initiative is now at an advanced stage of designing a measuring, reporting, and verification (MRV) approach and developing a project design document (PDD), setting a national pathway for REDD+. It is an appropriate time to initiate a learning platform so that common issues and knowledge on REDD+ can be identified and shared among countries.

The Regional REDD+ Workshop

The workshop on 'Learning on reducing emissions from deforestation and forest degradation (REDD+) in South Asia' was organized from 24 to 27 July 2012 at ICIMOD's headquarters in Kathmandu, Nepal. It brought together 59 participants from outside ICIMOD including experts on REDD+; government officials, focal points, and forestry officials from several of ICIMOD's regional member countries (Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan); representatives of civil society and non-governmental organizations; and close to 30 ICIMOD experts concerned directly or indirectly with REDD and REDD+. The workshop started with a two-day field visit to Kayar Khola watershed – one of the REDD pilot sites in Nepal – which provided participants with a hands-on view of a REDD+ project being implemented by local community forest users. The two days of presentations' and discussions that followed increased participants understanding of the different national strategy and policy options for developing a REDD+ framework; consolidated regional knowledge and common issues to facilitate policy development; and set a trajectory for regional policies, practices, financing, and operational standards on REDD+. The workshop focused on identifying capacity and technical needs as well as options for financing mechanisms. It also discussed how to address social and environmental safeguards in REDD+ and how to further involve local communities in the REDD+ process, and identified the steps for promoting sustainable REDD+ strategies.

Workshop objectives

The specific objectives of the workshop were:

- to bring together REDD+ practitioners in a regional learning forum to improve understanding of national strategy and policy options for developing a REDD+ framework;
- to consolidate regional knowledge and common issues in order to facilitate policy development to ensure that poor people benefit from REDD+ initiatives; and
- to set the trajectory for regional policies, practices, financing, and operational standards on REDD+.

Programme

The programme was divided into three main sections each with several presentations followed by discussions, as well as a section on group work.

Country presentations (India, Myanmar, Nepal, Pakistan)

Presentations from the four countries focused on issues of national policy and strategic progress, progress in technical matters (baseline and reference scenarios, inventory methodology, MRV, and others), REDD financing arrangements, bottlenecks and issues, the immediate outlook, and long-term prospects for REDD+.

Case studies

Representatives of non-governmental organizations (NGOs) and others presented reports of case studies that they have carried out in support of REDD+ development. The presentations focused on the project outline, stakeholder and community involvement, the financing instruments and mechanisms, how social and environmental safeguards have been integrated, challenges and bottlenecks at the implementation level, and the future of the project.

Technical methods

A range of technical methods and developments in the different countries were described including capacity building of local communities to monitor carbon stocks, development of an MRV framework, potential contribution of a geospatial approach to MRV, assessing the impact of REDD payments on livelihoods and economic development, and the overall REDD+ readiness process.

Group work

The plenary presentations and discussions were followed by discussions in four break-out groups on policy development and options, financing mechanisms, technical issues and MRV, and social and environmental safeguards.

About This Report

This document presents the proceedings of the workshop with the individual presentations and the results of the group work discussions.

Session 1:

Country-Level Policies

REDD+ in Nepal: An Overview

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Introduction

The 13th Conference of the Parties (COP 13) of the United Nations Framework Convention on Climate Change held in Bali in 2007 adopted 'Reducing emissions from deforestation and forest degradation' (REDD) as an effective strategy for mitigating climate change. Since then, interest in REDD has been growing at national and international levels. The broadened approach of 'REDD+' has emerged as an innovative market-based mechanism to address climate change mitigation that can significantly reduce emissions at a low cost. Many developing countries, including Nepal, have expressed their interest in participating in a REDD+ mechanism, and REDD+ has emerged as an opportunity for sustainable financing of forest management initiatives in developing countries.

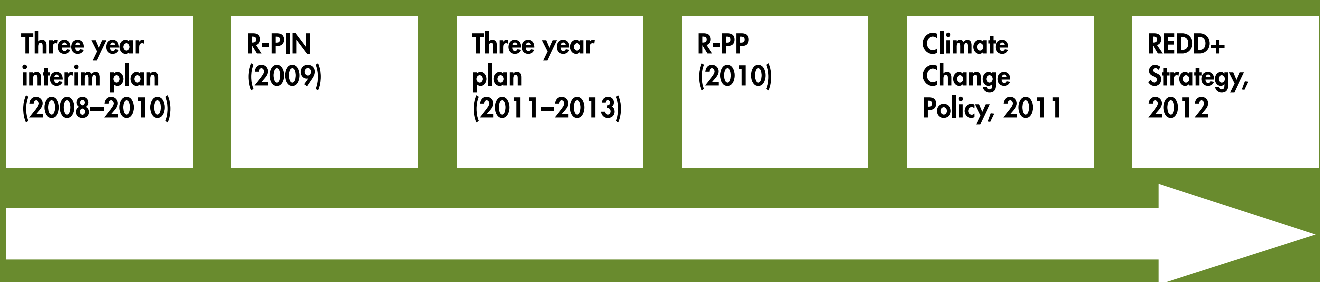
Although Nepal contributes only 0.025% of the world's greenhouse gas (GHG) emissions, the country has been disproportionately affected by climate change, especially by the increasing atmospheric temperature (MoEST 2011). If GHG emissions from land use change in forestry are taken into account, Nepal is seen to have a relatively high level of emissions for deforestation and forest degradation. The high rate has motivated the Ministry of Forests and Soil Conservation (MOFSC) to take an initiative to control the key drivers of deforestation and forest degradation.

Nepal has been receiving assistance from the World Bank's Forest Carbon Partnership Facility (FCPF) to support a REDD+ readiness process. Under this mechanism, Nepal has received financial support for activities to enhance REDD+ readiness including (a) determining a national reference scenario based on historical emissions from deforestation and degradation; (b) preparing a national REDD strategy; (c) establishing a monitoring system for emissions from deforestation and forest degradation; and (d) developing capacity building systems.

National policy and strategic progress

Nepal has been making concerted efforts to address environmental concerns since the 1980s and this has been reflected in the various international conventions, treaties, and agreements it has signed over the years. Figure 1 outlines the Nepal National REDD strategy development process.

Figure 1: **Nepal's national REDD+ strategy process.**



Note: R-PIN = readiness plan idea note and is the starting point of REDD readiness. The purpose of the R-PIN is to request an overview of a country's interest in the FCPF programme and to provide an overview of land use patterns, causes of deforestation, a stakeholder consultation process, and potential institutional arrangements in addressing REDD. R-PP = 'readiness preparation proposal'. The R-PP essentially defines a set of minimum requirements for readiness and urges a roadmap to be drawn up for achieving REDD readiness; the road map indicates how steps will be laid out and organized in achieving readiness to undertake REDD activities.

In response to the COP 13 decision, Nepal developed the concept of carbon trade, climate change mitigation, and payment for environmental services in its Three Year Interim Plan (2008–2010). The subsequent Three Year Plan (2011–2013) also emphasized the climate change issue and extended the national commitment to implement international treaties and conventions related to climate change, particularly the Kyoto Protocol, by adopting the Clean Development Mechanism (CDM). To address climate change impacts, the government has already approved a National Adaptation Programme of Action (NAPA), which is a strategic tool that helps in assessing climate vulnerability and systematically responding to climate change adaptation. The government also endorsed the Climate Change Policy 2011. Both documents include the importance of sustainable forest management in addressing climate change impacts.

The development of climate change-related policies and plans has provided a firm basis for developing a national REDD+ strategy by the end of 2013. The REDD Forestry and Climate Change Cell under the MOFSC has commissioned a series of analytical studies to back up the national REDD+ strategy preparation. MOFSC has been functioning as the focal ministry for the REDD+ process in Nepal, although the Ministry of Environment, Science and Technology (MOEST) is the state focal agency for climate change issues, and the designated national authority (DNA) for the UNFCCC.

Progress in the REDD+ Process

Baseline and reference scenario

Establishing a nation-wide baseline and future projection for national deforestation and degradation trends is a major issue. Deforestation is taking place due to the conversion of forest land into other land uses. Equally, there are many other drivers of forest degradation, including unsustainable harvesting of forest products, livestock grazing, and forest fires. Various forest assessments have been carried out mainly focused on understanding the extent of forest cover. Table 1 summarizes the forest inventories carried out in Nepal since the 1960s. Although there have been a number of forest assessments, inconsistencies in the methods used, coverage, and outputs means that the challenge of establishing a robust reference emission level for Nepal remains.

It is essential to have a reliable reference emission level to evaluate the success of the implementation of activities relating to deforestation and forest degradation, but the baseline emission level is sensitive to the input data. The Land Resource Mapping Project (LRMP) assessment carried out in the late 1970s was relatively extensive as it was a wall-to-wall inventory and mapped forest and scrub separately. But it was not exactly comparable with the National Forest Inventory (NFI) of 1994 as it used low resolution images and different types of survey from different dates in different physiographic regions. The NFI only distinguished between forest land and non-forest land, and does not provide information on crown status or a crown-based forest classification.

The quality of data and associated uncertainties are major concerns. Nevertheless, experts suggest that the data can be used to make conservative estimates for establishing a reference emission level. More precise reference emission levels can be developed after developing further capacity and generating site specific information. Currently, the Forest Resource Assessment (2010–2014) project is assessing the

Table 1: **Major forest inventories in Nepal**

Name	Year	Geographical coverage	Methods applied	Major output variables
Forest Resource Survey	1963–1967	Terai and Hills	Aerial photography combined with field inventory	Forest resource information and forest cover map
Land Resource Mapping Project (LRMP)	Late 1970s	Entire country	Aerial photographs along with ground truthing, land survey, and topographic maps	Wall-to-wall hardcopy and topographic maps
National Forest Inventory	1994	Entire country	Satellite images, aerial photographs, and field measurement	Region-wise forest area and stocking estimate
Japan Forest Technical Association	2000	Entire country	Satellite images, ground truthing, and field sampling	Forest area classification at the national scale and forest resource maps
Forest Cover Change Analysis	2005	Terai districts only	Satellite images, topographic maps, ground verification, and rectification	Forest resources in the Terai districts

Sources: MOFSC (2010), Acharya et al.(2009)

forest resources of the entire country in order to generate national-level data on variables such as the forest extent, status of forest cover under different forest regimes, growing stock, forest products, and non-wood forest products and biological diversity.

Monitoring, reporting, and verification (MRV)

A national monitoring system provides the foundation for measurement, reporting, and verification for net emissions reduction over time. A good monitoring, reporting, and verification (MRV) system should be simple, adjustable, and replicable so that negative impacts can be mitigated and positive impacts scaled up. REDD+ activities are expected to have a positive social and environmental effect. A systematic and continuous national monitoring effort is essential for all countries. Nepal has developed a readiness preparation proposal (R-PP) with financial assistance from the World Bank's Forest Carbon Partnership Facility (FCPF). A reliable and plausible MRV system is essential for participating in the REDD readiness process. The R-PP aims at designing an MRV system to monitor GHG emissions and ensure less negative impacts and more optional benefits from REDD+ implementation. However, designing a reliable and robust MRV system is difficult due to limited understanding of the MRV requirements and lack of reliable information on forest resources and land use change over time.

The Intergovernmental Panel on Climate Change (IPCC) has its own set of requirements and activities for REDD+ MRV. MRV should be conducted in accordance with the requirements of the IPCC guidance and guidelines and the five reporting principles of consistency, comparability, transparency, accuracy, and completeness (Romijn et al. 2012). Nepal has a long way to go to meet the standards of IPCC good practice guidance requirements (Jha and Paudel 2010; Romijn et al. 2012). Nepal's limited capacity for MRV is mainly due to methodological and capacity gaps.

Methodological gaps

IPCC good practice guidance has recommended three tiers for measuring and recording deforestation and forest degradation, with different levels of accuracy. Countries can adopt any of the tiers based on the available financial resources and technical capacity. Nepal is aiming for a Tier 2 system with the target of moving to Tier 3 in the future. Authors such as Jha and Paudel (2010) and Romijn et al. (2012) have identified a range of possible gaps in Nepal's MRV methods, including that measurements of co-benefits are not taken into account in the current monitoring system, there are no time series data on biomass growth for most of the tree species, and forest fires are not monitored comprehensively and there is no mechanism in place for immediate response to forest fires.

Besides the various gaps in designing MRV systems, there are many issues and challenges that need to be addressed adequately. A prominent issue is that of the spatial scale of accounting, which refers to the geographical scale at which carbon accounting and financial transactions take place. The MRV system must have the same scale as used for carbon accounting. Given the diverse national circumstances, a nested approach is thought to be appropriate for Nepal (GoN 2010). With this approach, REDD+ activities can be implemented at the sub-national level. The choice of scale needs to be decided based on effectiveness, efficiency, and equity outcomes.

Monitoring of co-benefits in the MRV system

REDD + not only contributes to reducing forest-based emission of GHGs, it also produces various co-benefits. The main co-benefits include soil and water conservation and biodiversity. Socioeconomic benefits include livelihoods and public health. Hence, the MRV system should be designed in a way that enables the co-benefits to be measured, reported, and verified together with emission reductions. Designing an MRV system to assess both carbon benefits and co-benefits is challenging for a developing country. First, forests produce a number of co-benefits and specifying them in the MRV is challenging. Second, the choice of methods for assessing a wide range of co-benefits is cumbersome. Third, in the existing weak institutional context, it is challenging to design and implement a robust MRV system.

REDD Financing Arrangement

The majority of countries, including Nepal, lack concrete strategies on how to implement REDD+; it is therefore difficult to define national REDD+ financial needs. In the context of Nepal, two main types of financing option can be considered – a voluntary fund and a regulated market mechanism. Nepal is currently receiving voluntary funds for REDD+ readiness and capacity building (GoN 2010). Considering the pros and cons of both mechanisms, both may be needed to address the specific forest and socioeconomic conditions of the country.

Nepal is thinking about establishing an independent National REDD+ Fund for receiving funds for carbon credits and disbursing such funds to support relevant policy initiatives, strategies, and programmes within the country (GoN 2010). The Government of Nepal is in favour of creating a trust fund to manage REDD finance. However, the structure and governance have yet to be worked out. Similarly, there is a need for a clear structure and mechanism for the distribution of money received from REDD+ implementation among various stakeholders. Therefore, formulating an effective, efficient, and transparent mechanism for ensuring equitable benefits is an essential aspect of REDD+ implementation in Nepal. A well-established benefit distribution mechanism already exists in various community-based forest management regimes, viz. community forestry, leasehold forestry, collaborative forest management, and buffer zone forest management. Improving the existing benefit distribution systems would be more cost effective than creating new mechanisms. Even though there is a likelihood of receiving carbon financing in Nepal, various challenges still exist, such as elite capture, uncertainty of carbon markets, domination of international technology in deciding the amount and value of carbon, nationalization of carbon revenue, and complex methodologies.

Bottlenecks and Issues

REDD+ is a cost-effective mechanism for climate change mitigation and there is growing optimism that its implementation will contribute to climate change initiatives at a global level. It can generate multiple co-benefits concurrently at the local level. Yet REDD+ implementation has raised many concerns and challenges at the country level. Prominent issues and challenges include designing a REDD+ compatible policy, unplanned deforestation, size of forests, diverse models of forest management, and limited capacity.

Policy and institutional aspects

The success of REDD+ is determined not only by reducing carbon loss but also by enhancing stock through governance improvement at different levels. A state restructuring dialogue is ongoing in Nepal, so power is likely to be shared across different levels of governance. It is anticipated that there will be three levels of governance – federal, provincial, and local. The designing of strategy, policy, and institutions without a clear vision of the governance structure would be risky, particularly if the use-right practices under the current management regimes are curtailed under a new federal structure.

Unplanned deforestation

Owing to Nepal's diverse socioeconomic and climatic conditions, the demand and supply of forest products varies significantly across the country. Complex and very diverse drivers of deforestation are observed in the different physiographic regions. This creates difficulty in identifying a common set of drivers of deforestation. A 'one size fits all' policy intervention may not work; hence, it may require different sets of policy interventions in different regions. Moreover, the drivers are linked to the livelihoods of rural people; hence there is a risk of a high opportunity cost for behavioural change.

Size of forests

The size of forest is also an issue for Nepals REDD+ implementation. Community forests in Nepal range from one hectare to 3,000 hectares. The small scale of forests may involve high transaction costs for global buyers. Evidence suggests that carbon storage and livelihoods are only complementary if the forest is large (Chhatre and Agrawal 2009).

Diverse models of forest management

Nepal has diverse models of forest management – community forestry, leasehold forestry, collaborative forest management, buffer zone forest management, government-managed forests, protected forests, and protected areas. Each of these has distinctive governance mechanisms in terms of forest management responsibility and benefit sharing. For example, in community forestry, the local community holds the management rights and keeps the entire income generated from the forest products. In collaborative forest management, communities have limited rights over the management and forest products; only 25% of income goes to the local community and 75% to the government. Such inconsistencies in the management rights and benefit-sharing mechanisms may lead to conflicts between the government and the community regarding sharing of benefits generated from carbon credits. Clarity of ownership, rights to the benefits, and an equitable benefit sharing mechanism are essential to ensure the implementation of REDD+ (Kotru 2008). In addition, high transaction and administrative costs may be incurred for governing REDD+ implementation if it is subject to diverse benefit-sharing mechanisms.

Capacity to participate in REDD+

The implementation of the REDD+ programme in Nepal is facing multiple challenges, both technical and institutional. The development of the REDD process requires new techniques and skills in the field of carbon trade and forest carbon inventory, which could be unaffordable for a developing country. For example, monitoring of carbon enhancement and changes in forest cover requires robust and efficient remote sensing techniques and information. Nepal does not have adequate capacity at present. Likewise, to ensure Nepal's engagement in the REDD+ process, legal and policy reforms are required compatible with evolving REDD+ polices and institutions at the international level. Hence, regular research and studies at multiple levels are required to design the governance of REDD+ in Nepal (Bhusley and Khatri 2011).

Immediate Outlook

Scale of accounting

Spatial scale determines the level of accounting for carbon emissions and financial transactions. The REDD literature discusses three spatial scales: national, sub-national, and nested. Although the RPP advocates for a nested approach for REDD implementation, a national approach is ideal, considering the transaction costs and leakages associated with other approaches.

The diverse geographic regions, climatic conditions, and socioeconomic status of people suggest that a national approach to REDD implementation may be appropriate for Nepal. Furthermore, the national approach addresses national sovereignty issues (Angelsen et al. 2008). A major advantage of the national approach is that the government can, to a large extent, implement a broader set of policies to address deforestation and forest degradation issues. Under this approach, the national government implements a national accounting system based on a national level baseline. Credits can be allocated to the national government based on the performance against the national baseline. The funds collected at the national level are then distributed to sub-national level projects based on their performance. However, the central question of how to allocate projects remains a challenge.

REDD+ implementation at the sub-national level is also under discussion at the policy level. There are several options for developing sub-national REDD+ projects. One option is landscape-level REDD+ implementation. A landscape is characterized by a mosaic of ecosystems containing a pattern of ecological processes of interest. Evidence suggests that REDD+ implementation at the landscape level allows bundling of multiple co-benefits such as biodiversity conservation and livelihoods. The issue of leakage can also be addressed to some extent. In Nepal, landscapes extend from east to west, and products are harvested within the landscape.

There is another option for demarcating sub-national units based on geographic boundaries. The national forest inventories were conducted across geographic regions. This also facilitates adjustment of leakages, because harvesting of forest products mostly takes place within geographic regions. This approach also provides a good opportunity for establishing market transactions between upstream ecosystem service providers and downstream service users for various environmental services (Kosoy et al. 2007).

Thoughts of a watershed boundary or river basin boundary to demarcate the REDD implementation unit are also emerging. This approach may enable bundling of carbon sequestration with other ecosystem services such as soil and water conservation. However, there are no forest activity data across watersheds or sub-watershed basins and the problem of leakage is difficult to address as the watersheds are in general aligned north to south.

Long-term Prospects for REDD+

REDD+ is seen as a win-win strategy for mitigating climate change and is equally important for generating various kinds of benefits beyond carbon sequestration. It has the potential to support biodiversity conservation and deliver other benefits from environmental services. Likewise, it has the potential to contribute to poverty alleviation and improved rural livelihoods. Some piloting studies have shown that communities are able to enhance carbon stocks while fulfilling their demand for forest products through sustainable management of the forest. In addition, maintenance of forest-based ecosystem services that support other economic sectors can strengthen societies' resilience to climate change. REDD+ can also be expected to provide co-benefits in terms of hydrological and soil conservation services. Forests play an important role in moderating the quantity and quality of water that flows out of watersheds. As rainfall patterns affect the hydrological services provided by forests, this would be increasingly important for maintaining water flow downstream. REDD+ implementation also has some potential disadvantages. There are concerns that the financial resources generated through REDD+ engagement might reinforce, rather than address, the social and institutional factors that contribute to deforestation and forest degradation, such as elite capture and corruption. Concerns also exist related to the limited capacity of local forest users to negotiate with carbon buyers and to develop a carbon-oriented management plan. Lack of reliable baseline data and the requirement for a robust MRV system may lead to a centralized governance system (Lyster 2011; Phelps et al. 2010)

The REDD Forestry and Climate Change Cell is in the process of developing an emissions reduction proposal, which is essential for demonstrating carbon reduction potential through REDD+ activities. The proposal will consist of a REDD+ pilot inventory, determination of sites for piloting based on landscape, addressing drivers of deforestation and forest degradation, and emission reduction solutions. The proposal will also identify probable difficulties, issues, and challenges in the monitoring, reporting, and verification system. The timeline for the first phase of REDD readiness is 2020, and all concerned are expected to provide their support and suggestions during this period.

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Learning on REDD+ in South Asia: the Case of Pakistan

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Forests and Forestry in Pakistan

Pakistan has a total land area of 88.43 million hectares, with forest cover spread over 4.55 million hectares, or 5.1% of the land area. A wide variety of forest and vegetation types is found in different parts of the country. These include alpine pastures, sub-alpine forests, coniferous forests of several types (dry temperate forests, moist temperate forests, and sub-tropical chir-pine forests), oak scrub forests, sub-tropical broad-leaf evergreen forests, tropical thorn forests, riverine forests, coastal mangroves, and plantations of different types.

Pakistan's contribution to global GHG emissions is less than 1%, with per capita GHG emissions of 0.76 t CO_2. The energy sector contributes 50.7%, agriculture and livestock 38.8%, industrial processes 5.8%, forestry and land use change 2.9%, and waste 1.8%.

Pakistan is a low forest cover country in contrast to other forest rich countries in South Asia. Its forests are also subjected to heavy human and livestock pressure. Notwithstanding, the country has substantial scope for REDD+ projects in its different forest types. Priority areas for REDD+ are coniferous forests, coastal forests, dry temperate juniper and chilghoza forests, riverine forests, and plantations of different types. The geographic distribution of forests in Pakistan is uneven with the majority located in the northern part of the country. Khyber Pakhtunkhwa, Gilgit-Baltistan (GB), Azad Jammu and Kashmir (AJK), and the Federally Administered Tribal Areas/Frontier Regions (FATA/FRs) have a rich endowment of natural forests. Land cover in Pakistan according to province, region, or territory is shown in Table 2.

Pakistan has large potential for both emissions reduction in forestry and forest carbon stock enhancement. The coniferous forests are the most important sites for REDD+ due to their high carbon stock, presence of peatlands, and longer maturity age.

All provinces and federated units in Pakistan have different forest types that can be managed under a REDD+ regime in a gainful manner; however, Khyber Pakhtunkhwa, due to its vast coniferous forests, has a special and lead role for implementing the REDD+ programme in Pakistan.

Brief History of REDD and REDD+

REDD owes its origins to UNFCCC COP 13 Decision 1 of the Bali Action Plan, where it was defined as: 'policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries'.

Reducing emissions from deforestation and forest degradation (REDD) is an effort to create a financial value for the carbon stored in forests and to offer incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. Subsequently, the scope of REDD was expanded to REDD+, which aims at enhancing forest carbon stocks as well as forest carbon emissions control by addressing the following major areas: deforestation, forest degradation, forest conservation, sustainable forest management, and enhancing forest carbon stocks.

The major milestones and instruments for climate change and REDD+ are as follows:

- United Nations Framework Convention on Climate Change (UNFCCC) (1992) is an international treaty among participating countries to limit carbon emissions. Pakistan has ratified the UNFCCC.
- In 1997, the Kyoto Protocol recognized the role of land use, land-use change, and forestry (LULUCF), but did not include REDD as an eligible offset project type. Pakistan is a signatory to the Kyoto Protocol.
- In 2007, UNFCCC officially recognized the critical role of REDD in reducing emissions with the Bali

Table 2: **Distribution of forest and land resources in Pakistan (area in hectares)**

Land cover type	Province/ region/ territory								
	Khyber Pakhtunkhwa	Punjab	Sindh	Balochistan	Gilgit-Baltistan	AJK	FATA/FR	Islamabad	Total	%
1. Forest										
Alpine pasture	649,721	0	0	0	636,125	84,256	5,242	0	1,375,344	1.6
Sub alpine	44,542	0	0	0	23,679	3,366	0	0	71,587	0.1
Dry temperate	532,591	0	0	125,485	254,961	48,013	317,924	0	1,278,974	1.4
Moist temperate	391,668	17,249	0	0	0	162,647	1,648	0	573,212	0.6
Oak forest	83,480	0	0	0	58,851	3,484	28,588	0	174,403	0.2
Sub-tropical chir pine	217,753	27,283	0	0	0	105,343	6,447	0	356,826	0.4
Sub-tropical broad-leaf evergreen	222,373	345,374	0	294,636	0	93,538	135,313	17,708	1,108,942	1.3
Tropical thorn	12,007	42,556	52,501	76,425	0	0	34,120	0	217,609	0.3
Plantation (irrigated and unirrigated)	4,190	89,301	71,186	0	0	18,747	10,539	2,635	196,598	0.2
Riverine	0	32,099	183,835	0	0	0	0	0	215,934	0.2
Mangrove	0	0	353,062	2,360	0	0	0	0	355,422	0.4
Sub-total (excluding alpine pasture)	**1,508,604 (20.3%)**	**553,862 (2.7%)**	**660,584 (4.6%)**	**498,906 (1.4%)**	**337,491 (4.8%)**	**435,138 (36.9%)**	**534,579 (19.5%)**	**20,343 (22.6%)**	**4,549,507 (5.1%)**	**5.1**
Sub-total (including alpine pasture)	**2,158,325 (29.0%)**	**553,862 (2.7%)**	**660,584 (4.6%)**	**498,906 (1.4%)**	**973,616 (13.9%)**	**519,394 (44.1%)**	**539,821 (19.7%)**	**20,343 (22.6%)**	**5,924,851 (6.7%)**	**6.7**
2. Other land cover										
Shrubs and bushes	533,523	698,367	585,292	635,936	182,880	79,681	346,485	3,283	3,065,447	3.5
Rangeland	794,471	3,759,493	1,836,882	29,094,114	3,095,799	152,631	1,179,419	9,839	39,922,648	45.1
Snow and glaciers	813,530	0	0	0	2,445,235	125,812	10,433	0	3,395,010	3.8
Agricultural land	2,224,739	13,254,336	6,593,492	2,750,131	115,477	246,733	300,339	39,620	25,524,867	28.9
Barren land	646,305	1,291,126	3,838,788	1,503,299	126,206	12,331	266,994	2,187	7,687,236	8.7
Fruit orchards	15,519	68,809	99,942	75,609	0	0	0	0	259,879	0.3
Settlements	110,536	537,042	191,277	90,895	1,396	11,263	16,868	13,965	973,242	1.1
Water bodies	151,688	377,414	457,661	545,906	40,778	30,193	72,909	713	1,677,262	1.9
Sub-total	5,290,311 (71.0%)	19,986,587 (97.3 %)	13,603,334 (95.4 %)	34,695,890 (98.6%)	6,007,771 (86.1%)	658,644 (55.9%)	2,193,447 (80.3%)	69,607 (77.4%)	82,505,591 (93.3%)	93.3
Grand-total (including alpine pasture)	**7,448,636 (100%)**	**20,540,449 (100 %)**	**14,263,918 (100 %)**	**35,194,796 (100 %)**	**6,981,387 (100 %)**	**1,178,038 (100 %)**	**2,733,268 (100 %)**	**89,950 (100 %)**	**88,430,442 (100 %)**	**100**

Source: Pakistan Forest Institute, Land Cover Atlas 2011

Road Map and Bali Action Plan.

- In 2008, the concept of REDD+ was introduced in UNFCCC, which added forest conservation, sustainable forest management, and carbon stock enhancement as eligible activities in addition to reducing emissions from deforestation and forest degradation.
- The UN-REDD Programme was established in 2008 to assist countries to become 'REDD-ready'.
- In 2009, the 'Copenhagen Accord' pledged the establishment of a mechanism for mobilizing funding for REDD+ activities.
- In 2010, the Copenhagen meeting did not agree to binding targets but continued to emphasize the role of the REDD post-Kyoto Protocol (post-2012).
- In 2010, the UNFCCC meeting in Cancun (COP 16) officially included emissions from REDD+ as agreed by the parties.
- In 2011, the Durban Conference emphasized the emissions reduction agenda in the post-2012 period but could not reach an all inclusive binding agreement.
- In 2012, Rio+20 carried forward the agenda of sustainable development and the green economy, which support the REDD+ initiatives.

Pakistan participated in all the above forums. Selected aspects of REDD+ in Pakistan are described in the following sections.

National Policy and Strategic Progress

Pakistan and its different federated units at the sub-national/provincial level have a package of policies, strategies, and action plans related to forestry and the environment which are intended to provide conducive conditions for the protection, development, and sustainable management of forests and the environment at large in the country and its provinces and territories.

At the national level, Pakistan has a number of environment, climate change, and forestry related policies and strategies. They include the following:

- Establishment of the Ministry of Climate Change in 2012
- Adoption of the Climate Change Policy, 2012
- National Climate Change Strategy and Action Plan (2012–2022)
- National Response Strategy to Combat Impacts of Climate Change on Forests of Pakistan, prepared in 2012
- Guidelines for Wetlands Management, 2012
- National Sustainable Development Strategy, 2012 – Draft
- Establishment of a CDM Cell and notifying REDD+ focal persons
- Clean Development Mechanism – National Operational Strategy
- National Forest Policy, 2010 – Draft
- National Rangeland Policy, 2010 – Draft
- National Environment Policy, 2005
- Biodiversity Action Plan for Pakistan, 2000
- National Conservation Strategy (NCS), 1992
- Provincial Supporting Policies and Strategies on REDD+

REDD+ specific progress in Pakistan includes the following:

- A National Steering Committee on REDD+ has been established.
- REDD+ provincial focal points have been notified.
- A national dialogue on REDD+ is in progress.
- A definition of forest has been adopted for REDD+ (minimum area 0.05 ha; minimum crown cover 10%; minimum potential height reach of vegetation at maturity 2 m).
- Pakistan has become a member of the UN-REDD Programme.
- Pakistan is a candidate for the Forest Carbon Partnership Facility of the World Bank.
- A project identification form (PIF) for a GEF grant has been prepared.
- A One-UN Project by ICIMOD for capacity building on REDD+ in Pakistan has been launched.
- Joint forest management committees and community-based organizations (CBOs) have been organized.
- A Pakistani delegation regularly participates in different international and regional conferences and workshops on REDD+.
- Training and capacity building in REDD+ is an ongoing activity. The following training and capacity building activities related to REDD+ have been implemented in Pakistan during the last few years:
  - A training programme on 'Climate change and natural resources management, development of CDM project design documents' was implemented in 2007 and 2009 supported by Inter-Cooperation, SDC.
  - A one-week training workshop on 'Forest carbon stock assessment' was held on 14-18 January 2011, supported by SDPI, Terra Global

  Capital, and ISESCO.
  - A training session on 'REDD+ in Pakistan' was held from 19-21 October 2011, supported by SDPI and One-UN Programme.
  - A workshop on 'Social and environmental principles and criteria for REDD+ safeguards' was held on 12 January 2012, supported by the Sustainable Land Management Programme.
  - A visit was made to REDD+ demonstration sites in Nepal in January 2012, supported by FAO and ICIMOD.
  - A national workshop on 'Modalities and procedures for implementing Cancun Agreement on REDD+' was held on 24 February 2012, supported by the Pakistan Wetlands Programme.

Progress in technical matters

Pakistan is aware of the key role of resolving technical matters such as baseline and reference scenarios, inventory methodology, measuring, reporting and verification (MRV), and similar issues. The following initiatives have been undertaken or are planned to address various policy, institutional, and technical matters:

- National Land Cover Atlas, 2012 developed
- National Ecological Gap Analysis under CBD in process and will be incorporated in REDD+ plans
- 2nd National Communication under process for submission to UNFCCC Secretariat
- A project on 'Development of credible and inclusive national governance systems for REDD+ implementation' submitted to UNDP
- A project on 'Improving measurement, reporting, and verification (MRV) and monitoring systems for implementing REDD+ in Pakistan' submitted to FAO
- A project PIF (project identification form) for 'Sustainable forest management' submitted to UNDP/GEF
- Three projects have been approved by the government for implementation during 2012–15:
  - Carbon stock assessment of forests of Khyber Pakhtunkhwa (cost PKR 58 million [USD 614,062], duration 3 years)
  - Development of designated forests carbon stock assessment for REDD+ and promotion of carbon credits marketing in Khyber Pakhtunkhwa (cost PKR 40 million [USD 42,3491], duration 3 years)
  - Capacity building on REDD+ in Gilgit Baltistan (cost PKR 40 million [USD 423,49])

Although the nomenclature of these projects seems to limit their scope to carbon stock assessment, their scope is being expanded to cover the whole spectrum of policy, institutional, and technical matters related to REDD+. With the implementation of these projects, Khyber Pakhtunkhwa Province intends to accomplish the following objectives pertaining to REDD+:

- Develop policies, strategies, and systems for REDD+ in the Province
- Work towards linking provincial policies, strategies, and systems to provincial development plans and national policies, strategies, and systems
- Give REDD+ and climate change-related input to different levels of government and forums and strengthen the knowledge of key stakeholders (government, politicians, civil society, private sector, media, academia, and donors) on REDD+ concepts and prerequisites for a successful REDD+ programme
- Design, develop, implement, and monitor a REDD+ programme and its supporting projects
- Develop project design documents, baseline and reference scenarios, inventory methodology, MRV, and others for REDD+ projects.
- Support activities to link the Khyber Pakhtunkhwa REDD+ programme with REDD+ programmes at national, regional, and international levels
- Establish inclusive REDD+ forums and roundtables
- Undertake different awareness raising, training, and capacity building activities
- Gather and consolidate experiences and lessons learned, and disseminate these through different technical papers and publications, policy briefing papers, and fact sheets

REDD Financing Arrangements

Adequate, predictable, and sustainable financial resources are needed for proper support to, and institutionalization of, the REDD+ programme in Pakistan. This would require varied, flexible, and multiple source funding mechanisms. Accordingly, Pakistan will have to pursue a phased approach to international REDD+ financing arrangements as follows:

Phase I: Striving for a support instrument so as to gain immediate access to international funding for national strategy development, including national dialogue, institutional strengthening, and demonstration activities

Phase II: Looking for a fund-based instrument that allows Pakistan to access predictable REDD+ finance based upon agreed criteria. It may negotiate with the fund that although continued funding under this instrument would be results-based; performance would not necessarily be monitored or measured only on the basis of emissions and removals against reference levels.

Phase III: Aiming at a market and greenhouse gas based instrument that rewards performance on the basis of quantified forest emissions and removals against agreed reference levels.

In addition to the above international funding mechanisms, the country may also mobilize local funds from the public sector as well as private sector funding under public-private partnership arrangements. Public sector funds will be mobilized through the Federal Public Sector Development Programme (PSDPP), Provincial Annual Development Programme (ADP) and donor-assisted programmes, the latter particularly for REDD-readiness, institutional capacity building, and design and implementation of pilot/demonstration projects.

In addition to planning for adequate and timely financial inputs, proper planning and implementation is needed for benefits distribution from REDD+ that is equitable locally, nationally, and internationally.

Bottlenecks and Issues

A number of bottlenecks and issues may hamper REDD+ initiatives in Pakistan. These include the following, among others:

- Lack of all-inclusive binding agreements on climate change and REDD+
- Large population with high dependence on forests
- Subsistence rural economy with lack of alternative livelihood and employment opportunities
- 'Excessive' requirements for wood as fuelwood and for construction
- Multiple and at times conflicting demands on forests
- High incidence of poverty
- Low literacy rates
- Low priority and level of investment in the forestry sector
- Arid environment in large parts of the country
- Land tenure problems
- Gender issues and lack of participation of women in conservation societies
- Leakages and activity shifting problems, displacement of emissions
- Risks of non-permanence and reversals
- Lack of proper awareness among policy makers, planners, the general public, community members, forestry professionals, the media, and academia
- Knowledge and technology gaps and other capacity problems
- Institutional and governance weaknesses
- Major drivers of deforestation and degradation in the country, including
  - cutting of trees for domestic timber and fuelwood;
  - illegal logging for commercial use;
  - conversion of forest land into crop land;
  - conversion of forest land into settlements;
  - unregulated grazing of animals;
  - natural calamities; and
  - forest fires.

Immediate Outlook

A number of initiatives on REDD+ are underway. For example, Khyber Pakhtunkhwa is negotiating public-private partnership for a REDD+ project over an area of 223,000 ha, and is in the process of inviting expressions of interest for another 20,000 ha in government-owned reserved forests. The Azad Jammu and Kashmir government is negotiating public-private partnership over an area of 200,000 ha of forest land, rangeland, and wasteland. Gilgit-Baltistan has invited expressions of interest for a REDD+ project, and Sindh, Punjab, and Balochistan are also considering different options for REDD+ projects.

The outlook for the immediate future may become even better if certain issues that hamper REDD+ are resolved, including the availability of international funds for formulation of policies and strategies, awareness raising, and institutional capacity building. Thus, in the immediate future, Pakistan will be exploring different international and bilateral donor funding sources, especially for policy formulation and overall institutional development, mainstreaming of REDD+ and climate change initiatives in economic and development planning and national dialogue, awareness raising, and training and capacity building.

In order to make substantial progress, the country will also have to take the following steps:

- Address the problems of institutional capacity and effective coordination between the national and provincial levels

- Vigorous pursuit of access to international funding, especially through support-based instruments and fund-based instruments
- Address awareness problems of, and gaining support from, different stakeholder groups
- Local communities, decision makers, planners, media, and academicians
- Address technological and knowledge gaps
- Institutionalize the climate change mitigating role of forests in forestry planning and management

Long-term Prospects for REDD+

The long-term prospects for REDD+ in Pakistan are bright. The country has a forest area of about 4.6 million hectares that is eligible for undertaking REDD+ projects. It also has around 40 million hectares of rangelands (about 45% of the land area of the country) in which tree cover density can be increased under REDD+ carbon stock enhancement programmes.

Sufficient, predictable, and accessible funding, as well as well functioning carbon market mechanisms, will help realize the long-term potential. Other supporting international measures for the realization of long-term potential include shaping of international agreements on modalities, financing, and marketing and enhanced regional cooperation for mutual benefits.

National supportive measures include addressing wood supply and demand problems, provision of alternative energy sources, diversifying the economic base of forested regions, providing livelihood and employment opportunities in hilly areas, resolving property rights and tenure issues, and tackling different technical, social and institutional issues.

REDD+ in India: from Negotiations to Implementation Preparedness

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Introduction

Reducing emissions from deforestation and forest degradation (REDD) in developing countries is an active agenda of the UNFCCC to achieve climate change mitigation objectives. Rawat and Kishwan (2008) from the Indian Council of Forestry Research and Education (ICFRE) presented a climate change mitigation approach for India based on forest conservation and advocated for compensating countries for the carbon conserved through sustainable management of forests and enhancement of forest carbon stocks. This Indian approach later became the 'plus' part of the REDD agenda in UNFCCC. The Government of India has initiated a capacity building programme for REDD+ implementation at the national level and plans to initiate pilot REDD+ projects in joint forest management (JFM) areas or where there is strong community control over forest resources. ICFRE recommends a phased approach for REDD+ implementation with safeguards for local communities and biodiversity, a system of reporting, capacity building, a REDD+ strategy, pilot projects at sub-national levels, and a measurement, reporting, and verification (MRV) regime for the country.

Case Study of a REDD Initiative by ICFRE

Providing REDD-plus incentives through community-based forest management in the Himalayan State of Uttarakhand

India intends to launch three pilot projects, one each based on the concepts of conservation, sustainable management of forests, and enhancement of forest carbon stocks (EFCS) (Bali Action Plan), to understand the intricacies of the issues in successful implementation and administration of the processes involved in REDD+ and accrual of benefits to the community. These projects are proposed to be undertaken at locations selected to cover different forest types and sociogeographic regions. The projects are proposed to be implemented through the mechanism of joint forest management (JFM), a concept that recognizes the share of protecting communities in forest produce. This approach matches well with the objectives of the REDD+ programmes being implemented in other countries. Promoting and integrating REDD+ actions in JFM activities to increase sequestration of carbon stock will meet both the national objectives of climate change mitigation and international obligations as a responsive member of the international community.

To start, ICFRE has proposed a pilot project in the Himalayan state of Uttarakhand. Forests play a pivotal role in the Himalayas where the economic structure and social organization are built around a primary relationship with natural resources. The forests in Uttarakhand (a northern Himalayan state) perhaps have a longer history of people's participation in forest management than any other part of the country. The van (forest) panchayat system in particular, as an institution at village level or village group level, has considerable potential for involving local communities in forest management and conservation. All these activities and measures can fit into mitigation measures, with a sizeable potential for increasing the sequestration of carbon. The overall objective of the project will be to develop ideal pilot projects for demonstration of REDD+ actions in the selected cluster of van panchayats and JFM areas of Uttarakhand covering an area of about 5,000 ha with active involvement of local communities. In order to achieve the overall objective, the following short-term objectives have been identified:

- Estimation of carbon status in different carbon pools in the selected van panchayat forests of Uttarakhand
- Estimation of enhancement in forest carbon stocks as a result of conservation efforts in van panchayat forests

- Empowering forest dependent communities for forest carbon conservation and developing an MRV system for REDD+ actions
- Capacity building of participating communities for developing a transparent MRV system at the small project level
- Developing a system of respecting and reporting of safeguards in accordance with the international agreements at UNFCCC
- Feasibility study for getting the project registered for carbon credits and developing a system of payment for environmental services (PES) to the participating communities.

Methodological and Technical Requirements for REDD

UNFCCC Decision 4/CP.15 requests developing country Parties, on the basis of work conducted on the methodological issues set out in Decision 2/CP.13, to take the following guidance into account, and without prejudging any further relevant decisions of the Conference of the Parties, in particular those relating to measurement and reporting:

- To identify drivers of deforestation and forest degradation resulting in emissions and also the means to address these;
- To identify activities within the country that result in reduced emissions and increased removals, and stabilization of forest carbon stocks;
- To use the most recent Intergovernmental Panel on Climate Change (IPCC) guidance and guidelines as adopted or encouraged by the Conference of the Parties, as appropriate, as a basis for estimating anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks, and forest area changes;
- To establish, according to national circumstances and capabilities, robust and transparent national forest monitoring systems and, if appropriate, sub-national systems as part of national monitoring systems that:
  - Use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating, as appropriate, anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks, and forest area changes; and
  - Provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties, taking into account national capabilities and capacities.

Also, countries are to follow safeguards ensuring, for instance, the full participation of indigenous peoples, local communities, and other stakeholders. The Cancun COP decision on REDD+ prescribes that actions should be consistent with the conservation of natural forests and biological diversity, ensuring that REDD+ actions are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services and to enhance other social and environmental benefits.

Technology Options for MRV and REL and Projections

A reference emission level for reduced emissions from deforestation and forest degradation plus sequestration (REDD+) refers to the benchmark of gross emissions from deforestation and degradation against which performance in reducing gross emissions is measured, reported, and verified. The scope of REDD+ has now been defined to include both reductions in emissions and increases in sequestration. As such, it is important to consider how reference emission levels for measuring reductions will interact with reference levels for measuring increases in sequestration. The tentative definitions of REL and RL are as follows: the reference emissions level (REL) is the amount of gross emissions from a geographical area estimated within a reference time period (REDD+); the reference level (RL) is the amount of net/gross emissions and removals from a geographical area estimated within a reference time period (conservation, SFM, enhancement of forest carbon stocks).

India considers that the reference level (RL) in essence will be a business as usual forest carbon stocks position based on the historical trend of conservation and removals, with the projected trends of population growth, GDP growth, energy requirement, and any other relevant parameter duly factored in. A consensus will need to be reached when fixing the RL amongst intra-country stakeholders, which would include the central government, state governments, forest experts and scientists, the local communities, and civil society. India enacted a Forest Conservation Act in 1980, the results of which were visible by the late 1980s, and revised the National Forest Policy

in 1988. In the 1990s, India initiated a policy of supporting a participatory approach involving local communities for forest protection and improvement of degraded forest lands (JFM/PFM). Thus in the view of ICFRE, 1990 can be considered as the base year for the reference level.
India is among the few countries to regularly use satellite-based remote sensing technology for detecting forest cover change. The Forest Survey of India has been assessing the forest cover of the country using satellite remote sensing technology on a two-year cycle since 1987. The 12th biennial cycle was completed in 2011. Forest biomass carbon and soil organic carbon (SOC) are also estimated under the programme on Second National Communication to UNFCCC. The procedure followed under this programme has the potential of being developed and adopted as a REDD+ methodology for assessing changes in forest carbon stocks over a stipulated period.

A robust monitoring mechanism is essential for successful implementation. A simplified methodology for measurement, reporting, and verification (MRV) is suggested to implement REDD+ activities. Existing institutions like the National Remote Sensing Centre (NRSC), Forest Survey of India, and ICFRE could be utilized effectively. Additional elements to capture information relevant for a REDD+ project could be built into the existing monitoring system. India's future strategy with respect to this is to devolve more and more responsibility to the state forest departments to carry out the assessment and estimation of forest carbon stocks in conjunction with the biennial exercise of assessment of forest and tree cover. This is considered essential to improve the precision level for estimation of forest carbon stocks.

Technical Capacity of Stakeholders and Institutions

Technical capacity of institutions

The Government of India has established a REDD+ Cell in the Ministry of Environment and Forests with the task of coordinating and guiding REDD+ related actions at the national level and collaborating with the state forest departments to collect, process, and manage all relevant information and data relating to forest carbon accounting. The National REDD+ Cell will also guide the formulation, development, funding, implementation, and monitoring and evaluation of REDD+ activities in the states. The Forest Survey of India has adequate capability for accounting of national forest carbon stocks. Backed by its expertise in estimation of forest and tree cover in the country, the Forest Survey of India is capable of handling this national responsibility. India intends to work further on technological and methodological issues and policy and definitional issues to be able to contribute proactively in the future deliberations of the UNFCCC on REDD+. Review and fine-tuning of technological, methodological, and connected infrastructural capabilities are considered essential for operationalizing the national-level forest carbon stock accounting.

Among the Non Annex countries, there are only a few countries with proven satellite-based remote sensing technology like India that can help in the capacity building programmes of other countries under the REDD+ umbrella. Training workshops are regularly organized by ICFRE at Dehradun for participants from Non Annex countries. Such capacity building programmes will help strengthen the MRV regime for REDD+ countries. A suitable multilateral financial mechanism needs to be developed to operationalize such a capacity building programme for countries intending to participate in REDD+ activities.

Technical capacity of local communities

In India, joint forest planning and management (JFPM) involving forest-fringe communities and state forest departments is the principal approach adopted to regenerate and conserve multiple-use forests that are at various stages of degradation largely due to overuse. JFPM attempts among others to halt the process of forest degradation, enhance regeneration of degraded forests, improve the status of vegetation in the forests, enhance the availability of forest products for the participating communities by means of improved forest management, bring in a sense of ownership of forests among communities, enhance the status of biodiversity, and, improve the water regime for agricultural and human use. Technical capacity programmes need to be planned and undertaken for local communities to create awareness, build knowledge, and develop skills that lead to actions under REDD+. Since forest degradation in most developing countries is intrinsically linked to the livelihood needs of communities, capacity building must lead to integration of these needs with forest management and local institutions. Local institutions should in turn be strengthened to take up diversified activities related to livelihoods such as value addition, improved storage, and multi-linked product marketing. According to figures compiled for 15 Indian states by the Indian Council for Forestry Research and Education (ICFRE), Dehradun, benefits worth INR 19,280 million (approx. USD 344 million) of forest products have accrued to people in JFPM villages at an average annual rate of INR 1,944 (approx. USD 34) per family The direct benefit accrual at this rate is indeed low. This is also borne out by the experience of JFPM programme implementation, which suggests that the benefits of JFPM alone are not sufficient to attract fringe communities whole-heartedly as JFPM provides limited avenues to sustain livelihoods.

Financing for REDD+

What is the financing instrument and mechanism? India has made it clear in UNFCCC negotiations that all sources of financing, including public, private, and markets, should be considered for results-based actions. Separate financial approaches need to be adopted to provide positive incentives for the two types of carbon stocks under the REDD+ regime, i.e., change in carbon stocks (with sub-categories for incremental carbon stocks and reduced deforestation), and baseline carbon stocks. India supports a non market-based approach for stocks with reference to actions relating to the conservation of forest carbon stocks and sustainable management of forests, while a market-based approach could be considered in the case of actions to reduce emissions from deforestation and forest degradation, sustainable management of forests, and enhancement of forest carbon stocks.

India has launched a very ambitious Green India Mission with the objectives of increasing forest/tree cover on 5 million hectares of forest and non-forest lands and improved quality of forest cover on another 5 million hectares (a total of 10 million hectares), increased forest-based livelihood income for 3 million forest dependent households, and enhanced annual CO_2 sequestration of 50-60 million tons by the year 2020 (MoEF 2010). Initiatives like the Green India Mission and National Afforestation Programme, together with programmes in sectors like agriculture and rural development, would add or improve 2 million hectares of forest and tree cover annually in our country. This will add 2 million tons of carbon incrementally per year, and post 2020 the forest and tree cover will be adding at least 20 million tonnes of carbon every year. This would require an investment of INR 90 billion (USD 2 billion) every year for 10 years. India expects a substantial part of this investment to come from REDD+ financial support from UNFCCC (UNFCCC 2011).

Incorporating Social and Environmental Safeguards

The REDD+ framework that is part of the Cancun Agreement includes a number of safeguard provisions that are to be addressed and respected throughout the implementation of REDD+ activities. Countries are to follow safeguards ensuring, for instance, the full participation of indigenous peoples, local communities, and other stakeholders. Some of the key issues related to safeguards in the REDD+ process and implementation on the ground have been the subject of considerable discussion during REDD+ negotiations in the UNFCCC process and outside. The safeguards outlined in the Cancun Agreements are focused more on recipient (or stakeholder or local community) safeguards, as opposed to donor safeguards. This leads to a more holistic approach in the concept. A safeguard information system could have international guidelines or general principles that each country can adapt to their situation. Implementation of safeguards should be country-based and not enforced externally. Safeguards need to be flexible and reflect national circumstances, and not construed as additionality (IISD 2011). Many of the proposed safeguards are already inbuilt in the forest governance of the country.

The following are some of the important acts, instruments, and rules governing the protection and conservation of forests in India:

- Indian Forest Act, 1927
- Forest (Conservation) Act, 1980, amended 1988
- National Forest Policy, 1988
- Forest (Conservation) Rules, 1981, amended 1992
- Biological Diversity Act, 2002
- Forest (Conservation) Rules, 2003
- Biological Diversity Rules, 2004
- Indian Wildlife (Protection) Act, 1972, amended 1993
- Wildlife (Protection) Rules, 1995
- National Environment Policy, 2006
- Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2007

Implementation Level Bottlenecks and Challenges

Implementing REDD+ at the local level is a challenging task, given the complex nature of governance structures, socioeconomic status of communities, and huge diversity of forest management practices in India. The major bottlenecks and challenges are summarized in the following sectors.

1) **Governance structures** – Policy making for the forestry sector in India is done by the national government, whereas the ownership of resources lies with the provincial (state) governments. Local forest dependent communities have a direct stake in implementation of REDD+ as there might be a threat of alienation from centuries-old relationships with forests. The structures at the provincial and local levels need to be strengthened to make REDD+ a success. There is a strong necessity to integrate REDD+ with panchayati raj institutions, which is in itself a complex issue to manage.

2) **Socioeconomic status of communities** – Wide gaps exist in the socioeconomic status of individuals and communities in the rural and forest landscapes of India. Social divisions exist as a result of caste, community, language, and religion. Landowners, marginal farmers, and landless people can be seen as distinct economic classes. Each of these classes has a unique set of aspirations for REDD+ on account of their dependence on natural resources. Thus equity considerations are one of the biggest challenges for implementing REDD+ so that it does not lead to capture of benefits by the elite.

3) **Forest management** – India's forests contain huge reserves of biodiversity and are managed by different sets of systems and practices in different biomes. Each biogeographic zone has its own management requirements for REDD+ implementation, so we cannot expect a standardized package for the whole country. The challenge lies in involving the stakeholder communities from all such zones and arriving at a common platform.

4) **MRV issues** – Looking at the mechanism of REDD+, one of the bottlenecks is the capacity of local communities to carry out monitoring, reporting, and verification of carbon stocks. Some communities have learned this by way of social and community forestry projects undertaken earlier. But looking at the country as a whole, building the capacity of local communities and provincial governments to carry out this task poses a big challenge.

5) **REDD+ architecture**

6) **Slow progress on A/R projects**

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REDD+ Readiness in Myanmar

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Introduction

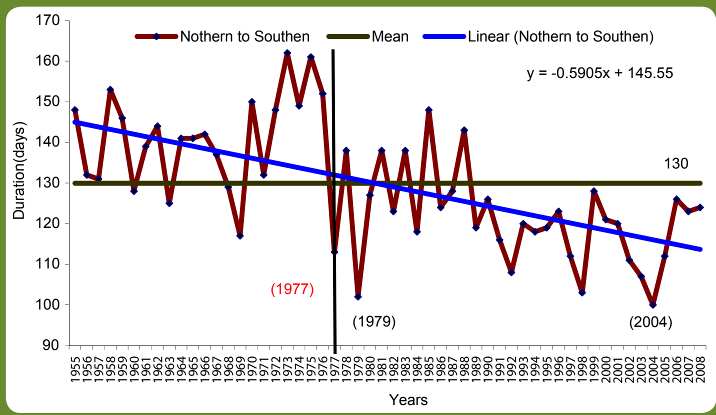
Climate change is not a myth; it is real and measurable. Observed changes include higher temperatures, a rise in sea level, glacier recession, and changes in precipitation patterns and the frequency of extreme climatic events. Greenhouse gas (GHG) levels are rising and now have the highest atmospheric concentrations in the last 400,000 years (Folland et al. 1990). This increase is attributed to human activities. Consumption of fossil fuels is driving this trend, accounting for about 80% of human-caused emissions. Land disturbance processes such as burning, loss and degradation of forests, and degradation of rangeland and soils, among others, account for the remaining 20% (IPCC 2007).

The forest sector (i.e., forestry and forest industry, including the use of forest land) plays an important role in the global climate change debate – partly because the sector influences the global carbon cycle, and partly because the sector is influenced by possible global climate change caused by increased concentrations of greenhouse gases, among which CO_2 is the most important. Houghton et al. (2001) estimated that at least one-third of the world's remaining forests may be adversely affected by the changing climate, especially in the boreal zone where warming will be greatest. On the other hand, forests globally will become a significant net source of CO_2 emissions by 2050, due to deforestation and forest degradation processes.

Climate Change in Myanmar

Climate change due to global warming has been observed in Myanmar; Lwin and Shein (2007) described the changes over the last five decades (1950 to 2000). Changes in monsoon climatology include a shorter monsoon (late onset and early withdrawal), increased heat indices, and decreased annual rainfall after 1977 (Figure 2). The monsoon strength decreased sharply after a warm episode from 1978 to 1983. Normal monsoon breaks disappeared in the 1990s, and abnormal synoptic situations occurred in the 1980s and 1990s. Extreme events include a record high temperature of 47.2°C recorded in the central dry zone of Myanmar in 2010 (2010 was one of the warmest years ever in Myanmar), and record rainfall of 742 mm (29.2 inches) in a single day in Rakhine State in 2011. In addition, Cyclone Nargis hit the Myanmar delta area in 2008 and Cyclone Giri hit the western part of Myanmar in 2010, with many casualties and destruction of infrastructure.

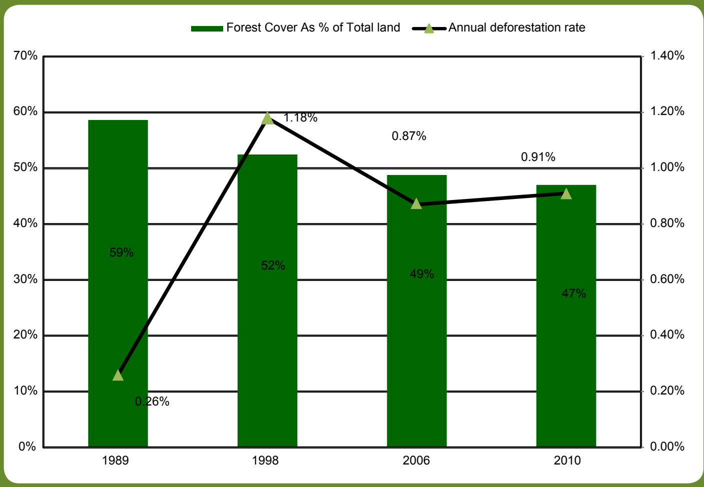
Figure 2: **Duration of monsoon from onset in the north of Myanmar to withdrawal from the south (1955–2008)**



Deforestation

Myanmar is endowed with natural resources, with 47% of the total land area covered by natural forest, 20% closed forests, and 27% open forests. However, Myanmar has a high rate of deforestation with a decline from 59% of land area in 1989 to 47% in 2010 (FRA 2010), an annual deforestation rate of 372,250 hectares, the third highest in the world (Figure 3). The major drivers of deforestation in Myanmar include population pressure, shifting cultivation, encroachment of agricultural land, land use changes, and illegal logging.

Figure 3: **Deforestation rate in Myanmar**



Major International Agreements

Myanmar became a signatory to the following international conventions and agreements on the dates shown:

- UN Framework Convention on Climate Change (UNFCCC) in November 1994
- Kyoto Protocol in 2003 as non-Annex I country
- UN Convention to Combat Desertification (UNCCD) in January 1994
- UN Convention on Biological Diversity (CBD) in November 1994
- International Tropical Timber Organization (ITTO) in November 1993
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in June 1997
- Botanical Gardens Conservation International in November 1998

Important Legislation

The important policies, legislation, and guidelines for implementing sustainable forest management in Myanmar and for the REDD+ mechanism are as follows:

- Forest Law (1992)
- Myanmar Forest Policy (1995)
- Forest Rules (1995)
- Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)
- National Forestry Action Plan (1995)
- Community Forestry Instructions (1995)
- Guidelines for district forest management plans (1996)
- Myanmar Agenda 21 (1997)
- Criteria and indicators for sustainable forest management (1999)
- National code of timber harvesting practices (2000)
- Protection of Wildlife and Wild Plants and Conservation of Natural Areas Rules (2002)
- Environmental Conservation Law (2012)

Conservation of Carbon Stock

The natural forest resources of Myanmar are classified as permanent forest estate (PFE) or un-classed forests. The Forest Department of Myanmar is responsible for the formation and systematic management of PFE, which is subdivided into reserved forest, protected public forest, and protected area system. Currently, a total area of 197,899 km² (30.7% of total forest cover) are managed as PFE by the Forest Department of Myanmar (MECF 2011) (Table 3).

Table 3: **Status of PFE in Myanmar in 2009**

Legal classification	Area (km²)	% of land area
Reserved forest	121,843	18.0
Protected public forest	40,950	6.1
Protected area system	35,107	6.7
Total area of PFE	**197,899**	**30.7**

Enhancement of Carbon Stock

Myanmar started developing teak plantations as early as 1856 using the taungya method. Large-scale plantation forestry began in 1980; about 30,000 ha of forest plantations have been developed since 1984. Plantation forestry has always been a supplement to natural forest management and is regarded as additional carbon stock to compensate for the carbon loss from deforestation and forest degradation. There are four types of forest plantation (Table 4). A total of 967,477 ha of forest plantation was established by the Forest Department between1981/82 and 2009/10 (MECF 2011).

Table 4: **Area of forest plantations in Myanmar (1981/82 to 2009/10)**

Plantation type	Area (ha)	% of total planted area
Commercial	541,781	56.0
Industrial	73,624	7.6
Village supply	215,088	22.2
Watershed	136,984	14.2
Total	**967,477**	**100.0**

Private sector investment in teak and other hardwood plantations was permitted in 2006. By March 2010, private investors had established 13,127 ha of teak plantation and 16,220 ha of other hardwood plantations (MECF 2011).

Community Forestry

In a significant step, the Forest Department issued 'Community Forestry Instructions' in 1995 in line with the Forest Policy 1995 and with the aim of gaining environmental stability while addressing the basic needs of local communities. The Instructions focused on the management of forests by rural communities through the protection of natural vegetation and establishment of forest plantations to enable them to fulfil their basic needs for fuelwood, farm implements, and small timber. By 2010, 39,298 forest user groups had been established with 41,458 ha of community forests.

Sustainable Forest Management

The systematic management of the natural forests in Myanmar dates back to 1856 and is an exploitation-cum-cultural system known as the Myanmar Selection System (MSS). MSS is practiced within boundaries of space-area (felling series), size-girth (minimum girth limit) and time limit (felling cycle of 30 years) so as to achieve a sustained yield of the natural forest while ensuring its healthy condition.

The MSS system involves felling cycles of 30 years, prescription of exploitable sizes of trees, girdling or marking of exploitable trees, girdling of defective or deteriorating marketable teak trees, thinning of congested teak stands, removal of other trees interfering with the growth of both young and old teak, enumeration of remaining trees, carrying out special silvicultural operations in bamboo flowering areas, and fixing annual yield. Trees of exploitable size are selectively marked within the bounds of the annual allowable cuts, which are carefully calculated for each felling series based on the principle of sustained yield management.

Some major developments towards sustainable forest management in Myanmar include identification of criteria and indicators, implementing the national forest master plan and district management plans, formation of permanent forest estate, formation of 34 protected areas for biodiversity conservation, people's participation in sustainable forest management through community forestry and private plantation programmes, rehabilitation programmes, watershed conservation and dry zone greening programmes, and initiation of a timber certification process.

Preparation for REDD+ Readiness in Myanmar

Although Myanmar has done considerable preparation in reference emissions level (REL) capacity and REDD strategy setting, there is still some way to go towards REDD+ readiness, including developing the readiness process itself, stakeholder participation, an implementation framework, and MRV capacity in the forestry sector (UN-REDD 2010). A series of capacity building workshops, pilot projects, and needs assessment projects are being implemented for REDD+ readiness.

Capacity building and awareness raising

Myanmar has started individual capacity building through learning about the REDD mechanism since the initiation in Bali in 2007. However, nationwide capacity building and awareness raising programmes started in 2010. Two national workshops and a series of training events and seminars have supported the preparation of the draft REDD strategy.

Pilot projects

A REDD+ pilot project entitled 'Mitigation of climate change impacts through restoration of degraded forests and REDD+ activities in the Bago Yoma region' is being implemented with support from the Korea Forest Service (KFS). The major project activities include enhancement of forest carbon stock; capacity building and awareness raising about REDD+; MRV and baseline carbon stock assessment; income generation and rural development activities; and preparation of technical reports.

A second pilot project entitled 'Capacity building for developing REDD+ activities in the context of sustainable forest management' was launched in 2012 supported by the International Tropical Timber Organization (ITTO). The Royal Norwegian Government assigned an international expert team to conduct a survey in Myanmar in 2012 to facilitate a needs assessment.

National REDD+ strategy draft

Myanmar has drafted a national REDD+ strategy during several national workshops on REDD+. The six REDD+ strategies and the major tasks associated with them are as follows:

Strategy 1: Tackling deforestation and forest degradation

- Analyse major drivers of deforestation and forest degradation
- Develop more effective conservation and management of permanent forest estate (PFE)
- Develop more effective management of planted forests and enhance forest carbon stock
- Stabilization of shifting cultivation
- Integrate forestry with the rural development programme

Strategy 2: Enabling policies

- Establish institutional mechanism
- Clarify and ensure legal carbon and land tenure rights
- Establish quantifiable national forestry emissions reduction targets
- Develop long-term policy on payment for ecosystem services (PES)
- Ensure REDD+ social and environmental safeguards

Strategy 3: Strengthening forest governance

- Establish National REDD+ Committee/REDD National Working Group
- Integrate/mainstream REDD+ into sectoral plans
- Establish equitable benefit distribution system
- Develop technical and institutional guidance to implement REDD+
- Strengthen law enforcement and anti-corruption scheme

Strategy 4: Set reference level emissions (REL) at the national level

- Measurement of baseline carbon stock at the national level (and sub-national level) with appropriate MRV tools
- Establish MRV system at national level (and sub-national level)
- Implementation of pilot project for MRV and REL

Strategy 5: Strengthen institutional capacity building and awareness raising about REDD+

- Development of infrastructure for REDD+
- Establishment of multi-stakeholder coordination mechanism
- Build capacity of all relevant stakeholders
- Implement 'free prior informed consent'
- Promote REDD+ through information, education, and communication
- Enhance learning exchange
- Sustain government and non-government cooperation

Strategy 6: Ensure sustainable financing for REDD+

- Implement multilateral and bilateral approaches for sustaining financing (diverse long-term funding mechanism)
- Seek immediate donor funding for REDD+ readiness
- Pursue equitable and reasonable benefit sharing among stakeholders

Challenges for REDD+ in Myanmar

The main challenge for REDD+ in Myanmar is the lack of awareness among all stakeholders in the forestry sector, especially at decision-making levels. Other challenges include the following:

- Financing for preparation of REDD+ readiness
- Capacity building and institutional strengthening
- National baseline data for carbon stock
- Setting reference level of emissions (national level)
- Establishment of MRV system (national level)
- Benefit distribution system
- Local people's participation
- Policy adjustment for REDD+

Conclusions

The REDD+ mechanism has the potential to generate substantial benefits in addition to the reduction of greenhouse gases. It is regarded as an important element in the future climate change scenario that integrates the role of forests and forestry with GHG emission reduction. Many developing countries with natural forest resources are preparing to implement REDD+ activities. However, the REDD+ mechanism needs international commitment by the industrialized countries.

Myanmar has many enabling conditions for implementation of the REDD+ mechanism and has been moving forward as well as exploring its own capacity. However, much still needs to be done to achieve REDD+ readiness. International cooperation is needed for capacity building, demonstration activities, policy reforms, and strengthening governance.

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Session 2:

REDD+ Case Studies

Preliminary Reflections from Community REDD+ in Nepal

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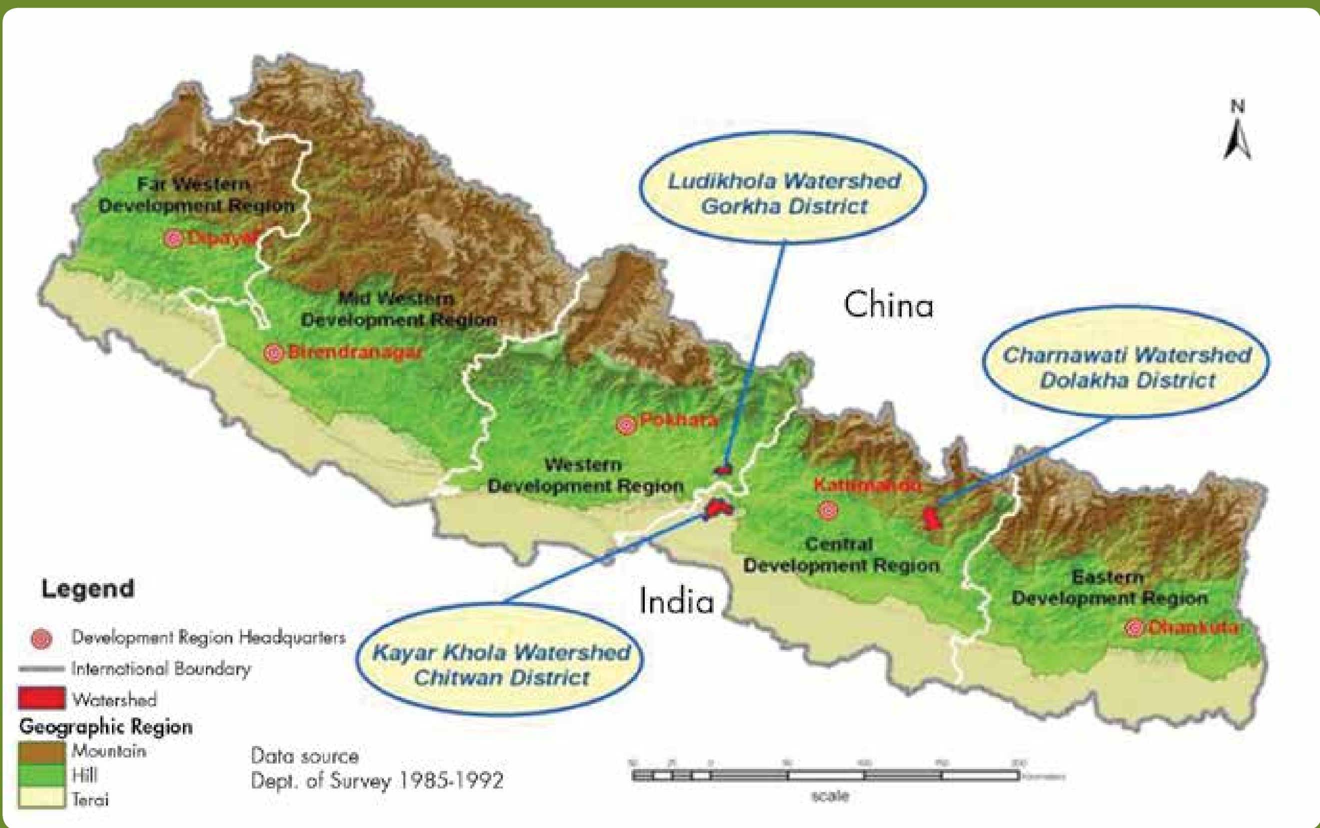
Introduction

Nepal was one of the first developing countries to adopt community forest management, with a national forestry policy conferring authority to local communities as community forest user groups (CFUGs), autonomous institutions established for the conservation and management of a forest and its resources. Giving the authority for forest management to CFUGs ensures that the communities benefit from the use of forest products, builds local level capacity for self-governance, and increases understanding of democratic principles (Pokharel 2011). With the aim of designing and setting up a governance and payment system for Nepal's community forest management under REDD+, ICIMOD is piloting a REDD+ project through its national partners: the Federation of Community Forestry Users Nepal (FECOFUN), and the Asia Network for Sustainable Agriculture and Bio-resources (ANSAB). The project is financed by the Norwegian Agency for Development and Cooperation (NORAD) under Climate and Forest Initiatives. It is being implemented in three watersheds (Charanawati in Dolakha District; Kayar Khola in Chitwan District and Ludikhola in Gorkha District) which lie in different geographic regions (Figure 4).

The watersheds have altitudes ranging from 245 to 3,549 masl and contain more than 10,000 ha of community forest managed by 105 CFUGs serving a diverse population of around 90,000 people belonging to different ethnic groups (Table 5).

Figure 4: **Location of the project sites**



Source: ICIMOD 2011a

Table 5: **Demographic information of CFUGs in three watersheds**

Watershed (District)	No. of CFUGs	Households involved in CFUGs	Population	Major ethnic groups at the project sites
Charnawati (Dolakha)	58	7,870	42,609	Tamang[a], Chhetri, Brahmin, Thami[a], Dalit[b]
Kayar Khola (Chitwan)	16	4,146	23,223	Chepang[a], Tamang[a], Brahmin, Chhetri
Ludikhola (Gorkha)	31	4,110	23,685	Magar[a], Gurung[a], Tamang[a], Dalit[b], Brahmin, Chhetri
Total	**105**	**16,126**	**89,517**	

Source: PMU 2010

[a] Indigenous people as defined in the National Foundation for Development of Indigenous Nationalities Act-2002, i.e., ethnic groups or communities who have their own mother tongue, traditional customs, a distinct cultural identity, social structure, and written or oral history

[b] Dalits are defined by the National Dalit Commission 2002 as 'those communities who by virtue of atrocities of caste-based discrimination and untouchability are the most backward in social, economic, educational, political, and religious fields, and are deprived of human dignity and social justice.'

With the help of remote sensing and geographic information system (GIS) based mapping, the project has established 572 permanent sample plots (250 m^2 circles) in the 105 community forests in the three watersheds. The sample plots are used to measure the carbon stocks in four carbon pools – above ground (trees and saplings), below ground (root carbon), leaf litter, and soil organic carbon. A forest carbon inventory was carried out for each of the 105 forest areas in 2010 and regular carbon monitoring in 2011 and 2012. Guidelines were developed for forest carbon measurements taking into account international standards and methodologies (IPCC 2006). Local communities were trained extensively and involved in the field measurement of forest carbon within their forested area (www.communityredd.net). The average carbon increment in the community forests was 2.62 tonnes per hectare in year one and 2.45 tonnes per hectare in year two (Table 6). The incremental forest carbon stock (above ground, below ground, leaf litter, and soil carbon) not only shows the amount of atmospheric carbon sequestration, but also illustrates the biodiversity richness in that particular area through forest regeneration and enhancement.

Key Achievements

Development and application of community-based

The project developed a sub-national level monitoring, reporting, and verification (MRV) system for regulating the seed grant under the REDD+ scheme. The MRV framework (Figure 5) features a reporting system, monitoring indicators, standard of

Table 6: **Total average carbon stock in three consecutive years (2010, 2011, and 2012)**

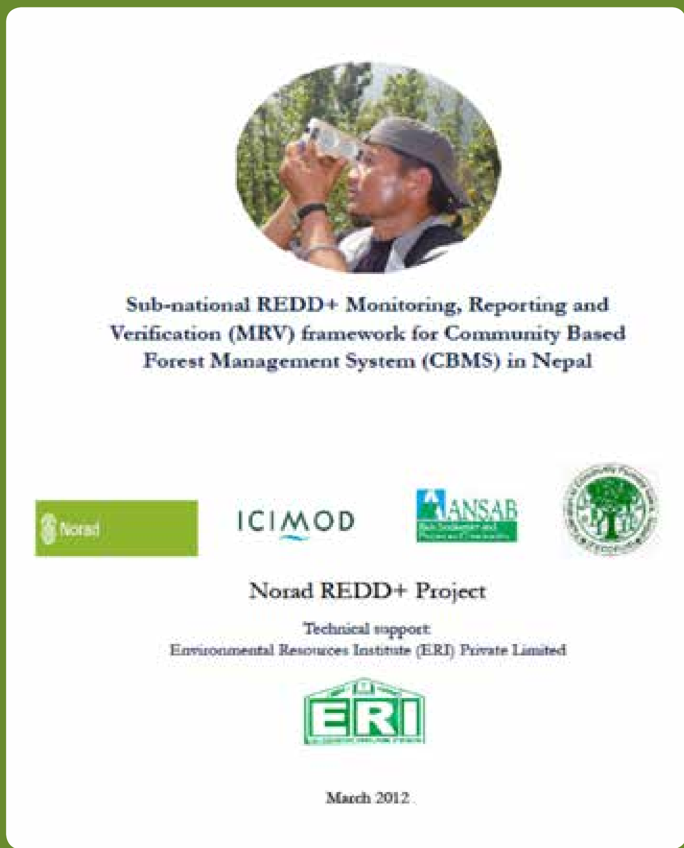
Project site	Area (ha)	2010 (Feb–April) Weighted mean (t C/ha)	2011 (Feb–April) Weighted mean (t C/ha)	2012 (Feb–April) Weighted mean (t C/ha)
Kayar Khola	2,382	288.4	289.8	291.2
Charnawati	5,996	207.0	209.3	212.0
Ludikhola	1,888	209.1	214.4	217.3
Total all sites	10,266	226.3	228.9	231.4
Total carbon stock t C		**2,323,196**	**2,350,093**	**2,377,637**
Total annual carbon increment	t C/year		26,897	27,544
	t C/ha/year		2.62	2.45

Source: PMU 2012

validation, and verification levels. This is the first time that MRV standards to regulate a seed grant under the operational guidelines of a forest carbon trust fund have been applied in Nepal.

A number of local resource persons (LRPs), REDD+ network members, and CFUG members were trained and oriented on forest carbon measurement and data analysis. So far, 301 individuals have been directly involved in carbon monitoring. The involvement of the local community in carbon monitoring is not only cost effective but also helps to increase their ownership and confidence in the process. Carbon monitoring is

Figure 5: **Framework guideline for MRV in community forestry in Nepal**



institutionalized by incorporating provisions of REDD+ in the management plan and constitution of the CFUGs. So far 25 CFUGs have already incorporated, and eight are in the process of incorporating, REDD+ provisions in newly developed and revised forest management plans and the CFUG constitution.

Mechanism and actions for permanence and additionality of forest carbon

The project has initiated various interventions such as plantation, installation of alternative energy technologies, monitoring and control of forest fires, internal monitoring systems, and sustainable practices of forest management. Promotion of alternative rural energy technologies such as biogas and improved cooking stoves has reduced the dependence of local people on fuelwood, thereby enabling an increase in the carbon stock in their forests. So far, the project has installed more than a thousand alternative energy products (Table 7). Likewise, forest fire, one of the main drivers of forest degradation, has been monitored manually by local communities, and through satellite information.

Operation of Forest Carbon Trust Fund and Seed Grant Distribution

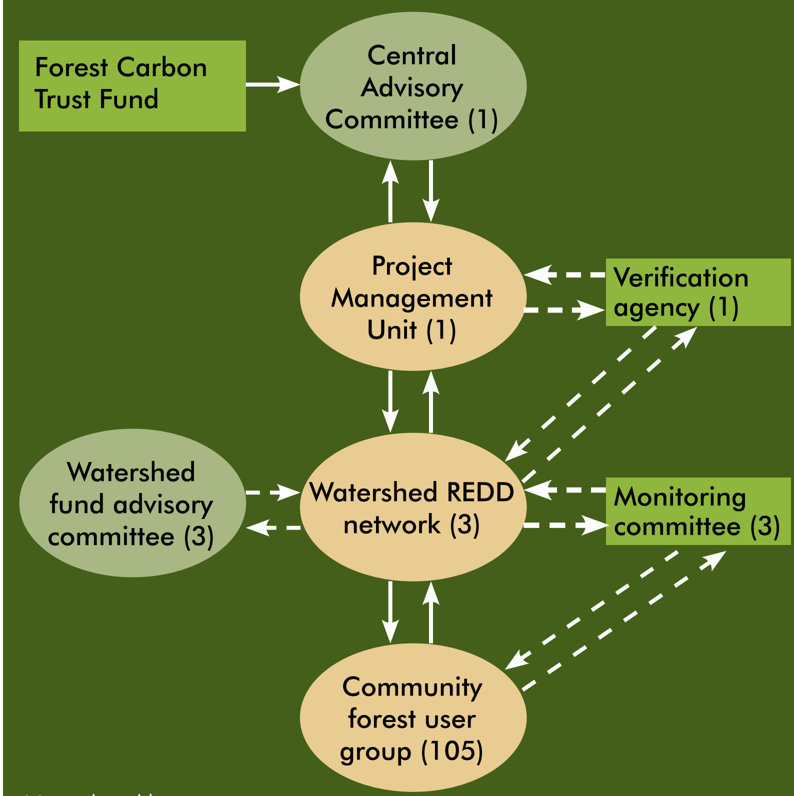
A pilot forest carbon trust fund (FCTF) mechanism was developed through a multi-stakeholder interaction, consultation, and feedback process at national and local levels. It was designed to regulate a REDD+ seed grant to make payment to local communities in recognition of their efforts to conserve forests. The operational guidelines of the FCTF describe the structures, system, and standards to transfer REDD+ payments from a central trust fund to local forest groups (ICIMOD 2011b).

Table 7: **Number of households adopting alternative rural energy technologies (ARET) in 2010–2012**

Watershed	Type of ARET[a]	No. of households installed ARET			Total no. of ARET installed
		Dalit	Indigenous people	Other	
Charnawati	ICSa	47	222	106	375
	Biogas	12	23	25	60
Kayar Khola	ICSa	53	50	12	115
	Biogas	39	35	31	105
Ludhikhola	ICSa	55	201	228	484
	Biogas	10	24	13	47
Total	ICSa	155	473	346	974
	Biogas	61	82	69	212

Source: PMU 2012.
[a] ICS = improved cooking stove

Figure 6: **Structure and system of pilot forest carbon trust fund**



Note: dotted lines represent reports, data, and information, and solid lines represent seed grant

Source: adapted from ICIMOD (2011b)

Distribution of REDD+ Seed Grant to Local Communities

In order to address equity-related concerns in community forestry, a system has been considered by which payment is made to local communities (Figure 6). The system considers quantity of forest carbon stock, forest carbon increment above the baseline, the number of households of indigenous peoples and Dalits, the number of women, and the number of poor households within the project area. The weightage given to each of the six attributes that form the REDD+ payment criteria is as follows:

Payment = f [forest carbon stock (24%) + forest carbon increment (16%) + number of indigenous peoples households (10%) + number of Dalit households (15%) + women population (15%) + number of poor households (20%)]

Each CFUG forwards information on household economic status, men/women ratio, indigenous people, and Dalits, together with the forest carbon data to the watershed REDD network, a sub-national institution which is the implementing body for the project. The watershed REDD network compiles

Table 8: **Payment to watersheds in 2011 and 2012 based on the payment criteria (USD)**

District (watershed) No. of CFUGs	Year	Seed grant payment according to individual criteria (USD)						Base amount USD 100 per CFUG	Total disbursed (USD)	Difference 2012/2011
		Forest carbon stock	Forest carbon increment	IP households	Dalit households	Women population	Poor households			
Chitwan (Kayar Khola) 16	2011	5,257	3,505	2,190	3,286	3,286	4,381	0	21,905	2,787
	2012	5,542	3,695	2,309	3,464	3,464	4,618	1,600	24,691	
Dolakha (Charnawati) 58	2011	10,928	7,286	4,553	6,830	6,830	9,107	0	45,535	-1,347
	2012	9,213	6,142	3,839	5,758	5,758	7,678	5,800	44,188	
Gorkha (Ludikhola) 31	2011	6,614	4,410	2,756	4,134	4,134	5,512	0	27,560	-1,439
	2012	5,525	3,683	2,302	3,453	3,453	4,604	3,100	26,121	
Year wise total	2011	22,800	15,200	9,500	14,250	14,250	19,000	0	95,000	
	2012	20,280	13,520	8,450	12,675	12,675	16,900	10,500	95,000	
Difference 2012/ 2011		-2,520	-1,680	-1,050	-1,575	-1,575	-2,100	10,500	0	

Source: ICIMOD 2012

and makes claims for payment to the central Project Management Unit (PMU). Following review and recommendation by the central advisory committee, the PMU disburses the payment to the watershed REDD network. The fund advisory committee at the watershed level follows a similar process for distributing the funds to individual CFUGs. The REDD+ payment is sent to the individual CFUGs within the project area. The payment made to each watershed based on the six criteria is shown in Table 8.

The CFUGs can decide how to invest the money themselves, within guidelines laid down for utilization. They formulated plans and used the seed grant for various activities focusing on environmental and social safeguards (Box 1). The proportion of the seed grant spent on different activities is shown in Table 9. In 2011, half of the grant was spent on activities related to livelihood improvement. Apart from the benefits accrued by the entire community from improved forest condition, a total of 2,322 households in the project area benefited directly from various activities implemented using the seed grant in 2011 (Table 10).

Table 9: **Expenditure of seed grant disbursed in 2011**

Main heading for seed grant expenses	Expenditure in %			
	Dolakha	Gorkha	Chitwan	Average
Livelihood improvement	53.8	50.3	48.5	50.9
Alternative energy	11.9	15.0	13.5	13.5
Forest carbon monitoring (training and involving in forest inventory)	7.2	4.3	27.7	13.1
Capacity building (awareness)	9.7	9.4	8.3	9.1
Other (forest management + enrichment plantation + miscellaneous activities)	17.4	21.0	1.9	13.4
Co-financing by CFUGs (%)	43.9	2.3	69.9	49.2

Source: (ICIMOD 2012)

Box 1: **Key activities for seed grant utilization**

- Activities that reduce deforestation and forest degradation
- Activities related to conservation and enhancement of forest carbon stock
- Sustainable management of forest and biodiversity conservation
- Poverty reduction/livelihood improvement activities
- Forest carbon monitoring and auditing of FCTF and verification of carbon data
- Awareness raising and capacity building on REDD and climate change

Initiation of co-financing by CFUGs

The REDD+ seed grant was disbursed for REDD+ project activities and monitoring; at the same time the CFUGs started to mobilize their own funds as co-finance to support the REDD+ project activities. Often the REDD+ payment was not sufficient, and although the REDD+ project enabled CFUGs to identify the priority areas for undertaking project activities, this required additional funds. Table 11 shows the total REDD+ funds disbursed, the total REDD+ expenditure, and the co-financing contribution from the CFUGs. Co-financing was significant in Dolakha and Chitwan, although nominal in Gorkha.

Gorkha District has the highest proportion of poor households, and the smaller proportion of co-finance seems justified. The high level of co-finance in Chitwan may have been partly due to the relatively lower number of poor households and absence of demarcation in some CFUGs in Chitwan regarding

Table 10: **Population directly benefiting from the seed grant distributed in 2011**

Watershed	Households and people benefiting						
	By ethnic group (HHs)				By gender		
	IP	Dalit	Other	Total	Female	Male	Total
Dolakha	147	23	226	396	1146	1217	2363
Chitwan	357	89	106	552	1301	1176	2477
Gorkha	737	332	305	1374	3093	2504	5597
Total	**1,241**	**444**	**637**	**2,322**	**5,540**	**4,897**	**10,437**

Table 11: **Co-financed amount 2011**

Watershed	Total REDD+ payment fund distributed (USD)	Total REDD+ expenditure (USD)	Co-financed amount (USD)	% Co-financing of total expenditure
Dolakha	44,103	36,444	29,080	80
Chitwan	20,540	24,181	47,965	198
Gorkha	25,887	21,914	540	2.5

Note: % cofinancing = co-financed amount/total expenditure

the use of the REDD fund and CFUG fund, but also shows the willingness of the community to actively participate in REDD.

Initiation of collective decision-making process in watersheds

The establishment of a REDD network in each watershed has provided a platform for the individual CFUGs to discuss their problems together. The bundling of CFUGs not only reduces the transaction cost of REDD+ activities but also enables the CFUGs to plan their activities considering the watershed as a management entity, leading in effect to both institutional and biophysical bundling.

Key Empirical Lessons

The project has brought new stakeholders such as the Nepal Federation of Indigenous Nationalities (NEFIN) and Dalit NGO Federation (DNF) on board. Although these organizations have both been working on the rights of indigenous people and Dalits, they have had little active involvement in forest management. The project acknowledges the importance of such organizations in developing policy on REDD benefit sharing.

The project's intervention of bundling CFUGs in a REDD network has reduced the transaction costs. One of the key lessons of the project is that community participation in carbon monitoring not only reduces the cost of monitoring but also enhances ownership towards the project and confidence in the monitoring process. The REDD+ incentives come as additional income to the benefits that the communities are getting through the sustainable management of the forests. One of the highlighted aspects of the project is that the communities have started to co-finance the activities initiated. Finally, as forest carbon is an international public good, the sequestrated carbon may provide an opportunity for the project to participate in a payment of ecosystem services mechanism.

Challenges

Despite the several achievements, the project is also facing some challenges. One is the high initial costs for setting up, implementing, and monitoring of the project activities. This is mainly due to the fragmented nature of community forests. Likewise, the additionality counted may be very low when the forest was already being managed sustainably. Considering the stock value of carbon is always a challenge under the REDD framework. The other challenge is to achieve a balance between the performance and non-carbon values when deciding the payment criteria. At present, the project has given more weight to social safeguards than to carbon stock and increment. Determining the appropriate weightage is a challenge in heterogeneous communities as in this project area. The other challenges are knowledge transfer to poor and newly-elected forest management committee members. As there is no mechanism in the community forestry system for knowledge transfer from a previous management committee to a newly-formed committee, there is a chance knowledge that the the previous committee gained could disappearing.

Future Prospects

The project was successful in making people aware of REDD+, increasing ownership by the local communities, building the capacity of local people in carbon monitoring, and establishing a benefit distribution mechanism; but for continuity of these achievements, the project needs to take the carbon to an international market. For this, a robust project design document (PDD) is needed which clearly explains the additionality and the permanence of the project.

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Carbon Stock Assessment in a Sub-Watershed of Himalayan Forest

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Introduction

Reducing emissions from deforestation and forest degradation (REDD) is an evolving concept to protect forests against deforestation and degradation. This has now evolved into REDD+ with the inclusion of the conservation of forest carbon stocks, sustainable management, and enhancement of forest carbon stocks. The REDD + mechanism lays down some mandatory steps and components. These steps include the establishment of baselines or 'reference emission levels' (RELs) and developing a reliable measurement, reporting, and verification (MRV) system to monitor the progress of REDD+ projects and programmes.

Carbon stock assessment in the forests is an important component. Different methods are being used in different countries depending on the objectives of the project, forest types, and geo-climatic conditions of the area. WWF-Pakistan conducted a carbon stock assessment study in a sub-watershed with an area of Himalayan forest in Ayubia National Park to test these methods and compare the results with those of other studies. The study was funded by WWF-Pakistan's Scientific Committee.

Figure 7: **Ayubia National Park in Pakistan**

Study Area

Ayubia National Park was established in 1984 in the Galiat area of Khyber Pakhtunkhwa Province in Pakistan with a total area of 3,322 ha (Figure 7). The park falls within the Western Himalayan ecoregion and is famous for its biodiversity, with 757 plant species, 650 insects, 203 birds, 31 mammals, 19 reptiles, and three amphibians (Waseem 2007). The park has three ecotypes: subalpine meadows, Himalayan moist temperate, and sub-tropical chir pine (Farooque 2002).

Objectives

The overall objective was to test contemporary methods of carbon stock assessment in sub-tropical moist and chir pine forests. The specific objective was to assess the carbon stocks in the above and below ground biomass, dead wood, soil, and litter.

Methods

Sample size and selection

An initial short survey was conducted in which the per hectare biomass was roughly estimated in 25 sample plots to determine the number of plots needed for the detailed survey using the following formula:

$$n = \frac{\left[\sum_{h-1}^{L} N_h * S_h\right]^2}{\frac{N^2 E^2}{t^2} + \left[\sum_{h-1}^{L} N_h * S_h\right]}$$

Where

E = allowable error or desired half width of the confidence interval (calculated by multiplying the mean carbon stock by the desired precision, i.e., mean carbon stock × 0.1, for 10% precision, or 0.2 for 20% precision).

t = the sample statistic from the t-distribution for the 95% confidence level (here t is set at 2 as the sample size is unknown)

N_h = number of sampling units for stratum *h* (= area of stratum in hectares or area of the plot in hectares; = total stratum area/area of each plot)

N = number of sampling units in population

S_h = standard deviation of mean carbon stock of stratum h (in this case the project area as it is a single stratum project)

L = describes the strata (in this case the project area, Ayubia National Park)

The number of sample plots required was found to be 87; a total of 87 plots were laid out in the project area – 77 in moist temperate forest and ten in chir pine forest – using a random sampling technique.

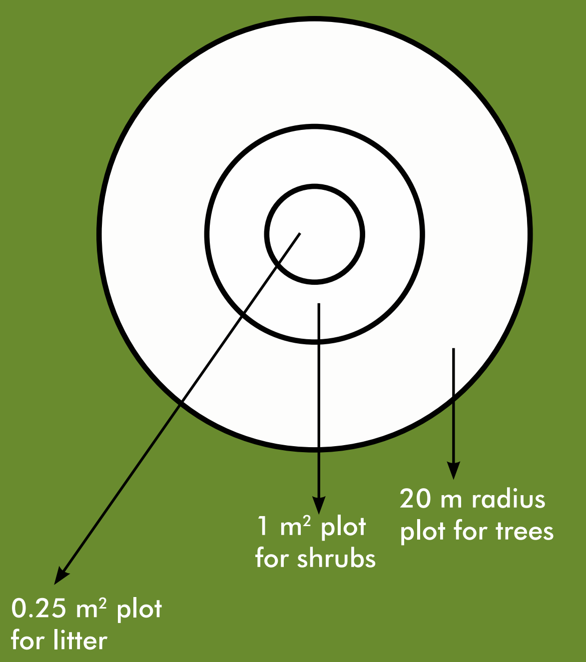
Field measurements and data collection

Five carbon pools were considered in the study:

- above ground biomass (AGB), consisting of trees and shrubs;
- below ground biomass, consisting of tree roots;
- dead wood, both standing and lying on the ground;
- litter, i.e., leaves, pine needles, and similar lying on the forest floor; and
- soil, i.e., soil organic carbon.

Circular plots with a radius of 20 m (0.12 ha) were laid out in the forest area. A series of nested plots were demarcated by marking concentric circles within the plots with radii of 14 m and 4 m, and areas of 1 m^2 and 0.25 m^2 (Figure 8).

Figure 8: **Circular and concentric plots for measurements**



Biomass measurement and carbon calculation in trees

Trees with dbh (diameter at breast height) >50 cm were measured within the whole plot; trees with a dbh of 20–50 cm were measured within the 14 m radius area, and trees with a dbh of 5–20 cm were measured within the 4 m radius area (Pearson et al. 2005). The height, dbh, and increment were recorded using a measuring tape, laser range finder, and increment borer. The biomass expansion factor was calculated using the formula

$$AGB = V \times BEF \times D \times CF$$

Where

AGB = aboveground biomass (t)
V = volume of a tree (m^3)
BEF = biomass expansion factor
D = specific wood density of tree species (t/m^3)
CF = conversion factor, taken to be 0.5.

The carbon content in AGB was calculated using the formula

$$C = AGB \times CF$$

Where

C = carbon.

Biomass measurement and carbon calculation in shrubs

Shrubs were measured within the 1 m^2 nested plot at the centre of the main plot. Destructive sampling was carried out. All the shrubs within the defined area were cut, their green weight determined, and samples collected to measure the dry weight.

Below ground biomass (BGB) in trees

For belowground biomass and carbon calculations' default values were worked out from the regression equation for temperate forests ($BGB = \exp(-1.0587 + 0.8836 \times \ln AGB + 0.2840)$).

Litter

Litter was measured within the 0.25 m^2 nested plots at the centre of each main plot. All litter was collected and put in bags for dry weight determination.

Soil

Soil samples were collected from the centre of the plots up to a depth of 30 cm for laboratory tests and measuring carbon content.

Deadwood

For standing deadwood, the height and dbh of sampled trees were recorded as for living trees. A line intercept method was used for dead wood lying on the ground. Lines were laid out at right angles, and the intercepted lying deadwood was taken as a sample for calculating carbon content.

Statistical analysis

Statistical comparisons were carried out using Minitab 15. Mann Whitney's Test was performed to see carbon variations in

- AGB (moist temperate forest vs subtropical chir pine forest);
- BGB (moist temperate forest vs subtropical chir pine forest);
- shrubs (moist temperate forest vs subtropical chir pine forest);
- litter (moist temperate forest vs subtropical chir pine forest);
- soil (moist temperate forest vs subtropical chir pine forest); and
- standing deadwood (moist temperate forest vs subtropical chir pine forest).

Results and Discussion

The average carbon per hectare found in each pool and forest type is shown in Table 12 and illustrated in Figure 9.

The total average carbon stock in Ayubia National Park was found to be 311.7 t/ha with 140.5 t/ha in the moist temperate and 329.2 t/ha in the chir pine forest (Table 12 and Figure 9). Mann Whitney's Test was applied for comparison of the carbon stock in the different carbon pools in moist temperate and chir pine forest. The differences were significant in all pools except shrubs and litter. The Pearson correlation coefficient was used to discover any correlations between the carbon stock in each pool and factors like altitude, slope, and aspect. The only significant correlation was between soil carbon pool and elevation.

The average carbon stock in the subtropical chir pine forests (140.5 t/ha) was in line with the findings of other studies. Various authors have reported values of 81.3 to 115.4 t C/ha, not including standing deadwood or soil, in Kumaun in the central Himalayas in India (Jina et al. 2008; Rana et al. 1989; Malhi et al. 1998; Press et al. 2000). Nizami et al. (2009) reported values of 126 t C/ha and 99 t C/ha, excluding shrubs and deadwood, in Ghoragali and Lethrar, respectively, and Banskota et al. (2007) reported a value of 110.3 t C/ha, excluding standing deadwood, in Uttarakhand, India.

The value of 329.2 t/ha measured for average carbon stock in moist temperate forests was higher than reported by others. Malhi et al. (1998) reported a carbon stock of 181 t C/ha in moist temperate forests, while boreal and temperate forests were reported to sequestrate between 0.5 and 8 t C/ha/yr (Press et al. 2000). The higher carbon content found in Ayubia National Park could be due to less disturbance and the presence of a relatively large amount of deadwood.

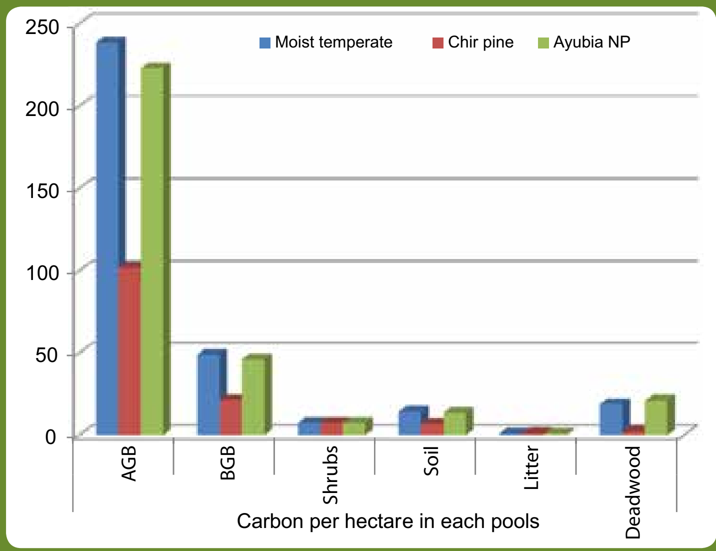
As compared with other studies, the soil carbon content (13.5 t/ha) was low. However, the study only considered soil to a depth of 30 cm, whereas most studies take soil to a depth of 70 cm.

The significant positive correlation found between soil carbon and elevation is thought to be due to the decrease in levels of human disturbance with

Table 12: **Average carbon per hectare in each pool and forest type**

Forest type	Carbon Pool						
	AGB	BCB	Shrubs	Soil	Litter	Deadwood	Total mean
Moist temperate	238.7	48.8	7.37	14.3	0.96	18.9	329.2
Chir pine	101.8	21.3	7.51	6.85	1.01	2.03	140.5
Ayubia NP	223.0	46.0	7.38	13.5	0.96	20.9	311.7

Figure 9: **Forest Types and per hectare carbon content in each pool**



elevation. Our results contradict those of Sheikh et al. (2009) who found a negative correlation between the two, but agree with those of Singh et al. (2011), Sims et al. (1986), and Tate (1992).

No significant correlation was found between carbon stocks and aspect, in contrast to the findings of Sharma et al. (2011) who identified a positive correlation between the two in Garhwal Himalaya, India, where the precipitation and temperature is higher than in Ayubia National Park.

Conclusion and Recommendations

Pearson's method of carbon stock assessment needs slight modification and adjustment according to local conditions. The study was conducted in only one location, and that in a national park. The method needs to be tested in other areas with the same forest types to properly compare the results. Along with Pearson's method, other contemporary methods should also be tested to gain a better idea of which is the most suitable for the different forest types in Pakistan.

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Linking Livelihood Interventions and Capacity Building of Communities for a REDD+ Regime in the Indian Central Himalayan Region

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Introduction

The rising level of CO_2 is the most widely accepted cause of global warming and resultant climate change. Carbon accumulation by terrestrial ecosystems appears to be the cheapest means of mitigating the CO_2 level increase. The primary objective of the United Nations Framework Convention on Climate Change (UNFCCC) is to stabilize the greenhouse gases (GHGs) in the atmosphere. The concept of REDD was born at UNFCCC COP 11 in Montreal, when some South American countries raised the idea of reducing carbon emissions by decreasing deforestation. REDD+ is a more advanced concept of REDD, which also focuses on conservation and enhancing carbon stock in forests. In the entire Himalayan region, forests suffer from degradation because of high anthropogenic pressure. Even though green felling has been banned for the last few decades in the Indian Himalayan region, forests continue to degrade as a result of the relentless pressure on them for fodder, fuelwood, and grazing.

Deforestation and Forest Degradation in the Central Indian Himalayas

As in other mountain ecosystems, the people in the Indian Himalayan region rely to a great extent for their livelihoods on their immediate natural resources, through agriculture, forestry, livestock, and others. The dependence of the ever-increasing population on these limited resources is increasing. Lack of modern technology to reduce mountain specificities and enhanced production to meet the burden are exhausting the resources, and, in conjunction with the marginality of farmers, increasing poverty (Samal et al. 2003).

The central Himalayan states have been able to curb deforestation to a large extent as a result of strong local consciousness and activism against commercial forestry, and the subsequent ban on cutting introduced in 1982. However, forest degradation, i.e., decrease in forest carbon without change in forest area, continues to be a problem. Forest degradation has a poverty aspect, in contrast to deforestation, which generally has a commercial aspect (Skutch et al. 2009). In most Himalayan states, open degraded forest accounts for 30–50% of forest area (ICIMOD 2011). Due to labour intensive measurements and lack of capacity and human resources in the line departments, there are no data available on forest degradation in the Himalayan states. Most forests in developing countries showed no change in biomass density between 1990 and 2005 (FAO 2006). Data from the Forest Survey of India (FSI) shows that the forest cover in the Himalayan states and other states of India is either increasing or is stable, but almost nothing is known about carbon density within the forests as affected by degradation. A recent study by ICIMOD indicates that nearly 48% of Indian Himalayan forests have varying degrees of degradation. Owing to the strong connection of forest degradation with the subsistence needs of local people, the livelihood needs of communities and the mountain specificities need to be considered to address the situation.

Nature of degradation: day-to-day collection of biomass

In the central Himalayas, the local communities depend on forests for their day-to-day needs for fodder, fuelwood, and leaf litter (for preparing manure for fields). Although the area of forest cover is large (more than 45% of the geographical area), much of the forest has a stocking density far lower than the potential. Forest degradation has set in in many areas, with denudation of trees, thinning of stocking density, and loss of top soil. Mountain agriculture relies heavily on forest resources, with each agronomic energy unit entailing about 5-10 energy units from forests (Singh and Singh 1992). Each year, some forest floor carbon is transferred to soil in fields through the transport of forest floor litter. Apart from the demands of subsistence living, forests are under frequent threats due to forest fires, spread of invasive species, and unregulated extraction of non-timber forest products. Forest degradation will not only adversely affect local subsistence living and water sources such as springs and streams, it can also impair the flow of ecosystem services from the mountains to the adjacent great Gangetic plains, with a population of more than 500 million people.

The central Himalayas play a special role in supporting the Gangetic plains through the supply of ecosystem services along its river connections. However, because of their poverty, people need an economic incentive to become interested in forest conservation. The stake is high and we cannot afford to ignore the waning health of forests. The hill communities in the central Himalayas have played a pivotal role in the preservation of the forest wealth through their traditional practices and self-imposed rules, especially under the van panchayats (VPs), a community forestry system in Uttarakhand state recognized under the Indian Forest Act.

Need for Active Involvement of Local Communities

In Uttarakhand there are about 12,089 van panchayats covering more than 0.5 million hectares. Community forestry is seen as a cost-effective means of dealing with forest degradation and management. Communities in India and Nepal have been highly successful in terms of forest conservation as well as management at the local level with limited or no external financial support. Per capita CO_2 emissions in the Himalayan region is extremely low (less than 1 t CO_2/capita/yr) (K:TGAL 2009). The low level of emissions is attributed to poverty and lack of lifestyle options for the local population. However, the traditional cooking practice using wood is a major cause of ill health and early mortality of women, and the black carbon associated with the burning of fuelwood is also thought to be a major contributor to warming and glacial recession in the Himalayas.

Conserving forests without access to modern energy, restrictions on economic activities, and the creation of infrastructure is far more creditable than sequestering carbon in forests where there are high per capita CO_2 emissions, as in the developed world. We argue that by contributing to carbon sequestration through forestry measures, local communities in mountain areas would be able to share the benefits and payments accruing from national and international mechanisms. This also provides an opportunity for poor mountain people to develop modern community-based institutions with a global perspective. Payments for carbon sequestration by community management could be used to provide clean energy, the benefits of which are likely to far exceed the costs. For example, this would lower the emission of black carbon, and also reduce day-to-day collection of biomass, which would reduce women's drudgery and enable them to use the time saved for multiple benefits.

India's View on REDD and REDD+

India's national strategy aims at enhancing and improving forest and tree cover in the country, thereby enhancing the volume of forest ecosystem services that flow to (local) communities. The services include fuelwood, timber, fodder, NTFPs, and also carbon sequestration. In the Indian context, the carbon service from forests and plantations is one of the co-benefits and not the main or sole benefit. Initiatives like the Green India Mission (GIM) and National Afforestation Programme (NAP), together with programmes in sectors like agriculture and rural development, are intended to add or improve 2 million hectares of forest and tree cover annually in the country. This would sequester an additional 2 million tonnes of carbon each year; until post 2020 the forest and tree cover will be adding at least 20 million tonnes of carbon every year. An investment of INR 90 billion (USD 2 billion) is needed every year for 10 years (abstracted from India's viewpoint on the COP decision on REDD implementation; UNFCCC nd).

Forests degradation is an issue in India. The FSI's claim that forest cover in the country is stable or increasing needs to be assessed in view of the degradation factor. Preliminary observations on growing fodder and providing access to clean energy such as biogas indicate that action is required at the community level to meet day-to-day needs from outside the forest areas. Policy changes are required to enable local communities to derive benefits out of global and national programmes.

Interventions to Address Forest Degradation and Social Upliftment

The Central Himalayan Environment Association (CHEA) in Nainital has taken several initiatives to implement various programmes in the mountain region to reduce women's drudgery and improve livelihoods and socioeconomic status and to reduce the degradation of forests, with a focus on enhancing the carbon pool. Some of the technological interventions which link enhancement of carbon sequestration and livelihoods are described in the following sections.

Community carbon forestry – the Kyoto: Think Global, Act Local project

Kyoto: Think Global, Act Local (K:TGAL) was a research and knowledge development project implemented from 2003 to 2009 through multinational partnerships. The project was led by the University of Twente, The Netherlands, and regionally coordinated by the International Centre for Integrated Mountain Development (ICIMOD) for India and Nepal. CHEA implemented the project as the Indian partner in Uttarakhand State in partnership with the van panchayats. The central aim was to explore the potential for, and support policy change towards, valorization of carbon maintenance and growth in forests managed by local communities in developing countries. Briefly, the idea was to explore the feasibility of using carbon market mechanisms to support sustainable community-based forestry which would combat deforestation and degradation. The motivation was two-fold:

1. to provide marginalized rural communities with a financial incentive for the sustainable management of their forests, thus supporting livelihoods in a way that is positive for the local environment; and
2. to contribute to the mitigation of greenhouse gas emissions and climate change.

Under the project, Uttarakhand's van panchayats were made capable of measuring carbon sequestered by their forests using internationally verifiable methods, including geographical information systems (GIS), handheld computers, ground probing, and calculations using standard techniques of carbon measurement, to arrive at a carbon sequestration rate and quantity. Van panchayats are a unique institution, representing grassroots democratic environmental governance. Van panchayats were born in the late 1920s as the outcome of a colonial power conceding rights to forest-dependent mountain communities after these communities rose up in violent protest against government control over their forests. Van panchayats are arguably the world's oldest community-managed forests, and are governed by Rules framed under the Indian Forest Act, 1927, thus even legally sustainable.

The project objectives were to enable local communities to contribute to climate mitigation – a global problem – and share the benefits emerging from international carbon credits. The aim was also to sensitize policy makers to the contribution of local communities in carbon sequestration leading to climate mitigation in the hope that suitable changes in policy will be brought about to reward such efforts by local communities. The project findings indicated that mean carbon sequestration rates in the degraded sites of the van panchayats (mixed banj oak with chir pine degraded and chir pine with bushy banj oak strata) are lower than in less disturbed sites under community management, $2\ t^{-1}\ ha^{-1}\ year^{-1}$ compared to close to $4\ t^{-1}\ ha^{-1}\ year^{-1}$.

The Forest Department of the Uttarakhand Government approached CHEA to prepare a memorandum for the 13th Finance Commission of the Government of India in March 2008. A comprehensive note was prepared by the K:TGAL team advocating valuation of forestry ecosystems services in the national accounting system. The research data generated in the K:TGAL project was used to support the argument. Since carbon sequestration is a major environmental service, the project data on carbon sequestration rates by the community forests (van panchayats) was also significant for the memorandum. The memorandum has been submitted to the 13th Finance Commission by the Government of Uttarakhand. The Government of India, on the recommendation of the 12th Finance Commission, allocated USD 272 million to the states for management of their forests for a period of 5 years (2005-2010). This step marks an important commitment by the federal government to carbon mitigation on a voluntary basis and is also a form of 'payment for environmental services'. The Green India Mission, one of the eight national missions in the recently adopted National Action Plan on Climate Change of the Government of India, has taken note of the K:TGAL project's approach of involving communities in carbon measurement.

Fodder development and livestock management

As per the estimate of the Uttarakhand Livestock Development Board (Annual Report 2004/05), the annual requirement for green and dry fodder in the state is 19.78 and 5.43 million tonnes, respectively, whereas only 8.29 and 4.26 million tonnes, respectively, are produced in the state. Thus, the green fodder supply is short by 58% and dry fodder by 22%. Fodder shortage leads to villagers practising unrestricted grazing, and fodder collection from the forest is a likely cause of deterioration of forest and land quality.

For the past five years, CHEA has taken the initiative to develop fodder banks in van panchayats and to encourage fodder plantation on private land. Plantation of improved fodder grass in the vicinity of households resulted in the production of 30 tonnes of fodder harvested by 200 households, leading to savings of 90–100 hours a year in fodder collection. The use of mangers and a chaff cutter has reduced the time used for fodder collection by a further 60–70 hours a year. In addition, 90 tonnes of fodder have been harvested from van panchayats by the community. Besides reducing drudgery, the activity has had a positive impact in reducing the exploitation and uncontrolled lopping of trees and facilitating natural regeneration, thus reducing forest degradation.

Promotion of alternative energy

On average, villages have around 50 households each, and each household needs at least 2 ha of forest to meet day-to-day biomass needs. CHEA has introduced biogas to help meet the energy needs of villagers and reduce women's drudgery and the biotic pressure on the community forests. Like natural gas, biogas is a mixture of gases with methane as its principal component; biogas production helps to reduce methane and CO_2 emissions from animal waste providing an alternative to fuelwood. A biogas unit can give farmers an additional reliable and environmentally friendly means of financial support. The fermented waste from biogas is used as organic manure, resulting in reduction of biomass removal for manure from the forests.

So far, 30 biogas units have been installed and 50 more are under way. Each family uses biogas for 90–120 minutes per day, reducing fuelwood extraction by 15–20 kg per day. The biomass remaining in the forests will help the regeneration of natural vegetation as well as in improving the soil and micro climatic conditions. CHEA's field experience indicates that a single biogas unit saves 8–10 tonnes of fuelwood in a year and gradually helps recovery of approximately 1 ha of forest. Biogas could become an alternative source of energy and reduce the pressure on van panchayats by 50% if maintained properly. The biogas units have shown encouraging results and beneficiaries are contributing in labour and cash for installation. The time saved through biogas also helps in reducing poverty as it can be used to undertake economic activities. The success achieved through partial technical and financial support for establishing biogas units has opened up new avenues.

Difficulties in execution

Supporters of REDD argue that the emissions occurring from deforestation and degradation can be reduced by 2030 if REDD is implemented properly. It is also one of the most economical methods to reduce global warming. Although REDD seems a straightforward and simple concept, it has faced some difficulty in international negotiations. There is still very little clarity on how to measure reduced emissions through the REDD+ mechanism. Similarly, payment mechanisms are still being debated, while areas which need more clarification include safeguards, reference levels, and measurement, reporting, and verification (MRV). Owing to these shortfalls, a clear consensus on REDD has still not been achieved.

Way Forward for Making REDD+ Work for Communities

The central Himalayan region has many elements that are positive for the REDD+ mechanism. Involving the unique institution of the van panchayats would be a marked advantage. However, supportive legal policies would be required to realize the full potential, together with linkages to government programmes (e.g., Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and National Rural Health Mission [NRHM]) and non-governmental programmes. Awareness at both national and local levels is essential for generating interest and participation in the REDD+ design process. However, there are no resources available for immediate implementation of REDD+ programmes, and upfront financing is essential to initiate such programmes. Certain countries like Nepal have already been funded by the World Bank under the Forest Carbon Partnership Facility (FCPF) programme (Singh and Chaturvedi 2012).

There is a need to identify and train organizations and individuals to assist the programme. Strengthening of local institutions, such as van panchayats, and capacity building of rural youth will enable the region to implement the REDD+ programme; this will not only ensure ownership by the rural population, it will also generate employment for young villagers. In addition, the possession and admission rights of the rural population need to be reformed and strengthened, and new policies need to be introduced and old ones updated in view of the REDD+ mechanism – these rules and policies must not contradict other existing acts. The Forest Department can play a very important part in the implementation and operation of REDD+. An effectual, competent, and clear governance structure is required to ensure maximum benefits (Manandhar 2009). The governance structure should be able to address associated risks while ensuring mechanisms for reduction in CO_2 emissions. Creating jobs at the village level will modernize the quality of life and reduce outmigration of youth from the villages.

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REDD+ Environmental and Social Safeguards: A Case Study from Vietnam

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SNV's Priority Intervention Areas

SNV Netherlands Development Organisation works in the agriculture and forest products, renewable energy, and water, sanitation, and hygiene (WASH) sectors to contribute to solving some of the leading problems facing the world today. SNV supports people in accessing and developing the capabilities, services, and opportunities needed to live a healthy, productive, and otherwise fulfilling life, while sustainably using the natural resources they depend on.

SNV has identified six areas where intervention is necessary to make REDD+ work, while supporting the poor and enhancing biodiversity:

- Low emission development plans
- Benefit distribution systems
- Livelihood linkages
- Participatory forest monitoring
- Social and environmental co-benefits
- Reduced biomass local energy solutions

This paper focuses on Vietnam's response to issues related to REDD+ environmental and social safeguards.

Vietnam's REDD+ Readiness Process

Vietnam was one of the first Asian countries to engage in REDD+ at a national level in anticipation of a future international compliance regime negotiated under the United Nations Framework Convention on Climate Change (UNFCCC). Responding to the 2007 UNFCCC Bali Action Plan, Vietnam submitted a readiness plan idea note (R-PIN) to the Forest Carbon Partnership Facility (FCPF), which was elaborated into a full readiness preparation proposal (R-PP) in 2010. The resultant USD 3.6 million grant started in 2012.

Vietnam is also one of the first countries in the region to implement a UN-REDD country programme: Phase 1 commenced in 2009 and has been extended into 2012; a proposal for Phase 2 (2012-2017) is currently under preparation. In addition to these programmes, a number of bilateral development partners and international non-governmental organizations are implementing grant-funded demonstration projects. At present, SNV's REDD+ portfolio in Vietnam comprises five projects with a total value of approximately USD 5 million.

These investments have permitted Vietnam to develop some of the key elements in national REDD+ architecture, including the following:

- Institutional development – establishment of an inter-ministerial REDD+ committee, standing office, inclusive multi-stakeholder national network, working group, and six sub-technical working groups (STWG)
- Stakeholder engagement – through network, working group, and STWGs at the national level; developed and field tested guidelines on free, prior, and informed consent (FPIC); instigated a participatory governance assessment (PGA)
- Benefit distribution system (BDS) – conducted policy options research followed by consultative design of pilot local-level BDS, and explored the use of payment coefficients and self-selection procedures for the distribution of REDD+ benefits
- Reference (emission) levels – activity data (forest cover and forest cover change) standardized, and 'Tier 3' (in-country) allometric equations developed (as the basis for calculating emissions factors) for ecologically stratified national forest estate
- REDD+ measurement, reporting, and verification (MRV) framework – national MRV framework document endorsed and land monitoring system component under further systematic development
- National REDD+ Programme – draft in final stages of revision, to be submitted for prime ministerial approval in second quarter 2012

Despite these advances during the initial phase of REDD+ readiness, one area where Vietnam has yet to develop a coherent policy response is that of addressing and respecting environmental and social safeguards, as agreed by the UNFCCC Parties in Cancun in 2010. Although a number of 'early starter' countries – notably Brazil (Acre), DR Congo, Ecuador, Indonesia (Central Kalimantan), Nepal, and Tanzania – have attempted a national-level safeguard response during 2011, Vietnam has hitherto only experienced ad hoc implementation of safeguard-relevant activities.

National-level safeguard responses instigated in 2011 have largely been driven by external multilateral initiatives, first and foremost the Cancun safeguards, but also multilateral safeguard initiatives of the international agencies technically and financially assisting countries in their REDD+ readiness. Three such safeguard frameworks are of particular note:

- UN-REDD Social and Environmental Principles and Criteria (SEPC)
- Forest Carbon Partnership Facility (FCPF) Strategic Environmental and Social Assessment (SESA)
- Civil society developed REDD+ Social and Environmental Standards (SES)

What Has The Project Been Doing?

In 2010, in anticipation of international agreement on environmental and social safeguards for REDD+, SNV in partnership with the Vietnam Administration of Forestry (VNFOREST) designed a project entitled 'Exploring mechanisms to promote high-biodiversity REDD+: Piloting in Vietnam' (HB-REDD+ project). Partners secured financing from the German Federal Environment Ministry (BMU) and commenced operations in 2011. The HB-REDD+ project aims to deliver four tiers of results:

- International level – mechanisms to foster high-biodiversity REDD+ schemes explored and supported
- National level – biodiversity safeguards are recognized and operationalized as part of the national REDD+ programme
- Subnational level – biodiversity monitoring system is designed and tested in one province and integrated into the national safeguards information system
- Local level – participatory forest (carbon and biodiversity) monitoring methodologies and protocols developed and piloted

Progress against each of these results is discussed briefly below.

International level

International policy research conducted in 2011 in partnership with the International Institute of Environment and Development (IIED) indicated that within the global arena there are three main sets of activities to pursue to foster high-biodiversity REDD+ (Swan and McNally 2011; Swan et al. 2011).

The first is strengthening international policy. This includes clearly defining key terms – such as 'natural forest' and 'sustainable management of forests' – used in the Cancun safeguards, and harmonizing guidance across the UNFCCC and CBD. Addressing leakage issues is also important and will require wide participation in the international REDD+ mechanism. An international levy, following the precedent of the 2% adaptation levy applied to all Clean Development Mechanism (CDM) transactions under the UNFCCC, could also help promote high-biodiversity REDD+.

Second is the use of 'standards' through the REDD+ readiness phase. This is arguably the most immediately relevant development in the field of REDD+ co-benefits, and has attracted the greatest interest as a way of implementing the Cancun safeguards. Prominent standard-type frameworks that could be applied at the national and sub-national levels include the SEPC, SES, and SESA.

The third type of action for promoting high-biodiversity REDD+ at an international level is the use of financial incentives and preferences applied by countries, or funds, 'buying' REDD+ credits. These would be relevant to the results-based phase of REDD+, but should be tested during the readiness phase. Adopting policies such as minimum targets, price premiums, or joint financing would raise the demand for actions that reduce emissions while also yielding significant biodiversity co-benefits, and potentially influence their price. These options are equally relevant to a market-based scheme, where governments buy REDD+ credits from many 'competitor' countries, and to a more regulated system based on international or bilateral funds.

National level

The same research (Swan and McNally 2011; Swan et al. 2011) that explored international options for operationalizing Cancun safeguards also explored how countries readying for REDD+ could respond to these international commitments, in addition to others, such as the Convention on Biological Diversity (CBD) 'Aichi Targets' for delivering the Strategic Plan 2011–2020. A six-category typology of national options for safeguard operationalization was identified:

- **National policy strengthening** and coherence, e.g., including explicit statements of biodiversity objectives in REDD+ strategies or programmes
- **Integrated and strengthened subnational planning**, including integrating biodiversity into subnational low-emissions land use and socioeconomic development planning
- **National REDD+ programme-level 'standards'** for co-benefits, possibly informed by SEPC, SES and SESA
- **Regulatory approaches**, e.g., establishing new, or strengthening existing protected areas and biodiversity corridors
- **Economic incentives**, e.g., biodiversity premiums added to the payment for emission reductions/ enhanced removals of greenhouse gases from forestry and land use sectors
- **Monitoring and reporting**, e.g., participatory forest monitoring for local management, national decision making, and international reporting (UNFCCC, CBD, and others)

These options for national-level safeguard responses are presented in the context of delivering environmental co-benefits; however, they are equally applicable to social co-benefits. The project has developed generic guidelines on these six options and is now applying them as a contribution to Vietnam's national safeguard response process. The technical assistance to a country-led national safeguard response comprises three key steps to be implemented in sequence over 2012/2013:

- **Comparative analysis**, conducted in partnership with the United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC), of international, multilateral safeguard frameworks – Cancun safeguards, SESA, SEPC, SES – including institutional processes, purposes, content, and applications
- **Options assessment**, also supported by UNEP-WCMC, informed by the comparative study as the basis for developing generic guidance on national safeguards approaches which can accommodate and benefit from multiple sets of safeguards addressed in a single country-led process
- **'Roadmap' development**, drawing on the options assessment, a phased national safeguards response will be drawn up through an analysis of gaps and weaknesses in existing Vietnamese policies, plans, programmes, and practices that relate first and foremost to the Cancun safeguards, and secondly to multilateral frameworks such as SEPC, SES, and SESA

In addition to these efforts to mainstream biodiversity into evolving REDD+ policy, the project has most recently engaged with the national Biodiversity Conservation Agency (BCA) to assist with the integration of REDD+ risks to, and opportunities for, biodiversity conservation into the current National Biodiversity Strategy and Action Plan (NBSAP) revision, which is required under the aforementioned CBD Strategic Plan 2011–2020.

Sub-national and local levels

Under the last two results areas of the project, SNV is designing and field testing models of participatory forest monitoring (PFM) for a variety of REDD+ and broader forestry sector applications. Specifically, in the context of this paper, PFM is promoted as a putatively cost-effective contribution to national safeguard information systems (SIS), as required under UNFCCC commitments. The project is pursuing development of PFM through three complementary and interlinked areas of intervention:

- **Technical** – including the development and field testing of global best practice methodologies for participatory carbon monitoring (PCM) and participating biodiversity monitoring (PBM)
- **Operational** – development of institutional frameworks and operational systems which identify entry points in Vietnam's existing forest monitoring and inventory systems
- **Political** – engaging national and (pilot) provincial governments in policy dialogue using the operational framework as a vehicle to explore political appetite for PFM

Stakeholder and community involvement

As indicated above, Vietnam's REDD+ environmental and social safeguard response is in its infancy, with the SNV-VNFOREST project currently assisting preliminary analysis and planning phases of in-country safeguard responses. National-level safeguard processes are, however, co-ordinated through the REDD+ STWG for safeguards, which is co-chaired by SNV and VNFOREST. (VNFOREST has established additional REDD+ STWGs on benefit distribution systems governance, MRV, private sector, and local

implementation, to give a total of six groups, all co-chaired by SNV). The group held its inaugural meeting in February 2012 and second meeting in April 2012; a third meeting is planned for June 2012.
The objective of the STWG, as stated in the mutually agreed terms of reference, is to ensure co-ordinated technical assistance is delivered to the Government of Vietnam, and other relevant stakeholders, in the operationalization of safeguards to promote social and environmental co-benefits from REDD+ at national, sub-national, and local levels. Composition is inclusive and open to all stakeholders with an interest in REDD+ environmental and social safeguards; formal membership criteria have yet to be applied. Attendance at STWG meetings is high (more than 50 participants at the most recent meeting), with representatives of government, UN agencies, development banks, and international and national non-governmental organizations as participating organizations.

The STWG has set four results to be achieved in the future, and works to a mutually agreed annual work plan; these results, and the 2012 indicators, are as follows:

- STWG established and operationalized: 2012 indicator – six STWG-SG meeting agendas and minutes (with regular meetings every other month)
- Options for operationalizing REDD+ safeguards in Vietnam identified: 2012 indicator – options paper identifying existing and potential safeguard actions
- National REDD+ programme environmental and social safeguards developed: 2012 indicator – roadmap for national REDD+ safeguards
- National SIS developed: 2012 indicator – first coherent draft of SIS framework document [likely to be rescheduled to 2013]

At present, the only dedicated resources available to the STWG are those provided by the HB-REDD+ project; although Vietnam's FCPF grant is anticipated to be mobilized within 2012 and inception of a UN-REDD+ Phase 2 programme for Vietnam is expected to follow soon after. Both of these multi-million dollar interventions have resources earmarked for assisting Vietnam to respond to environmental and social safeguard commitments. In addition to the preliminary stages of Vietnam's safeguard response, limited financial resources are a key factor constraining broader stakeholder engagement in national safeguard response processes. The STWG has acknowledged the need for near-future efforts to reach out laterally across compartmentalized government agencies, as well as vertically penetrating down to the grassroots levels to ensure "full and effective participation of relevant stakeholders, in particular, indigenous peoples, and local communities" (UNFCCC 2010).
Through the development of participatory forest management a number of local government agencies have been engaged in leading the process to develop plans for piloting in the province of Lam Dong (southern Vietnam). Preliminary training in participatory carbon monitory has involved local forestland 'owners' – such as state-operated forestry companies, a national park, and village smallholders – together with villagers currently contracted by the state to perform forest protection functions under pilot payment for forest ecosystem services schemes. A second round of training, to integrate participatory biodiversity monitoring with the carbon monitoring, will expand to involve a total of 18 villages in three pilot communes, covering an area of about 44,000 ha.

Implementation Level Bottlenecks and Challenges

Challenges to the project in technically assisting and facilitating safeguard responses within Vietnam are diverse and substantial. Firstly, the inherent and persistent uncertainties within the international climate change negotiations for REDD+, following an indecisive conclusion at the last Conference of the Parties (COP 17 in Durban in 2011), sends a weak signal from the 'demand' to the 'supply' side of any future REDD+ compliance transactions. Consequently, national governments pursuing development of national REDD+ strategies or programmes, such as Vietnam, are not encouraged to invest significant amounts of political or financial capital in a strong environmental and social safeguard response. With indications of financing arrangements for REDD+ hitherto forthcoming under the UN convened climate change negotiations, the priority for developing countries is first and foremost to establish and demonstrate systems for accounting changes in forest carbon stock and flows, i.e., functional MRV systems Safeguards are likely to remain as a perceived additional complication and burden to suppliers of forest carbon sequestration services.

The limits to, and institutional disconnection of, the human resources within the national government needed to co-ordinate country-led safeguard responses is arguably the second most significant challenge to projects such as HB-REDD+ in attempting to assist national ownership of these processes and their resultant 'products'. Development of core REDD+ elements, such as MRV, a benefit distribution system, and a national strategy or programme, is possibly already exceeding the absorptive capacity of the immediately available human resources within national governments. Such constraints could be alleviated by expansion out of the forestry sector, where REDD+ readiness efforts have intuitively focused until now, and recruiting support from other government agencies. In the case of Vietnam and the HB-REDD+ project, assisting the BCA, with no previous history of engagement in REDD+ processes, is an example of an attempt to connect capacities within the government in supporting safeguards processes.

International readiness assistance delivered by multiple agencies (UN, development banks, INGOs) presents a 'proliferation' of safeguard frameworks that could confer high transaction costs for in-country processes. In the case of Vietnam, an FCPF grant recipient, SESA is an obligatory contract conditionality; yet by participating in the UN-REDD programme, Vietnam is also encouraged to apply the SEPC. A number of countries attempting to make use of these external safeguard frameworks have complained of confusion and a burdensome requirement on the part of developing countries with acknowledged limited capacities and resources trying to meet more than one safeguards framework simultaneously. Indeed Nepal, in 2011, has already attempted to harmonize in-country processes for SES and SESA and concluded that such efforts a) are time-consuming; b) require significant financial resources and technical support; and c) come at a high transaction cost in managing multiple stakeholder expectations (Rimal 2011).

Achieving 'full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, is not cheap, and one of the basic challenges that will be met by the Vietnamese safeguard process is the cost (direct and transaction) of stakeholder engagement. Integrating across government agencies comes at relatively low direct financial cost, but transaction and political costs can be high. Penetrating down to engage grassroots-level stakeholders will require dedicated financial resources to cover the cost of transporting, accommodating, and compensating for the time of villagers to attend safeguard consultation meetings.

In conclusion, the HB-REDD+ project, although far from concluding safeguard interventions in Vietnam, has provided SNV with some initial take-home guidance to countries preparing for REDD+:

- There are a range of options available for operationalizing safeguards: national policy strengthening, integrated sub-national planning, regulatory and economic instruments, and improved monitoring systems
- Incorporating co-benefits into a national REDD+ strategy or programme doesn't necessitate the creation of brand new systems or technologies, but rather re-evaluation and enhancement of those already at a country's disposal
- REDD+ countries are already committed to environmental and social outcomes in the forestry sector; integrating co-benefits into REDD+ could reduce the investment and transaction costs of delivering these outcomes
- It is important to adopt national-level standards as a direct intervention that demonstrates political commitment to environmental and social co-benefits, but they are not the totality of a country's safeguard response

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REDD Readiness in the Terai Arc Landscape

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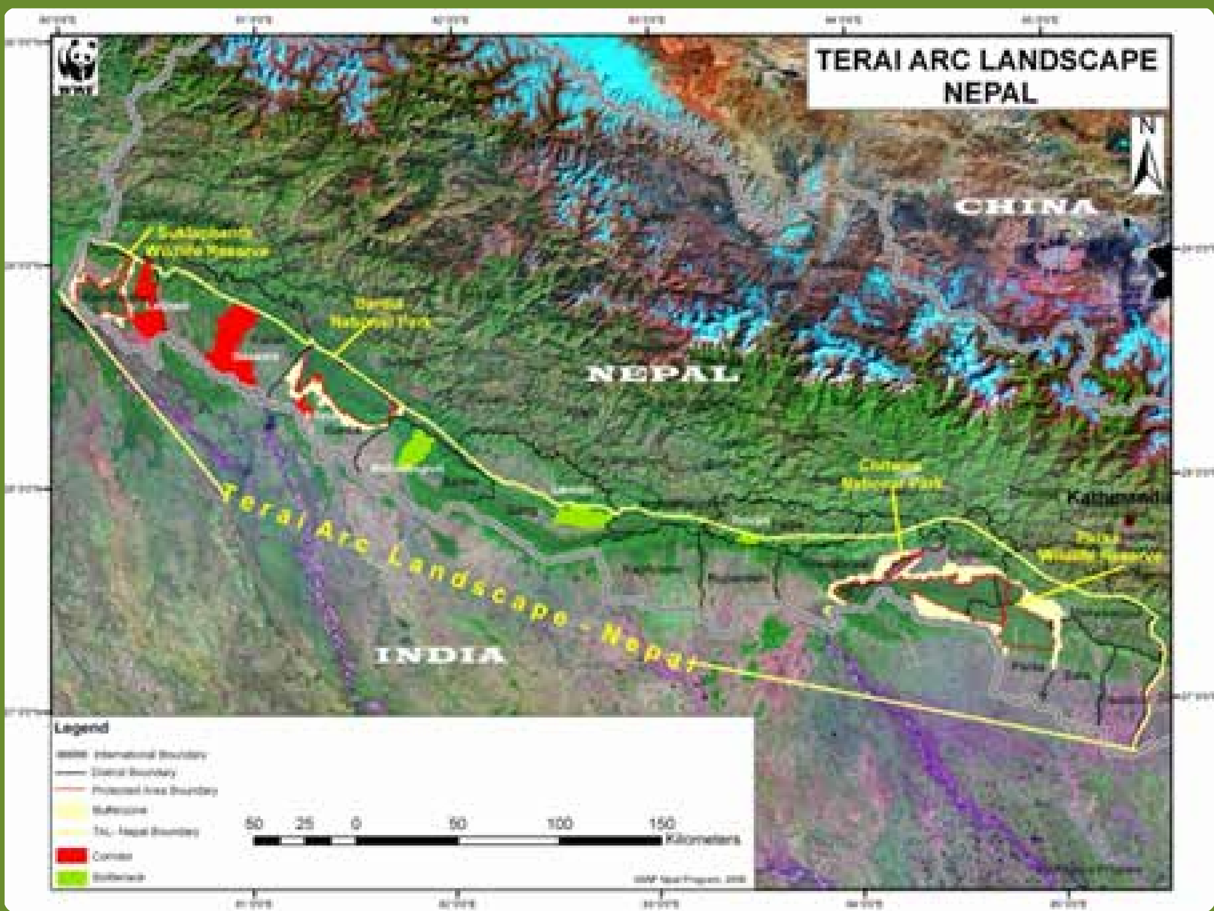
Introduction

In 2002, WWF-Nepal began the Terai Arc Landscape (TAL) Program in collaboration with several government departments and local community-based organizations with the aim of conserving biodiversity, forests, soils, and watersheds in the Terai and Churia hills, and thus ensuring the ecological, economic, and sociocultural integrity of the region. The TAL extends over 49,500 km^2, links 11 transboundary protected areas across Nepal and India, and is home to flagship species like the Asiatic wild elephant, rhinoceros, and tiger (Figure 10). In Nepal, the TAL encompasses 23,129 km^2 in all or part of 14 districts; it includes 75% of the remaining forests in lowland Nepal, the Churia hills, and four protected areas. The landscape has the second largest population of rhinos and one of the highest densities of tigers in the world; it showcases linkages in an important biodiversity hotspot and falls within the Global 200 ecoregions.

Deforestation and degradation is a major concern worldwide, including in Nepal. Until the sixties, the fertile plains (Terai) of Nepal were not inhabited by hill communities due to the vector-borne disease malaria. Following eradication of this deadly disease, extensive deforestation took place with increased encroachment for settlements and agricultural land. Increased global

Figure 10: **The Terai Arc Landscape**

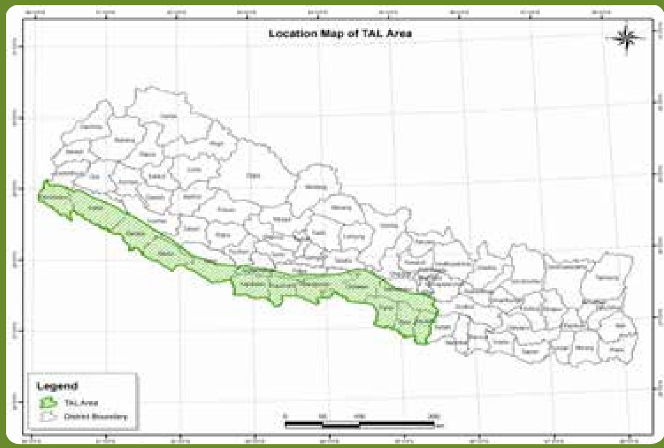


deforestation is one of the causes of the accumulation of greenhouse gases (GHG) in the earth's atmosphere which is leading to a global rise in temperatures and associated climate change.

Emissions reduction by avoiding deforestation has been regarded as a key element for a cost-effective future climate policy. Forestry projects can help to lower net greenhouse gas emissions in several ways. The first is by preventing the carbon stored in standing forests from being released into the atmosphere. This can be achieved by reducing deforestation and degradation and improving forest management practices to avoid damage to the surrounding vegetation. The second is to actively increase carbon stocks through tree planting, improved soil management, and/or enhancing natural regeneration of degraded forest land. REDD+ brings opportunities to reduce emissions from deforestation and forest degradation taking into account the conservation of carbon stocks, sustainable management of forest, and enhancement of forest carbon stocks. If a country wishes to participate in the REDD+ process, this does not mean it cannot allow any access to forests or should plant exotic plantations after clearing the natural vegetation; all these issues have to be safeguarded.

A REDD+ Readiness Project has been initiated by WWF-Nepal in the Terai Arc Landscape in partnership with the Ministry of Forests and Soil Conservation, Department of Forest, and Department of National Parks and Wildlife Services in collaboration with the TAL Program, and with support from Winrock Nepal. The location is shown in Figure 11. This project brings understanding of the whole process, learning about a sub-national approach and how the capacity of local communities can be built in the whole learning process, and a certain ownership in implementing REDD+. The project has received technical inputs from various government and non-governmental organizations and civil society groups in Nepal like the REDD Cell, Department of Forest Research and Survey (DFRS), Forest Resource Assessment (FRA) Project, District Forest Office (DFO), International Centre for Integrated Mountain Development (ICIMOD), Federation of Community Forestry Users Nepal (FECOFUN), Nepal Federation of Indigenous Nationalities (NEFIN), and Cooperative for Assistance and Relief Everywhere (CARE).

Figure 11: **The Terai Arc Landscape (TAL) programme area**



Approach

Forest inventories have been carried out previously in Nepal, but the estimation of forest carbon stock has followed a Tier 1 approach. The intention of the TAL project was to follow a Tier 2 approach leading to Tier 3 by conducting LiDAR, or more specifically LAMP-LiDAR Assisted Multisource Program. The aim was to establish an appropriate database that can support the Government of Nepal in developing a robust monitoring, reporting, and verification (MRV) system.

Inventory Steps

The forest carbon inventory process and data analysis comprised nine steps:

Defining the project boundary

The project boundary was taken as the boundary of the existing Terai Arc Landscape as approved by the Government of Nepal. The area covers all or part of 14 districts (Figure 11).

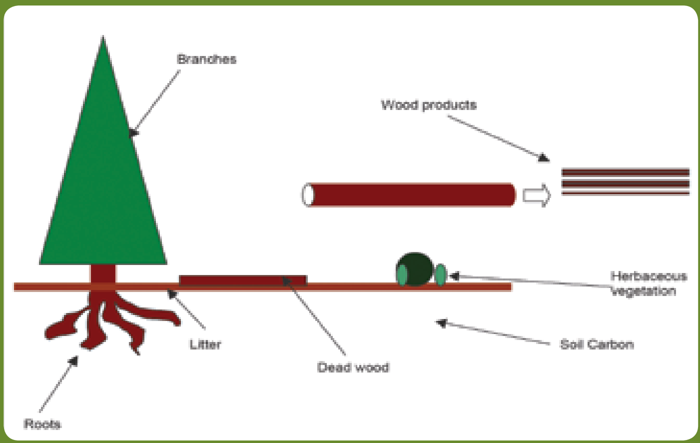
Selection of carbon pools

The carbon pools selected for analysis were above ground biomass, below ground biomass, shrubs, litter, and soil organic carbon (Figure 12).

Stratification

Stratification was based on canopy density as most of the vegetation of the TAL falls into the broad leaf category. Forests were classified as non-forest (1-10% canopy cover), degraded (11-40% canopy cover), moderately dense (41-70% canopy cover), and dense forest (71-100% canopy cover). Stratification was

Figure 12: **Forest carbon pools**



done using the Forest Canopy Density Mapper with LandSAT images.

Sampling design

The sampling design was developed following a variance analysis; 10 plots were initially taken per

$$\frac{(N x s)^2}{\frac{N^2 x E^2}{t^2} + N \times s^2}$$

strata for this analysis. The number of sample plots required was determined from Pearson's formula (Pearson et al. 2005):

Where

E = allowable error or desired half-width of the confidence interval, calculated by multiplying the mean carbon stock by the desired precision (e.g., mean carbon stock x 0.1, for 10% precision)

t = the sample statistic from the t-distribution for the 95% confidence level; t is usually set at 2 as sample size is unknown at this stage,

N = number of sampling units per stratum (= total area divided by plot area)

n = number of sampling units in the population

s = standard deviation of stratum.

The calculation showed that a total of 121 plots were required, taking into account extra plots to compensate for inaccessibility of areas and issues like point shifting due to error in the images (Table 13). The location of the plots is shown in Figure 13.

Plot layout

A circular nested plot with an area of 500 m^2 was designed for the carbon inventory (Figure 14). The circular form was chosen to minimize edging effects.

Table 13: **Number of sample plots required**

Strata	Required number of sample plots	Extra plots	Total o. of plots
1-10% canopy class	1	7	8
11-40% canopy class	15	8	23
41-70% canopy class	50	20	70
71-100% canopy class	10	10	20
Total	**76**	**45**	**121**

Measurements, inventory, laboratory analysis, and data entry

For the inventory of the different carbon pools, 120 local resource persons were trained with rangers as team leaders. The resource persons were trained for five days for the inventory work prior to engaging in the field.

All trees with a dbh of 5 cm and above were measured to calculate above ground biomass.

Shrubs were cut on the northern side within an area of 25 m^2 and litter was collected from four sides within four areas each 1m^2. The carbon in each was calculated from the fresh weight and laboratory analysis of dried samples.

Soil was collected from the same four points. Soil samples were dug to a depth of 30 cm and soil analysis was done using the colorimetric method with external heating.

The below ground biomass was calculated from the root to shoot ratio.

LiDAR was also conducted in 20 blocks each with an area of 50 m^2 in preparation for a Tier 3 approach.

Data analysis estimation of biomass and soil carbon

Based on the analysis of the various carbon pools, the carbon stock was estimated using the following techniques.

Projecting change in forest area

Based on analysis of the various images, the rate of deforestation was calculated to be 0.19% including Stratum 1, and 0.18% excluding Stratum 1 (Table 14).

If the deforestation rate can be reduced with the intervention of REDD to 0.13% over 40 years from 2010, around 54,854 ha of forest can be conserved.

Figure 13: **Location of sample plots**

Figure 14: **Layout of sample plots**

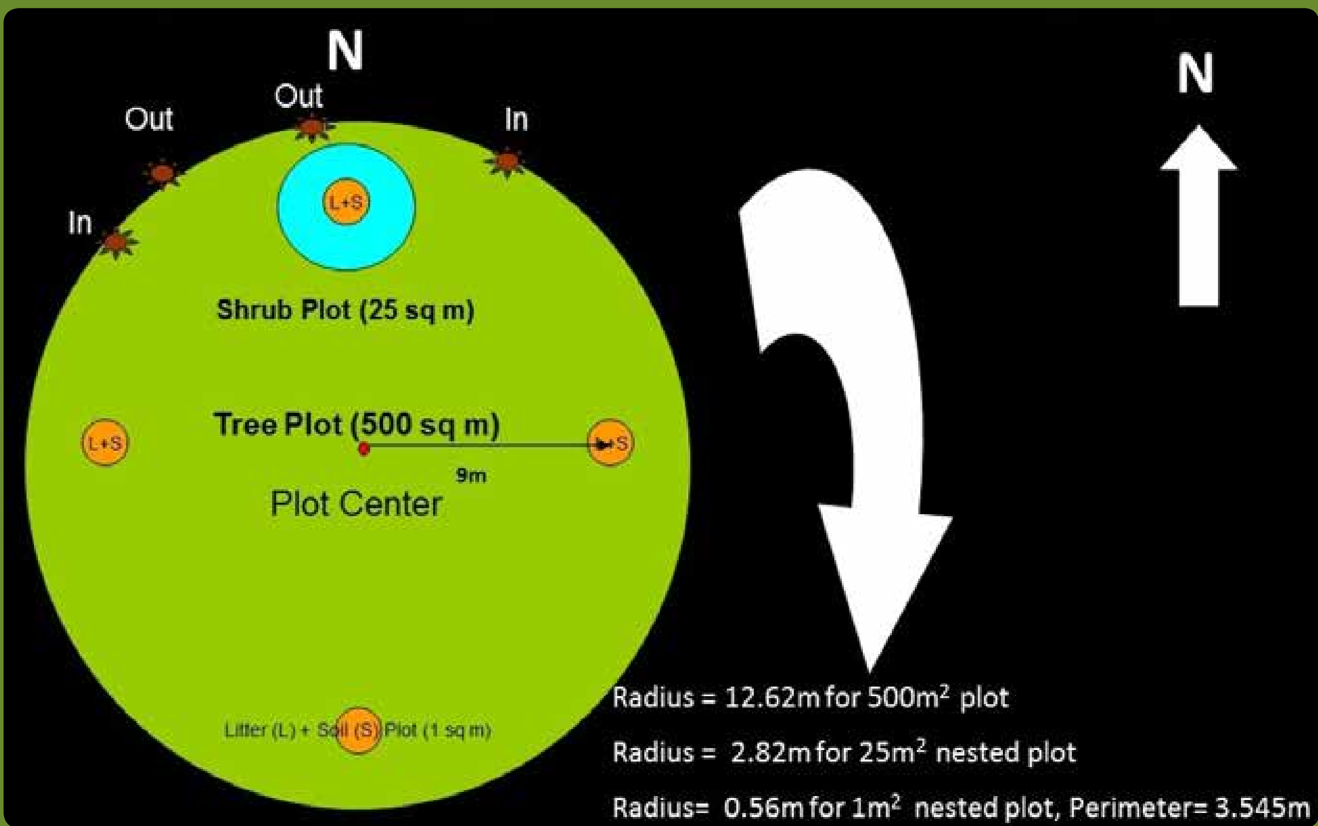
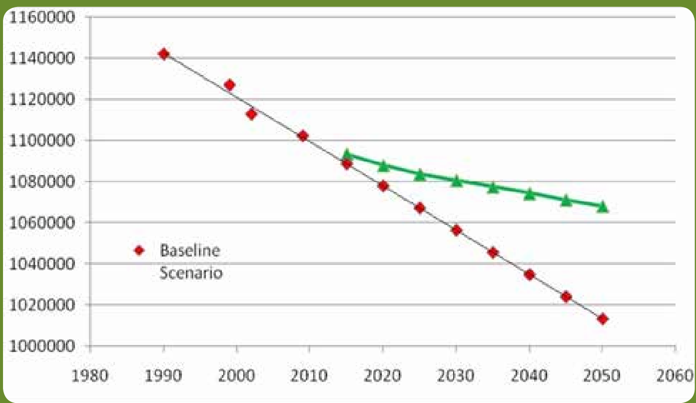


Table 14: **Stratum-wise time series of forest area**

Strata	1990	1999	2000	2001	2002	2009
Stratum 1	9,719	11,737	13,491	18,001	12,558	8,696
Stratum 2	161,814	214,155	335,249	282,191	229,664	222,510
Stratum 3	848,769	781,081	677,225	739,822	758,925	762,592
Stratum 4	131,409	131,725	164,644	109,214	124,299	117,197
Total	**1,151,711**	**1,138,698**	**1,190,609**	**1,149,228**	**1,125,446**	**1,110,996**

	Annual Deforestation Rates in % (1990-2009)
With Stratum 1	0.19
Without Stratum 1	0.18

Figure 15: **Projected deforestation with and without REDD intervention**



The estimated area of forest with REDD intervention and without (business as usual) is shown in Figure 15.

Carbon stock under baseline and project scenarios

The estimated carbon stock in the various strata is shown in Table 15. The density of carbon stock in forests managed under different regimes was also estimated: government forests had 206.2 t C/ha, community forests 240.0 t C/ha, and forests in protected areas 274.6 t C/ha t.

The potential emissions reduction over 40 years was estimated using carbon stock under agroforestry as a baseline. The agroforestry baseline was 109.8 t C/ha. Using this as a base, the reduced carbon emissions from avoided deforestation with REDD interventions over the next 40 years were calculated to be 12.37 million tonnes of CO_2 equivalent (Table 16).

Table 15: **Carbon stock in different strata**

Stratum (canopy cover)	2 (11-40%)	3 (41-70%)	4 (71-100%)	Weighted average
Mean carbon stock (t C/ha)	186.7	245.0	287.4	237.7
Uncertainty at 95% CI	±42.1	±25.4	±47.9	±66.5
Lower boundary at 95% CI	144.6	219.6	239.5	171.3

Quantifying emissions from degradation is still a challenge; however, the voluntary carbon standards (VCS) methodology looks at taking reference fuelwood consumptions to quantify degradation.

Drivers of Deforestation and Forest

Table 16: **Reduced carbon emissions from avoided deforestation**

Total avoided deforestation, area in ha	54,854
Average C stock (t C/ha)	171.3
Residual C stock (t C/ha)	109.8
Change in C stock (t C/ha)	61.5
Avoided C emission (million t C)	3.37
Reduced emission from avoided deforestation (million t CO_2e)	12.37

Degradation

Besides the technical constraints and challenges, the heart of the REDD project is addressing the drivers of deforestation and forest degradation. With development the main agenda, infrastructure developments such as hydropower, irrigation canals, roads, and oil and gas exploration will be a major cause of deforestation. Other key drivers of deforestation and forest degradation identified in the TAL include forest fire, overgrazing, high demand for fuelwood, illegal logging, and encroachment.

Control of leakage will also be an issue; leakage belts have been identified through local consultations. The TAL programme has initiated modalities for addressing drivers, such as developing community-based forest fire fighter groups, promoting biogas to minimize pressure on the forest, and promoting stall feeding to reduce grazing and the need for feed from the forest, and afforestation and reforestation programmes to increase forest cover and enhance carbon sequestration. Above all, the TAL programme looks at ways of providing local communities with sustainable livelihood options as this brings a huge ownership for conservation.

Marketing – Wildlife Premium

WWF-Nepal is looking at REDD from a marketing perspective. In this context, the idea of a 'wildlife premium' has been conceptualized and work is in progress to take this idea forward.

Challenges

Some of the major challenges faced during the inventory work are the quality of images, the availability of times series images at the required seasons, point shifting when reaching the point, and accessibility of the stratified random plots. Besides these technical challenges, there are challenges of instability in the country and issues such as how natural resources will be shared under a new political set up. The idea that some have that REDD will flood developing countries with financial resources is also wrong. REDD will be performance-based and resources will only come for better forest management.

Way Forward

The way forward in TAL will be to propose a reference level, take the work forward, and probably link it with the Forest Carbon Partnership Facility.

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Integrating REDD Schemes into National Forestry Development Policies in China

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Introduction

The rate of primary forest loss is still accelerating and accounts for the majority of global forest losses between 2000 and 2010 (FAO 2011). Deforestation, the conversion of forest ecosystems to other land uses (e.g., agricultural and urban uses), and forest degradation have been major threats to forest carbon (C) stock over the past decades (IPCC 2007). As a result, forest preservation and forest management are receiving significant attention. Reducing emissions of greenhouse gases from deforestation and forest degradation (REDD) is a smart scheme to adapt to and mitigate climate change, and some pilot REDD projects focusing on small areas have been designed and gradually carried out since 2007. But at present it is difficult to say that REDD is successful in terms of sustainability and efficiency (Angelsen 2008). The most difficult problem is how to use sustainable and effective pathways or models to avoid deforestation and forest degradation while safeguarding the livelihoods of the local people who depend on the forest resources.

China is the largest developing country and has a more complicated situation for REDD due to the large pressure from population growth and rapid economic development demands. Avoiding deforestation and forest degradation in China has been considered an indispensable pre-condition and pathway to effectively increase forest and acquire various co-benefits for nature, people, and society, including reducing greenhouse gas emissions. China has integrated avoidance of deforestation and forest degradation into the national forestry and environmental development policies and the national programmes that have been practised since 1998.

The major aim of this paper is to outline the contents and practices of two key national programmes in China since 1998, and the resulting forest change, and to introduce the relevant national policies and regulations that support implementation of these programmes. I hope this will be helpful for REDD design and implementation in other regions and countries for large-scale regional practices.

National Integrative Programme Implementation in China

Since 1998, China has launched two key national programmes to control deforestation and ecological degradation and improve forest restoration: the Natural Forest Conservation Programme (NFCP; tian ran lin bao hu gong cheng) and Return Slope Farmland to Forestland Programme (RSFFP; tui gen huan lin gong cheng). The NFCP focuses principally on nationally-owned, local, or collective forestry regions, and the RSFFP on agricultural regions.

The overall NFCP goal is to conserve natural forests by supporting natural regeneration and to enlarge the forest area. Three tasks have been carried out. The first is to ban illegal logging and effectively protect all natural forests, thus avoiding new forest degradation; the second is to establish forest plantations with ecological benefits by reforestation, afforestation, and forest reservation; and the third is to strengthen forestry management capability and solve appropriately the livelihood problems of surplus staff and retired workers in forest industry enterprises. NFCP implementation is in the second stage which will last from 2011 to 2020. The protection and effective management of the natural forest is still a major task. The focus will be on improving the quality of natural forests and young plantation forests (Sichuan Forestry Department 2011).

The conversion of forest into agricultural land is a serious ecological degradation pathway greatly increasing emissions of greenhouse gases (IPCC 2007). Thus, returning farmland to forestland is a key action for REDD in China. RSFFP started implementation in 1999. The basic content is designed to improve sloping farmland (>25° slope) by conversion to forestland through reforestation with economic compensation for farmers. The focus is on reducing serious loss of water and soil as a result of agricultural activities on marginal lands, returning low-production sloping cropland into forestland by reforestation, and promoting labour transformation and adjustment of agricultural economic components, by rewarding upland communities for maintaining watershed services. The key is that households themselves will decide whether or not to take part in RSFFP and which management type to use for reforestation on the returned forestlands: ecological benefit plantation forests, market-oriented, or commercial plantation forests (fruit trees, cash trees, and so on).Thus the RSFFP is an explicit attempt to combine watershed restoration with community development. Returning sloping farmland to forestland with economic compensation has been a national policy since 1999. The programme has passed through the pilot stage (1990-2000), and overall implementation stage (2001-2010), and is now entering the consolidation stage (2011-2017).

Financial operation and management is key for programme implementation. Both programmes apply a relatively simple financing mechanism: most investments are from the Chinese central government, and a small proportion from local government and enterprises. For example, in Sichuan in southwest China, central finance invested 20.4 billion CNY (RMB yuan) (approx USD 3.2 billion), local finance provided 1,424 million CNY (approx USD 224 million), and prefecture-owned forestry enterprises paid about 111 million CNY (approx USD 17.5 million) for NFCP implementation during 1999-2010 covering 21 cities, 174 counties, 28 forestry enterprises, two natural reserves (Wolong and Tangjiahe National Nature Reserve), and up to 204 county-level sectors/organizations (Sichuan Engineer Center of NFCP 2010). By the end of 2008, accumulative investment for the RSFFP reached 2.38 billion CNY (approx. USD 0.37 billion) of which 93.7% came from central government finance and only 6.3% from the Sichuan provincial government (Dai 2011).

Implementation of the two integrative programmes has enabled China to double the increase in both forest area and timber volume stock since 2005 and become one of the countries with the most rapidly increasing forest resources, in contrast to the general loss of forest resources in most parts of the world (FAO 2011). According to a preliminary estimation by the Chinese Academy of Forestry, more than 78.11 billion t C is stored in China's forest ecosystems, about 4.68 million t CO_2 is sequestered in forest land annually, and about 0.43 billion t CO_2 has been prevented from release by controlling deforestation (CNMB 2009). In Sichuan, for example, 21.5 million hectares forestland had been effectively preserved by November 2010 and more than 5.3 million hectares ecological benefit (non-commercial) forest had been planted. Between 2000 and 2010, forest restoration with avoidance of deforestation and forest degradation in Sichuan achieved great progress (Table 17). Felling of an estimated 36 million cubic metres of timber stock was avoided between 1999 and 2009, and about 0.42 million hectares of natural forests saved (Sichuan Engineer Center of NFCP 2010). A case study by Chen (2010) found a 0.6% increase in the active biomass carbon stock from 1997 to 2007 in Muru Forestry Center, Daofu County, in western Sichuan, with a net increase of 9,866 t C. More importantly, a management and operation system has been established and implemented, which is central to the protection, preservation, afforestation, and reforestation of forestland. There has been a real transformation of the forestry systems institutions and practices in China. In the past, the forestry management system overemphasized timber production, known as 'timber forestry'. This has been successfully transformed to the present system which emphasizes the multiple-purpose of forests, known as 'multiple function forestry', and especially the ecological service supply of forests in terms of providing environmental safeguards and biodiversity conservation.

Table 17: **Changes in forest resources in Sichuan from 2000 to 2010**

Strata	2000	2010	Net change
Forest area (million ha)	11.7	16.7	+5.0
Live timber volume stock (billion m^3)	1.465	1.720	+0.25
Forest cover (%)	24.23	34.41	+10.18
Natural reserve area ('000 km^2)	28	78.3	+50.3
Ratio of natural reserve area to total (%)	5.8	16.1	+10.3

Source: Data from report of online interview with Deputy Director Liu Shugui, 21 December 2010
www.sc.g ov.cn/hdjl/zxftspzb/slyt_lsg_1_1/index.shtml

Key Policies and Regulations

Several relevant policies and regulations have played an indispensable role in the effective implementation of NFCP and RSFFP.

Classified forest management regulations

Forest classification management is a key measure to further deepen forestry sector reform, to change the traditional management model, and to improve intensive forestry management (Luo et al. 2006). The fundamental classification principles are according to the major ecosystem services provided by the forest. In China, all forest and forest-used lands are divided into two types: ecological benefit forest or forestland, and market forests or forestlands. The baselines are shown in Table 18. The forest management classification varies across regions according to the natural conditions. Overall, most forests are classified as ecological benefit forest and managed in the main so as to satisfy environmental protection and ecological service demands; only a few forests and forestland with a high site quality index and convenient transportation connections are used mainly to produce timber, industrial material, and other products by intensive management. For example, in western Sichuan, which is characterized by high mountains and deep valleys, all nationally owned forests are classified as key ecological benefit forests, but in the Sichuan basin, which is a major collective-owned forest region, about 80-85% of forests are managed as 'no-commercial' (ecological) forests. The implementation of the regulations has improved production of forest products through market-oriented management, while conserving most forest resources and promoting forest quality through management aimed at ecological targets. The implementation of classification management has led to a significant change in forest utilization, resulting in major timber management targets gradually moving to plantation forest (Wang et al. 2010).

Ecological benefit compensation system

Several national compensation funds have been established and implemented to support NFCP and RSFFP. The best known is the fund for returning sloping farmland to forestland through afforestation, which was implemented in 1999. Participants receive about 750 CNY (approx USD 119) per hectare toward the cost of tree seedlings and about 150 kg grain subsidy per hectare per year for eight years if they return sloping farmland to ecological benefit plantation forest; after eight years they receive a further 75 CNY (USD 12) per hectare compensation (increased to 150 CNY (USD 24) from 2012) for the ecological plantation forest. In Sichuan, 6.45 million rural households – more than 23.17 million farmers – have been covered by RSFFP. By the end of 2008, the compensation funds in Sichuan reached 23.76 billion CNY (USD 3.73 billion), and about one-third of the farmers in the province had received cash directly from the fund, on average 3,740 CNY (USD 588) per household. RSFFP has become the largest direct allowance benefit in farming policy. The ecological forest construction fund is another source of funding; it provides subsidies to support effective protection and preservation of national and local forestry regions. For example, out of a total NFCP investment in Sichuan between 1999 and 2010, about 14 billion CNY (USD 2.2 billion) came from central government special funds and 6.38 billion CNY (USD 1,003 million) from non-commercial forest funds. Compensation for tending forests started in 2009 and about 500 million CNY (USD 79 million) was transferred to five provinces (including Sichuan) from the central government to carry out forest tending work. This is an

Table 18: **Regulation of forest classification management**

Type	Ecological benefit forests or forestlands	Market forests or forestland
Definitions, management destination	Forest, trees, and forestland in which the major management aim is to ensure improvement of environmental conservation, maintenance of the ecological balance, conservation of genetic resources and biodiversity, scientific research, provision of forest tourism services, and safeguarding of land	Forest or forestland in which the management targets are designed principally to obtain economic benefit
Sub-type classification	1. Key ecological benefit forests (national forest), e.g., forests in national reserves, river buffer belts, national forest parks, scenic forests 2. Common ecological benefit forests (local forests), e.g., shelter forests or trees.	Local and national subtypes include: 1. Timber forests 2. Industrial material forests 3. Economic forests (e.g., fruit) 4. Firewood forests
Management limitation	Prohibition of commercial timber harvesting, ecotourism allowed to develop	Conservative utilization
Financial investment	National or local finance as major pathway, others as supplement	Market-oriented investment (e.g., enterprises)

important indication that a complete compensation system, including reforestation and management, has been established in China.

Limitation of timber harvest quotas

The regulation of planned harvest has been carried out in China since 1988. Ratification after examination is the first obligatory step for any timber harvesting plan. Since 1998, commercial logging quotas in national and local forestry regions have been reduced to zero, enterprises have shut down their timber production, and timber shipments have been stopped. For example, in Sichuan, the forest area for timber production was reduced from 6.52 million hectares in 1997 to 4.66 million hectares in 2010, and timber production decreased from 3,114 thousand cubic metres in 1998 to 1,626 thousand cubic metres in 2010 (Wang et al. 2010). Only collective plantation forests can be harvested in-situ to supply local baseline timber demands (e.g., fuelwood); timber harvesting is prohibited in non-commercial forests (ecological forests), and only tending and selective harvesting of young and unhealthy trees are allowed.

Special regulations for NFCP and RSFFP

The special rules and regulations that were issued greatly facilitated smooth implementation of NFCP and RSFFP. In April 1999, China issued timely preliminary regulation of NFCP, including six chapters and 52 items, with further revision in 2006. Furthermore in 2006, the Regulation of NFCP archives was issued and implemented, including six chapters and 22 items. In December 2002, the Central Government of China also promulgated RSFFP Rules, including seven chapters and 65 items, which were implemented in January 2003. The Rules clearly prescribe the RSFFP process and management approach, including general principles and requirements, arrangement of tasks and capability construction, design and plan requirements, fund use and management, responsibility and management for goals, checks before acceptance and supervision, guarantee measures, and others.

Forestland ownership reform in collective forestry regions

In China, collective-owned forests or forestland account for about 40% of forests. Most of these forests have low economic income benefits, far lower than traditional grain production farmland. The forests are often subject to serious illegal timber collection and unreasonable resource utilization due to unclear management obligations and ineffectual supervision. There is recognition that protection of natural forests while promoting an increase in income from forest industry can offer great potential for China's economic development. In 2008 the central government decided to push for reform of collective-ownership forestry, similar to the reform of agricultural land institutions since 1981. The major reform in policy is based on other policies and includes:

- separating forestland management ownership and tree ownership for the collective-owned forest management region;
- contracting households to have responsibility and identifying farmers as having the major management responsibility;
- introducing 70-year contracting periods for forestland; and
- permitting negotiability of forest management ownership, which can be used as a commodity for leaseholds, mortgages, and transfer.

This policy activates development of collective-ownership forestry and diversified forest products, effectively resolving countryside development in mountainous regions. Furthermore, it helps promote enterprise development based on materials from a large area of collective forestland management. In particular, the policy allows local farmers to obtain direct income from their returned plantation forests and greatly encourages local farmers to promote forest management and production.

Conclusion

China has implemented the national NFCP and RSFFP programmes for more than 12 years and has decided to continue implementation. The comprehensive forestry practices have created multiple ecosystem services for nature, people, and society, including livelihood safeguards, sustainable forestry governance, biodiversity and bioresources conservation, and other environmental rewards (e.g., reducing greenhouse gas emissions) due to several key national policies and regulations. The practices make it clear that REDD has been actively integrated into and aligned with national forestry development strategies in China. This not only mobilizes participation, especially of governments, it also ensures sufficient investment, which is usually a bottleneck for single REDD implementation. But there are still some bottlenecks and challenges to be solved, at least in terms of monitoring and evaluation of carbon sequestration, improvement of plantation forest quality, supply of a basic amount of timber to fulfil the demands of local people, and forest restoration methodology in some highly fragile regions. Therefore, it is suggested that the future implementation of NFCP and RSFFP focus on quality of forest restoration, environmental improvement, and livelihood safeguards for communities and their harmonious development. The monitoring and evaluation methodologies should be improved as soon as possible and implemented over the long term to better understand the ecological effects, including carbon sequestration and greenhouse gas emission reduction.

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Session 3:

Technical Methods

Forest Carbon Assessment in Community-Managed Forest in the Nepal Himalayas: Strengthening Local Communities to Monitor Carbon Stocks under REDD+ Initiatives

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Introduction

Global climate change is a major global problem triggered principally by anthropogenic emissions of greenhouse gases (GHG). About 20% of GHG emissions come from forest carbon sources, in particular deforestation and degradation, thus forest carbon finance is at the centre of the future global GHG mitigation strategy. In view of the other environmental and social benefits of forests, initiatives have been proposed to consider co-benefits of forests when initiating forest carbon projects. REDD+ is one such initiative that has been under consideration globally; it supports the idea that forests should not only be considered as carbon storage, but also for their potential to supply co-benefits such as biodiversity conservation, conservation of carbon, and other associated social and environmental goods and services. Engaging local people in carbon monitoring could provide a cost-effective approach for REDD+ (Burgess et al. 2010; Phelps et al. 2010; Skutsch 2010). At the 15th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in December 2009, an agreement was drafted which proposed stabilizing global greenhouse gas concentrations in the atmosphere at a level that keeps the global temperature increase below 20°C in the coming century (UNFCCC 2010a).

Forests cover 31% of the world's surface area; and more than 22% of the total forest area is owned and/or managed by indigenous people and local communities (White and Martin 2002). According to the latest National Forest Inventory (NFI 1999), about 39.6% of the total land area of Nepal is covered with forests and shrubland (MOFSC 2010). In terms of physiographic regions, the hills have 35.3% of forests, the Siwaliks 22.8%, and the mountains (including the high Himalaya) 33.5%. As per the NFI (1999), the average annual rate of deforestation in Nepal was 1.6%, with the highest rate in the Terai (1.7%), followed by the Siwaliks and high Himalaya. Though, there is no reliable estimate of CO_2 emissions from deforestation and forest degradation in Nepal, based on 1994/95 data, the National Communication Report (2004) estimated 22,895 Gg emissions from the land-use sector (18,547 Gg from forest and grassland conversion and 4,948 Gg from soil). Thus there is scope for introducing forest carbon initiatives such as REDD+ for the conservation of forests and thus a reduction in CO_2 emissions from deforestation and forest degradation in Nepal.

REDD+ can be an opportunity for developing countries like Nepal to receive payments from developed countries for their performance in REDD+ activities, which include reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks. An operational REDD+ policy will require monitoring of deforestation and forest degradation across a whole country, not only to quantify the carbon savings in a particular area, but also to account for any compensatory increase in loss of forest biomass ('carbon leakage') elsewhere within the country (Mollicone et al. 2007). There are gaps in knowledge about monitoring in practice, but it is needed for effective implementation of REDD+.

The Asia Network for Sustainable Agriculture and Bioresources (ANSAB), International Centre for Integrated Mountain Development (ICIMOD), and Federation of Community Forest Users Nepal (FECOFUN) are implementing a project on 'Design and setting up of a governance and payment system for Nepal's community forest management under reducing emissions from deforestation and forest degradation (REDD)'. This pilot project aims to demonstrate the feasibility of a REDD payment mechanism in community forest by involving local communities, including marginalized groups, so that deforestation and forest degradation can be reduced by linking sustainable forest management practices with economic incentives. Further, the project focuses on the concerns of indigenous and marginalized people and local communities dependent on forests by involving them in the design and functioning of a national-level REDD governance and payment mechanism that supports community forestry at the grassroots level. One of the most contentious debates during the recent climate talks centred on the possible use of forests as credit towards REDD, thus for the success of REDD programmes there is a need for a reliable, accurate, and cost-effective methodology for measurement and monitoring of forest carbon. This is still lacking in the context of developing countries like Nepal. With the aim of overcoming the technical difficulties, ANSAB's technical team have developed and tested 'Forest Carbon Stock Measurement: Guidelines for measuring carbon stocks in community managed forests', in consultation with various experts, together with key stakeholders, and following various standards like the Voluntary Carbon Standard (VCS), IPCC, and Climate Community and Biodiversity Alliance (CCAB). The main points of the carbon monitoring process are described briefly in the following sections.

Methods and Approach for Forest Carbon Assessment

The methods for carbon measurement in community-managed forests focus on two aspects: capacity building and measurement on the ground. First, forest technicians, local resource persons (LRPs), and local people were trained in carbon measurement, and the carbon in the community forest was then measured with their support. The steps in the carbon measurement process are shown in Figure 16.

Boundary mapping and stratification

A participatory map of each community forest was prepared with the help of local people, as they are familiar with important characteristics of the forest

Figure 16: **Forest carbon measurement process in community-managed forests**

1 • Capacity building of forest technicians, LRPs, and local users

2 • Delineation of project boundaries

3 • Stratification and boundary mapping of forest blocks

4 • Pilot inventory for variance estimation

5 • Field measurements in the permanent plots (AGB, BGB, soil, dead wood, herbs and litter)

6 • Data analysis (calculation of carbon stock density)

7 • Leakage analysis belt and monitoring

8 • Report preparation

such as species distribution, age class, and crown density. The boundary of the community forest was mapped jointly by the researcher and community members using GPS and ArcGIS. For this, the entire forest boundary was visited and coordinates marked.

In order to increase the accuracy of carbon measurements, the forests were divided into two major strata: sparse (less than 70% crown canopy) and dense (more than 70% crown canopy) using ArcGIS software with high resolution remote sensing images, ERDAS Imagine, and Definiens Developers. For each of the selected forests, variance analysis was carried out to determine the number of permanent plots needed to achieve a confidence level of 90%, as explained below.

Variance estimation for sampling intensity

Ten to 15 temporary plots with a radius of 8.92 m (an area of 250 m^2) were randomly selected across all sites (Figure 17). Diameter at breast height (dbh, 1.3 m above the ground) of all trees equal to and greater than 5 cm was measured to determine variance in tree stocking. All research sites in this study have a moist climate with annual rainfall between 1,500 and 4,000 mm, so the equation suggested by Brown et al. (1989) was employed:

$$\text{Tree biomass (kg)} = 38.4908 - 11.7883 * dbh + 1.1926 * dbh^2$$

The tree biomass in the temporary plots was converted into carbon by multiplying by 0.47 (IPCC 2006) and the mean tree carbon per hectare was estimated. The total number of permanent plots required was calculated using the following equation (MacDicken 1997):

$$N = \frac{(CV * t)^2}{E^2}$$

Where

N = maximum number of sample plots

CV = coefficient of variation of biomass

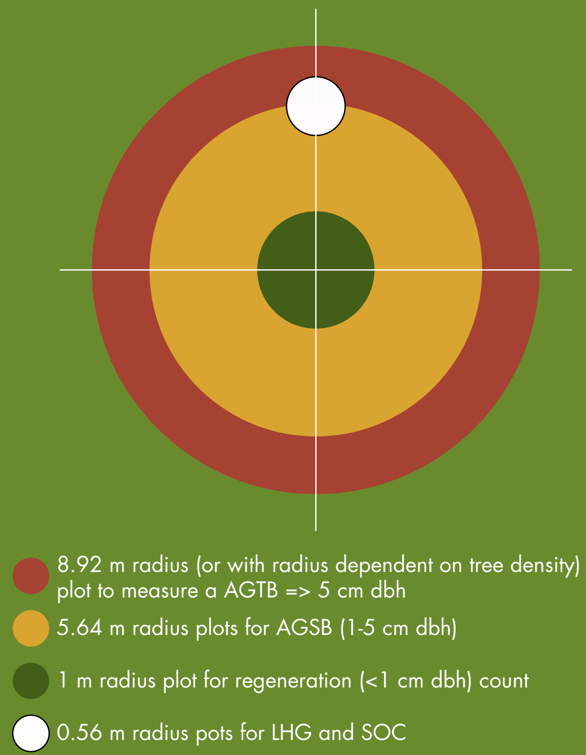
t = value of t obtained from student's t-distribution table at n-1 degrees of freedom of the pilot study. at 10% probability

E = sampling error at 10%.

Distribution of permanent sampling plots

The analysis showed that 481 permanent plots would be required across the three watersheds, 89 more plots were added to enhance the reliability of the results. Circular plots were used because they are easier to establish and it is less problematic to determine whether trees are inside or outside than in rectangular plots. Hawth's ArcGIS analysis tool was employed to distribute the plots randomly across the forests, and the coordinates of the plot centres were loaded into the GPS (Garmin Map 60CSx). The centre of each plot was marked in the field using a reinforced concrete cement pillar.

Figure 17: **Sampling design of the circular plots**



AGTB = above-ground tree biomass; AGSB = above-ground sapling biomass; LHG = LEAF litter, grass, and herbs; SOC = soil organic carbon; DBH = diameter at breast height

Pool-wise carbon inventory

Five different carbon pools were measured to estimate the total forest carbon stock and annual changes: above ground tree biomass, below ground tree biomass, above ground sapling biomass, leaf litter, grass and herb biomass, and soil carbon. The process and methods used in the study are described below.

Above-ground tree biomass (AGTB)

All trees equal to or above 5 cm dbh were measured for diameter and height using a dbh tape and Vertex and clinometers. Data were recorded in a spreadsheet and a simplified standard regression model based on dbh, height, and wood density was used to calculate the biomass of the trees as suggested by Chave et al. (2005). A number of regression models have been developed to estimate forest biomass in Nepal; however, these models are based on a small number of harvested trees, do not represent trees of higher diameter class, and are available only for a few species. We chose Chave's model because it takes into account the wood-specific gravity of each plant species, one of the important variables in the biomass function, and it gave the most accurate results in tests with five other models carried out in Uttar Pradesh in India under similar climatic conditions and vegetation types to those in Nepal. Cheve's model follows the equation:

$$AGTB = 0.0509^{*} \rho D^2 H$$

Where,
$AGTB$ = above ground tree biomass (kg)
ρ = wood-specific gravity (kg m^{-3});
D = tree dbh (cm); and
H = tree height (m)

Above-ground sapling biomass (AGSB)

Saplings with a diameter between 1 and 5 cm were measured at 1.3 m height. AGSB was analysed using a site and species-specific national allometric regression model, which was developed jointly by the Department of Forest Research and Survey, Tree Improvement and Silviculture Component, and the Department of Forest, Nepal (Tamrakar 2000).

$$\text{Log}(AGSB) = a + b \log(D)$$

Where,
Log = natural log (dimensionless)
$AGSB$ = above ground sapling biomass (kg)
a = intercept of allometric relationship for saplings (dimensionless)
b = slope of allometric relationship for saplings (dimensionless)
D = sapling dbh(cm)

Leaf litter, grass, and herbs (LGH)

Destructive sampling was applied to estimate the biomass of the pool of leaf litter, grass, and herbs. Forest floor litter materials (dead leaves, twigs, fruit, flowers) were collected from a 1 m^2 area, avoiding contamination with soil and stones. The living components, mainly grass and herbs, were also harvested and weighed. Dry weight was analysed in samples of the materials in the laboratory. The leaf litter, grass, and herb (LGH) biomass per hectare was calculated using the following formula, and carbon content was determined by multiplying with the IPCC (2006) default carbon fraction of 0.47.

$$LHG = \frac{W_{field}}{A} \cdot \frac{W_{subsample,\ dry}}{W_{subsample,\ wet}} x \frac{1}{10000}$$

Where
LHG = biomass of leaf litter, herbs and grasses (t ha^{-1})
W_{field} = weight of fresh sample of leaf litter, herbs, and grass, destructively sampled within area A (g)
A = size of area in which leaf litter, herbs, and grasses were collected (ha)
$W_{subsample,\ dry}$ = weight of oven dried sub-sample of leaf litter, herbs, and grass, taken to laboratory to determine moisture content (g)
$W_{subsample,\ wet}$ = weight of fresh sub-sample of leaf litter, herbs, and grass, taken to laboratory to determine moisture content (g)

Below-ground tree biomass (BGTB)

Methods for estimating below ground biomass (biomass of the roots) for different land use systems are still not standardized (IPCC 2006). The methods commonly used to estimate this pool are excavation of roots, root-to-shoot ratio, and allometric equations. Destructive excavation is very complex, time consuming, and expensive (MacDicken 1997), whereas the available allometric equations are not suitable for this study as they are mostly based on native forests (Ravindranath and Ostwald 2008) and the forests in our research sites are of mixed natural and plantation types. Therefore, a conservative root-to-shoot ratio value was used to calculate the root biomass. As most of the research sites are similar to tropical moist deciduous and sub-tropical humid forests, a 0.20 fraction was used to estimate the below ground carbon as recommended by IPCC (2006) and MacDicken (1997 p. 14).

Soil organic carbon (SOC)

Soil organic carbon is an important carbon pool as it contains 81% of the total carbon of terrestrial ecosystems (WBGU 2000). The soil carbon stock in forests may vary substantially: from 54 to 84% of total carbon (Bolin et al. 2000).

Soil samples were collected at depths of 0–10, 10–20, and 20–30 cm. Samples of exactly 100 cm^3 were taken and transferred to pre-weighed sampling bags. The wet weight of samples was determined in the field with 0.1 g precision. Samples were then oven dried (70°C) in the laboratory to constant weight to determine water content. Samples from each of the three depths were then combined and a well-mixed sample per sampling plot prepared for carbon measurement by removing stones and plant residues >2 mm and grinding the sample. Carbon concentration was determined by flash combustion in a total carbon analyser. The carbon stock density of soil organic carbon was calculated from the formula:

$$SOC = \rho \times d \times \%C$$

Where
SOC = soil organic carbon stock per unit area (t ha^{-1})
ρ = soil bulk density (g cm^{-3})
d = total depth (30 cm) over which the sample was taken
%C = carbon concentration in percentage total carbon

Total forest carbon

The forest biomass in all pools was converted into forest carbon by multiplying by the default value 0.47 (IPCC 2006). The carbon stock density of each stratum at the beginning of the project period (t=0) was calculated by summing the carbon stock densities of the individual carbon pools of that stratum using the formula given in the following equation. Any individual carbon pool in the formula can be ignored if it doesn't contribute significantly to the total carbon stock.

$$C(LU) = C(AGTB)+C(AGSB)+C(BB)+C(LHG)+SOC$$

Where
C (LU) = carbon stock density for a land use category (t C ha^{-1})
C (AGTB) = carbon in above ground tree components (t C ha^{-1})
C (AGSB) = carbon in above ground sapling components (t C ha^{-1})
C (BB) = carbon in below ground components (t C ha^{-1})
C (LHG) = carbon in litter, herbs, and grass (t C ha^{-1})
SOC = soil organic carbon (t C ha^{-1})

Carbon was summed, and the total was then multiplied by 44/12 (3.67) in order to convert to the carbon dioxide equivalent.

The forest carbon assessment in the community forests enabled members of the local community in the three watersheds to quantify the carbon stocks and carbon increment in their forests for a given interval of time. The results are summarized in Table 19.

Conclusion and Recommendations

Community-based forest management in Nepal effectively enhances biomass and carbon. Thus community forest management could be a good contributor to a REDD+ programme in the future. Strengthening communities to own and monitor carbon stocks could provide a rapid and cost-effective way of estimating carbon dioxide emissions and contributing to local livelihoods and forest biodiversity conservation. By involving local people, it is possible to carry out repeated monitoring of data of relevance to REDD+ – which would be logistically impossible for professional surveys – that could provide a fair basis for estimating payments to communities for carbon savings. This could in turn provide an incentive for their engagement with REDD+ monitoring and forest management. The approach also enhances ownership over the process. The grouping of scattered community forests into a single unit, institutionalized community carbon registration and monitoring (by incorporating the provisions of REDD+ in community forest management plans and constitutions), and locally-based approach in monitoring may in fact provide a good way of addressing some of the social issues that have been raised in connection with the implementation of REDD+. Based on field experience,

Table19: **Forest carbon stock (t/ha) in the project area in 2010, 2011, and 2012**

Watershed	Total forest area (ha)	Area in the strata (ha)		Forest carbon					
				2010		2011		2012	
				t C ha-1	total carbon stock (t C)	t C ha-1	total carbon stock (t C)	t C ha-1	total carbon stock (t C)
Kayar Khola	2,382	1,903	dense	296	564,042	298	567,029	300	572,174
		479	sparse	256	123,008	257	123,338	258	123,831
Ludhikhola	1,888	1,635	dense	216	353,507	221	362,514	224	367,009
		253	sparse	162	41,217	166	42,226	170	43,215
Charnawati	5,996	3,899	dense	228	891,212	231	902,091	233	911,488
		2,097	sparse	166	349,674	168	352,862	171	359,908

in order to conduct an effective assessment of forest carbon in community-managed forests, we need to train, educate, and build the capacity of local community people and forest technicians. This will help to maintain and assure the quality of the data and measured carbon stocks. There is a need for a database management and registration system for forest carbon from local to national levels. The forest carbon monitoring process should be recognized and mainstreamed in Nepal's national REDD policy. There is also a need for extensive research on biomass and carbon modelling, as the forest types in Nepal vary from tropical in the plains to temperate in higher mountain regions up to the timberline.

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Sub-National MRV Framework for REDD+ in Community-Based Forest Management in Nepal

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Introduction

Participating countries need a national level monitoring, reporting, and verification (MRV) framework as a prerequisite for successful implementation of REDD+ mechanisms to ensure that greenhouse gas (GHG) emission reductions are real, measurable, and transparent. Nepal's REDD readiness preparation proposal (RPP) 2010 envisions a hybrid approach including MRV at both national and sub-national levels for REDD+ implementation.
The scope of MRV varies with the carbon standard or certification system, and this determines its applicability. The primary focus of the proposal is on accounting of GHG emissions and reductions from various land use and land cover changes. Thus the MRV was essentially developed for quantifying and verifying GHG emissions and reductions by employing periodic measurement of carbon stock changes in relevant carbon pools. REDD+ MRV is quite new to many people and is emerging. No specific procedure has been agreed internationally, thus this document should be considered as a living document which will require updating from time to time.

Guiding Principle

The principles of MRV must comply with international standards and good practices for measuring and monitoring carbon stock change in forest biomass in the relevant carbon pools after implementation of the project. The following underpinning principles have been identified for MRV at the sub-national level:

Relevance: The MRV has been developed within current international carbon standard requirements (i.e., International Panel on Climate Change [IPCC], and Verified Carbon Standard [VCS]) and technical capabilities.

Comprehensiveness: The MRV offers a complete MRV system for a REDD+ project at the sub-national level with potential application to a national MRV. This sub-national MRV could be applied to other countries similar to Nepal.

Consistency: The MRV will be consistent with up-to-date monitoring methodologies and with international best practices, e.g., IPCC method for quantifying GHG emissions reductions and monitoring of socioeconomic and environmental benefits.

Transparency: Project information and data will be maintained in the public domain and freely accessible to all interested parties, including the verifier, buyer, and others.

Stakeholder participation: MRV will involve all relevant stakeholders such as communities, non-governmental organizations (NGOs), international non-governmental organizations (INGOs), government organizations (GOs), and local political institutions in the design, implementation, and monitoring of a REDD+ project at the sub-national level.

Accuracy and precision: All measurement equipment will be properly calibrated before each measurement. Inventory crews will be led by a trained forestry professional during all field measurements.

Flexible to suit the new political structure of the country: The MRV has been developed with the changing political structure post-federalization in Nepal in mind and can easily adapt to suit a new political system. This flexibility in the MRV makes it applicable to other countries.

Assumptions of the Framework

This MRV framework developed for sub-national REDD+ activities is based on the following assumptions:

- A community or group of communities who manage or own forests and have legal carbon rights are eligible for developing a sub-national REDD+ activity aimed at reducing carbon emissions and enhancing carbon sequestration for generating carbon credits. Local NGOs, INGOs, or other institutions could encourage and assist communities in developing a sub-national REDD+ activity.

- The sub-national REDD+ activity will safeguard the rights of indigenous people, women, and Dalits.
- A project design document (PDD) for a sub-national REDD+ activity is based on a methodological element approved by the relevant national authority and meets the IPCC's current methodologies adopted from the Conference of the Parties (COP) meeting for a sub-national forest monitoring system and for determining sub-national forest reference emissions levels.
- The necessary policy, legal frameworks, institutions, and infrastructure for a full carbon accreditation scheme or standard (validation, verification, and registration of carbon generated from a sub-national REDD+ activity) will be developed to recognize the MRV for the sub-national REDD+ activity during the REDD+ preparation phase as envisioned by the RPP.

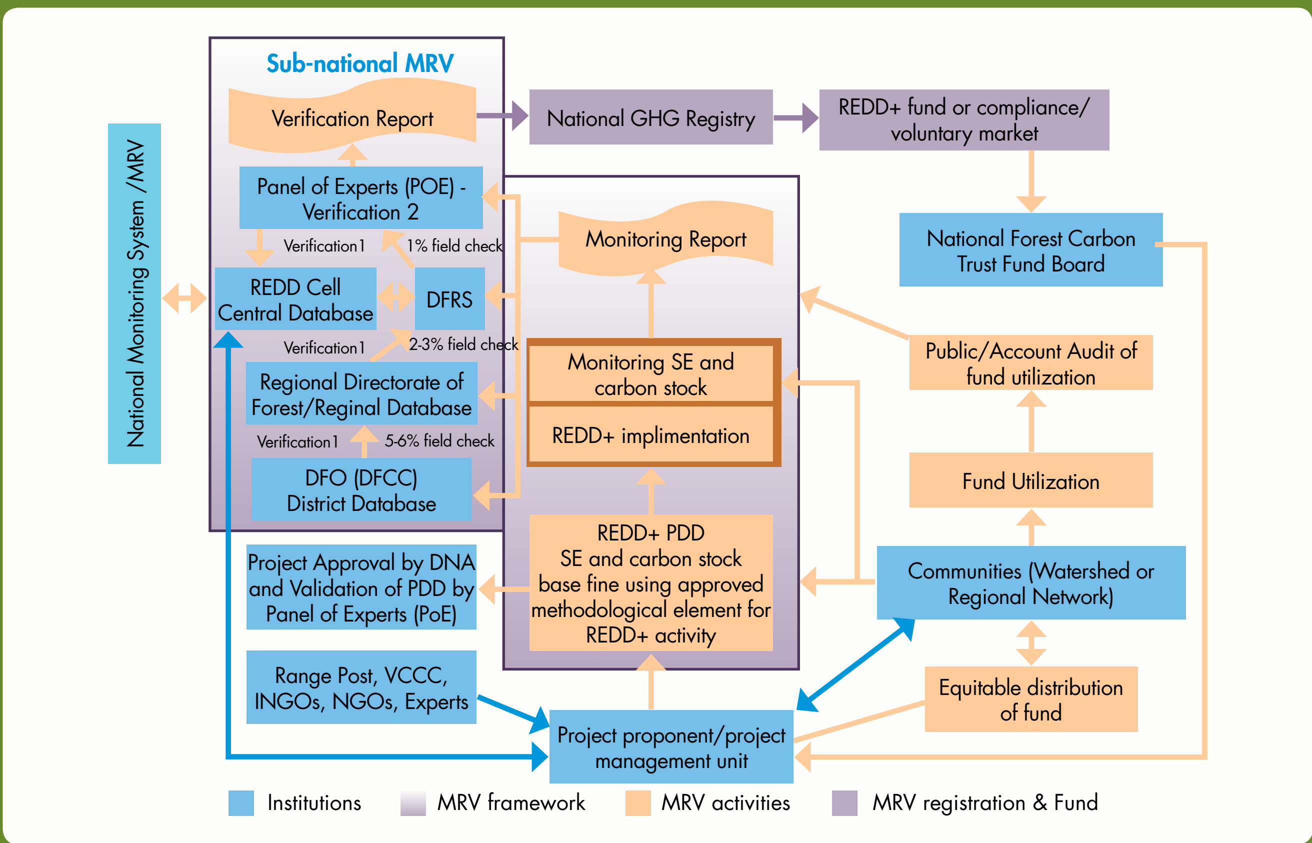
The Sub-National MRV Framework

The MRV for REDD+ activity at sub-national level is an integral part of the project development cycle as shown in Figure 18. The flow-diagram has been divided into four major interrelated and interdependent components: 1) project design, validation, and implementation; 2) monitoring, reporting, and verification (MRV); 3) GHG registration, issuance, and commercialization; and 4) REDD+ fund distribution, use, and monitoring.

REDD+ Project Design, Validation, and Implementation

The design and scope of a sub-national MRV is primarily governed by the methodological approaches for determining sub-national forest emissions reference levels, and accounting for GHG emissions reductions, leakage, and permanence of a sub-national REDD+ activity. A methodological element for developing projects at the sub-national level encompassing REDD+ projects is urgently needed for Nepal as a benchmark for assessing and accrediting that these projects demonstrate high environmental integrity and compliance with IPCC rules and requirements.

Figure 18: **Project cycle for a REDD+ project in Nepal including a sub-national MRV framework**



The approach used by ICIMOD, ANSAB, and FECOFUN to identify the REDD+ pilot project area may be replicated by other INGOs or NGOs in other watershed areas or landscapes for developing new REDD+ activities at the sub-national level. A network of communities can form a project management unit (PMU) for the institutions involved; the community representatives will oversee the overall project development, implementation, initial fund sourcing, and distribution of REDD+ incentives to communities. The PMU will acquire legal authority from the participating communities and act as the project proponent (PP).

The PP will obtain written consent from the designated national authority (DNA) to design the project. This will ensure that the project gets approval and support from the government. The PP/PMU will lead preparation of a project design document (PDD) with technical assistance from communities, forestry carbon experts, range posts, and local NGOs. The PDD should be developed by applying an approved methodological element for REDD+ activity at sub-national level as in the MRV of the CDM programme and VCS standard. The PDD will be submitted to the DNA under the Ministry of Forest and Soil Conservation (MOFSC) for approval as for projects under CDM. The REDD working group (RWG) will form a panel comprising three to five national and international experts on REDD+MRV and this panel of experts (PoE) will validate the PDD.

Communities involved in the REDD+ project design will implement identified activities that reduce deforestation and forest degradation, promote sustainable forest management, and enhance forest carbon stock, as well as leakage mitigation measures, as prescribed in the validated PDD.

REDD+ Activity Monitoring

The PP for the sub-national REDD+ activity will organize monitoring as stated in the PDD monitoring plan. The PDD monitoring plan should provide a complete guide to the measuring data and parameters that quantify GHG emissions, reductions, and social and environmental co-benefits or impacts as a result of implementing the project during the monitoring period. After each monitoring period, each community group will prepare a report containing all data/information in the relevant section of the monitoring reporting template form (MRTF). The monitoring report also includes non-permanence risk and leakage mitigation measures for verification.

In order to account and verify the impacts of a REDD+ activity on climate, communities, and the environment, certain data and/or parameters are regularly monitored. A country specific REDD+ social and environmental standard (SES) is being developed under the REDD+ SES initiative (see www.redd-standards.org). In this framework, the social and environmental indicators and their data and parameters are categorized into two groups: 1) social and environmental indicators and their data and parameters to be monitored in each monitoring event, and 2) social and environmental indicators and their data and parameters monitored in the first verification only. Altogether 11 indicators with 85 types of data and parameters have been suggested to suit the generalized social and environmental conditions for REDD+ activity implementation at the sub-national level in Nepal, and three indicators and 28 parameters to suit the generalized forest conditions and REDD+ activities. The indicators and parameters for forest carbon stock change are also categorized into two groups: 1) indicators and their data and parameters to be monitored in each monitoring event, and 2) indicators and their data and parameters monitored in the first verification only.

The monitoring period or frequency is the time interval between two consecutive monitoring events when performing field measurements of all data and/or parameters. Since monitoring is mandatory for assessing, quantifying, and verifying GHG benefits as well as the social and environmental co-benefits or impacts, it is appropriate to determine the monitoring period or frequency based on the period that is required for the net positive carbon stock change in a forest carbon pool. Under the CDM and VCS programmes, monitoring and verification of GHG emissions reductions must occur at least every five years for all eligible projects. Community groups normally conduct forest inventories every five years to review their forest operation plans. Thus in a community-based REDD+ it is reasonable to apply a monitoring period of a maximum of three to five years for tree biomass. However, the soil carbon pool may be monitored every 10 years as it changes very slowly. The effect of catastrophic disasters such as forest fire, forest pest/disease, and landslides are monitored and reported immediately after the incident.

REDD+ Activity Reporting

The PP/PMU will complete the MRTF and submit it to the District Forest Office, Regional Forest Directorate, and Department of Forest Research and Survey (DFRS) for the first verification. The monitoring report contains the project information, data, and parameters available and monitored at validation, and an estimation of GHG benefits accounting for baseline, project, and leakage emissions. The report also provides information on how the REDD+ activities have met the requirements for addressing and respecting safeguards as stated in decision 1/COP-16 throughout its implementation. In addition, the MRTF includes an assessment of non-permanence risk and leakage mitigation from all community groups participating in the REDD+ activity at the sub-national level.

Following the first verification, the PP/PMU will submit the monitoring report and the first verification report to the panel of experts for a second verification.

REDD+ Activity Verification

To ensure confidence in field measurements and enable estimation of the project's benefits, double verification of monitoring reports has been suggested for the MRV framework for REDD+ activity at the sub-national level.

First level verification

First level verification of the monitoring report will be conducted under the leadership of three institutions at the district, regional, and central levels. After organizing for measurement of the permanent sample plots and collection of social and environmental data and parameters, the PP/PMU will request that the District Forest Office (DFO), Regional Directorate of Forest (RDF), and Department of Forest Research and Survey (DFRS) verify the field measurements and data and parameters for the social and environmental co-benefits. A verification team of experts from government and non-government sectors is formed in each institution. The verification starts at the DFO. Based on the monitoring report from PMU and verification report from DFO, the RDF conducts verification and provides a report according to the given template to DFRS for final internal verification. Based on the monitoring report and verification report from DFO and RDF, the DFRS conducts verification and prepares a verification report. To streamline the verification responsibility, the DFO, RDF, and DFRS will establish a REDD+ unit/division that will be solely responsible for verification and reporting of REDD+ activities. This unit/division will also coordinate with the REDD Cell to support establishment and management of a central database. The verification task will be integrated into the DFO, RDF, and DFRS's regular activities by including it into their annual plan and budgeting to ensure adequate allocation of staff, budget, and resources.

The DFO, RDF, and DFRS will verify field measurements by re-measuring in 5-6%, 2-3%, and 1% of the total permanent sample plots, respectively. In total, between 8 and 10% of the permanent sample plots will be randomly verified. Measurement in a permanent sample plot will not be repeated if it has already been verified at a previous stage.

For field verification of social and environmental data and parameters, the DFO, RDF, and DFRS will randomly select at least one community from each watershed or region and verify the data and parameters in the monitoring report with the database maintained and managed by the community.

Second level verification

In the absence of guidance on verification of GHG emissions reductions by REDD+ projects from the international REDD+ mechanism, the panel of experts will conduct a second verification of sub-national REDD+ activities. The panel's independence must be ensured such that none of the members have been involved in designing, implementing, and/or monitoring sub-national REDD+ activities in Nepal and must not benefit directly or indirectly from these activities.

Carbon Fund Management, Distribution and Auditing

International negotiations on REDD+ mechanisms have yet to reach agreement on direct marketing of carbon credits in compliance markets. If there is any agreement that allows for carbon credits from REDD+ activities at the sub-national level to be sold, the PP/PMU will be able to commercialize the carbon credits in the global market at the best price available. In the absence of direct marketing, a nested approach for carbon accounting has been suggested where the sub-national REDD+ project will be able to receive financial incentives based on the contribution of each sub-national REDD+ project.

The RPP has outlined the establishment of a National Forest Carbon Trust Fund (NFCTF) and Board of Directors to manage the funds received from selling of carbon credits from REDD+ activities. If the PP/PMU is able to sell carbon credits in the international market, the fund should be directed to the NFCTF. This national board will manage and distribute funds to the PP/PMUs of all sub-national REDD+ projects that have generated carbon credit, after negotiating a reasonable funding model by consulting with all stakeholders. The funding model will be constantly reviewed and updated at least once every two years.

The PP/PMU will distribute the funds to participating communities based on the negotiated funding model. Currently, the REDD+ activity piloted by ANSAB, ICIMOD, and FECOFUN has developed a fund-sharing mechanism based on carbon stock improvement and socioeconomic conditions. The applicability and relevance of this fund sharing model in a performance-based REDD+ mechanism should be assessed and an update of the current model or new model negotiated with the communities.

Fund utilization and audit

Local communities will be required to use funds on negotiated items that are verified by a public audit. The socioeconomic benefits generated by the project and utilization of REDD funds will be summarized in the monitoring report.

Conclusion

With experience gained from piloting REDD+ activities, RPP 2010, and reviewing international standards and best practice, a framework for a REDD+ activity at the sub-national level in Nepal has been developed that ensures transparency, consistency, and comprehensiveness by adhering to the above-mentioned scope and guiding principles. The design and scope of sub-national MRV is primarily governed by the methodological approaches for determining sub-national forest emissions reference levels and accounting for GHG emissions reductions, leakage, and permanence for a sub-national REDD+ activity. Thus a methodological element for developing projects at the sub-national level encompassing REDD+ projects is urgently needed for Nepal as a benchmark for assessing and accrediting that these projects demonstrate high environmental integrity and compliance with IPCC rules and requirements.
The reality of a sub-national MRV will depend on the Government of Nepal's decision to adopt it as an interim option until a national framework for REDD+ management and accounting can replace it.

Geospatial Perspective of the MRV Process: A Case Study in Kayer Khola, Chitwan District

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Introduction

Forests provide a wide range of goods and services. Goods include timber, fuelwood, food products, and fodder. In terms of important services, forests and trees play a vital role in the conservation of ecosystems, in maintaining the quality of water, and in preventing or reducing the severity of floods, avalanches, erosion, and drought. Forests provide a wide range of economic and social benefits such as employment, forest products, and protection of sites of cultural value (FAO 2006). They are the most important carbon sinks, storing more carbon than the world's oil reserves; they also constantly remove carbon from the atmosphere through photosynthesis that converts atmospheric carbon to organic matter. While forests are absorbing atmospheric carbon, deforestation is releasing carbon back into the atmosphere at a rate of 5.9 Gigatonnes (Gt) CO_2 per year. In other words, 60% of the carbon absorbed by forests is emitted back into the atmosphere by deforestation (Myers Madeira 2008).

The reducing emissions from deforestation and degradation (REDD) mechanism is a great hope for saving the world's forests. In the expanded form of REDD+, it could create financial incentives to keep forests standing instead of cutting them down for timber, pulp, paper, cattle ranching, palm oil, and rubber (Phelps et al. 2010). The Cancun Agreement on REDD+ sought to safeguard the multiple uses and benefits of forests and discussed the challenges of integrating forests and REDD+ into broader low-carbon development strategies. The 194 UNFCCC parties also agreed to establish a Green Climate Fund (GCF) with the potential to channel hundreds of billions of dollars in aid from rich economies to poor, vulnerable nations.

Nepal is one of fourteen countries selected in the first batch by the World Bank within the Forest Carbon Partnership Facility (FCPF) for addressing global climate issues under the REDD principles. To support Nepal's REDD activities, ICIMOD in collaboration with the Federation of Community Forestry Users Nepal (FECOFUN) and the Asia Network for Sustainable Agriculture and Bioresources (ANSAB) is implementing a project on 'Design and setting up of a governance and payment system for Nepal's community forest management under reducing emissions from deforestation and forest degradation (REDD)' financed by the Norwegian Agency for Development Cooperation (Norad) under the Climate and Forest Initiative. The project covers over 10,000 ha of community-managed forests and has an outreach to over 16,000 households with more than 89,000 forest dependent people. It is one of the world's first carbon offset projects involving local communities in monitoring the carbon in their forests and providing the necessary training for them to do so.

Measurement and monitoring of carbon stock in community-managed forests is fundamental for the establishment of a REDD governance and payment mechanism. A geospatial approach provides robust, transparent, replicable, and long-term monitoring systems for measurement, reporting, and verification (MRV). Moreover, remotely sensed satellite images are available from the 1970s onwards, which provide a quick snapshot for analysing forest changes (deforestation and degradation) related to a given baseline (Baccini et al. 2004; DeFries et al. 2007).

This paper describes the geospatial activities undertaken as part of the REDD initiative, including boundary delineation using participatory GIS, capacity building of national partners, identification of deforested and modelling techniques for wall-to-wall biomass estimation, and mapping.

Study Area

The Kayer Khola watershed in Chitwan District, Nepal, was selected as an example for this paper (Figure 19). The watershed has an area of 8,002 ha (80.02 km^2)

and includes both plains and low hill areas (Siwalik hills). The altitude ranges from 235 to 1,935 masl. The people in the watershed are socially and ethnically diverse, and include forest dependent indigenous communities such as Chepang and Tamang. The watershed has 15 community forest user groups (CFUGs) with a community forest area of 2,382 ha (23.82 km²) in three VDCs (five CFUGs in Shiddi, nine in Shaktikhor, and one in Chainpur).

The area has a sub-tropical humid climate characterized by three distinct seasons: a hot, rainy monsoon; a warm, dry winter; and a hot, very dry, windy pre-monsoon. Over 75% of the annual rainfall falls during the monsoon from June through September, with an average annual rainfall of 2,000 mm. The maximum summer season temperature is 45°C, while in winter the temperature falls below 10°C. The forests mainly consist of high-value *Shorea robusta* (>90%) with a mix of other tropical and subtropical species. Other hardwood species include *Schima wallichii*, *Cleistocalyx operculatus*, *Xeromphis spinosa*, and *Buchanania latifolia*.

Remotely Sensed Data

GeoEye-1 satellite images were obtained on 2 November 2009. The GeoEye-1 multispectral image consisted of four bands in the visible part of the electromagnetic spectrum with 2 m spatial resolution – blue (450-510 nm), green (510-580 nm), red (655-690 nm), and near infrared (IR) (780-920 nm) – and panchromatic (450-800 nm) with 0.5 m spatial resolution (GeoEye 2010). All the images obtained for the study were ortho-rectified using rational polynomial coefficients (RPC) with a 20 m topographic digital elevation model (DEM) using the UTM WGS 84 coordinate system.

For the preparation of base data layers, digital layers were acquired for topographic sheets from the National Geographic Information Infrastructure Project (NGIIP), Department of Survey. The data layers correspond to topographic sheets of scale 1:25,000/50,000 based on 1992 aerial photographs for eastern Nepal and 1996 aerial photographs for western Nepal published in 1995 onwards. The datasheets were merged to generate layers of

Figure 19: **Study area – Kayer Khola, Chitwan District, Nepal**

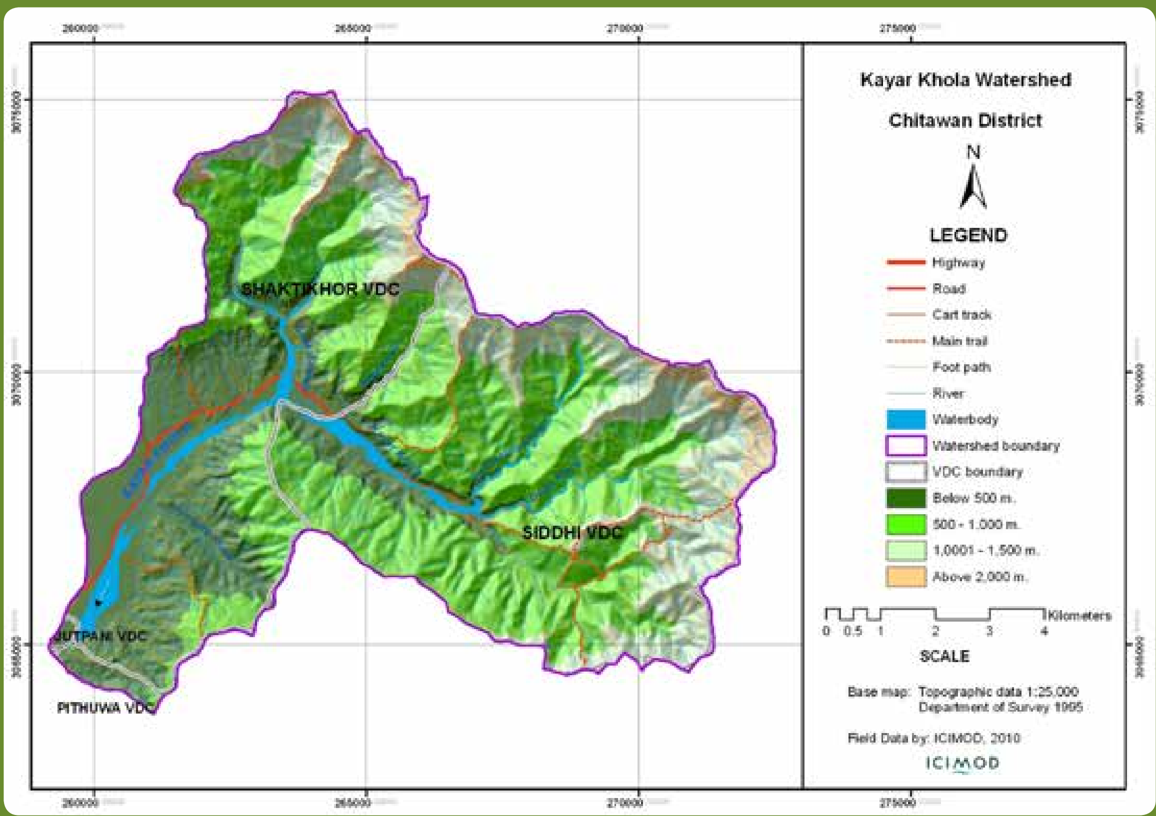


Figure 20: **Mapping the community forest: a) delineation of community forest with CFUG members; b) sketch map of commuity forest; c) digitized communit forest overlaid on satellite image**

contours, settlements, roads and trails, and streams for each watershed. A 20 m digital elevation model (DEM) was generated from the contour and spot height layers using the topogrid model of ArcGIS.

Boundary Delineation, Capacity Building, and Stratification

For the delineation of community forests, field maps were prepared using the high resolution GeoEye-1 (0.5m) satellite images in A0 size. Additional information from the topographic maps was included for better identification of locations. Community forest boundaries were identified in consultation with the members of CFUGs (Figure 20). Ancillary information such as the existing maps and descriptions prepared by the community forestry groups were used as the basis for demarcation. In areas where community forests were adjacent to other forests (national or leasehold), a GPS survey was carried out together with the local participants. The demarcated areas were then plotted on the field maps which were digitized at a later stage. Altogether 111 community forests (65 in Dolakha, 31 in Gorkha, and 15 in Chitwan) and 89 leasehold forests (18 in Dolakha and 74 in Chitwan) were delineated. Feedback from District Forest Officers (DFO) was included on the area and orientation of community forests.

Two national-level training courses in basic and advanced level geo-informatics were conducted in close coordination with the Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente.

Two strata of forest cover were identified (dense forest and open forest). The number of sample plots within community forests areas was designated on the basis of these strata and field data were collected.

Spatial Change Assessment

Deforestation and regeneration of forest was assessed at both watershed and community forests level using Landsat TM 1990–2010 and GeoEye-1 (Google Earth) images from 2002–2009. Figure 21 illustrates deforestation (lower green circle) and regeneration (upper green circle) of forest outside the community forests.

Individual tree canopy and spatial change assessment of forest within community forests (Pragati, Janapragati and Nibuwatar Community Forest) was measured using the GeoEye-1 Google Earth images (Figure 22).

Biomass Estimation Modelling

Two different biomass models were used and their accuracies examined. These models are still being calibrated.

The species-level biomass estimation model is based on crown projected area (CPA) and its relationship with diameter at breast height (dbh) as measured in the field. For the construction, a model sal/non-sal species classification was done based on training areas in a satellite image (Figure 23). The CPAs were delineated linked with dbh to provide a final biomass estimation using an allometric equation. Overall accuracy of 65% was assessed.

Figure 21: **Assessment of deforestation (lower circle) and forest regeneration (upper circle) outside the CFs**

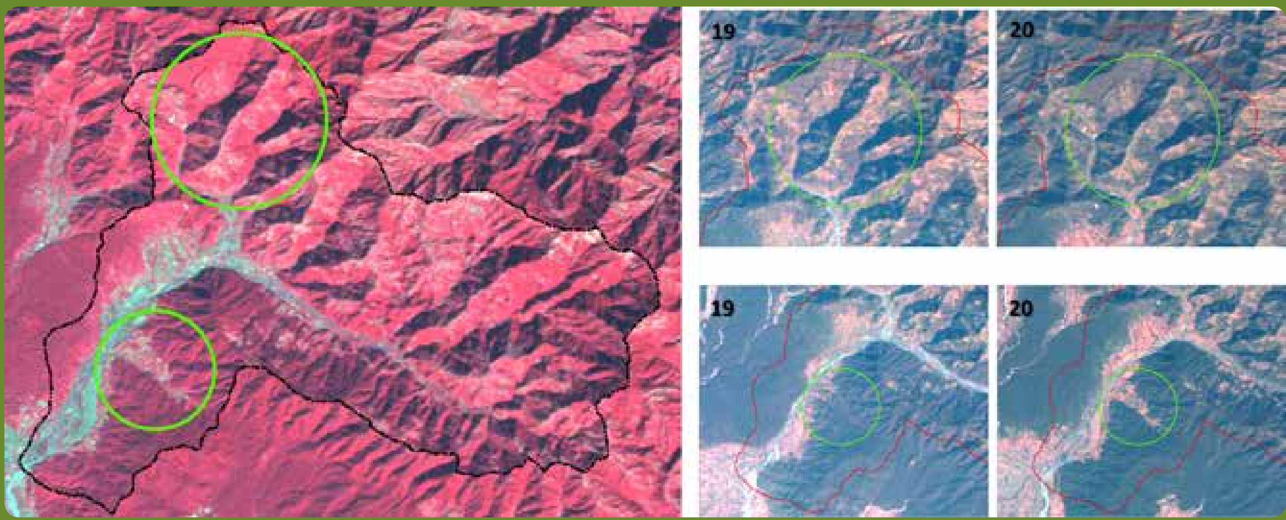
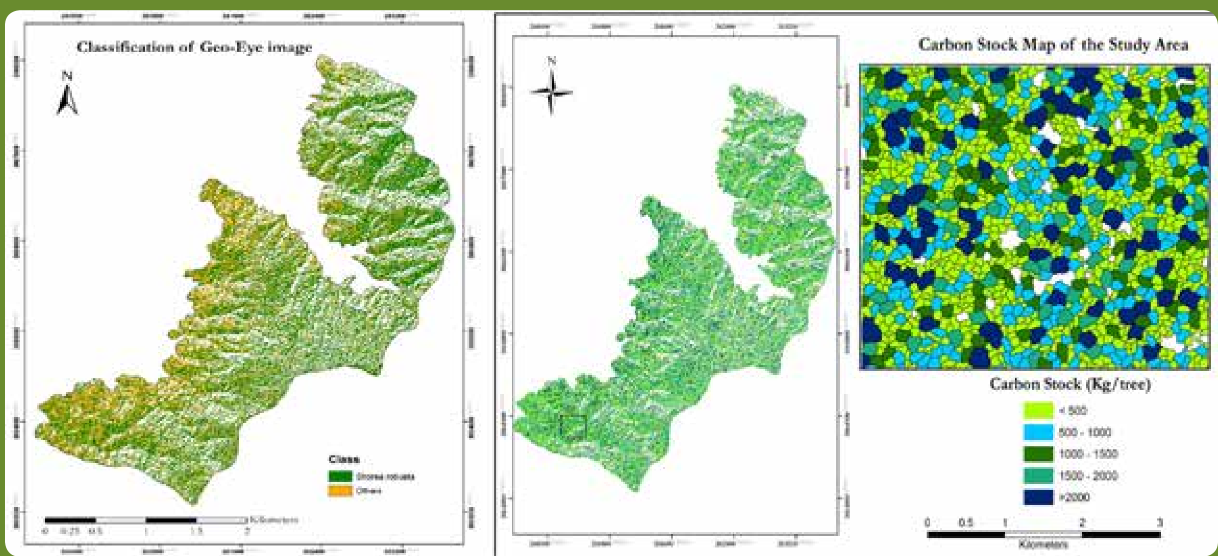


Figure 22: **Assessment of change in individual tree canopies within CFs (2002–2009)**

Figure 23: **Sal and non-sal classification biomass map**



A stratification approach was used to estimate the basal area (BA) and number of trees within the watershed using normalized difference vegetation index (NDVI) stratification and field information through an iterative process. This resulted in three distinct forest strata (Figures 24 and 25).

Figure 24: **The three strata identified from spectral response and the spatial basal area map**

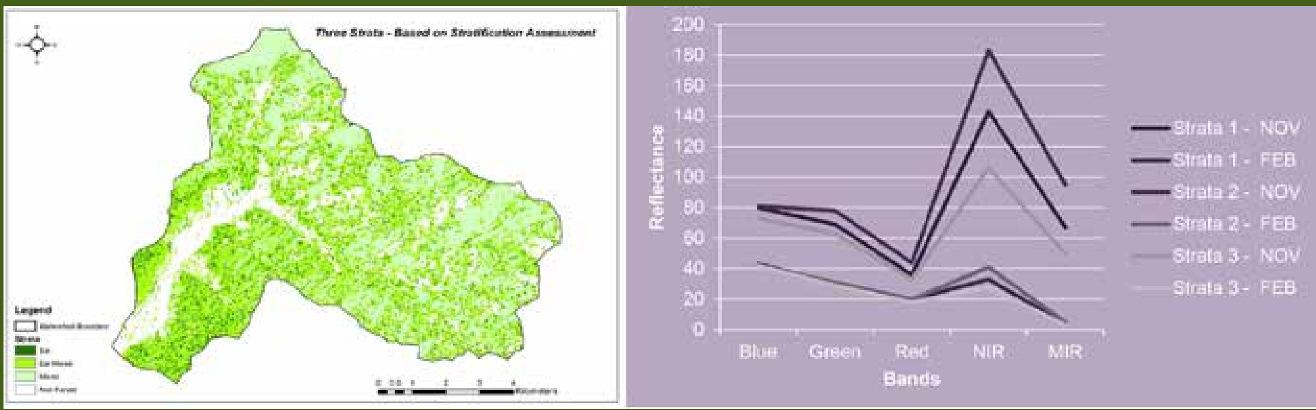
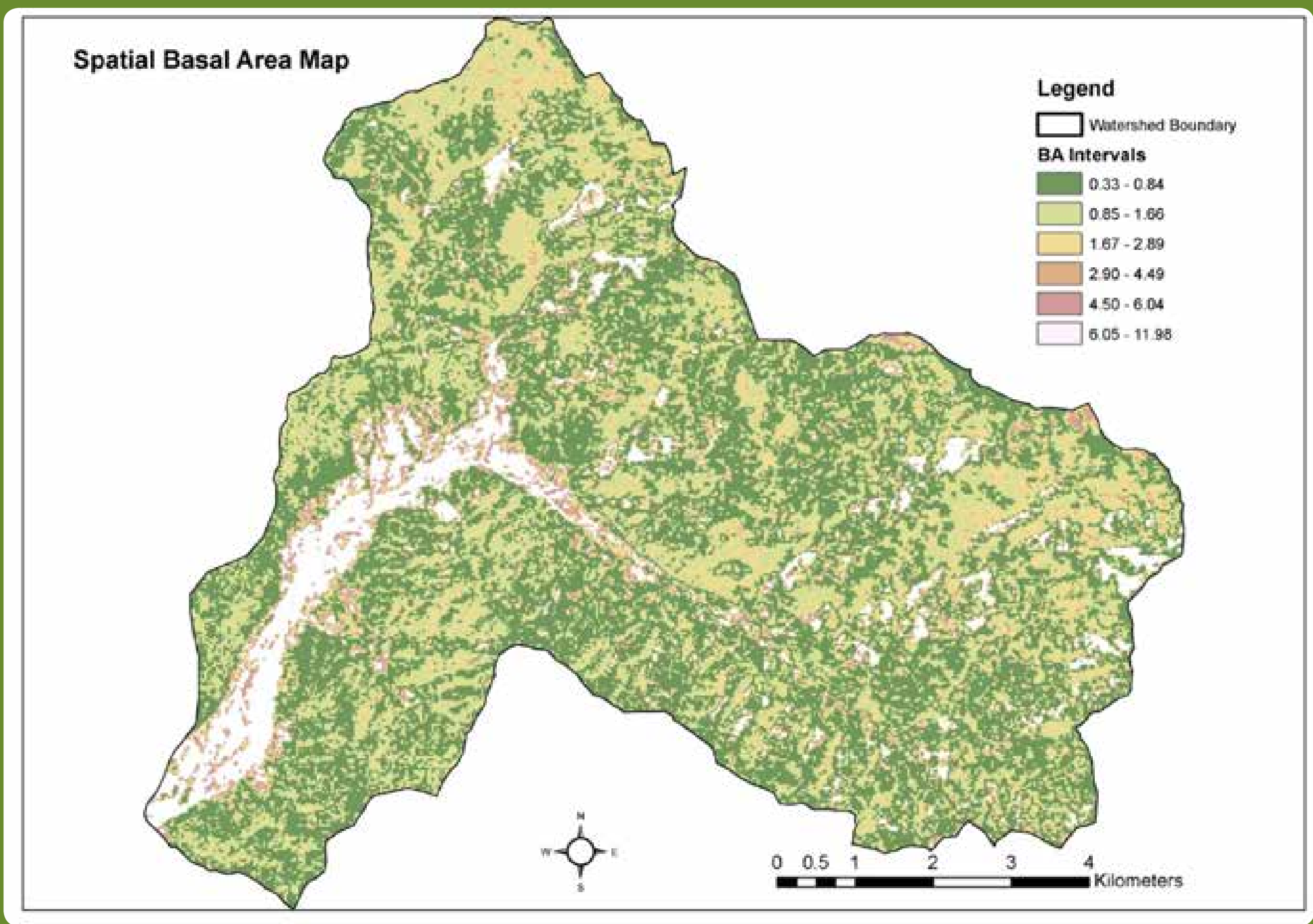


Figure 25: **Spatially explicit basal area map**



Way Forward

The geospatial system provides a solution for the MRV process using activity data, forest stratification, and a modelling approach. Although the accuracy of the models developed is still somewhat low, all the models are still being calibrated and improved, and new models are being developed, for example, a stand model for quantification and biomass estimation and decision tree data mining techniques. These models can be easily used to scale up the biomass and carbon stock from the watershed level to district and national levels using additional activity data. Integration of active and passive optical remote sensing data is also under consideration. The development of these models would save a lot of time and cost in collection of field data. There are a number of initiatives at national and sub-national levels on the estimation of greenhouse gas (GHG) emissions, but there is a need to develop synergy among them.

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Examining the Implications of REDD Payments for Livelihoods and Local Economic Development in Nepal: Methodological Issues

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Introduction

This paper aims to introduce the reader to the methodologies adopted in an experiment on assessing the socioeconomic and livelihood impact of the 'Reducing emission from degradation and deforestation along with carbon enhancement (REDD +)' study being undertaken in watersheds in three topographical regions of Nepal. It also highlights the prospects and limitations of the study in the face of the complex issues and debates on the future impacts of REDD+.

REDD+ has emerged as a new market-based incentive mechanism in the forestry sector. It is an arrangement through which countries reducing deforestation and degradation or enhancing carbon sequestration (beyond a baseline) are rewarded in the form of carbon payments. REDD+ is expected to be a technically efficient and economically viable approach to mitigating global warming and climate change within a short span of time. The idea of REDD+, however, is still at a conceptual stage and has yet to be formalized through international arrangements. Thus, what REDD+ holds for the future of forest dependent communities in countries like Nepal is still unclear. Experimenting with REDD+ thus deserves careful attention to ensure technical and economic efficiency and equity in the distribution of benefits. Reliable piloting along with methodologically sound impact assessments can contribute to developing roadmaps for negotiations and formation of domestic policies by the government.

There are three criteria for the success of REDD+: carbon effectiveness, cost efficiency, and equity and co-benefits (Angelsen and Wertz-Kanounnikoff 2008). Carbon effectiveness refers to the magnitude of carbon reduction achieved compared to the business-as-usual situation; cost efficiency refers to achieving emissions reduction at a minimum cost; and equity and co-benefits imply that REDD+ benefits are shared equitably, are capable of improving livelihoods, reduce poverty, improve biodiversity, and protect the rights of indigenous forest dependent people.

REDD+ Context in Nepal

REDD will be launched officially after the expiry of the first commitment period of the Kyoto Protocol (2008–2012). Thus, a number of countries including Nepal have initiated REDD/REDD+ activities and are making necessary preparations in terms of human resources, infrastructure, and institutional measures to implement and benefit from REDD/REDD+ provisions. International donors such as the World Bank's Forest Carbon Partnership Facility (FCPF) have been providing financial support to enhance this process. Nepal has also been an observer country of UNREDD+. A number of piloting studies have also been initiated. The Government of Nepal has established a 'REDD Cell' to accelerate REDD preparedness. In one such project, the International Centre for Integrated Mountain Development (ICIMOD) partnered with the Federation of Community Forest Users Nepal (FECOFUN) and the Asia Network for Sustainable Agriculture and Bio-resources (ANSAB) to implement a REDD demonstration project at a pilot scale starting in 2009. Nepal was chosen for this piloting as it is considered to have successfully implemented a model of community forest (CF) management which has led to significant forest regeneration over the past few decades (Bushley and Khatri 2011). As a country with high geographical and cultural diversity, Nepal provides a high degree of replicability and applicability to act as a model for 'paving the way for new practices', not only for the South Asian region but globally wherever community forestry management is practised. To enhance replicability, piloting was conducted at the ecosystem level in three different geographical regions representing the mountains (high altitude), hills (medium altitude), and plains (low altitude). This is also expected to enhance understanding of the impact of topographical factors on forest carbon stocks and the response of the forest dependent populations in such regions.

As a part of this project, a Forest Carbon Trust Fund (FCTF) was established in 2011 to institutionalize the REDD+ payment mechanism; the first carbon payments were disbursed in 2011. After carbon payments were made to CFUGs, communities started utilizing the funds for local community development activities. The carbon fund expenditures at the community level are ultimately channelled to households in the form of pro-poor and livelihood improvements, forest enhancement, and capacity development/awareness activities. There is a need to examine how payments made for carbon sequestration in the pilot programme in Nepal affect the livelihoods of local communities, and to discover whether the monetary incentive actually helps to increase the forest carbon stock.

REDD+ will only be successful in the long run if the ultimate users of forests, the local communities, are willing to give up certain forest extraction practices for payments. But are the payments adequate to compensate villagers for abandoning these age-old practices? How might the payments affect the local economy, and will they affect different users differently? In consideration of these issues, an additional study is being conducted jointly by the South Asian Network for Development and Environment Economics (SANDEE) and ICIMOD. This study is expected to add value to the pilot by allowing scope to triangulate carbon, socioeconomic, and institutional dimensions with the existing study. The specific research objectives of the SANDEE/ICIMOD study are

- to analyse the impact of REDD payments on carbon enhancement in the CFs,
- to examine the impact of REDD payments on livelihoods and on social welfare at the local level, and
- to explore effective fund management and the benefit-sharing mechanisms that are most likely to help REDD fulfil its intended objectives.

Since the study is at its inception, and the utilization of carbon payments has yet to produce any tangible impact in terms of behavioural change, the objective of this paper is to discuss the methodology adopted in the study and the prospects and limitations.

Methodology

Conceptual framework

We used the difference in difference or double difference method (DD) to attain the objectives of the study. The DD method measures the impact of a treatment at the intervention site at a given time compared to the baseline scenario by comparing comparable data from control CFs to serve as a counterfactual. With panel data over two time periods ($t = \{0,1\}$ where 0 is baseline and 1 is end-line), the treatment group denoted by T, and the control group denoted by C, the expected *DD* estimator of the outcome of interest (Y) is given by

$$DD = E\,(Y_1^T - Y_0^T \,|\, T_1 = 1) - E\,(Y_1^C - Y_0^C \,|\, T_1 = 0)$$

Where Y_t^T and Y_t^C are the respective outcomes for the treatment and the control in periods t, $T_1 = 1$ denotes treatment areas, and $T_1 = 0$ denotes controls areas (Khandker et al. 2010).

The outcomes of interest include the incremental carbon sequestered in the community forests, changes in forest product extraction, shifts to alternative fuels, land use changes, and household welfare for the treatment versus the control CFUGs. The DD assumes that unobserved heterogeneity is time invariant and not correlated with treatment over time. The impact analysis framework is shown in Figure 26.

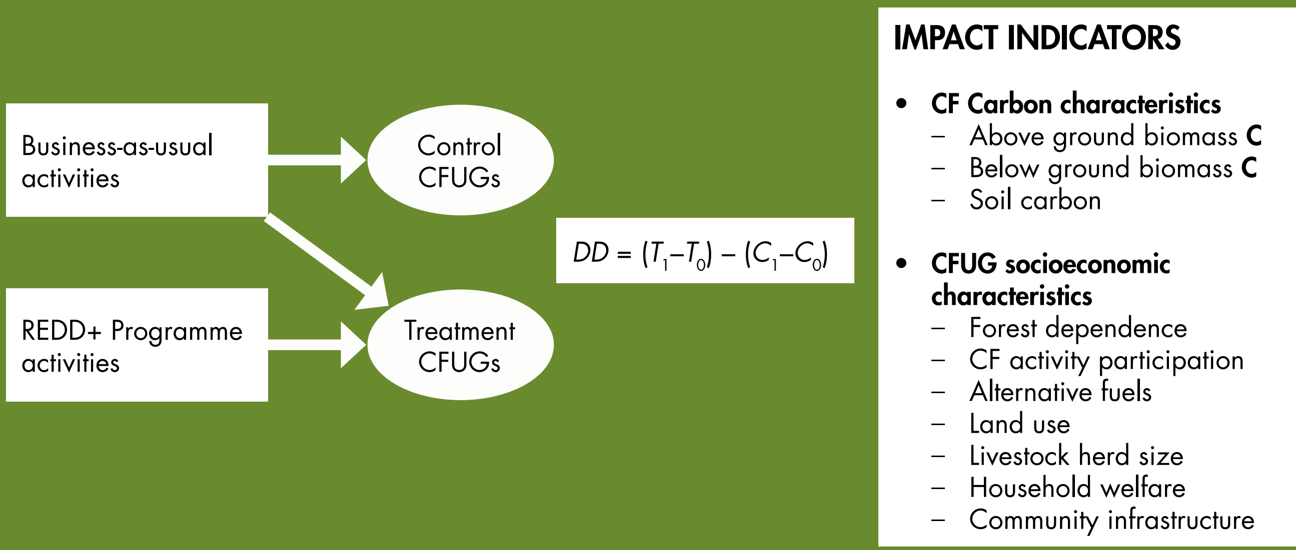
The DD will be used to examine the impact on socioeconomic indicators and how it varies in relation to biophysical, socioeconomic, and community characteristics. A range of interrelated variables allows for controlling the impact on the target variables.

The institutional analysis of the REDD+ fund utilization mechanism will look into the fund allocation mechanism in the treatment CFUGs versus the control CFUGs and its implications on equity and efficiency.

Matching treatment and controls

The creation of a counterfactual requires identifying comparable treatment and control CFs in the three watersheds. The propensity score matching (PSM) technique using the Mahalanobis metric was used to select matching REDD and non-REDD CFUGs. The general inclusion criteria used in the selection of matching treatment and control CFUGs were (a) near to but not adjoining the watershed community forests (to avoid the effect of carbon leakage), (b) have

Figure 26: **Impact analysis framework**



similar topographical and forest characteristics, and (c) the socioeconomic, forest use, infrastructure, and market access characteristics among CFUG member households are similar to those in the REDD pilot CFUGs.

We followed the CIFOR technical guidelines adopted in REDD+ project sites (Sunderlin et al. 2010) to identify the matching variables for the PSM for selection of comparable treatment and control CFUGs. The variables suggested by the guidelines were deforestation pressure, NGO presence, strength of forest tenure, number of active community groups, population size, extent of forest cover around the village, high forest dependence, and distance to main road. These eight variables were further divided into 22 sub-variables. These variables have been used previously in Brazil, Cameroons, Indonesia, Tanzania, and Vietnam in the selection of matching villages for REDD experiments. We adopted these variables with necessary adjustments to obtain quantitative indicators that match with the local Nepalese context. Based on this list of variables, we identified 26 quantitatively measurable variables. These were later combined to give ten variables for the PSM. For example, the area of the community forest and the number of CFUG households were combined to give the number of households per hectare of CF. The list of ten variables identified and utilized for PSM were years of formal CFUG handover; number of households per hectare of CF; percentage of indigenous and deprived households in the CFUG; number of local organizations in the CFUG community; growing biomass per hectare of CFUG; income per hectare of CFUG; number of households with LPG cylinders; percentage of households with biogas as a percentage of households with biogas plant; average time taken to collect fuelwood from CFUG area; and average time of access to public facilities (school, health post, police station, bank).

The PSM consists of creating a weighted average, where the weights are the inverse of the elements of the variance-covariance matrix of the ten variables for each of the potential CFUGs. The noisiest variable receives the lowest weight. Accordingly, at the first stage, we used focus group discussions with key informants at the district level to identify 14 REDD+ CFUGs from the treatment category and 14 CFUGs from the control category. From the 14 matching REDD+ and control CFUGs, the PSM identified statistically the best matching seven pairs, with index values closest to those given by the mean value for each of the ten variables using the statistical software package STATA. Randomness in sampling of the treatment and control CFUGs was thus ensured through the statistical matching process.

Collection of carbon and socioeconomic data

The study area for the treatment and control sites consists of the three watersheds of Charnawati in Dolkha District, Ludikhola in Gorkha District, and Kayar Khola in Chitwan District, and the area beyond but adjacent to these three watersheds. The treatment area consisted of three clusters while the control area in each district was quite scattered.

In accordance with the analytical framework, both the baseline and the final dataset have two components – the technical carbon stock data and the socioeconomic data – collected in an exactly similar manner from the treatment and control CFUGs. The technical data on the biophysical characteristics of the community forests and carbon stock in the watershed is obtained from the carbon monitoring conducted by ANSAB, FECOFUN and ICIMOD on an annual basis in accordance with technical guidelines that follow international standards with permanent sampling plots in the three watersheds. ANSAB, which is the institution assigned to collect carbon data in the REDD+ sample plots, was assigned to collect carbon data from the control sample plots to ensure uniformity in methods and calibration of equipment. GIS plots rather than permanent plots were set in the control CFUGs to avoid any contamination of forest product extractors that can be created from permanent plots. The carbon baseline for this study is 2011 and the end line year 2013.

The carbon data consists of the above ground biomass, below ground biomass, and a range of biophysical and forestry practice data. The biophysical and forestry practice data include altitude, slope, aspect, soil type, soil depth, vegetation type, crown cover, grazing practice, and signs of forest fire. The biophysical and forest use data allow for controlling of the impact of these characteristics on the target variable.

Stratified random sampling procedures were applied in both the treatment and control CFUGs for collection of the socioeconomic data. Fifteen households were selected at random in three categories (indigenous groups, Dalits, and others) in proportion to the ethnic distribution of the households in the CFUG (found from the records available in the CF operational plan documents). This gave a total of 210 households (105 REDD households and 105 non-REDD households) in each watershed. A total of 315 REDD households and 315 non-REDD households in the three districts were surveyed to give a total of 630 households for the survey. The same households will be surveyed during the end-line survey in 2013.

The questionnaire for the household survey was developed through several rounds of piloting to capture extraction behaviour, participation, benefit flows from CF activities, and similar. Since the end-line data will be collected two years after the baseline data, it is unlikely that any great changes will have taken place in household behaviour as a result of the REDD+ programme. Thus a multitude of dimensions were included to capture even small changes in behaviour. Even if there are no behavioural changes, there is some likelihood of changes in perceptions about community forestry and its benefits. A detailed listing of CF activities, household participation in them, and perceived benefits to the household have been included in the questionnaire. The main components of the household survey are

- General section – household roster, education, occupation, and similar;
- Forestry section – forest product extraction by source, production, and transaction cost;
- Forestry perceptions – community forestry activities and returns from these activities;
- Household assets – land, livestock, consumption, asset index and income sources;
- Domestic fuel consumption, cooking environment, and similar; and
- Community characteristics (presence of external agencies, participation in community activities, and access to public facilities).

The baseline socioeconomic data was collected around August to November before carbon payments made to REDD CFUGs started being spent. The final data will be collected around August-November 2013.

Discussion and Conclusions

Randomized control trials are considered to be the 'gold standard' in impact evaluation (Gertler et al. 2011). Since ICIMOD, FECOFUN, and ANSAB had already selected the treatment CFUGs to pilot the carbon payment mechanism, adding a socioeconomic and livelihood impact assessment to the pilot project provided a good opportunity to analyse the socioeconomic and livelihood impacts together with any institutional modifications. Identification of the matching sets of treatment and control CFUGs through the widely used PSM statistical instrument is expected to provide unbiased samples in both categories. The carbon and socioeconomic baseline data which comprise a multitude of dimensions are expected to provide a sound impact analysis of the REDD+ experiment being conducted in Nepal. A test of balance of the two sets of samples will indicate the need for any adjustment for imbalances. There are also a number of complex issues on the impact of REDD+ that have been raised globally that need to be looked into. The triangulation of technical, socioeconomic, and institutional data will create a sound basis for comprehensive impact evaluation.

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India's Readiness for REDD+: Issues and Prospects

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The Food and Agriculture Organization (FAO) estimates that at present forest covers 31% of the world's land area and stores around 289 Gigatonnes of carbon, which is more than the total amount of carbon in the atmosphere (FAO 2010). Similarly, the fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) estimated that deforestation's share of global emissions in 1990 was around 20% (UNFCCC 2009), higher than the emissions from air and land transport. But the global forest area is shrinking, with a net loss of 5.2 million hectares annually over the past decade. This deforestation is a significant cause of climate change emissions, thus protecting forest has to be a major part of any effort aimed at combating climate change. In international negotiations, the provision of incentives to protect forest has been operationalized through the 'Reducing emission from deforestation and forest degradation' (REDD) mechanism, agreed to by almost all nations.

The concept of REDD was first discussed on an international platform in December 2005 at the Montreal Climate Change Conference in response to a proposal by Papua New Guinea and Costa Rica, after which it became a part of the climate change dialogue. REDD officially became a part of the UNFCCC climate change negotiations at the 13th Conference of the Parties to UNFCCC (COP 13) in Bali in 2007 (The Bali Action Plan), where all parties were invited to further strengthen their ongoing efforts to reduce emissions from deforestation and forest degradation on a voluntary basis and increase the capacity of developing countries towards REDD by providing technical assistance and transfer of technology. The importance of forests in climate change mitigation, and the need to move towards carbon forestry options other than afforestation and reforestation under the Clean Development Mechanism (AR CDM), was realized in the light of the high tropical forest emissions.

At the meeting of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) held in Poznan in December 2008, REDD officially became REDD+, and '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' came into effect. This change was made in response to the pressure from countries such as India, which want 'conservation, sustainable management of forests, and enhancement of forest carbon stocks' given the same level of priority in the negotiations as deforestation and forest degradation. This expanded form of REDD is referred to as 'REDD+'. REDD+ provides financial incentives in the form of compensation to nations that work to reduce deforestation and forest degradation. This can yield significant sustainable development benefits, and may generate a new financing stream for sustainable forest management in developing countries such as India (www.un-redd.org).

National Policy and Strategic Progress

India has a strong legal, policy, and institutional framework for sustainable forest management, and to implement REDD+. The National Forest Policy envisages the involvement of people for sustainable forest management with a slightly stronger emphasis given to ecological security, while ensuring sustenance and livelihood security. The central government has the responsibility for policy and planning, while the state forest departments have responsibility for implementation with the assistance of local people through the 'joint forest management' mechanism. The enactment of the Forest Rights Act, 2006, strengthened the involvement of people in forest governance through an approach in which forest governance is based on gram sabhas (a village level democratic institution) and ensuring tenurial security to enhance the livelihoods of the people living in and around forests. India has already initiated its efforts towards the implementation of REDD+ by launching the Green India Mission, which will result in the removal of 50-60 million t CO_2 by 2020. India has the potential of achieving more than 1 billion tons of CO_2 sequestration in the next three decades. The gram sabha is the core centric body for implementation of the Green India Mission. The forest governance, livelihoods, and capacity building of the community are key issues for the implementation of REDD+. India has a legal framework to strengthen the livelihoods and community-based forest governance regime in the form of the Forest Rights Act 2006 and Panchayat Extension to Scheduled Area Act (PESA) 1996. The joint forest management institution provides community access to minor forest produce on the principle of care and share. Under the Forest Rights Act 2006, the ownership of minor forest produce is with an individual or group on a care and share basis. This kind of overlapping must be clarified by the entral government for better implementation of REDD+. The Government of India has taken a policy decision to place joint forest management committees under the gram sabhas to resolve this overlap.

Methodological Issues

Recently, India has submitted methodological guidelines for a REDD+ project to the UNFCCC, in which it states that stratification of forest areas, tree-outside-forest (TOF), crown density classes, sampling design, precision of estimates, protocols for collecting sample data, and models and equations used in computing forest carbon stocks will form an essential part of accounting in the report. All equations, growth, and biomass yield models used in the computation of forest carbon stocks will be based on published records, and freely and readily accessible to all for evaluation. Developing countries will have the option to choose all or any of the pools of forest carbon stocks. Indigenous peoples, local communities, civil society bodies, and other interested entities will be fully involved and informed about the technological, methodological, policy, and financial aspects of the measuring, reporting, and verification (MRV) processes and procedures. The following sections briefly analyse the main methodological issues such as project scale, baseline reference level, leakages, and monitoring of REDD+, in the context of India.

Project scale

Scale is one of the most critical policy issues for REDD+ projects in the country as all the other important parameters such as baseline reference level, permanence, leakages, monitoring, and investment depend on it. Broadly, there are three scales for a REDD+ project – national, sub-national, and a hybrid of national and sub-national.

The national-level approach has various constraints, for example managing a project at the national level is very difficult in big countries such as India as it requires a large number of skilled and trained forestry professionals across the nation, and complex bureaucratic procedures and processes, which would lead to higher transaction costs. Small-scale sub-national level projects are more suitable for individuals, communities, NGOs, civil societies, private companies, and local governments to implement in a well defined geographical area or at a project scale. Smaller projects can help in building capacity at the grassroots level, and spreading knowledge and awareness. They can clearly define project stakeholders and distribute the benefits more efficiently, and there are good possibilities for attracting private investors due to simple processes and well-defined stakeholders. A hybrid, or nested, approach tries to include the positive aspects from both approaches. The hybrid approach suggests implementing a REDD+ activity at the project level first and then extending it at national level. Building the capacity of various sub-national stakeholders would be helpful in implementing the policy at the national level. Credits generated could be shared between the project proponent and the central authority (Aggarwal 2010).

The feasible scale for the country is at the sub-national level, in view of the positive points of the project level approach. Initially, some projects could be started at the project level to build the capacities of various stakeholders – including forest staff at the grassroots level – and then implemented within a defined geographical area.

Baseline reference level

The baseline reference level refers to the forest cover of an area at a certain period against which progress of the REDD+ project interventions can be measured. There are various arguments related to setting up the baseline reference level for a REDD+ project. If the baseline is only based on data from recent years, it would discourage and demotivate countries who have already made efforts to check deforestation rates as it would not yield any significant credits for them. India favours a baseline reference level of 1990, while countries such as Brazil and Latin America favour an average historical ten-year period. The baseline reference level should depend upon the availability of data. India favours the 1990 baseline due to the availability of GIS, RS, and forestry data for the entire country at this time. India has one of the most advanced forest mapping programmes in the world; the Forest Survey of India (FSI) conducts a biennial cycle of forest and tree cover assessments throughout the nation. In addition, larger activities under the aegis of sustainable forest management (SFM) started in the 1990s in the country.

Monitoring

Regular monitoring of carbon stock is very important for REDD+ projects. Issues include the lack of any uniform definition of terms like forest, deforestation, and degradation across the globe. There is no uniformly agreed density classification, which makes it difficult to monitor the progress and effectiveness of REDD+ projects across nations. Most of the world's developing and under-developed nations also lack historical data, as well as technical skills for field measurements, carbon stock calculations, and interpretation of satellite imageries.

India has established a REDD+ Cell in the Ministry of Environment and Forests (MoEF) to coordinate and guide REDD+ related activities at the national level. One of the major aims of the Cell is to collaborate with the state forest departments (SFDs) to collect, process, and manage all relevant information and data relating to forest carbon accounting. The national REDD+ Cell also helps in the formulation of projects, funding, implementation, monitoring, and reporting and verification of REDD+ activities in individual states, and assists the MoEF in developing and implementing appropriate policies related to REDD+ within the country.

Leakages

Leakages are defined as changes in GHG emissions outside the project boundary due to project interventions. Leakages can reduce the impact of a project significantly, hence the problem should be addressed properly when implementing a REDD+ project. In India, the primary sources for leakages from the forest are fuelwood, fodder, and timber extraction. Fuelwood leakages can be reduced by deploying energy-efficient mechanisms, such as renewable energy sources – especially solar energy sources – and providing alternate employment to the people who were dependent on fuelwood extraction for their livelihood. Fuelwood requirements could be tackled through the installation of improved cooking stoves, biogas plants, LPG, and other means at the village level under the REDD+ project. Leakages in the forms of fuelwood and fodder can be managed through proper implementation of the management prescriptions provided in the working plans and various other forestry documents, cultivating nutritious grass species such as barseem and napier on private farms, and encouraging plantation of fodder tree species such as bhimal, oak, neem, and bauhinia. The leakage of timber could be managed through proper implementation of the silvicultural and management techniques provided in the working plans of the respective forest divisions. In addition, conservation practices and sustainable harvesting should be encouraged.

Financing Arrangements

India, in its submission to the UNFCCC, recommended a flexible combination of market-based and non-market based approaches for providing positive incentives for the two types of carbon stocks under the REDD+ regime, i.e., change in carbon stocks, which includes incremental carbon stocks and reduced deforestation, and baseline carbon stocks. The market-based approaches that would be developed for providing incentives for reductions in removals and emissions should be separate from the CDM market. India initially proposed a strictly fund-based approach but has now shifted its position to a mixed approach. The approach of using a mix of market and non-market mechanisms to finance REDD+ is increasing in the country and the present proposal is to use markets to finance positive change in forest carbon stocks and funds to maintain the stocks.

In addition, an operating fund is required for the ongoing sustainable forest management efforts to enhance carbon stocks and contribute to continued delivery of the full range of goods and ecosystem services. The current levels of assistance under overseas development assistance are largely insufficient for meeting the sustainable forest management objectives in the country. Funding should be increased under existing financial mechanisms such as the Program on Forests (ProFor), National Fire Protection Association (NFPF), Official Development Assistance-World Bank (ODA-WB), Japan International Cooperation Agency (JICA), and United Nations Development Programme (UNDP). India should tap into new sources of finance from the World Bank FCPF. Finally, implementing REDD+ can prove to be an excellent opportunity for communities to secure additional financial resources from trading of enhanced carbon thereby enhancing their socioeconomic condition. A market-based approach would bring more efficiency and accountability to the entire system. Discussions include the use of public funds for capacity building, pilot tests, preparing carbon inventories, and monitoring and market-generated funds for payments to stakeholders to tackle the drivers of deforestation and provide alternative livelihoods.

Bottlenecks and Issues

Although REDD+ is at present at the negotiation stage, many challenges and obstacles remain. Among others, there is a lack of established approved methodologies, lack of technical skill in assessing carbon stocks, lack of awareness among communities and stake-holders, and lack of capacity in conservation, protection, and sustainable management of forests. Documentation such as micro plans at the village level, fear of releasing information/data, and transfer of key field forest officials are additional constraints faced by REDD+ activities in the country.

REDD+ projects face risks, mainly due to non-permanence. Compared to regular carbon credits, the market for temporary credits from the forestry sector is comparatively very low cost. One of the major issues in this is the EU's decision to exclude forestry credits from the EU Emissions Trading Scheme, which currently holds the major share of the overall carbon market. The reasons provided are the different priorities for climate policy and risks associated with forest carbon sinks. Since the trading scheme covers much of the European private sector, this EU policy keeps forestry credits out of reach.

Immediate Outlook

The established methodology for REDD+ projects should be as simple as possible involving the communities, indigenous people, and civil society. There is an urgent need to identify a national-level institution or research organization for monitoring, reporting, and verification (MRV) of REDD+ projects on the basis of criteria and indicators developed for sustainable forest management, carbon assessment, and other ecosystem services. The MRV process should be as simple as possible so that the project owners can develop and monitor a project by themselves.

The Ministry of Environment and Forest (MoEF) of the Government of India should take the initiative to build the capacity of the state forest department with respect to MRV and assessment of carbon and other ecosystem services.

The scale of projects should be first at the project level and then extended at the state or national level to ensure smooth and effective implementation and coordination of the project. The baseline reference level should be 1990, as larger activities under the aegis of sustainable forest management (SFM) started during the 1990s within the country. The project should be developed on a small scale, pilot-based, so that benefits can be transferred easily to the communities. Village forests, community forest resources, forest areas assigned to JFM, and areas of a similar nature may be taken as the unit for implementing a REDD+ Project. The REDD+ approach should incorporate benefits for improving livelihoods, biodiversity conservation, and ecological security, in addition to the carbon benefits.

Definitions of forest, deforestation, and degradation, should be uniform across the globe; India should clearly define these terms in the context of REDD+ and submit the proposed definitions to the UNFCCC. Carbon should be assessed by adding above ground, below ground, and soil carbon. Both above and below ground carbon should be calculated as per the IPCC guidelines. There is a need to organize and reorganize capacity building programmes for forest staff, local communities, and all project stakeholders on MRV and assessment of carbon and other ecosystem services at national and sub-national/state level to ensure minimum transaction costs for the preparation of REDD+ projects. Each state government should establish a REDD+ cell at the state level, which will function under the national REDD+ cell. The local communities should develop projects under the guidance of the state REDD+ Cell; institutes of excellence working on forest-related issues will be identified to provide technical and methodological guidance and policy support to the national REDD+ Cell, state REDD+ cells, and local communities.

Future Prospects for REDD+

The potential of forests for mitigating climate change effects has been increasingly realized at both national and international levels. There have been continuous discussions and negotiations among developed and developing nations on the role of forestry in the mitigation of GHG emissions worldwide. REDD+ and AR CDM in the forestry sector have provided an opportunity to developing nations to take advantage of an incentive mechanism to protect, conserve, and sustainably manage their forests. This will not only provide financial incentives, but will lead to other co-benefits in the form of different ecosystem services, fuelwood, fodder, and minor forest produce.

In India, more than 273 million people depend on forests and their resources for their livelihoods, and are also involved in the management, conservation, and protection of forests under benefit-sharing mechanisms. India is expecting to enhance its biomass stock sufficiently to sequestrate 50 to 60 million t CO_2 by 2020, and approximately one billion tons of CO_2 over the next three decades. India can play an important role in the REDD+ negotiations to ensure international funding for sustainable management of forests and to also ensure financial incentives to communities for enhancing carbon stock. REDD+ is an opportunity for these forest-dependent communities to take advantage of these incentives to work towards increasing forest cover through conservation, protection, and management practices.

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Session 4:

Closing Sessions

Closing

Results of Group Sessions

During the workshop, break out groups discussed the four topics of policy development and options, financing mechanisms, technical issues and MRV, and social and environmental safeguards. The conclusions of the discussions are summarized in the following tables.

Policy development and options

Country	REDD Progress	Challenges	Scope of collaboration	Recommendations
Pakistan	• REDD+ project	• Planning, implementation, monitoring and evaluation • Lack of international modalities • High forest dependency • Poor policies • Forest fire • Institutional challenges • Different level of understanding • Standard REDD+, SES • Inadequate data • Land tenure • Designing MRV and RL/REL • Dynamics in the carbon market	• Academic and research organizations • Collaboration and cooperation at regional level • Database management • Extended capacity building at regional level • Common fund at regional level • Learning and sharing • Technology exchange • Leakage avoidance	• Should have REDD+ strategy/road map • Develop REDD+ as a national sustainable development strategy • Documentation of successful stories • Common methodology • Inclusion of women in REDD strategy development and implementation process
Bangladesh	• REDD Cell established in MoEF			
India	• Draft of REDD strategy • Piloting plan vivo in Khasi hills • Tier 3 for MRV • REDD+ cell established in MOEF			
Myanmar	• REDD+ core unity (MoECAF)			
Nepal	• REDD Cell established under MOFSC • Drafting REDD strategy • Multi-stakeholder consultation • Pilot project at landscape and watershed level • Benefit-sharing mechanism • Carbon payment • Plan vivo			

REDD+ Financing Mechanisms

Financing Source	Nature of funding	Progress made so far	Challenges	Scope for cooperation	Recommendations
Donor national level, sub-national/ province level, local funding	• Fund-based mechanism • Market-based mechanism	• Multilateral • Bilateral	• Uncertainty of international negotiation fund • Carbon market • High transaction costs • Benefit-sharing mechanism • Fund distribution • Private sector engagement in REDD+	• Learning and sharing between countries in region • Develop regional institutions for collective actions	• Regional understanding • Fund-based approach • CSR • Benefit-sharing combined with carbon and socioeconomic aspects • Develop SAARC as a platform

Way Forward

Dr VRS Rawat from ICFRE highlighted the related policies and national interest on REDD+ in India. The country has come a long way, but is still in a learning process. "In Bali, India moved from two components of degradation and deforestation to include sustainable management of resources, gender, and social inclusion with REDD – plus", he added. In Copenhagen, methodological guidance on REDD+ was introduced, and in Cancun the scope of REDD+ was decided for five elements (REDD+ strategies, drivers of deforestation and degradation, gender and social inclusion, and effective engagement of

Technical issues and MRV

Critical components	Inventory	MRV	Verification
• Availability of time series data • Trained human resources • Undefined scale (level) • Who bears the cost • Complex methodology	• Type of inventory and equipment • Human resource • Consistency of methodology • Carbon pools included in the inventory • Database management and processing • Accuracy and precision	• Measurement • Frequency of measurement and monitoring • Data precision, accuracy and validity • Methods and instruments	• Protocol of agency • Cost • Methodology • Progress – few pilot projects
Challenges		**Scope**	**Recommendation**
• RL/REL • No standard manual • Reliable data availability • Methodology – efficient and effective • Capacity of government and local communities • Uncertainty in REDD+ market • Technology transfer regionally and nationally		• SAARC/ICIMOD to share data • Facilitate/data exchange • Developing standard MRV manual	• Research and pilots initiative • Continuing piloting

Social and Environmental Safeguards

Countries	Progress so far	Critical components
Nepal	• Forest carbon trust fund (FCTF) • Institutionalized in forest operational plans • REDD piloting and studies (environmental and social)	• Tenure rights • Carbon ownership
Bangladesh	• REDD+ unit	
India	• Legal empowerment of people/communities as per Forest Act • SFM – social indicator mandatory	
Critical components		
Social safeguards	• FPIC rights of IPs (women, Dalits) • Women's rights and UN-CEDAW • Inclusive and transparent	
Environmental safeguards	• Biodiversity • NTFP • Water resources • Forest fire • Invasive species	
Challenges	• Highly technical • Balancing technical and social aspects • Integration of local reality and global requirements • Equitable transparent and fair benefit sharing that benefits the rural poor and marginalized communities • Dry zones in Myanmar	
Recommendations	• Collaborative research • Cross-country learning and experiment learning • Exposure visits for community leaders • Safeguard information system	

stakeholders) and every country was asked to develop a strategy as well as look at drivers for degradation and deforestation. Discussions at COP 17 last year covered safeguarding of information systems, the financial mechanism reference level (REL and RL), and MRV. Countries are now finally set for REDD implementation at national and sub-national levels. It is important that there is synergy between REDD+, NAPA, and LAPA. At COP 18 in Doha, a sustainable REDD financing mechanism will be discussed to implement a fully-fledged REDD+ mechanism. The issue of whether MRV needs to be a part of a national forest monitoring system or not also needs to be discussed.

Riaz Ahmad, Conservator of Forest from Sindh, Pakistan, described REDD+ as a very technical subject. Pakistan's officials are beginning to understand from experience and field visits that there is a need to shift from the traditional focus on tangible benefits to a focus on intangible benefits but it is not easy for local communities to understand. Accounting for forest services together with forest goods is a complex process. The MRV estimation method needs to be simplified. MRV involves many equations that foresters may understand, but that may confuse local people. Local communities do not understand the technicalities; the equations must be simplified. Methodological synergies are required between the Hindu Kush Himalayan countries as different countries have different settings. Cost-effective methods need to be developed and applied. The need for a reliable database is also an issue that requires more effort from all concerned. Sharing of data is very important. The carbon market remains uncertain and elusive. New and innovative approaches may be required for developing new markets. REDD+ needs to explore both financial and non-financial markets. Regional lobbying based on a common agenda is vital to present the regional cases strongly. There should be an international leader in this region; ICIMOD is in an ideal position to play this role.

Mr Hussain from UNDP – Bangladesh considered that the issues of REDD+ are new except for the community engagement in forest and natural resource management in South Asia. Communities are the key managers of forests and natural resources. The ownership of community-managed forest resources and land needs to clearly articulated. It is still unclear as to who will win and who will lose from REDD+. In a carbon market, there are multiple layers of stakeholders. Though a pro-poor agenda is common, it is possible that REDD+ may restrict the access of marginalized and poor people to forest resources. Target communities should be carefully selected taking into account their cultural, social, and economic aspects. A key issue is whether communities will be allowed to carry out the activities that they have been doing for a long time. The sustainability of payments under current projects is crucial. The benefit distribution of REDD money needs to be carefully monitored in terms of who is benefitting by how much.

Mr Mohammad Manju of UNDP-Pakistan focused on the four I's – institution, infrastructure, information, and ideas – which he considers crucial to the successful of any REDD activity implementation. It is important to consider local livelihood strategies to ensure active community participation in projects. Social safeguards (also mentioned at Cancun COP 16) should be ensured by REDD and REDD-related projects. In this regard, capacity development of all stakeholders is a prime issue. As per UN REDD+ policy; countries that seek REDD+ financing have to have these safeguards as a prerequisite.

Mr Dil Khatri from Forest Action Nepal noted that the benefits from REDD need to be equitably distributed, and that it is important that local communities receive most of the carbon money. A governance structure and criteria for allocating funds should be balanced and prevent elites capturing the money.

Key Messages

Dr Rajan Kotru from ICIMOD summarized the key messages from the workshop in terms of policy, governance, technology/methodology, and financing. REDD is a very topical subject. He emphasized the five noble truths of REDD: 1) contributing to sustainable forest management; 2) good forest governance; 3) it is not a 'rags to riches tale' for communities or states; 4) innovative thinking on governance, equity, and poverty; and 5) forest alone cannot solve the problem of carbon emissions as deforestation and forest degradation account for less than 20% of global GHG emissions. He concluded that REDD is at a testing stage, and the piloting by different partners has brought many issues to the surface. Mainstreaming REDD is important at local, regional, national, and global scales.

Closing Remarks and Vote of Thanks

Dr Eklabya Sharma, Director of Programme Operations at ICIMOD, provided the closing remarks. The inputs from the participants and expert panellists will help frame ICIMOD's future work programme. When ICIMOD tried to work on carbon-related projects ten years ago, only a few people were working on carbon budgeting. Since 2007/08, ICIMOD has been taking carbon stock measurements in community forests in close collaboration with local communities. The carbon-based work and discussions have evolved considerably since those days; this is reflected in the very rich discussions at the workshop. Much knowledge has been generated and public awareness has risen significantly. The progress could have been better with a clearer vision of REDD+ that includes other land use systems in addition to forests. He reminded the audience that about 50% of land in the Hindu Kush Himalayan region is rangeland or pasture land. There is a need to see and explore potential carbon sequestration in total, not just in forest land. REDD+ should be seen as both a mitigation and an adaptation measure in the context of climate change. While the whole range of institutions and policies in the REDD architecture is complicated, it needs to be simplified by addressing target communities in the region. Dr Sharma emphasized that the results from pilot projects need clear linkages with policies. The REDD+ pilot in Nepal is linked to the policy of the Ministry of Forest and Soil Conservation and its action plans. Communities are critical, and there is a need to think more seriously of livelihoods and the rights of people, particularly for benefit sharing.

Prof Wu Ning, Programme Manager at ICIMOD, considered that the regional learning forum had helped all participants to improve their understanding of the national strategies and policy options for developing a REDD+ framework. The workshop had successfully consolidated the knowledge generated so far in the region. He hoped this would facilitate appropriate policy development in all the Hindu Kush Himalayan countries and that local communities would benefit from REDD initiatives. Regional cooperation can help identify and implement social and environmental safeguards in regional REDD strategies. Prof Wu Ning thanked all the delegates and organizers and then declared the workshop closed.

Annexes

Annex 1: Workshop Schedule

Opening and Reception Dinner: Wed 25 July 2012		**Venue: Hotel Himalaya**
6:30 – 7:30 evening	Opening Session • Welcome – Dr David Molden, DG ICIMOD • Statement – Mr Bibek Chapagain, Norwegian Embassy • REDD+ in South Asia – Dr Bhaskar Karky, ICIMOD • Statement from Chairperson, Mr Nabin Ghimire, Secretary, MFSC • Workshop purpose and structure – Dr Laxman Joshi, ICIMOD • Vote of thanks – Dr Madhav Karki, DDG ICIMOD	Chair: Mr Nabin Ghimire, Secretary, MFSC Rapporteurs: Sunita Chaudhary, Navraj Pradhan MC: Naina Shakya
7:30 – 8:30 evening	*Reception dinner*	Hotel Himalaya
Day 1: Thursday 26 July 2012		**Venue: ICIMOD**
8:30–9:00	Registration	
9:00–11:00	Session 1: Country presentations • Introduction of participants • 4 presentations (each 15 min with 5 min Q&A) • Nepal: MFSC, REDD Cell • Pakistan: IGF • Myanmar: • India A: ICFRE • Discussion • Session summary from Chairperson	Chair: Dr Madhav Karki, DDG ICIMOD Rapporteurs: Eak Rana, Dipshikha Gurung
11:00–11:30	*Refreshment and photo session*	
11:30–12:45	Session 2: Case studies • Case Study 1: FECOFUN-ANSAB-ICIMOD • Case Study 2: WWF, Pakistan • Case Study 3: CHEA, India (Dr Phuskin Phartiyal)	Chair: Resham Dangi, MFSC Rapporteurs: Laxmi Dutt Bhatta, Dr Manohara Khadka
12:45–13:45	*Lunch*	
13:45–14:45	Session 2: Case studies (cont.) • Case Study 4: Vietnam (Dr Surendra Joshi, SNV) • Case Study 5: WWF, Nepal (Ugan Manandhar) • Discussion • Session summary from Chairperson	(Continuation)
14:45–16:45	Session 3: Break out groups • 2 groups per topic • Topic 1: Policy development and options • Topic 2: Financing mechanism	Moderator and reporter to be selected by group (Support: Utsav Maden, Kamal Aryal, Sunita Chaudhary, Basant Pant)
17:00	Bus leaves for hotel	

Day 2: Friday 27 July 2012		Venue: ICIMOD
8:30–10:30	**Session 4: Technical Methodology** • Community Carbon Assessment: ANSAB: (Dr Nabin Joshi) • Community MRV protocol (Shambhu Dangal , ERI) • Geospatial Perspectives of MRV Process (Hammad Gilani, ICIMOD) • Impact Assessment in REDD+ benefit sharing (Dr Bishnu Pd. Sharma, SANDEE) • India: Dr J.V. Sharma, TERI • Discussion • Session summary from Chairperson	Chair: Dr T.P. Singh, Asst. DG, ICFRE Rapporteurs: Dr Laxman Joshi, Seema Karki
10:30–12:15	**Session 5: Break out groups** • 2 groups per topic • Topic 3: Technical issues, MRV • Topic 4: Safeguards (social and environmental)	Moderator and reporter to be selected by group (Support: Neha Bisht, Madhav Dhakal, Basant Pant, Navraj Pradhan
12:15–13:00	*Lunch*	
13:00–14:30	**Session 6: Summary from Groups** • Group presentations • Plenary Discussion	Chair: Prof Bao CAS China Rapporteurs: Eak Rana, Dipshikha Gurung
14:30–15:30	**Session 7: Panel – Way forward** • 5 panellists • Questoin and answers • Plenary Discussion	Chair: Dr Eklabya Sharma, DPO ICIMOD Rapporteurs: Dr Suman Bisht, Laxmi Dutt Bhatta
15:30–15:50	*Refreshments*	
15:50–16:50	**Session 8: Closing** • Key workshop messages: Dr Rajan Kotru, ICIMOD • Country Representatives: Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan • Remarks from Chairperson • Vote of Thanks: Dr Wu Ning, ICIMOD	Chair: Dr David Molden, DG ICIMOD Rapporteurs: Kamal Aryal, Utsav Maden
17:00	Bus leaves for hotel	

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