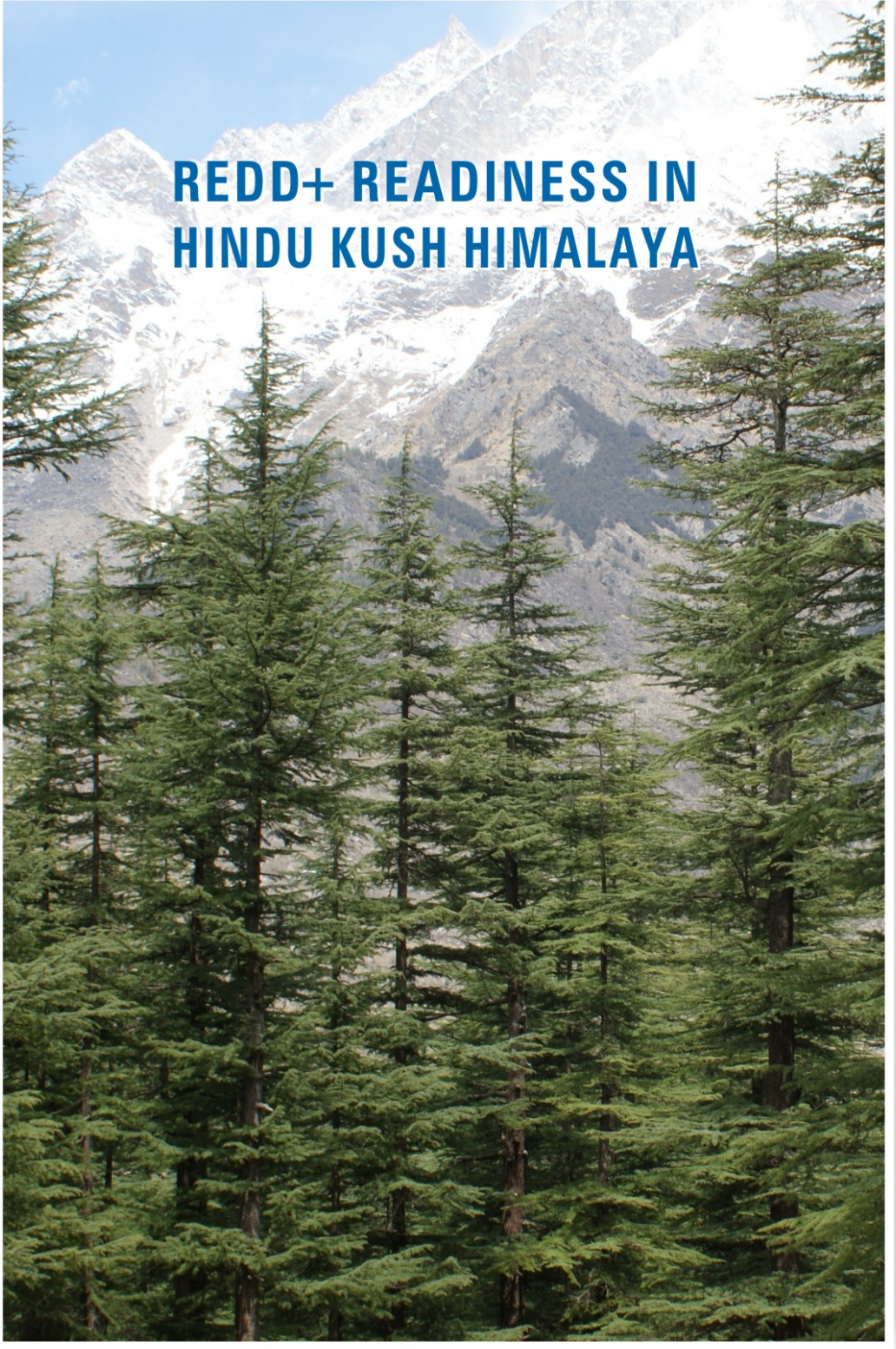
REDD+ READINESS IN HINDU KUSH HIMALAYA



ICIMOD

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On behalf of:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

of the Federal Republic of Germany

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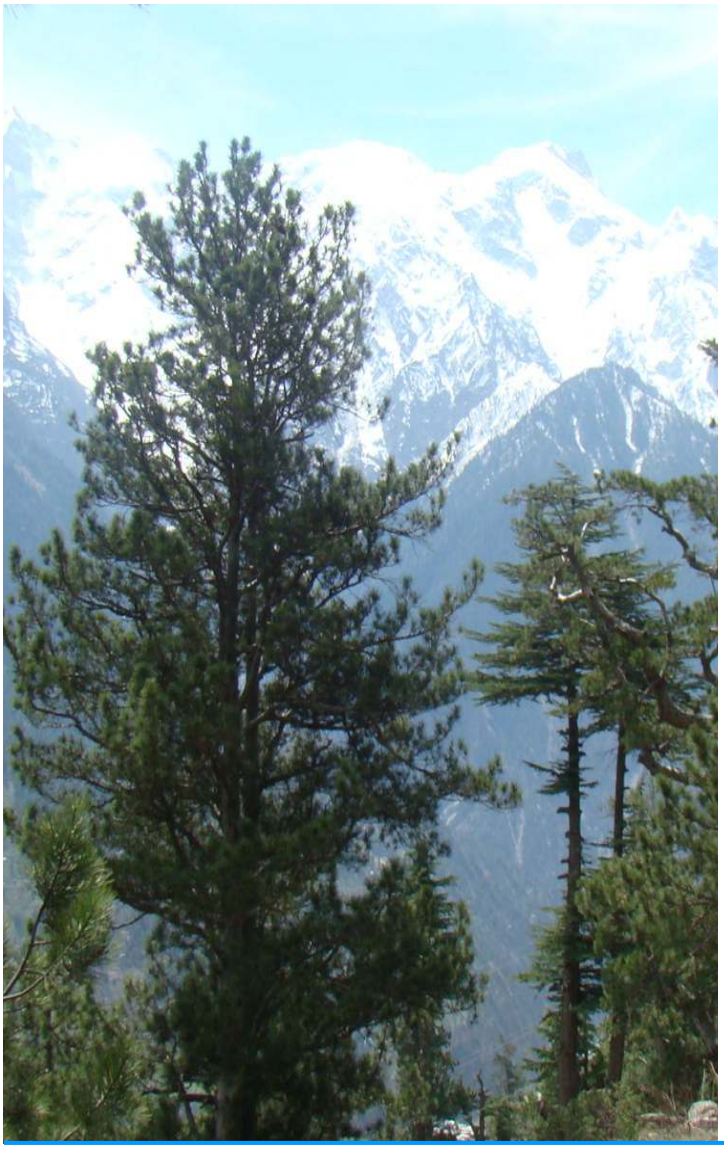

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ICIMOD

Message

It gives me great pleasure to acknowledge the support extended by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Government of Germany, through the International Climate Initiative (IKI) to the four regional member countries of ICIMOD namely Bhutan, India, Myanmar and Nepal, to further conservation of natural carbon sinks in the Himalayas.

The REDD+ Himalaya project was rolled out in 2014 and has successfully concluded in 2020. The project was coordinated by ICIMOD with technical support from GIZ. This final publication produced by ICFRE and ICIMOD stands as a testimony to the fruitful regional cooperation through a south-south learning platform between the REDD+ focal points in these countries to work together to develop their specific readiness road maps.

I would like to commend and congratulate our partners Forest Resources Management Division (FRMD), Department of Forests and Park Services, Royal Government of Bhutan, Indian Council of Forestry Research and Education (ICFRE), Ministry of Environment, Forest and Climate Change, Government of India; Forest Research Institute (FRI), Ministry of Natural Resources and Environmental Conservation, Government of Myanmar, and REDD Implementation Centre, Ministry of Forests and Environment, Government of Nepal. The progress and achievements of the project with BMU assistance are well documental in this publication. I would also like to thank the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH for providing technical support to this programme.

With this project coming to a close, all the participating countries have made significant progress in building capacity, reforming policy and strategies, and restructuring institutions to comply with the Paris Agreement commitments.

Building on this IKI Support for developing a socially and environmentally sound forestry sector to mitigate and adapt to climate change, ICIMOD will continue to work with our partners in the region. In future, we will assist in leveraging climate finance in the forestry sector by putting local communities at the centre.

Thanking you,

Pema Gyamtsho, Ph.D.
Director General

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Message

In the year 2015, Parties to the UNFCCC agreed on the Paris Agreement and set a target of limiting the global mean temperature well below 2° C above pre-industrial level, while pursuing efforts to limit it to 1.5° C. IPCC Special Report on Global Warming of 1.5°C released in 2018 states that the world has already warmed by 1° C due to anthropogenic activities and some area have already attained 1.5° C. As a result, climate change is already affecting ecosystems, people and their livelihoods across the globe, with extreme climatic events. The Paris Climate Agreement of 2015 also recognizes role of forests as carbon sink for climate change mitigation.

Global community is seriously engaged in adopting various actions aimed at climate change mitigation and adaptation. Reducing emissions from deforestation and forest degradation along with conservation of forests collectively known as REDD+ is one such activity under UNFCCC which has large potential to achieve climate change mitigation and adaptation objectives through better management of forests and at the same time providing livelihood opportunities to the forest dwelling communities. REDD+ intends to provide financial incentives to the local communities for their role in conservation of forests and enhancement of forest carbon stocks.

Hindu Kush Himalaya because of its very unique location in the globe is most vulnerable to climate change. The Indian Himalayan Region covers about 17% of the total geographical area of the country. It has high forest cover with more than 41.5% of its geographical area, and provides important ecosystem goods and services for the sustenance of the mountain people. In Indian Himalayan region, people are largely dependent on forests for their livelihoods and have always

showed a strong bond with forests in their daily life. *Chipko* Movement is one such as example of forest conservation movement by the local communities of the Garhwal Himalaya. Any climate change impact on forests will have adverse implications on the livelihoods of forest-dependent communities of the Himalayan region.

ICIMOD and GIZ in partnership with REDD+ focal points in four Hindu Kush Himalayan countries, namely Bhutan, India, Myanmar and Nepal jointly implemented transboundary REDD+ Himalaya Project. The project mainly focused on capacity building, technology sharing and knowledge dissemination on REDD+ through South-South cooperation. ICFRE in collaboration of ICIMOD and GIZ facilitated the project partner countries to share their experience of REDD+ with global audience at the various COP meetings of UNFCCC. The project has increased capacity of stakeholders at different levels, developed knowledge products, guidelines and action plans on REDD+ and institutional mechanism for implementation of REDD+ actions.

I compliment the team of experts from the ICFRE, ICIMOD and GIZ-GmbH, Nepal for bringing out a publication on REDD+ Readiness in Hindu Kush Himalaya under the REDD+ Himalaya Project. I am hopeful that this publication will serve as a guiding document for implementation of REDD+ activities in the Hindu Kush Himalaya.

Arun Singh Rawat

Dr. Elke Förster
Country Director
GIZ-Nepal

Foreword

"In my role as Country Director for GIZ Nepal I am particularly grateful for having this regional programme in our portfolio. I am convinced that close cooperation on climate change impacts in the Hindukush Himalaya Region can facilitate for the region to become a globally recognized player in combating climate change.

We all know that forests are important for combatting climate change and its impacts. About one third of the earth's surface is covered by forests. Their value is immeasurable: around 80 per cent of known animal and plant species outside the oceans are found in forests. At the same time, worldwide, forest provides a livelihood for one in five people.

Every year, however, more than 7.6 million hectares of forest are lost - a large part of it in the tropics and subtropics. The loss of forest areas also leads to the loss of a major carbon sink, while deforestation releases additional greenhouse gases, which contribute to climate change. Forest conservation is an important measure in the fight against climate change: natural regeneration, reforestation and agroforestry measures that combine crops with trees can bind carbon in the long term. Erosion control and improved water availability also make a significant contribution to climate change adaptation.

At international level, there are important agreements on the protection, sustainable use and restoration of forests. These include the New York Declaration on Forests (NYDC) adopted in 2014, which aims to put a complete halt to deforestation. Furthermore, in 2015, the Article 5 on REDD+ was negotiated in the Paris Agreement to the UNFCCC which finalized a 10-year cycle of negotiations on rulebooks, governance and implementation modalities.

Nevertheless, the ambitious goals for forest protection have yet to be adequately implemented. Partner countries have the political will, but still struggle with weak governance in the forestry sector. Furthermore, a lack of coordination of individual measures are slowing down progress towards achieving our common goals.

Therefore, it is encouraging to see that the countries of the Hindukush Himalaya have achieved a sizeable part of the REDD+ Readiness since 2014 and made inroads into the implementation of better forest governance. The need to improve forest governance is widely acknowledged, but difficult to achieve due to divergent interests and the complexity

of negotiating win-win solutions. Improving the quality and accessibility of information is proven to be an important first step towards improved forest governance and therefore REDD+ Implementation.

The articles in this compilation of REDD+ Readiness actions showcase a rich diversity of examples of how different aspects of REDD+ have been addressed in various settings. This issue brings together experiences from a wide range of REDD+ Readiness initiatives. Some relate to new lessons from relatively well established approaches to REDD+ and forest governance reform, such as community forestry, while others are show-casing how to link nature-based solutions and recovery after economic and societal shocks. The articles show that international instruments — such as REDD+ have been and continue to be important drivers to address governance in the forest sector.

We thank all the authors for their contributions and the editors for producing this publication. We also thank the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) for their generous support. ICFRE and ICIMOD are acknowledged for their support in the editing and layout.

Finally, let me thank all the actors in the Hindukush-Himalaya Region who contributed to the success and continue with compassion and creativity to facilitate for the region to become a globally recognized successful contributor in combating climate change".

Dr. Elke Förster

Preface

About one quarter of anthropogenic greenhouse gas emissions are emitted from land use change and agriculture activities. Deforestation in many developing countries is still persistent despite of the well-known role of forests in greenhouse gas emission reduction. Reducing emission from deforestation and forest degradation in developing countries (REDD) was introduced as a climate change mitigation option under the United Nations Framework Convention on Climate Change (UNFCCC). Later on, the concept of REDD was upgraded to REDD+ with inclusion of conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks. COP 16 of UNFCCC was a major milestone in REDD+ negotiations and REDD+ activities were finalized which were agreed in COP 19 as a 'Warsaw Framework for REDD+'. The Paris Agreement also recognizes the role of forests as carbon sink for climate change mitigation that include all activities of REDD+.

REDD+ is primarily a climate change mitigation effort. However, an effective REDD+ programme will provide a variety of income generation opportunities, livelihoods security, resilience and social wellbeing benefits. Ecosystem services provided by forests, and their continuous supply are now becoming increasingly important in the context of adaptation to climate change. REDD+ programmes and actions contribute towards mitigation and adaptation to climate change and at the same time provide financial incentives to the participating communities.

Globally many countries are now accessing finance for REDD+ readiness and results-based payments to incentivize action for emission reductions from one of the climate financing instruments such as the Green Climate Fund, Forest Carbon Partnership Facility, and other similar financing mechanisms. A number of international initiatives have been providing support to these efforts, including UN-REDD Programme, Forest Carbon Partnership Facility and Forest Investment Programme of the World Bank, and International Climate Initiative of Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany to name a few. This publication documents the assistance received from International Climate Initiative of the Government of Germany for Bhutan, India, Myanmar and Nepal for building a socially and environmentally sound REDD+ framework in these four Hindu Kush Himalayan countries.

The International Centre for Integrated Mountain Development and the German Development Agency (GIZ) GmbH in collaboration with four Hindu Kush Himalayan (HKH) countries namely, Bhutan, India, Myanmar and Nepal have implemented an International Climate Initiative sponsored project titled 'REDD+ Himalayas'. It has provided support for developing and implementing of REDD+ actions which were focusing on capacity buildings, technology sharing and knowledge dissemination. The outcomes of this programme are enhanced capacity for development and implementation of REDD+ Strategy or Action Plan at national and sub-national and improved understanding of scientific knowledge for precise estimation of forest carbon stocks.

HKH countries are preparing strategies for implementing REDD+ activities and simultaneously developing the capacity of the stakeholders at different levels so that REDD+ activities can be implemented effectively and efficiently. With support from multilateral, bilateral and domestic instruments HKH Countries have made progress in developing the key requirement viz. National REDD+ Strategy or Action Plan, Forest Reference Emission Level/ Forest Reference Level (FREL/FRL), National Forest Monitoring System and Safeguards Information System for implementation of REDD+ activities. Some of the countries are also ready in piloting of REDD+ demonstration projects. The HKH countries have also opted for various forestry-based options including REDD+ in achieving their Nationally Determined Contribution targets committed under the Paris Agreement.

The Forest landscape restoration (FLR) approach aims to restore ecological integrity at the same time provide economic benefits to the communities and climate change benefits through carbon sequestration across deforested or degraded forest landscapes. FLR become a global initiative for addressing climate change issue as well as helpful in meeting international obligations of the countries such as Bonn Challenge Targets, Nationally Determined Contributions, Sustainable Development Goals, Aichi Biodiversity Targets and Land Degradation Neutrality targets by 2030. HKH countries are already commencing the FLR activities under the REDD+ framework which provides a considerable opportunity in degraded forest land restoration. Countries can best use the south-south platform to share their sustainable land management related best practices in degraded forest landscape restoration so that, other countries can replicate or modify the practices for upscaling.

Bhutan has 71% of the area under forest cover and implementation of REDD+ activities in Bhutan will further improve and strengthen the existing policies, programmes, systems and capacity to protect and conserve Bhutan's pristine environment and uphold the Constitutional mandate of maintaining 60% forest cover for all times to come. Bhutan has developed all the key elements of REDD+ and submitted its FREL/FRL to the UNFCCC which is under technical assessment.

India is among the top ten forested countries of the world with 2% of the total global forest area. India is one of the few countries where forest and tree cover has increased in recent years transforming the country's forests into a net sink of carbon dioxide owing to national policies aimed at conservation and sustainable management of forests. Government of India's long-term goal is to bring 33% of its geographical area under forest cover eventually. India has developed its National REDD+ Strategy and Forest Reference Level. India has robust forest monitoring system and is among the few countries which are regularly using satellite based remote sensing technology in detecting forest cover changes. India is assessing its forest cover since 1987 using remote sensing satellite data. India is in the process of developing safeguards information system as per the Cancun Agreements.

Forest cover of the Myanmar is 42.19% of the total geographical area of the country. Myanmar has developed Forest Reference Level, draft National Forest Monitoring System and Safeguards Information System, and development of National REDD+ Strategy is under process.

In Nepal, forest and other wooded land represent 44.74% of the total area of the country. Nepal has made a significant progress in REDD+ readiness through various readiness activities. It has developed National REDD+ Strategy and National Forest Reference Level. Strengthening of National Forest Monitoring System and Safeguards Information System are under progress.

The governments encourage that gender mainstreaming is required for successful implementation of REDD+ programmes in the HKH countries. The role of mountain women as a forest dweller and user of forest derived natural resources with respect to fulfilling substantial responsibilities towards their families for sustainable livelihoods and food security make them the real forestry managers.

Additionally, the interaction between land use systems needs to be taken into account. Grassland is one of the most widely distributed ecosystems and plays an important role in the global terrestrial carbon cycle. About 34% of the global terrestrial carbon is stored in grasslands and a significant amount of the carbon sequestered by the grassland vegetation is stored in the soil. Knowledge of carbon stock and its dynamics in grassland ecosystems not only helps our understanding of the potential role of grassland ecosystems in HKH's terrestrial carbon cycle, but also provides a basis for sustainable use of limited grassland resources in HKH.

The COVID 19 pandemic brings about global economic depression, communities in the Hindu Kush Himalayan region will have to fend for themselves searching for local solutions to this global problem. Relying on nature-based solutions by exploiting human capital and natural capital can be one strategy forward. This strategy makes local economies resilient to future shocks, strengthens domestic production and balances the marco-economy and leads the country towards a green economy trajectory. Implementation of well-structured REDD+ programmes can provide nature-based solution for the fallouts of such types of pandemic in HKH.

While HKH countries have progressed the REDD+ agenda, supported by a small number of bilateral donors and multilateral agencies providing direct incentives for various preparatory phases of REDD+, REDD+ has not yet delivered the transformational change culminating into result-based finance for HKH countries. Fulfilling the potential of REDD+, should be an urgent priority for the international community. Significant amount of results-based payments from both public and private sources is needed to give HKH countries additional incentives and confidence to undertake REDD+ actions. Through the regional scale REDD+ programmes participating countries can obtain results beyond REDD+ expectations as landscapes are better conserved and managed for sustaining ecosystem goods and services to improve livelihoods and

enhance ecological integrity, economic development, and socio-cultural resilience to environmental changes.

The Governments of HKH regions need to recognise that REDD+ will continue to play an important role in the post-2020 climate change regime and when implemented earnestly, participating nations and communities in the region will receive the climate change mitigation and adaptation co-benefits. An effective REDD+ implementation in HKH region will save forests, generate ecosystem services, provide many income generation opportunities and will set countries on a sustainable development path.

This publication on REDD+ Readiness in Hindu Kush Himalaya is an effort to share the knowledge of the partner countries of the 'REDD+ Himalaya Project' on REDD+ readiness for accelerating the implementation of REDD+ activities to mitigate the impact of climate change, to promote forest land restoration, biodiversity conservation and to provide alternate income generation opportunities to the local communities.

This publication documents the impacts of the investment supported by International Climate Initiative (IKI) in these four countries and how the countries were able to benefit from the support. This IKI grant was made available by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Government of Germany through GIZ.

To bring this publication together wouldn't have been possible without the whole-hearted support and encouragement from various quarters. First and foremost, we would like to express our deep gratitude to Dr. David James Molden, the then Director General ICIMOD, Dr. Pema Gyamtsho, the present Director General, ICIMOD, Mr. Arun Singh Rawat, Director General, ICFRE, Dr. Eklabya Sharma, Dy. Director General, ICIMOD, Dr. Elke Förster Country Director, GIZ Nepal, and Mr. Anurag Bhardwaj, Director (International Cooperation) ICFRE for their guidance and continuous support enabling us to publish this work. We gratefully acknowledge the sincere efforts put in by the REDD+ Himalaya Project Teams from ICIMOD, GIZ, Bhutan, India, Myanmar and Nepal, and contributors from ICIMOD, GIZ, ICFRE, Department of Forest and Park Services Bhutan, Forest Research Institute Myanmar, REDD Implementation Centre Nepal and Chinese Academy of Science for contributing country specific chapters in this publication.

We are thankful to Dr. Vaneet Jishtu, Scientist, Himalayan Forest Research Institute, Shimla (Himachal Pradesh) for sharing his beautiful photographs of Indian Himalayan Region.

We are also thankful to all the officers and staff from ICIMOD, GIZ and ICFRE for their support and encouragement for preparing this publication.

Editors

Abbreviations

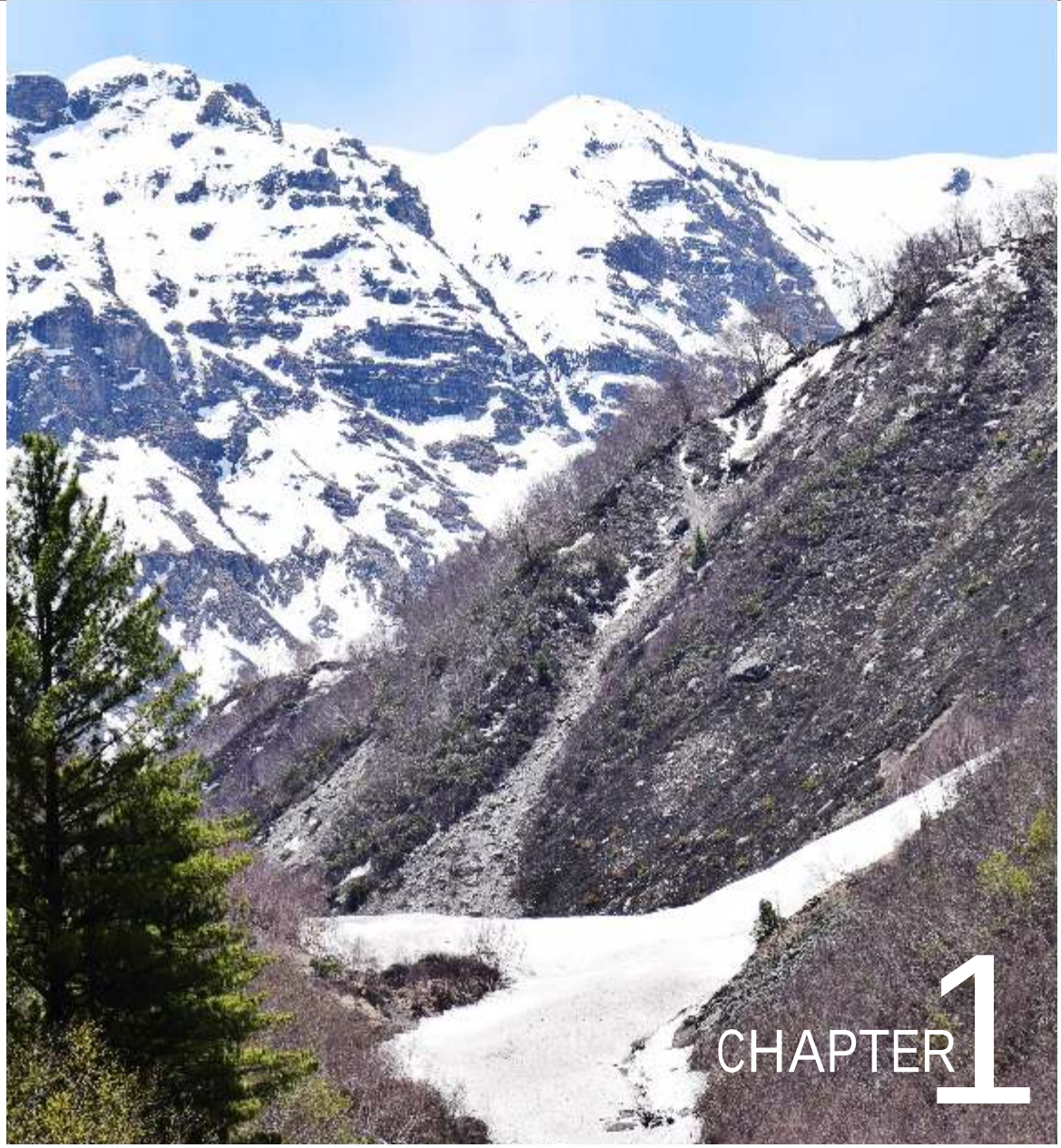
AFOLU	Agriculture, Forestry and Other Land Use
AGB	Above Ground Biomass
BGB	Below Ground Biomass
C	Carbon
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CEDAW	Convention on Elimination of all Forms of Discrimination against Women
CF	Community Forest
CF	Carbon Fund
CFUG	Community Forestry User Group
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
cm	Centimetre
COP	Conference of Parties
CSO	Civil Society Organisation
D&FD	Deforestation and Forest Degradation
DFID	Department for International Development
DoFPS	Department of Forests and Park Services
EDC	Eco-Development Committee
4E	Engaging, Efficient, Effective and Enabling
EIA	Environmental Impact Assessment
eq	Equivalent
ER	Emission Reduction
ERPA	Emission Reduction Payment Agreement
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FIMS	Forest Information Management Section

FLR	Forest Land Restoration
FREL/FRL	Forest Reference Emission Level/ Forest Reference Level
FSI	Forest Survey of India
GA	Geographical Area
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GNH	Gross National Happiness
GOM	Government of Myanmar
Gt	Giga tonne
ha	Hectare
HKH	Hindu Kush Himalaya
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICFRE	Indian Council of Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
ICS	Improved Cook Stove
IGA	Income Generation Activity
IHR	Indian Himalayan Region
IKI	International Climate Initiative
INGO	International Non-Governmental Organisation
INR	Indian Rupee
IPCC	Intergovernmental Panel on Climate Change
IPO	Indigenous People's Organisation
JFM	Joint Forest Management
JFMCs	Joint Forest Management Committees
JICA	Japan International Cooperation Agency
Kg	Kilogram
km	Kilometre
LULC	Land Use and Land Cover Change

LULUCF	Land Use, Land-Use Change and Forestry
m	Metre
MDF	Moderately Dense Forest
mha	Million Hectare
MoAF	Ministry of Agriculture and Forests
MoEA	Ministry of Economic Affairs
MoEF	Ministry of Environment and Forests
MoEFCC	Ministry of Environment, Forest and Climate Change
MoHCA	Ministry of Home and Cultural Affairs
MoWHS	Ministry of Works and Human Settlements
MRV	Measurement, Reporting and Verification
MT	Million Tonne
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
NECS	National Environment Commission Secretariat
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NGO	Non-Governmental Organization
NLCS	National Land Commission Secretariat
N_2O	Nitrous Oxide
NORAD	Norwegian Agency for Development Cooperation
NPR	Napalese Rupee
NRS	National REDD+ Strategy
NTFPs	Non-Timber Forest Products
PAMs	Policies and Measures
REDD+	Reducing emissions from deforestation and forest degradation, and role of conservation, sustainable management of forests and enhancement of forest carbon stocks
RF	Readiness Fund
RIC	REDD Implementation Centre, Nepal
R-PIN	REDD+ Readiness Plan Idea Note

R-PP	Readiness Preparation Proposal
SDC	Swiss Agency for Development and Cooperation
SFDs	State Forest Departments
SFM	Sustainable Forest Management
SIS	Safeguard Information System
SLMS	Satellite Land Monitoring System
SNC	Second National Communication
SOCS	Soil Organic Carbon Stocks
SOC	Soil Organic Carbon
SOI	Summary of Information on Safeguards
sq km	Square Kilometre
SRAP	Sub-national/ State REDD+ Action Plan
TAL	Tarai Arc Landscape
TNC	Third National Communication
t	Tonne
UCAS	University of Chinese Academy of Sciences
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	US Dollar
VCS	Verified Carbon Standard
WWF	World Wide Fund for Nature

Contents



CHAPTER 1

REDD+ AND HINDU KUSH HIMALAYAN COUNTRIES

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[2]International Centre for Integrated Mountain Development, Kathmandu, Nepal

1.1 Introduction

Land use contributes about one-quarter of global greenhouse gas emissions, notably carbon dioxide (CO_2) emissions from deforestation, methane (CH_4) emissions from paddy cultivation and ruminant livestock, and nitrous oxide (N_2O) emissions from fertiliser use (Smith *et al.*, 2014). Land use sector is collectively known as agriculture, forestry and other land use (AFOLU) results in both emissions and removals of greenhouse gases to and from the atmosphere. These fluxes are affected simultaneously by natural and anthropogenic drivers, making it difficult to separate natural from anthropogenic fluxes. Deforestation and peatland degradation contribute most of the 13% of total anthropogenic CO_2 emissions attributed in the recently published IPCC special report on Climate Change and Land (IPCC, 2019). Land ecosystems also take up large amounts of carbon as growing forests are also a natural carbon sink. According to the IPCC special report on Climate Change and Land, "reducing deforestation and forest degradation rates represent one of the most effective and robust options for climate change mitigation with large mitigation benefits globally" (IPCC, 2019).

Forests cover 31% of the global land area distributed around the globe in different continents across different geographical and ecological conditions yielding biodiversity. Almost half of the forest area is relatively intact, and more than one-third is primary forest. Deforestation and forest degradation continue to take place at alarming rates, which contributes significantly to the ongoing loss of biodiversity. Since 1990, it is estimated that some 420 mha of forest have been lost through conversion to other land uses, although the rate of deforestation has decreased over the past three decades. Globally, the forest area is decreasing, but the rate of loss has slowed. In the most recent five year period (2015-2020), the annual rate of deforestation was estimated at 10 mha, down from 12 mha in 2010-2015. However, the rate of net forest loss decreased substantially over the period from 1990 to 2020 due to reduction in deforestation in some countries, plus increases in forest area in others through afforestation and the natural expansion of forests. As a result, the net loss of forest area is less than the rate of deforestation. The rate of net forest loss declined from 7.8 mha per year in the decade 1990-2000 to 5.2 mha in 2000-2010 and 4.7 mha per year in 2010-2020 (FAO, 2020; FAO and UNEP, 2020).

Duan and Tan (2019) based on the latest annual data published by European Space Agency, analyzed the spatial-temporal characteristics of forest cover and determined the forest transition status in developing countries from 1992-2015.

They have summarized that the forest area in developing countries decreased from 1992-2015, although the rate of decrease slowed after 2004. From 1992-2015, the total forest area in developing countries decreased from 2180 mha to 2130 mha, and forest coverage decreased from 41.2 to 40.6%. The areas of forest reduction were mainly distributed in South America, which had the largest area of forest loss (50.51 mha) and accounted for approximately 85% of total forest loss.

1.2 Evolution of REDD+ under the UNFCCC Guidance

One of the most complex issues that Parties to the United Nations Framework Convention on Climate Change (UNFCCC) had to address since the UNFCCC came into force is how to approach the land use sector including forestry and agriculture (La Vina *et al*., 2016). Forests occupy centre stage in global climate change debates due to their important role in mitigation and inextricable linkage to human survival. The unique ability of forests to simultaneously reduce greenhouse gas emissions, capture and store carbon, and also reduce the vulnerability of people and other ecosystems to climate change as well as to address both climate change mitigation and adaptation. This has increased the attention of policy makers and scientific community on forests. However, the fact cannot be denied that the changing climate regime is adversely impacting the adaptive capacity of forests, and making them increasingly vulnerable (IPCC, 2007).

The potential of forests for large scale reduction in greenhouse gases (GHGs), as well as reducing emissions from deforestation and forest degradation (REDD) has been projected as a low cost and effective strategy to mitigate climate change, if well implemented (Sathaye *et al.*, 2007, Parker and Mitchell, 2009). The Stern Review (2006) had categorically mentions that reducing deforestation is the "single largest opportunity for cost-effective and immediate reductions of carbon emissions".

Reducing emissions from deforestation in developing countries was derived from the discussion in a side event of UNFCCC since Ninth Session of Conference of the Parties (COP 9) of the UNFCCC in 2003 under the issue of 'Avoided Deforestation', 'Compensated Reduction' and 'Reducing Emission form Deforestation (RED)'. The Agenda on REDD in international climate change negotiations was introduced for discussion at the COP 11 of the UNFCCC held at Montreal in 2005. As the debates progressed, very soon the agenda of REDD came under dispute and strong criticism for its narrow and skewed focus covering only reducing deforestation and forest degradation. India lead the charge to correct the skewed focus of REDD with strong support of China, Nepal and other like minded countries (Rawat and Kishwan, 2008; Rawat, 2010).

Transformation of REDD to REDD+: Among other range of policy approaches on REDD, and simultaneously rewarding forest conservation and enhancement of forest carbon stocks, India in 2006 in COP 12 at Nairobi proposed a new potential policy approach based on socio-environmental and technological perspectives and requirements of the country a motion that was seconded by Nepal. India proposed that countries who have implemented strong conservation measures and regulations be suitably compensated under the instrument of

REDD. The potential policy approach presented by India was named 'Compensated Conservation'. The Indian approach was intended to compensate the countries for maintaining and increasing their forests as carbon pools as a result of conservation and increase/ improvement in forest cover backed by a verifiable monitoring system. The Indian approach was discussed at greater length at COP 13 in Bali (Indonesia) in 2007. India's push for inclusion of conservation and increment of forest cover as a policy approach to reduce emissions from deforestation was finally recognized and given effect to in the Bali Action Plan (Para 1(b) (iii) as *".....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 above paragraph of Bali Action Plan {paragraph 1(b) (iii)} is collectively referred to as 'REDD-plus' or 'REDD+' (UNFCCC, 2008).

REDD+: Bali Action Plan and after: The outcome of COP 13 at Bali has been very encouraging for the countries that have practised strong conservation measures in respect of their forest resources. The intense negotiations on putting the agenda of conservation on board at Bali bore fruit when the *".....role of conservation, sustainable management of forests and enhancement of forest carbon stock...."* found a place in Bali Action Plan, (Decision 1/CP.13) and COP decision on REDD (Decision 2/CP.13). The 'Bali Action Plan' of the UNFCCC mandates Parties to negotiate a post-2012 instrument to provide financial incentives for the mitigation of climate change from forest actions in developing countries. Acknowledging the key role of forests in reducing greenhouse gas emissions and mitigating climate change, by the UNFCCC (UN, 1992), Article 5 of the Paris Agreement (UN, 2015) also reaffirmed the role of REDD+ and lays out a framework for the conservation of carbon sinks, including forests, through schemes such as results-based payments 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 (REDD+). UNFCCC (2011) specifies that actions to enhance forest carbon stocks should be consistent with the conservation of natural forests and biodiversity and used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits.

The journey of evolution of REDD+ at UNFCCC negotiations is described below in nutshell:

1.2.1 Cancun Agreements on REDD+

In Cancun, Governments agreed to accelerate action to curb emissions from deforestation and forest degradation in developing countries with due technological and financial support. The Parties taking cue from paragraph 1(b)(iii) of Bali Action Plan also agreed on the list of forestry activities that will qualify for positive incentives under REDD+. Paragraph 70 of the decision 1/CP.16 of Cancun Agreements describes the five REDD+ activities as follows:

"Encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking the activities on (a) reducing emissions from deforestation, (b) reducing emissions from forest degradation, (c) conservation of forest carbon stocks, (d) sustainable management of forest and

(e) enhancement of forest carbon stocks" as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances.

In the above paragraph, activities relating to the 'plus' part of REDD+ are indicated at (c), (d) and (e). In Para 1 (b) (iii) of Bali Action Plan on REDD+, (c) above is referred to as 'the role of conservation'. This in Cancun Agreements has now been changed to measurable activity 'conservation of forest carbon stocks'. The REDD+ mechanism agreed by Parties at COP 16 of UNFCCC held at Cancun and contained in decision 1/CP.16, includes a number of principles and clauses concerning safeguards such as:

- need for good forest governance,
- respect for the rights of indigenous peoples and members of local communities, and
- protection and conservation of biodiversity and ecosystem services.

Also, countries implementing REDD+ are required to follow safeguards ensuring, for instance, the full participation of indigenous peoples, local communities and other stakeholders.

These concerns have been addressed, by adding text on safeguards which states: 'Actions are consistent with the conservation of natural forests and biodiversity, 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'. Cancun Agreements also prescribe a system for providing information on how the safeguards are being addressed and respected throughout the implementation of the REDD+ activities while respecting sovereignty.

1.2.2 REDD+ in Durban COP 17

COP 17 at Durban, negotiations on REDD+ centered around four key areas: finance, safeguards, reference levels, and measuring, reporting and verification (MRV) of carbon emissions or removals from forest activities. Parties adopted a decision on REDD+ safeguards, requiring them to submit "a summary of information on how all the safeguards established at COP 16 are being addressed and respected throughout the implementation of the REDD+ activities". Decision on forest reference levels concluded that both forest reference emission levels (a measurement of the trend in emissions from a geographical area) and/ or forest reference levels (a measurement of trend in emissions and removals from a geographical area) are required to be established as benchmarks for assessing performance of a country's REDD+ activities. Durban negotiations could not clearly establish a financing mechanism and the issue of measuring, reporting, and verification (MRV) of REDD+ actions was also left largely unanswered.

In Durban, nationally appropriate mitigation actions (NAMAs) were accepted as a mechanism for developing country parties (non-Annex I) to achieve self-imposed, and currently voluntary, emission reduction goals. A range of mitigation activities, including REDD+ were accepted as eligible NAMAs.

1.2.3 REDD+ in Doha COP 18

On methodological guidance for activities relating to REDD+, Parties stressed that there was large volume of work on this issue, particularly MRV and national forest monitoring systems. Despite intense negotiations on the agenda, there was no agreement among the Parties on MRV. On the issue of REDD+ finance, no concrete

decision could be reached, and Parties agreed to undertake a work programme on results-based finance in 2013 capable of supporting the full implementation of the activities referred to in decision 1/CP.16, paragraph 70 (REDD+ activities). COP 18 in Doha also decided that the aim of the work programme was to contribute to the ongoing efforts to scale up and improve the effectiveness of finance for REDD+ activities, taking into account decision 2/CP.17, paragraphs 66 and 67, and also wide variety of sources in paragraph 65, including:

(a) Ways and means to transfer payments for results-based actions,

(b) Ways to incentivize non-carbon benefits, and

(c) Ways to improve the coordination of results-based finance.

1.2.4 REDD+ at COP 19 and Warsaw Framework

In Warsaw country Parties approved a package of decisions, named as Warsaw Framework for REDD+ that addresses a series of methodological guidance, institutional arrangements and results-based finance. The highlights of the package 'Warsaw REDD+ Framework' are as follows:

a) Results-based finance for the full implementation of activities: Results-based finance provided to developing country parties for the full implementation of REDD+ activities may come from a variety of sources, public and private, bilateral and multilateral, including alternative sources. Developing country Parties seeking results-based payments should provide the most recent summary of information on how all REDD+ safeguards have been addressed and respected in implementation of REDD+ activities. It was also decided to establish an information hub on the web platform on the UNFCCC website as a means to publish information on the results of REDD+ activities and corresponding results based payments.

b) Institutional arrangements for REDD+ finance: Interested REDD+ developing country Parties will have to designate a national entity or focal point. The national entities or focal points may, nominate their entities to obtain and receive results-based payments, consistent with any specific operational modalities of the financing entities providing them with support for the full implementation of the REDD+ activities.

c) Methodological guidance for REDD+

(i) Measuring reporting and verification (MRV): MRV of REDD+ activities is to be consistent with guidance provided in decision 4/CP.15. The data and information used by Parties in the estimation of anthropogenic forest-related emissions should be transparent and consistent over time and with the established forest reference emission levels and/ or forest reference levels; and data and information should be provided through the biennial update reports by Parties.

(ii) Guidance and procedure for technical assessment of forest reference emission levels/ forest reference levels: The COP decision on this issue adopted the guidelines and procedures for the technical assessment of submissions from country Parties on proposed forest reference emission levels and/ or forest reference levels; and the UNFCCC Secretariat to prepare a synthesis report on the technical assessment process.

The decision further invites Parties, in particular developed country Parties, and relevant international organizations to support capacity-building in relation to the development and

assessment of forest reference emission levels and/or forest reference levels, taking into account the work of the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention;

(iii) Timing and frequency of submission of summary of information on how safeguards are addressed and respected: Developing country Parties undertaking the REDD+ activities should provide a summary of information on how all of the safeguards are being addressed and respected throughout the implementation of the activities. The summary of information should be provided periodically and be included in national communications, or communication channels including Web Platform of the UNFCCC agreed by the Conference of the Parties.

(iv) Addressing drivers of deforestation and forest degradation: On the drivers of deforestation and forest degradation the COP, *inter alia*, encourages parties, organizations and the private sector to take action to reduce the drivers of deforestation and forest degradation, and to continue their work to address the drivers of deforestation and forest degradation and share the results of their work.

(v) National forest monitoring system: On this issue COP decision mandates development of national forest monitoring system for the monitoring and reporting of the activities, should take into account the guidance provided in decision 4/CP.15 and be guided by the most recent IPCC guidance and guidelines, as adopted or encouraged by the COP, as a basis for estimating anthropogenic forest-related greenhouse gas emissions by sources, and removals by sinks, forest carbon stocks and forest-area changes.

Further, it also decides that robust national forest monitoring system should provide data and information that are transparent, consistent over time, and are suitable for MRV of anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks and forest-area changes resulting from the implementation of the REDD+ activities, consistent with guidance on MRV.

1.2.5 REDD+ at COP 20 in Lima, PERU

REDD+ negotiations during COP 20 in Lima was focused on additional guidance on developing REDD+ safeguards information system (SIS) and non-market based approaches for REDD+. There were widely different views among developed and developing country Parties on this agenda item. Most of the developing country Parties including India were of the opinion that enough guidance is already agreed in Cancun, Durban and Warsaw hence there is no need for further guidance while developed country Parties viewed further guidance as helpful for countries to level off expectations and clarify understanding reporting requirement on safeguards. No agreement could be reached on further guidance on SIS.

1.2.6 REDD+ at COP 21 and Paris Agreement

Forestry negotiators were keen on having a strong decision on REDD+ under the Paris Agreement. During the course of negotiations, some countries were in favour of a language for establishing of a standalone 'REDD+ Mechanism' as an Article. Most developed countries wanted reference of REDD+ under mitigation. The Paris Agreement recognizes role of forests as carbon sink for mitigation of climate change, and devoted a whole section (Article 5) giving equal weightage to all components of REDD+ *i.e.*, reducing emissions from deforestation and forest degradation (REDD), and role of conservation, sustainable management of forests and

enhancement of forest carbon stocks (+). Paris Agreement included a standalone article for REDD+ without mention of a REDD+ mechanism. Article 5 of the Paris Agreement encourages all Parties, developed and developing countries, to take action to conserve and enhance emissions sinks and reservoirs, including forests. It also encourages countries to "take action to implement and support, including through results-based payments" for REDD+ activities. The overarching COP "decision" also recognised "the importance of adequate and predictable" finance for REDD+ activities.

Although the broad rules and methodological guidance for 'REDD+ were already agreed under 'Warsaw Framework for REDD+' and other relevant COP decisions, legitimizing and 'regulating' REDD+ activities under the Article 5 of the Paris Agreement was a strong political signal. This will give the added confidence to developing countries to continue with REDD+ strategy and readiness activities. Recognition of REDD+ under Article 5 of the Agreement and para 55 of the decision text will further boost REDD+ actions in meeting forest based Nationally Determined Contribution (NDC) targets of the developing countries. Many developing countries in their NDC view, REDD+ as a strategy for NDC compliance. However, the dialogue continues on how to avoid REDD+ emission reduction from NDC target to avoid double counting.

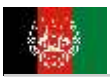
1.3 Deforestation and Land Degradation in Hindu Kush Himalaya

Land use and land cover change (LULCC) are the primary cause of land degradation, altering ecosystem functions and services, thus affecting the abilities of ecosystems to support human needs both locally and downstream. Changes in LULCC in Hindu Kush Himalaya (HKH), as elsewhere, are caused by a combination of natural drivers such as climate change and human activity such as land conversion. The HKH encompasses a total land area of 340 mha, more than half of which is rangeland, specifically grasslands and shrubland. In addition, forests occupy approximately 14% of the region, comprising broad-leaved forests, needle-leaved forests and plantations. Around 25% of the total geographical area (TGA) is classified as agricultural land. Wetlands cover about 10% of the TGA of HKH. The most significant LULCC in recent decades has been caused by degradation of grasslands and deforestation at lower altitudes (Wester *et al*., 2019). Other significant transitions have been the transformation of forest and grassland to farmland, shrinkage of wetland, and LULCC related to urban and infrastructure developments (Cui and Graf 2009; Jin *et al*., 2010). However, the recent implementation of large-scale ecological restoration programmes in HKH countries have slowed and sometimes even reversed the trend of degradation (Cai *et al*., 2015).

Exploitation of natural resources is one of the major environmental problems and drivers of change in mountains. Over-exploitation includes the destruction of forest and shrublands for fuelwood and for commercial timber collection, overharvesting of non-timber forest products such as medicinal plants, overgrazing, and unsustainable and/ or illegal mining (Uniyal *et al*., 2002; Shrestha and Dhillion, 2003; Dhanai *et al*., 2015; Shrestha and Bawa 2015). In addition, warm-temperate coniferous forest has nearly disappeared from the south-east Tibetan Plateau, mostly due to commercial logging before the end of the 1990s (Cui and Graf, 2009). An annual loss of 0.2% in forested area has been reported for the Indian mountains (Reddy *et al*., 2013) and of 0.3% for Myanmar (Leimgruber *et al.*, 2005). However, forest cover in Bhutan is increasing at an annual rate of 0.22% (Gilani *et al.*, 2015).

1.4 Strengthening REDD+ through Nationally Determined Contributions of Hindu Kush Himalayan Countries

Conference of Parties to the UNFCCC invited all country Parties to initiate domestic preparations for their Intended Nationally Determined Contributions (INDCs) towards achieving the objective of the Convention and to communicate before the Paris COP of UNFCCC. The Nationally Determined Contributions (NDCs) would outline the post-2020 climate actions, country Parties intend to take under the Paris Agreement. Actions to reduce emissions derived from deforestation and forest degradation and increase forest area to sequester carbon in many countries' pledges to the UNFCCC as part of their NDCs. The HKH countries have also communicated their NDCs to the UNFCCC. Analyses of their NDCs with special reference to forestry sector are as follows:



1.4.1 AFGHANISTAN

Forests in Afghanistan are net source of CO_2. Afghanistan's overall GHG emission figures demonstrate that 'Land-Use Change and Forestry' and 'Energy' sectors are the most important sources of CO_2 emissions. Among the range of key actions identified in Afghanistan's National Adaptation Plan is regeneration of at least 40% of existing degraded forests and rangeland areas. On the condition of meeting financial and technical support a relatively reduction in greenhouse gas emission is achievable through meeting Afghanistan's financial, technical, and technological needs in energy, forest and rangeland, industrial process and extractive industry, agriculture and livestock, and waste management sectors[1].

Afghanistan's NDC is primarily focused on sustainable process and development initiatives based on the outcomes of 2015 national consultation on low emission development strategies and nationally appropriate mitigation actions. Land use, forests and rangelands are the areas that will have special attention in the NDC. However, no quantitative figures for CO_2 mitigation through this process are provided.

1.4.2 BANGLADESH

Climate change adaptation has been identify as a key priority and the country has already undertaken initiatives to mainstream adaptation into national development such as in the water, health, forestry, agriculture and more prominently in the infrastructure sectors[2]. Bangladesh NDC proposed some possible conditional action-based contributions in land-use, land use change and forestry sector. It proposed (i) continuation of coastal mangrove plantation, (ii) reforestation and afforestation in the reserved forests, (iii) plantation in the island areas of Bangladesh and (iv) continuation of social and homestead forestry.

1.4.3 BHUTAN

Bhutan intends to remain carbon neutral where emission of greenhouse gases will not exceed carbon sequestration by its forests, which is estimated at 6.3 million tonnes of CO_2. Bhutan will maintain a minimum of 60% its total land under forest cover for all time in accordance the Constitution of the Kingdom of Bhutan. Efforts

[1] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Afghanistan%20First/INDC_AFG_20150927_FINAL.pdf*
[2] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bangladesh%20First/INDC_2015_of_Bangladesh.pdf*

will also be made to maintain current levels of forest cover, which currently stand at 70.46%, through sustainable forest management and conservation of environmental services through[3]:

- Sustainable management of forest management units (FMUs), protected areas, community forests, forest areas outside FMUs, and private forests
- Enhancing forest information and monitoring infrastructure through national forest inventories and carbon stock assessments
- Forest fire management and rehabilitation of degraded and barren forest lands

1.4.4 CHINA

China in its NDC to UNFCCC stated that it will accelerate the transformation of energy production and consumption and continue to restructure its economy, optimize the energy mix, improve energy efficiency and increase its forest carbon sinks, with a view to efficiently mitigating greenhouse gas emissions.

Through NDC, China presented its enhanced actions and measures on climate change to accelerate the transformation of energy production and consumption and continue to restructure its economy, optimize the energy mix, improve energy efficiency and increase its forest carbon sinks, with a view to efficiently mitigating greenhouse gas emissions. In its NDC, China has determined to increase the forest stock volume by around 4.5 billion cubic meters by 2030 on the 2005 level[4].

Among the wide range of policies and measures to implement enhanced actions on climate change, the proposed actions for increasing carbon sinks are: (i) to vigorously enhance afforestation, promoting voluntary tree planting by all citizens, (ii) continuing the implementation of key ecological programmes, including protecting natural forests, restoring forest and grassland from farmland, conducting sandification control for areas in vicinity of Beijing and Tianjin, planting shelter belt, controlling rocky desertification, conserving water and soil, strengthening forest tending and management and increasing the forest carbon sink, (iii) to strengthen forest disaster prevention and forest resource protection, and (iv) to reduce deforestation-related emissions.

1.4.5 INDIA

Keeping in view its development agenda, particularly the eradication of poverty coupled with its commitment to following the low carbon path to progress, India in its NDC *inter alia* communicated to create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030. A significant amount of this sink is proposed to be achieved through REDD+ programmes.

To achieve the above contributions, India is determined to continue with its on-going interventions, enhance the existing policies and launch new initiatives in the priority areas *inter alia* full implementation of Green India Mission and other programmes of afforestation. Planned afforestation has been seen as a major mitigation strategy in forestry sector. India is one of the few countries where forest and tree cover has increased in recent years transforming country's forests into a net sink. Government of India's long term goal is to bring 33% of its geographical area under forest cover eventually[5].

[3]https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bhutan%20First/Bhutan-INDC-20150930.pdf
[4]https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf
[5]https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf

1.4.6 MYANMAR

Myanmar in its NDC proposes that by 2030, its permanent forest estate target is to increase national land area as forest land with the following percentage of total land area[6]:

- 30% of total national land area under reserved forest and protected public forest
- 10% of total national land area under protected area systems

The Government of Myanmar is following the implementation plan as set out in the 30-Year National Forestry Master Plan (2001-30). To develop its capacity to meet such ambitious targets, Myanmar has set a number of activities under the plan at the national and regional level. In 2011, Myanmar joined the UN-REDD Programme and established a REDD+ Core Unit in the Ministry of Environmental Conservation and Forestry, and has the task of coordinating and guiding REDD+ related actions at national level. Myanmar developed its REDD+ Readiness Roadmap in 2013 and prioritized the activities for the implementation. In 2015 a new proposal was submitted for UN-REDD support for the Implementation of the Myanmar REDD+ Readiness Roadmap.

1.4.7 NEPAL

The NDC submitted by Nepal emphasizes, *inter alia*, to make community - based forests and watershed management climate adaptation-friendly, enhance carbon sequestration through sustainable management of forests, and support programmes that reduce carbon emissions from forest areas[7].

Considering climate change mitigation and resilience as one of the major strategic pillars, the Forestry Sector Strategy (2016-2025) aims to enhance Nepal's forest carbon stock by at least 5% by 2025 as compared to 2015 level, and to decrease mean annual deforestation rate by 0.05% from about 0.44% and 0.18% in the Terai and Chure, respectively. It also aims to put in place forest carbon trade and payment mechanism, protect 0.2 million ha of forests through the implementation of adaptation plans, and mainstream community/ ecosystem-based adaptation by 2025.

1.4.8 PAKISTAN

Pakistan intends to reduce up to 20% of its 2030 projected GHG emissions subject to availability of international grants to meet the total abatement cost for the indicated 20% reduction amounting to about USD 40 billion at current prices. Pakistan's mainly focuses on capacity building needs. The current forest cover of Pakistan is about 5% of its total geographical area, which is extremely inadequate when considering exposure of the country to future climatic threats. Forests in Pakistan are net emitter of GHG. Contributions of 'Land Use, Land-Use Change and Forestry' sector in overall emissions profile of the country are merely 2%. A consistent but gradual increase can be noticed over the last twenty years. Considerable efforts are in hand for the revival of forestry, aiming to expand the forest cover through mega tree plantation programmes and strengthening the regulatory & forest protection policy mechanism. The Khyber Pakhtunkhwa Province's Afforestation Programme and the Green Pakistan Programme are other noteworthy examples of the country's commitment[8].

[6] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Myanmar%20First/Myanmar%27s%20INDC.pdf*
[7] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Nepal%20First/Nepal%20First%20NDC.pdf*
[8] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf*

1.5 Conclusion

Many land management options exist to reduce the magnitude of emissions and to enhance carbon uptake. These options enhance crop productivity, soil nutrient status, microclimate or biodiversity, and thus, also support adaptation to climate change. The barriers to the implementation of mitigation and adaptation options include skills deficit, financial and institutional barriers, absence of incentives, access to relevant technologies, consumer awareness and the limited spatial scale at which the success of these practices and methods have been demonstrated. HKH countries are in different stages of REDD+ implementation at National and subnational level and are attempting to overcome these barriers in their National REDD+ Strategies and Sub-national/ State REDD+ Action Plans (S-RAPs). All the HKH countries are taking serious steps to engage in REDD+ programmes where a large population is dependent on forest resources.

Globally many countries are now accessing REDD+ results-based payments – rewards for emission reductions – from the Green Climate Fund and other similar mechanisms. A number of international initiatives have provided support to these efforts, including the United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation Programme jointly operated by Food and Agriculture Organisation, the United Nations Development Programme and United Nations Environment Programme, the Forest Carbon Partnership Facility and the Forest Investment Programme of the World Bank.

Although many of the HKH countries have been very active in shaping the evolution of the comprehensive concept of REDD+ at the international level, it needs much more to do domestically to ensure purposeful implementation of REDD+. They faced the challenge of constructing the National Forest Reference Level, a National Forest Monitoring System comprising independent MRV and Safeguards Information systems. Small least developed countries can gain mutually from expertise available with the partner countries.

It is now evident that carbon service alone can neither sustain the forest ecosystem nor the livelihoods of local communities dependent on goods and ecosystem services. This realization must be internalized in policy, planning and actions at national government levels with a view to provide equal importance to all forest ecosystem goods and services, and treating forest carbon service as one of the important services. As UNFCCC under REDD+ mechanism has started discussing methodological guidance for non-carbon benefits of REDD+ and will develop ways and means of putting a value on each of the other forest ecosystem goods and services. HKH countries must prepare themselves politically, technically, and institutionally to participate effectively in the future negotiations with a view to safeguarding its national as well as the interests of its local communities dependent on forests, and also in implementation of REDD+ activities at domestic levels.

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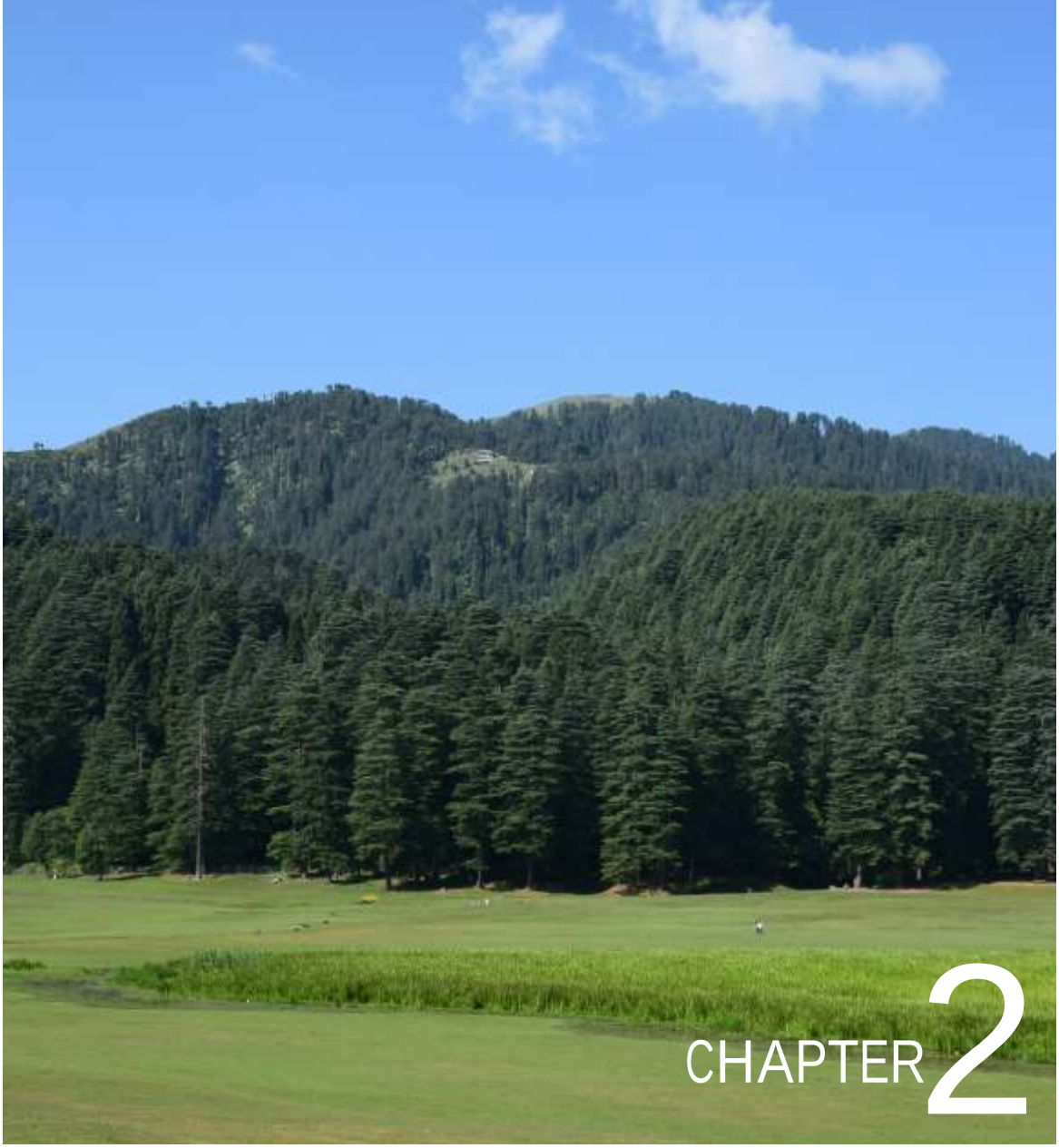

CHAPTER 2

FOREST LANDSCAPE RESTORATION IN HINDU KUSH HIMALAYA THROUGH REDD+ MECHANISM

–Synergies in Policy Formulation and Implementation

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2.1 Introduction

Globally, deforestation and forest degradation (D&FD) have become a major concern for sustainability. About 30% of global forest cover has been cleared and a further 20% has been degraded. As per the IPCC (2019), agriculture, forestry and other land use (AFOLU) activities accounted for around 23% of total net anthropogenic emissions of greenhouse gases. Greenhouse gas emissions from deforestation and forest degradation have been reported to be 9-11% of total emission from AFOLU activities (IPCC, 2014). Various anthropogenic activities have caused the overall landscape degradation and impacted negatively the well-being of at least 3.2 billion people; and has led to more than 10% of the annual global gross product cost in terms of biodiversity and ecosystem services loss. D&FD have resulted in a rapid loss of the global forest cover which is the major source of several ecosystem services with environmental, social and economic benefits. In order to halt the depletion of natural resource and engage in the enhancement of ecosystem services for the well-being of human beings, afforestation and reforestation have become critically important worldwide. To keep continuous ecological functioning, the concept of Forest Landscape Restoration (FLR) can play an important role to treat the deforested and degraded lands. FLR is more than just planting trees and it entails restoring a whole landscape to overcome the pressure on present and future requirements, allowing multiple benefits and avoiding degradation of natural resources to increase the forest quality. Afforestation, reforestation, promotion of natural regeneration, improvement of forest quality, protection of existing forests and introduction of alternative livelihood initiatives for forest dependent communities are the major activities of the forest landscape restoration mechanism. This mechanism also contributes towards empowerment of forest dependent communities and strengthens decentralized local governance of forests in the overall context of community based natural resource management. The chapter focuses on the initiatives taken by the Hindu Kush Himalayan countries (Bhutan, India, Myanmar and Nepal) on forest landscape restoration and also provide the synergy between the various REDD+ activities and FLR mechanism at the sub-national level.

Restoration of degraded forest landscapes enhance the carbon and non-carbon benefits and also supports the countries in achieving their international commitments under three Rio Conventions namely UNFCCC, UNCCD and CBD.

2.2 Looking for REDD+ Readiness

REDD+ mechanism aims to reduce anthropogenic greenhouse gas emission by incentivizing (through carbon finance) the developing countries for reducing the rates of D&FD and enhancing the carbon sinks through conservation and sustainable management of forest. As per UNFCCC COP Decision 1/CP16, paragraph 73, countries willing to access REDD+ payments and overall REDD+ benefits are required to move ahead in three phases, which are closely linked with each other. Moving ahead in those three phases, countries are required to formulate the prerequisites for REDD+ viz. national strategies or action plans, national forest monitoring system, forest reference (emission) level and safeguards information system. Ultimately, the REDD+ mechanism contributes towards introducing a low carbon and green economy framework to our existing conservation systems; this will influence land use-driven climate change initiatives for sustainable development. HKH countries are in different stages of REDD+ readiness.

2.3 Scope of Forest Landscape Restoration

In sustainable management of forest ecosystem, forest landscape restoration is an integrated approach which can play an important role to achieve/ maintain sustainable land use system with enhanced social, economic, and ecological benefits (Sayer *et al.*, 2013). Major activities include avoiding degradation of forests, wetlands, grasslands and croplands which provide more than one-third of the most cost-effective greenhouse gas mitigation potential required by 2030 to keep global warming to below 2°C (van Oosten, 2013). For achieving the success stories of those activities, there is a need for planning and implementation of measures to avoid deforestation and forest degradation. There are around 2 billion hectares of land available for restoration in this world and mostly located in temperate and tropical areas, among which 1.5 billion hectares is best suited for mosaic restoration (IUCN, 2014). Although, it is evident that numbers of attempts have been made by the countries in recent years to restore habitats, species, and human cultural values but these are not enough, and time has come to put up an accelerated effort for restoring the forest landscape by initiating action at the sub-national level. It can be judicious to adopt the 4E's guiding principles while implementing restoration activities (Figure 1).

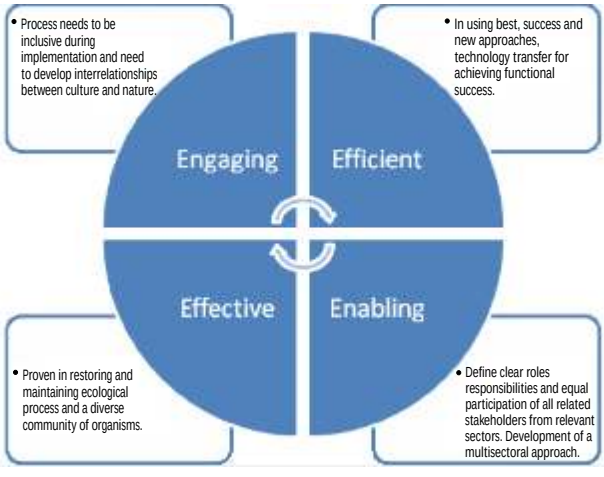

Figure 1: Guiding principles of land restoration (Adopted and modified from Keenelyside *et al.*, 2012)

Active involvement and coordination of international and development agencies have led FLR to integrate with international commitments like REDD+ which has been recognized by the UN Forum on Forests, the Aichi Target No. 15 of the Convention on Biological Diversity aiming to restore 15% of degraded ecosystems, and the Bonn Challenge, which aims to restore 150 mha of the world's degraded and deforested lands by 2020 and 350 mha by 2030. (van Oosten *et al*., 2014). As part of the Bonn Challenge, an increasing number of governments have been pledging part of their national territory to be restored, and national assessments of the potential are currently being carried out looking at where and how these pledged areas could best be situated. Not only the Bonn Challenge, but FLR as a whole can support other international commitments. From the UN Declaration of the Forest, Aichi targets, achieving goals of NDCs and ultimately supporting the Sustainable Development Goals and Land Degradation Neutrality Targets. Lastly and most importantly, this will guide and help the countries to execute towards mitigating the impacts of climate change by locking down the GHG emissions.

Forests have a central role to play as the world confronts the challenges of climate change, food shortages, and improved livelihoods for a growing population. Especially in developing countries, livelihoods of local communities in the rural areas are highly dependent on forests either directly or indirectly on a day to day basis. By providing different ecological services such as timber, firewood, food, and medicines - forest ecosystems always play a major role in the livelihood of rural communities (Babulo *et al*., 2009; Angelsen *et al*., 2014; Fikir *et al*., 2016). There is the likelihood that forest can fulfill the demands of another two billion people by 2050 for food, shelter and livelihoods (Lindenmayer *et al*., 2014). Hence, restoration of forest landscape can play an important role as the forest ecosystem provides the maximum solutions for the sustainable livelihood and coping with climate change for the growing world population.

Countries have their diversity of international policies, geographies and commitments relevant to climate change, it may be unreasonable to expect every country to include restoration or Bonn Challenge pledges in their NDCs. Some countries might include only the economic targets rather than indicating restoration interventions. But the Hindu Kush Himalayan countries have clearly indicated landscape restoration interventions for achieving their NDC targets.

2.4 Forest Cover Change and FLR in Climate Change Mitigation

Globally, forest cover is decreasing every year, and the latest Global Forest Resource Assessment, 2020 (FAO, 2020) estimates 420 mha of forest have been lost worldwide through deforestation since 1990, albeit the rate of loss has declined substantially (FAO, 2020). The same assessment report estimates the annual rate of deforestation for the most recent five years (2015-20) has been 10 mha. Deforestation is a serious issue that the world is facing today. The reasons for decreasing forest cover might differ from country to country, but the main problems are the increase in population and lack of livelihood opportunities in the rural areas. So especially, the rural communities/ poor households are bound to use forest products to meet their basic needs. For increasing the agricultural area, the local communities encroached the nearby forest areas and ultimately impacted the forest ecosystem negatively. Additionally, shifting cultivation (mainly in some parts of India and Myanmar) is another case where deforested lands are used for cultivation and left barren once after completing the cycle for the specific period. Developing countries also focus on economic activities like construction of roads, dams & reservoirs, local livelihood initiatives, small scale industries etc. Introduction of large-scale industries may provide opportunities for the local communities but they are also affecting the tree cover (airports, plantations and hydropower reservoirs). In India and Myanmar, there are cases of mining activities, due to which forest cover is also decreasing to some extent (Bhagwat *et al.*, 2017; Pardikar, 2020). Finally, natural calamities like fire shrink the forest cover in these countries. Table 1 shows the changing trend in forest cover of four Hindu Kush Himalayan countries. As information data on forest cover from these countries were not available for the same years, but the available data can exemplify the forest cover change scenario of these countries.

Table 1: Forest cover change trend in REDD+ Himalayan countries

BHUTAN				INDIA			
Year	Forest area (sq km)	% coverage of GA	Forest cover change %	Year	Forest area (sq km)	% coverage of GA	Forest cover change %
2017	27,308.89	71.13	2.87	2019	712,249	21.67	0.13
2014	26,206.9	68.26	-2.20	2017	708,273	21.54	0.2
2010	27,052.41	70.46	2.39	2015	701,673	21.34	0.11
2005	26,136.5	68.07	-0.01	2013	697,898	21.23	0.18
1995	26,140.6	68.09	-4.42	2011	692,027	21.05	0.03
1992	27,835.7	72.50	3.97	2009	690,899	21.02	0.42
1987	26,313.1	68.53	0.11	2005	677,088	20.6	-
1977	26,269.4	68.42	-	-	-	-	-

MYANMAR				NEPAL			
Year	Forest area (sq km)	% coverage of GA	Forest cover change %	Year	Forest area (sq km)	% coverage of GA	Forest cover change %
2015	290,454.90	42.93	-4.03	2014	59,624.38	44.74	6.44
2010	317,721.00	46.96	-2.29	1995	56,370.32	38.3	-1.3
2005	333,214.70	49.25	-2.29	1994	58,283.68	39.6	-2.6
2000	348,708.30	51.54	-	1985-1989	62,110.38	42.2	-0.6
-	-	-	-	1979-1989	62,993.47	42.8	-2.7
-	-	-	-	1964	66,967.36	45.5	0

Sources: Bhutan: Reddy *et al.*, 2016, FRMD, 2016; India: FSI, 2019; Myanmar-Timalsina *et al.*, 2018; Nepal: DFRS, 2015, 1999; Timalsina *et al.*, 2018

There is not such a radical change in forest cover in three countries (Bhutan, India and Nepal) but Myanmar is facing the problem of deforestation where forest cover is decreasing every year. However, the other three countries have already commenced FLR activities before it was called FLR, therefore forest cover is increasing in recent years. The above data compiled from different sources might have different methodologies for assessing the forest cover, so it might give only an indicative picture. At the best, we can conclude that the forest cover in these countries has not remained the same, but definitely changed over a period of time. Drivers for those changes differ from country to country. As all these countries are participating in the REDD+ mechanism, in recent years these countries have been creating schemes and innovations for restoring the degraded forest landscapes and further will help in increasing the forest cover as well as forest carbon stocks. Various initiatives in all the four countries have been initiated at national and sub-national level related to forest conservation, afforestation and livelihood improvement programmes. The landscape restoration provides support and opportunities to perform collective efforts by involving various departments, line ministries, independent organizations, local institutions, civil societies, NGOs etc. to cover the entire landscape.

Forest has been one of the main mediums for climate change mitigation but the forest areas are decreasing globally. The decrease in global forest cover has led to several negative consequences on the well-being of human beings and overall sustainable development. Apart from this, some of the vegetation is likely to shift towards the higher altitudes. This is happening due to the impact of climate change, and FLR activities has the potential and scope to converse/ restore the depleting endemic floral and faunal diversity of a particular area and can act as a long-term mitigation strategy in front of global community. FLR can increase the productivity of the entire landscape, support for the forest-dependent communities by providing livelihood opportunities; it also can regulate the ecosystems services, protect biodiversity, play an integral part

in the carbon sink, and act as major driver for sustainable growth. Those actions to conserve, manage, and restoring of degraded forest landscapes can contribute in economic growth, poverty alleviation, food security, and biodiversity conservation. Countries need to focus and intervene as per their drivers of D&FD (Table 2).

Table 2: Drivers of D&FD in HKH countries as per REDD+policy documents

Document	Bhutan		India		Myanmar		Nepal	
	D	FD	D	FD	D	FD	D	FD
National REDD+ Strategy	NA	NA	Economic activities, urbanization and illegal mining	Uncontrolled forest fires, insect and pest infestation, invasive species, extraction of fuel wood, fodder and small timber	Yet to finalize	NA	Infrastructure development, urbanization resettlement, Encroachment, mining/ excavation of sand, boulders & stones	Illegal and unsustainable harvesting, forest fire, uncontrolled and over grazing, weak forest management practices, expansion of invasive species
Sub-national REDD+ Action Plans	NA	NA	Mizoram: Topographic factors, traditional farming methods, and limited livelihood options. Uttarakhand: Diversion of forest land for non-forestry purposes, and encroachment of forest land	Mizoram: Shifting cultivation, Forest fire and collection of firewood and NTFP Uttarakhand Overgrazing and unsustainable fuelwood and fodder collection, and forest fire	Shan: Agricultural expansion (rubber, oil palm, horticulture, tea, maize, and others), shifting cultivation (traditional agriculture system), infrastructure development, mining; dam construction and encroachment	Shan: Over-exploitation of forest products and fuelwood, forest fire, grazing, and pests and diseases	Chitwan: Encroachment, developmental activities, resettlement of flood victims, resettlement & relocation Ilam: Forest encroachment	Chitwan: Unsustainable / illegal timber and fuelwood extraction, forest fire, grazing; invasive species and religious activities Ilam: Forest fire
Forest Reference (Emission) Level	NA	Timber harvesting from forest	NA	NA	NA	NA	NA	Harvesting of fuelwood & Grazing and fodder collection

Sources: FRI, 2019; ICFRE, 2018 a, 2018 b; MoFECC, 2018; MoEF, 2018, RIC, 2016; RIC, 2019
Note: D-Deforestation, FD-Forest Degradation, NA-Not Available

Most of the drivers seem common in all countries. There are several enabling policies that have been developed by these countries for addressing the identified drivers. Additionally, steps for addressing those drivers have already been initiated. Several enabling policies and forest restoration initiatives are listed in Table 3.

Table 3: Some enabling policies, legislations and initiatives for FLR

Information	Bhutan	India	Nepal	Myanmar
Policies	• Economic Development Policy, 2016 • National Forest Policy, 2011 • Land Act, 2007 • Local Government Act, 2009 • Middle Path- The National Environmental Strategy, 1998 • Bhutan Vision, 2020 • National Environmental Protection Act, 2007 • Forest and Nature Conservation Act, 1995 • Biodiversity Act, 2003 • Water Policy, 2002 • National Re-afforestation Strategy, 2008 • The Constitution of the Kingdom of Bhutan, 2008	• Indian Forest Act, 1927 • Wildlife (Protection) Act, 1972 amended in 1993 • Environmental (Protection) Act, 1986 • Forest (Conservation) Act, 1980 amended in 1988 • Forest (Conservation) Rules, 1981 amended in 1992 • National Forest Policy, 1988 • Joint Forest Management Guidelines, 1990 • Biological Diversity Act, 2002 • Forest (Conservation) Rules, 2003 • Biological Diversity Rules, 2004 • National Environment Policy, 2006 • The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 • National Agroforestry Policy, 2014 • National REDD+ Strategy, 2018	• Climate Change Policy, 2011 • Land Use Policy, 2015 • Forest Encroachment Control Strategy, 2012 • Biodiversity Strategy and Action Plan, 2014 • Forest Policy, 2015 • Forestry Sector Strategy, 2016 • National REDD+ Strategy, 2018 • Local REDD+ Action Plan, 2016 • District REDD+ Action Plan, 2016 (unpublished) • National Agroforestry Policy	• Community Forestry Instructions, 2016 • Land Use Policy, 2016 • Association Law, 2014 • Forestry Master Plan, 2001 • State REDD+ Action Plan

FLR Initiatives	• Afforestation at Pachu-Wangchu Valley in Western Bhutan • Afforestation at Chongdiri Catchments in Eastern Bhutan- A Component of an Integrated Watershed Management Programme • Industrial Plantation at Nangla Drang, Samtse, Southern Bhutan. • Green Bhutan Corporation Limited	• National Mission for a Green India • National Afforestation Programme • Compensatory Afforestation Fund Management and Planning Authority • *Namame Gange* Programme • Forestry Interventions in Other River Catchments • Green Highway Mission • Twenty Point Programme	• Expansion of CBFM across the country in the form of CF, CFM, leasehold etc. • GESI Strategy, 2009 focuses on gender friendly and sensitive programmes and budget • Introduction of SFM in CBFMs • Plantation in and management of public lands	• Establishment of community forestry stepping on Community Forest Instructions, 2016 • 183,000 ha of plantations through 'Village Supply Plantations' Scheme • Private plantations upto 56,100 ha of teak and 35,700 ha of non-teak species

Addressing the drivers of D&FD requires both financial and technical support. So, countries are earmarking funds from their budgets. But as developing countries, funds from tax income may not be sufficient for implementing and addressing the drivers. Collaboration with different donor agencies has been initiated for financial supports. Also, countries are focusing to tap climate change and REDD+ finance by developing action plans and proposals. For

Major Initiative and their Convergence for FLR in India

The Government of India has started various schemes at national level where plantation activities are also somewhere as a part of direct or indirect intervention viz Green India Mission, National Afforestation Programme, Compensatory Afforestation Fund Management and Planning Authority Rules, Integrated Development of Wildlife Habitats Programmes for Protected Areas, MGNREGA, *Pradhan Mantri Sinchayi Yojna,* Catchment area rehabilitation under *Namami Gange Scheme, National Bamboo Mission & Integrated Development of Horticulture; Rashtriya Krishi Vigyan Yojna;* Mission for Integrated Development of Horticulture; *Parampargati Krishi Vikas Yojna, National Mission for Sustainable Agriculture and National Mission on Oilseeds and Oil Palm etc.* However, there are certain specific schemes which provide support for afforestation activities along the roadsides, railway tracks etc. Since, for initiating the FLR at national level, the activities are already in place at country level. Government of India has expressed its support to Bonn Challenge initiative by committing restoration targets of 13 mha of degraded forest lands by 2020 and 8 mha by 2030.

accessing REDD+ finance countries are working for formulating the pre-requisites for REDD+ implementation. These countries have already made good progress in developing/drafting their National REDD+ Strategy with identification of wide range of drivers of deforestation and forest degradation in the respective countries. Nevertheless, due to the varied range of forest ecosystems, drivers of D&FD at specific site, it is logical for countries to develop Sub-national REDD+ Action Plans (SRAPs) for state/ province which can support in implementing National REDD+ Strategy at local level. Due to its transparent approach and multi-stakeholders process, SRAPs viability seems clear. Through this approach, countries can achieve the sustainable land use with enhanced social, economic and ecological benefits which is an integral part of forest restoration activity.

Among the four REDD+ countries, three of them prepared one or more Sub-national REDD+ action plans (SRAP) and Bhutan was able to access the GCF funding. The Table 4 interprets how much priority has been given by these countries in forest landscape restoration activities as per their Sub-national REDD+ Action Plans.

Nepal Showcases how Forest Restoration helps People and Biodiversity

Baghmara Buffer Zone Community Forest represents one of the best examples of restoring degraded land into forest land. This heavily degraded area is located in the southern part of Nepal, one of the buffer zone community forests of Chitwan National Park. Addressing the importance of forest and biodiversity, local communities decided to do the plantation activities. Communities organized several plantation campaigns for restoration of the degraded land. Finally, in 1995 this area was officially established as a community forest (CF) and this was due to the conservation and management of forest by the local communities. Since then this community forest has become a model for sustainable community forest conservation in Nepal and harbors diverse species of both flora and fauna. The best part of this forest is that more than 75% of the total area has been naturally regenerated through community efforts. Tharu, the local ethnic communities are forest dwellers and user groups. Due to its nature of diverse tourism activities, they are also one of the highest incomes generating CF of Nepal, earning more than 250,000 USD per year. The CF User Group invests further the earned money for staff, developmental works like repair and construction of road and school buildings, providing income-generating trainings to the needy and they have successfully lobbied to include the conservation and management curricula in the local schools. As an effort for poverty alleviation and employment generation, a fish pond was built by the group. Besides, improved cooking stoves were also distributed to decrease the demand for fuelwood. The economic incentives created from tourism, it helps to decrease pressure on the forest products as User Groups are now economically well off and now they can afford alternatives. This shows a fine example of FLR, a nature-based solution in a win-win situation. In Nepal, community forestry proved to be an effective tool for forest landscape restoration. This learning can be fostered through south-south cooperation in other countries.

Table 4 clearly interprets that countries are focusing on FLR activities. Due to its visible benefits in the region, Bhutan seems diverting their funds for forest management and conservation rather than restoration activities as already it has 71% of total geographical area under forest cover.

Further, the identification of interventions in the FLR and convergence of FLR activities along with the REDD+ mechanism can help the countries to gain the financial benefits and will also increase the scope to develop a national level REDD+ project. The countries can develop the project in accordance with the available voluntary carbon standards (VCS or VERRA / Plan Vivo) or there can be the scope for developing the REDD+ project by adopting the existing landscape specific methodologies and development of domestic carbon offset mechanism will help in regulating the flow of finance as a part of REDD+ benefit to the participating communities.

Table 4: Estimated cost allocation for FLR activities in national level or state level

Document	Country	Area	Ccy*	Estimated Cost	Cost allocated for restoration activities	% allocated for FLR	Time frame
SRAP	India	Mizoram	INR	270,431,000	125,400,000	46.37	Five years
SRAP	India	Uttarakhand	INR	1,190,000,000	774,000,000	65.04	Five years
SRAP	Nepal	Ilam	NPR	125,900,000	61,650,000	48.97	Four years
SRAP	Myanmar	Shan	KYT	1,002,322,200	592,281,300	59.09	Five years
GCF funding proposal	Bhutan	Nationwide	USD	1,182,000,000	268,250,000	22.69	Fourteen years

**Ccy- currency*

2.5 Conclusion

Forest landscape restoration has become a global initiative. Achievements will be in place once the planning and implementation of FLR activities are designed and implemented on the need basis with a bottom-up approach. Given the clear connection between FLR and climate change mitigation, without any doubt, it will help countries to achieve their NDCs targets submitted to UNFCCC under the Paris Agreement to contribute to global efforts to curb climate change. IPCC (2019) special report on Climate Change and Land states that sustainable land management including sustainable forest management helps in preventing land degradation and maintains productivity, supporting in mitigation and adaptation. Land-based activities like afforestation, reforestation, reduced deforestation, and bioenergy are the major option to limit global mean temperature to well below 2°C. So, to maximize climate benefits from the forests and to increase the quality of our existing forests, it is recommended to have more forest landscapes intact which need to be managed sustainably and carrying out the plantation activities in the open forest and barren areas with clear rules and regulation on local level for users. Several restoration activities, adoption of agroforestry, and horticulture in steep slopes, which not only will help in livelihood improvement and will also reduce the

risk of natural disasters like soil erosion and landslides. Since it is a multi-sectoral approach, so planning is important including all the list of active stakeholders with clear roles and responsibilities. As the approaches followed by the sub-national REDD+ action plans are transparent with all the stakeholders, a similar approach can be adopted while designing FLR programmes. Local communities play a critical role in the restoration, conservation, and management of the areas where FLR interventions are/ will be in place. It is highly recommended to respect and listen to the local voices on their success stories on forest restoration. Additionally, while planning for FLR activities one major activity should be on creating local employment opportunities. It is visible from the policy documents, plans, and proposals, the activities proposed for avoiding and reducing D&FD also include livelihood opportunities for the local communities, but this needs to be implemented on the ground effectively.

Hindu Kush Himalayan countries are already commencing the FLR activities under the REDD+ framework which provides a considerable opportunity in forest restoration. However, without having the political willingness and adequate access to finance, they are unlikely to meet the long term objectives. Countries can best use the south-south platform to share their best practices in forest landscape restoration so that, other countries can replicate or modify the activities.

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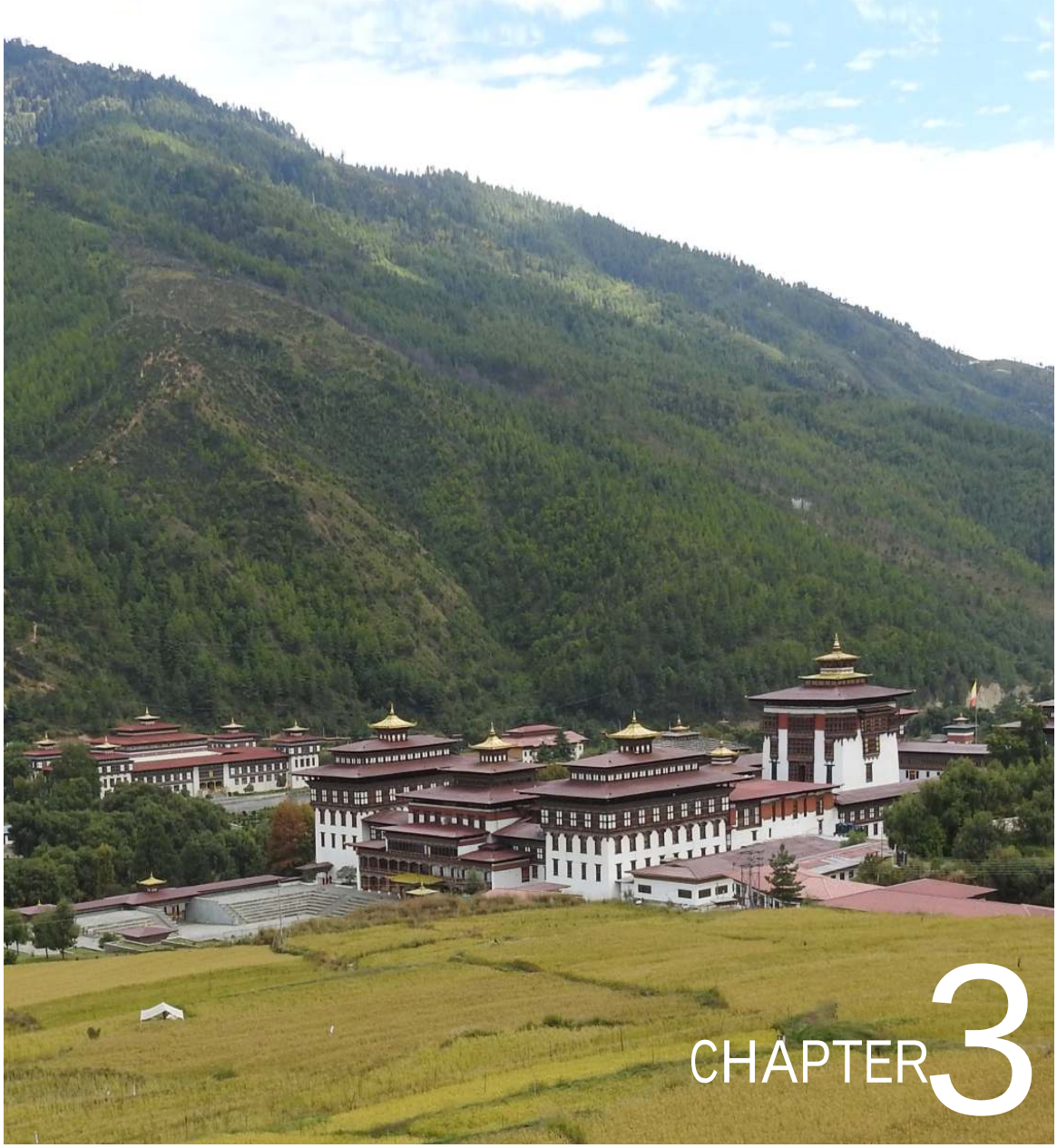

CHAPTER 3

REDD+ READINESS IN BHUTAN

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3.1 Introduction

Located in the Eastern Himalaya, Bhutan is a tiny land locked country, sandwiched between two of the most populous countries in the world – China and India. It shares international borders with China in the north and India in the east, south and west. Topographically, Bhutan is largely a mountainous country with a few pockets of plain areas mostly situated along the river valleys and southern part of the country. The altitude ranges from 100 meters above mean sea level (amsl) in the south to more than 7500 meters amsl in the north.

It has an area of 38,394 sq km, of which 71% is under forest cover (FRMD, 2016). The constitution of the kingdom of Bhutan requires maintaining 60% of the total geographical area of the country under forest cover in perpetuity (RGoB, 2008).

There are 11 major forest types, classified based on altitudinal range and major species composition, as reported in the recently completed national forest inventory report Volume I (FRMD, 2016) namely; subtropical forest (6%), warm broadleaved forest (18%), chir pine forest (3%), cool broadleaved forest (26%), evergreen oak forest (1%), blue pine forest (4%),

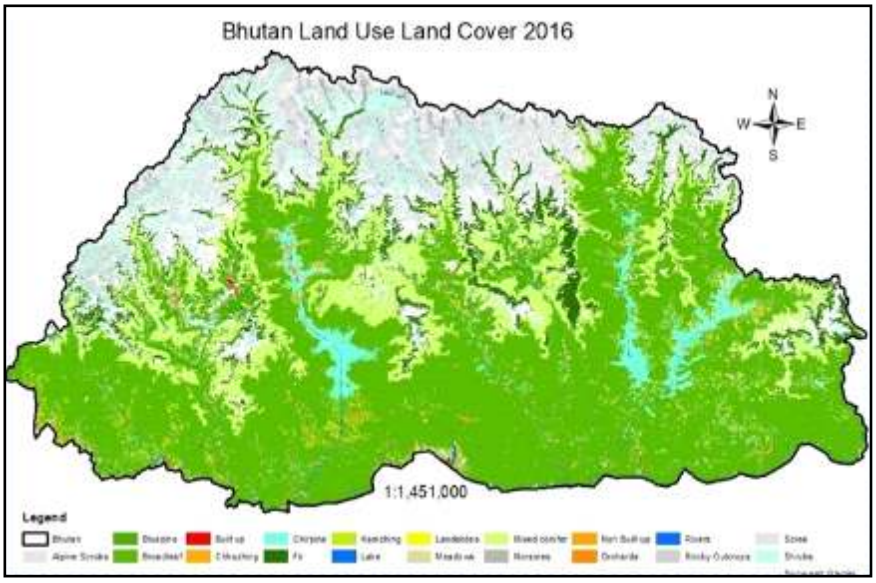


Figure 1: Land use and land cover map of Bhutan

spruce forest (1%), hemlock forest (2%), fir forest (9%), Juniper-Rhododendron forest (1%) and dry alpine scrub forest (<1%).

Currently, about 5% of the total land area is managed under sustainable forest management regime designated as Forest Management Units and 2% under community forest, and 51.44% under protected area system (DoFPS, 2018). With an estimated carbon stock of 709 million tonnes, stored in the form of biomass carbon and soil carbon (FRMD, 2018), Bhutan's forest is estimated to provide ecosystem services worth of 394 - 1,269 million USD annually (WMD, 2019 a).

Bhutan forms a part of the Eastern Himalaya global biodiversity hotspot in the region and there are 23 important bird areas, 8 ecoregions, a number of important plant areas and wetlands including two Ramsar sites (Banerjee and Bandopadhyay, 2016; BirdLife International, 2020). Bhutan is also home to more than 5000 species of vascular plants, 200 species of mammals and more than 700 species of birds (NBC, 2014). This includes endangered and magnificent species such as Royal Bengal Tiger, Snow leopard, Red Panda, Golden Langur, Asian elephant, Black Necked Crane and one of the rarest birds like White Bellied Heron.

Bhutan is largely an agrarian society with more than 62.2% of the total population residing in rural area and practicing subsistence mixed farming and is largely depending on forest resources for their livelihoods. The total population of Bhutan as per the population and housing census, 2017 is 735,553 including 53,833 non-Bhutanese nationals residing in the country as of May 30, 2017 (NSB, 2018). Thus, the population density of the country stands at 19 persons/sq km, making Bhutan one of the least densely populated countries in the world.

Bhutan is one of the smallest but fastest-growing economies in the world, with annual average growth between 2013 and 2017 reaching 5.4%, which exceeded average global growth of 4.4% (World Bank, 2019). With GDP per capita of USD 332 in 1980, Bhutan's GDP per capita increased to USD 3,438.2 in 2017 which is an increase of almost ten folds (World Bank, 2019). Hydropower is the largest contributor of GDP with 11.27% (NSB, 2019). This is closely followed by Tourism sector with 9% GDP contribution as per the review report on Tourism Policy and Strategies, carried out by Economic Affairs Committee of the National Council of Bhutan (NCB, 2016).

3.2 Objectives and Scope of REDD+ Activities

Reducing emission from deforestation and forest degradation (REDD) and conservation, of forest carbon stocks, sustainable management of forest and enhancement of forest carbon stocks (collectively known as REDD+) is one of the global initiatives to reduce carbon emissions from the forests and enhance carbon sequestration by providing incentives to the developing countries. With 71% of the country's geographical area under forest cover, strongly supported by enabling pro-conservation legislations and policies such the Constitution of the Kingdom of Bhutan, 2008, National Forest Policy, 2011, Forest and Nature Conservation Act, 1995, and National Environmental Protection Act, 2000 amongst other, Bhutan stand to benefit from this global initiative. Moreover, Bhutan is one of the countries with huge forest cover with low deforestation of 0.01%, REDD+ provides a platform to compensate the benefits forgone in

conserving the forests and curtailing deforestation. Bhutan REDD+ programme started in 2010 with the support from UN-REDD Programme, with the following objectives:

1. Strengthen the existing forest policy and management systems, information and data, participatory methods and other human and institutional capacity

2. Prepare Bhutan to engage in and benefit from the potentially emerging performance-based system of REDD+

Around the same time, as required by the country's Constitution and the National Forest Policy, 2011, the Department of Forests and Park Services initiated national forest inventory (NFI), many years after its supposedly first NFI which was referred to as Pre-investment Survey (PIS) carried out between 1974-81. The PIS was principally focused on assessment of timber resources in the country and therefore, it is not a multipurpose NFI as it is defined and viewed today.

The current NFI has wider scope and purpose transcending conventional NFI (mainly focused on timber resources), which is termed as multipurpose NFI. The NFI of Bhutan, carried out between 2009-2015 was a multipurpose and holistic in approach as well as in its objectives. The outcome of the NFI fulfilled many of the national policy requirements and international reporting commitments that the Bhutan is signatory to. Although it started in 2009, the period between 2009-12 was referred as Preparatory Phase of NFI, during which all the necessary preconditions and foundations for NFI were laid, that includes development of statistically robust inventory design and field protocols, procuring sophisticated equipment and gears for the field work and training the NFI field crews on use of equipment as well as data collection protocols. The actual field data collection work began from July, 2012 and completed in December, 2015.

Simultaneously with NFI field works, the Department of Forests and Park Services (DoFPS) initiated development of allometric biomass equations and collection of understory and soil samples to estimate understory biomass carbon and soil organic carbon under ICIMOD-GIZ sponsored trans-boundary REDD+ Himalaya Project from January 2015. Whilst its support was broadly complimentary to many of the ongoing REDD+ readiness activities of the Royal Government of Bhutan, it specifically supported Bhutan's ongoing NFI that included the biomass and carbon assessment initiatives. Main objectives of REDD+ Himalaya Project for Bhutan were to:

1. Build and strengthen existing technical capacity of the staff both within the DoFPS and its implementing partners from the Soil and Plant Analytical Laboratory on forest biomass and carbon estimation including soil carbon methods and techniques.

2. Build and strengthen existing laboratory facilities and infrastructure for biomass and carbon assessment.

3. Develop 20 allometric biomass equations for 20 species of trees to enable estimation of biomass of trees.

4. Support collection of understory and soil samples for biomass and carbon assessment.

5. Generate new information and knowledge products to enable informed decisions by the policy makers and also for use by students and academia fraternity.

6. Support carrying out Quality Assurance and Quality Control (QA & QC) programme for NFI.

In terms of scope and coverage, the support from REDD+ Himalaya Project for Bhutan was nation-wide covering and covered all 20 districts of the country. The REDD+ Himalaya project provided much needed financial support for conducting National Forest Inventory of Bhutan and development of allometric biomass equations. The biomass equations were used for estimating the aboveground tree biomass carbon of Bhutan's forest. This information was used for development of Forest Reference Emission Level/Forest Reference Level (FREL/FRL) which is one the building blocks of the overall REDD+ mechanism. Through community engagement, the project was able to support community forest management programmes and built the capacity of both professional foresters as well as local communities in context of REDD+. With development of FREL/FRL and conduct of NFI, Bhutan came closer to the technical readiness for REDD+ programme.

3.3 Status of REDD+ Readiness

Bhutan started REDD+ programme in 2010 with support from the UN-REDD Programme. Bhutan has made a huge stride in terms of implementing REDD+ actions ever since it started in 2010. Scoping study on the feasibility of REDD+ in Bhutan was carried out with technical support from SNV Bhutan in December, 2010 (WMD, 2010). Subsequently, several seminars, workshops and capacity building programme were conducted to create awareness and build capacity of the stakeholders on REDD+ between 2010 and 2013. Then in 2013, REDD+ Readiness Preparation Proposal (R-PP) was developed with the support from UN-REDD programme and submitted to the Forest Carbon Partnership Facility (FCPF) of the World Bank. It was approved by FCPF in December, 2013 with an initial grant of USD 3.8 million and then it was followed by an additional grant of USD 4.8 million in 2017.

Under REDD+ readiness phase, Bhutan successfully utilized the grants in the establishment of a national REDD+ framework that is pre-requisite to seeking REDD+ payments under the REDD+ arrangement. The key elements of this framework includes the National REDD+ Strategy, National Forest Reference Emission Level/Forest Reference Level, a National Forest Monitoring System, and a safeguards frameworks that comprises Safeguard Information System, Strategic Environmental and Social Assessment, and Environment and Social Management Framework including corresponding institutional and implementation arrangements. Bhutan has developed the following key elements of REDD+:

- National REDD+ Strategy
- National Forest Reference Emission Level/Forest Reference Level
- National Forest Monitoring System
- National REDD+ Safeguards Frameworks

3.3.1 National REDD+ Strategy

The National REDD+ Strategy is a key element of National REDD+ Framework. It puts forth vision, objectives and different strategies for implementing REDD+ activities. A comprehensive study was carried out to identify the drivers of deforestation and forest degradation through a consultative process, which constitutes one of the major components of the REDD+ strategy (WMD, 2017). The vision for Bhutan's National REDD+ Strategy is to be "a perpetually carbon

neutral, climate change resilient and a prosperous society". Aligned to this vision, the strategy document lays out ambitious objective of reducing emissions from deforestation and forest degradation and to foster conservation, sustainable management of forests and enhancement of forest carbon stocks. While the primary objective is to reduce emission from deforestation and forest degradation, the strategy document seeks to achieve far-reaching co-benefits that include livelihood of the local community, protection of ecosystem services and conservation of the biodiversity. In order to achieve vision and objectives including co-benefits, the REDD+ Strategy lays down four equally important multi-sectoral strategy options, namely:

1. Strengthened Forest Management Practices
2. Climate-Smart Primary Production
3. Integrated Land Use Planning
4. Improved Rural Livelihoods

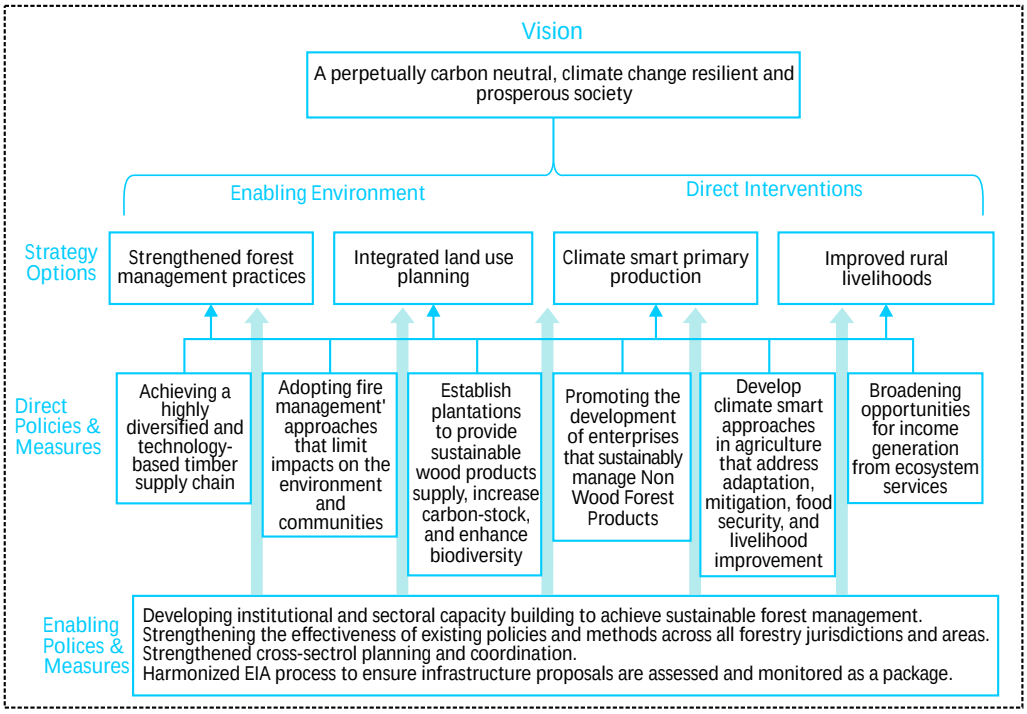
The focus of the strategy is to continue and strengthen the conservation of existing forests and increases the adaptive capacity to the impacts of climate change while enhancing the livelihoods, provide ecosystem services and conservation of biodiversity without compromising opportunities for economic development.

These four strategy options will be achieved through a series of multi-sectoral cross-cutting policies and measures (PAMs) and interventions identified and devised through REDD+ readiness programme and stakeholder consultations. A total of 10 PAMs are identified and developed in order to create and enabling environment by way of ensuring that policies, laws, regulations and approaches are strengthened and that they all functions in harmony with one another. Under each PAM, a set of actions and activities are proposed, which are envisaged to be

implemented by relevant organisations and implementing agencies including capacity and resources needs (WMD, 2019 a).

The Strategy options will be delivered via a number of cross-cutting policies and measures (PAMs). Ten PAMs are identified under four strategic options for implementation and provides enabling environment for interventions.

For each of the 10 PAMs, list of target actions are developed and cost of implementation of the PAMs are estimated. The potential funding sources are being currently explored for implementation of the strategy and all relevant stakeholders and implementing partners and/or agencies are identified. PAMs provide an enabling environment for interventions as described in Figure 2:



Source: National REDD+ Strategy

Figure 2 : Policies and measures provide an enabling environment for implementation of REDD+ activities

3.3.2 National Forest Reference Emission Level/Forest Reference Level

The National Forest Reference Emission Level/ Forest Reference Level (FREL/FRL) is another essential element of REDD+ framework. As required under the Cancun Agreements and Warsaw Framework for REDD+, Bhutan as a country implementing REDD+, has developed FREL/FRL within the framework of national circumstances. It is developed to serve as a benchmark for assessing the country's performance of implementing REDD+ activities. Given Bhutan's long and a credible history of continued effort ensuring sustainable management and conservation of its forest resources, FREL/FRL will showcase the effectiveness of our past policy interventions and enable to take stock of emissions and removals from the forestry sector by setting a baseline to

measure future performances. The FREL and FRL have been submitted to UNFCCC for technical assessment.

Reducing emission from deforestation, sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks are four out of five activities of REDD+ that are included in the FREL/FRL of Bhutan. The above and below ground biomass, dead wood, litter and soil carbon are the carbon pools included in Bhutan's FREL/FRL. Non-CO_2 emissions that includes CH_4, CO, and N_2O from the forest fire besides the CO_2 emissions have also been included in FREL/FRL.

The Bhutan's FREL/FRL has been constructed following the guidance and guidelines of the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change (UNFCCC) decisions 12/CP.17 and 13/CP.19, FCPF carbon fund methodological framework (2016) and GCF terms of reference for pilot projects.

Bhutan developed the FREL and FRL to take stock of emissions and removals from the forest sector and set a baseline to measure future (additional) performances. The FREL and FRL are under technical assessment by UNFCCC. The FREL in current form strengthen Bhutan's position and commitment under its Nationally Determined Contribution (NDC) by revalidating the forest cover, instituting a system to quantify and monitor carbon stocks and establishing a benchmark for tracking its performances in terms of forest management. However, considering more than 60% of population residing in rural area, depending on forests for their livelihood and other issues identified, Bhutan may not able to reduce its emission from the current level and therefore will be focusing on maintaining the status quo through future interventions under REDD+ and other programmes.

All REDD+ activities except forest degradation and all carbon pools (aboveground, belowground, dead wood, litter and soil organic carbon) are included in FREL/FRL. Besides CO_2 emissions, non-CO_2 emissions, namely CH_4, CO and N_2O from forest fire have also been included in FREL as CO_2 equivalent.

Deforestation data for reference period (2005-2014) obtained by satellite image analysis using global forest change product and sepal tool developed by FAO. The emission factor was calculated using the data from the National Forest Inventory and biomass equations.

Emission from sustainable management of forests and conservation of forest carbon stocks were determined from the volume of timber harvest data maintained with the Department of Forest and Park Services (DoFPS). The timber volume data was converted to carbon using the wood density and biomass expansion factor.

Carbon removal as a result of forest growth from the sustainable management of forests and conservation of carbon stocks were calculated based on forest area and the annual biomass increment. Enhancement from plantation are also estimated using area of non-forest land brought under plantation taking into account 20 years default transition period for land use change.

For the purpose of development of FREL and FRL, use of national data was preferred over the regional and international data where possible. The definition of forest is used in not only consistent with the National Forest Policy of Bhutan (2010) but also is consistent with Kyoto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Protocol Forest thresholds as well as FAO definition of forest thresholds. On account of scale of establishment of the FREL and FRL, there is very limited scope for result based payments and there is little room to reduce emission from current level as more than 60% of populations are residing in rural area depending on forest resources.

For transparency, consistency and future reporting, separate reference levels for emission (FREL) and removal (FRL) was developed to set the benchmark for emissions from deforestation and net removal from other REDD+ activities respectively. Proposed FREL for Bhutan is 0.506 million tonnes of CO_2 eq per year while the total annual net sequestration from sustainable management of forest, conservation and enhancement is set at 8.539 million tonnes of CO_2 eq which is proposed FRL for Bhutan. Thus, the proposed FREL of Bhutan is 0.506 million tonnes of CO_2 eq emission from deforestation per annum after adjusting 0.1% of biomass carbon stock over five years (as eligible under FCPF carbon methodological framework, 2016 for huge forest cover with low deforestation countries) and annual carbon sequestration of 8.539 million tonnes of CO_2 eq per year through sustainable management of forest, conservation of forest carbon stocks and plantation (DoFPS, 2020).

3.3.3 National Forest Monitoring System

The National Forest Monitoring System (NFMS) is yet another important element of REDD+ framework. In other words, NFMS is one of elements required to be developed by developing country Parties implementing REDD+ activities. For Bhutan, Action Plan for NFMS was developed and approved in 2015, which strengthened the necessary preconditions for development of full-blown NFMS (DoFPS, 2015).

NFMS encompasses monitoring and measurement, reporting and verification (MRV) functions and it is supported by three pillars, namely: a Satellite Land Monitoring System (SLMS), National Forest Inventory (NFI) and Greenhouse Gas (GHG) Inventory. SLMS enables collecting and assessing, over time, the activity data related to forest land and land use changes, while the NFI enables collecting information on forest carbon stocks and changes, relevant for developing emissions and removals factors. The GHG inventory is a system or a tool for reporting anthropogenic forest related GHG emissions by sources and removals by sinks to UNFCCC Secretariat in the form of National Communication.

Both (emissions and removals) are first two pillars of NFMS, Bhutan initiated implementation prior to R-PP implementation. While NFI was initiated in 2009 during the 10th Five Year Plan as one of the key programmes of the DoFPS, the land cover mapping programme which is a SLMS was initiated a year later by Department of Agriculture but under the Ministry of Agriculture and Forest.

NFI has been a massively expensive in terms of human as well as financial resources, keeping in view the area and economy of Bhutan. With support received, both from internal and external sources of funding opportunities, NFI was successfully implemented, albeit the field work or data collection phase itself took three and half years. The reports from NFI were published in two volumes. Whereas the Volume I, published in 2016, reported the conventional NFI reporting parameters which included stems count, basal area, volume and growing stock; the Volume II, published in 2018 reported biomass, carbon, biodiversity and forest and ecosystem health

parameters. Having successfully conducted first NFI and built institutions partially for periodic NFI, Bhutan has initiated efforts to conduct second round of NFI, the field work for which is expected to begin from latter half of 2020. In contrary to first NFI, the second NFI will adopt a decentralized approach to implement it, meaning that the responsibilities and accountability of collecting data from NFI plots will be given to the field offices, while the central agency – Forest Resources Management Division (FRMD) will provide overall guidance and support to ensure successful implementation of NFI. This approach is being adopted to mainly institutionalize the NFI, so that NFI is fully integrated with the regular day-day activities of the field offices, thereby ensuring periodic NFIs, as required both by the Constitution of the kingdom of Bhutan and the National Forest Policy, 2011.

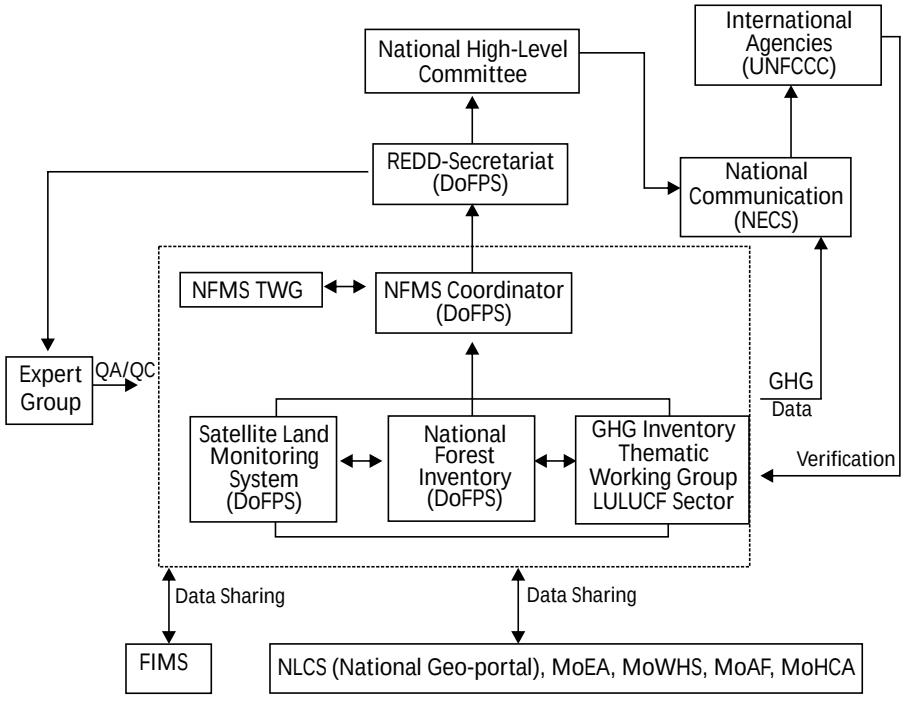
As part of R-PP implementation, the DoFPS undertook land use and land cover (LULC) assessment, the report of which was published in 2016. This exercise not only enabled monitoring land use and land cover changes but also helped validation and confirmation of forest cover figures reported through ground-based inventory (NFI). In carrying out LULC, the capacity of the technical staff has been built and the DoFPS today has staffs that are capable of carrying out similar exercises in future. Most importantly, with the technical assistance from Food and Agriculture Organization (FAO) of the United Nations, Bhutan has developed and launched NFMS web portal system- http://bhutan-nfms.org/.

In terms of GHG inventory, the National Environment Commission Secretariat (NECS) is the national focal point for UNFCCC and therefore has the mandate of reporting and submitting the National Communications, in which GHG inventory forms a part. However, the DoFPS has the mandate and obligation to provide information on emissions and removals by the forestry sector. Hence, there is already strong institutional arrangement that exists for GHG inventory. NECS has submitted second National Communication (SNC) to UNFCCC in the year 2011, the Secretariat is in the process of preparing the third National Communication (TNC). Institutional arrangement for NFMS and MRV is given in Figure 3.

3.3.4 National REDD+ Safeguards Frameworks

The Safeguards Information System (SIS) is equally important as other elements of REDD+ framework to protect or avoid risks of harm as a result of implementing REDD+ activities and they are important for successful delivery of result-based REDD+ programme. Bhutan has developed REDD+ Safeguards Information System following the guidelines set in by 'Cancun Agreements' of UNFCCC (WMD, 2016; WMD, 2019 b).

The Cancun Agreements provides general guidelines on developing safeguards information system (SIS) and a great level of flexibility for countries to develop the safeguards information systems taking into account the national circumstances. Besides, UNFCCC safeguards guidelines, Bhutan's SIS development followed guidelines outlined by both the Forest Carbon Partnership Facility (FCPF) and Green Climate Fund (GCF), since Bhutan's REDD+ activities are being supported by FCPF and GCF. Their requirements regarding SIS include:



Abbreviations

1. DoFPS	Department of Forests and Park Services
2. MoAF	Ministry of Agriculture and Forests
3. NECS	National Environment Commission Secretariat
4. NLCS	National Land Commission Secretariat
5. MoEA	Ministry of Economic Affairs
6. MoWHS	Ministry of Works and Human Settlements
7. MoHCA	Ministry of Home and Cultural Affairs
8. FIMS	Forest Information Management Section

Figure 3 : Institutional arrangement for NFMS and MRV

- For the GCF Environmental and Social Safeguards (ESS), countries are required to establish procedures to monitor and measure the effectiveness of the Environmental and Social Management System (ESMS), as well as compliance with any legal and/or contractual obligations and requirements. Where appropriate, countries must consider involving affected community representatives in monitoring activities. In cases where significant impacts have been identified, countries may need to allow external experts to verify its monitoring information. Countries must use

'dynamic mechanisms' to verify the compliance and progress towards the desired outcomes. Monitoring requires recording information to track performance and comparing this to previous benchmarks.

- For the FCPF Methodological Framework, countries are required to promote the UNFCCC REDD+ safeguards, in part, though not solely, demonstrated through having a SIS in place. It also requires countries to report on the implementation of the Emission Reduction (ER) Programme Safeguards Plans. Hence, the FCPF expects countries to have a SIS in place, which can provide information on compliance with both UNFCCC REDD+ safeguards and World Bank Operational Policies.

Bhutan's SIS highlights functions and institutional arrangements including identification of SIS information needs and sources in order to meet the requirements of all three, namely; UNFCCC, FCPF and GCF safeguards guidelines. The development of the SIS is an iterative process and its institutional arrangements will be flexible to evolve as REDD+ implementation is further changed and refined.

Notwithstanding, the safeguards requirement under UNFCCC, GCF and FCPF, Bhutan as a country, in fact, has been implementing safeguards and that the systems are already existing. For instance, the country's main development philosophy is Gross National Happiness (GNH) which entails placing societal welfare above economic development besides, strategically balancing economic development and environmental conservation. One of the pillars of GNH is environmental conservation which ensures that there is minimal harm to environment as development activities or programmes are undertaken. Hence, for any developmental activities to be undertaken, it is preceded by impact assessment such as environmental impact assessment. Therefore, necessary safeguard systems in terms of policies, law and regulations already exist in Bhutan and that the requirements under the UNFCCC, GCF and FCPF safeguard systems are in perfect complementarity to the existing national safeguards system.

The four pillars of the gross national happiness and environmental assessment takes care of most of the Cancun, FCPF and GCF safeguard. Firstly, four pillars of GNH, which include good governance; sustainable socio-economic development; reservation and promotion of culture; and environmental conservation addresses the safeguard principles by providing enable environment for transparency in the forest governance, providing access to forest resources, community engagement, avoided community relocation and displacement, institution of community forestry programmes and right to use and manage the resources. Secondly, detailed studies on both environmental and social impacts are required under environmental assessment before implementing any project. This provide platform for community and proponents to discuss all environmental and social issues and develop mitigation measures to avoid any potential negative impacts and risk.

As described earlier in section 3.1, the people living in the rural communities are dependent on forest resources for their livelihood and all forest dependent communities have right to use the forest resources and the timber are provided at nominal fees for construction purpose. They also have right to collect and use non-wood forest products under existing laws.

3.4 Challenges and Opportunities in Implementation of REDD+ Activities

REDD+ is a global initiative involving multilevel governance/ stakeholders. The aspirations and needs of people at local level, global demands, national and sub-national are all linked to REDD+. This interconnectedness poses huge challenge for implementation and requires integrated approach and thorough planning. If these features are not addressed, REDD+ is unlikely to fulfill its objectives.

Therefore, it should be implemented strategically and carefully to address series of challenges in the pathway of implementation or else it will 'do more harm than benefit'. Firstly, given its multilevel interconnection involving multiple players and stakeholders and lack of demonstrated emission reductions and low political acceptance by the developed countries, despite being a small country, it will be a huge challenge to implement REDD+ even for Bhutan on available technical and financial resources.

Secondly, Bhutan as a country with huge forest cover and low deforestation (HFLD), it will not be able to demonstrate a significant emission reduction, owing to its sheer smallness and insignificant emission from the forestry sector. While 71% of the country is under forest cover (FRMD, 2016), sequestering 8.359 million tonnes of CO_2 eq through sustainable management of forests, conservation and enhancement of carbon stocks, its rate of deforestation is 0.01%, thus emitting 0.16 million tonnes of CO_2 eq as per Bhutan FREL/ FRL submitted to UNFCCC. Therefore, there is a very little space to demonstrate the additional outcomes through implementation of REDD+ activities unlike countries having high deforestation in the past.

The benefit sharing would be another challenge as in many other developing countries, where major chunk of the benefits is drawn by the powerful and vocal groups of communities. However, the challenges are likely to occur at a much smaller scale compared to other REDD+ countries. The clear and strategically planned access and benefit sharing system are not resilient to implementation challenges on the ground.

On the contrary, Bhutan stands to gain hugely by implementing REDD+. Firstly, all four elements of the REDD+ mechanism such as National REDD+ Strategy, NFMS, FREL/FRL and Safeguards Information System already developed and either fully or partially functional. For instance, one of the principal components under NFMS is National Forest Inventory (NFI) and for Bhutan NFI was initiated in 2009, five years prior to implementing R-PP, thus establishing NFMS has come through smoothly without much challenge. Likewise, in terms of Safeguards frameworks, much of the existing policies and legislative environment in Bhutan is very complementary REDD+ safeguards framework. However, these systems (NFMS and SIS) need to be fine tunes in accordance with the relevant guidance of the UNFCCC as reflected in various COP decisions. Therefore, REDD+ implementation and the requirements frameworks under REDD+ will only strengthen the existing policies, legislations and regulations.

Other strength that Bhutan has is 'smallness' of its size. Although smallness has its share of disadvantages when it comes to reaping benefit on the basis of emission reduction targets. But for Bhutan, in the context of REDD+, the size is a great

strength. Being a small country, coordination and collaboration amongst multi-stakeholders involved in implementing REDD+ will be fairly smooth, efficient and easier, unlike other larger countries. Thus, we are able to, at least, initiate some of the component of REDD+ at National level and there is no question of implementing the REDD+ activities at smaller scale. Moreover, Bhutan already has a good system of smooth coordination and institutional arrangements working successfully and efficiently; and achieved tremendous outcome over the decades which the global community cannot deny as Bhutan is one of the carbon negative countries in the entire globe. Thus, implementation of REDD+ can be a huge success given a well-established institutions and coordination amongst the different stakeholders.

Technical capacity development has two-fold opportunity for Bhutan. First, REDD+ implementation will come with technical capacity building package, which will benefit Bhutan. Second, Bhutan already has a fairly well-built capacity of technical staffs of DoFPS and stakeholders who have been engaged in and are implementing readiness activities of REDD+, which is yet strength for Bhutan. Given Bhutan's successful implementation of REDD Readiness Preparation Proposal (R-PP) from 2015-18, an additional readiness fund was granted to Bhutan which too, is nearing completion of its implementation.

3.5 REDD+ and NDC Targets of Bhutan

REDD+ fits perfectly well within Bhutan's Nationally Determined Contribution (NDC) submitted to UNFCCC to mitigate and adapt to climate change. As one of the mitigation measures, Bhutan pledged and re-emphasized its earlier declaration of remaining carbon neutral for all times to come, besides reiterating the constitutional mandate of maintaining 60% of the total geographical area under forest cover for all times to come. Further, Bhutan submitted that it is committed to maintaining the current level of forest cover through sustainable management of forest which is one of the main activities of REDD+ (RGoB, 2015).

Towards achieving the NDC targets and goals, various strategies, plans and action are included in the NDC. One of these is sustainable management of forest and conservation of biodiversity to ensure sustained environmental services through sustainable management of forest management units (FMUs) from where mainly commercial timbers are harvested following scientific principles of sustainability, protected areas management, community forest management and local forest management plans (LFMPs). Notwithstanding these, other actions include improving forest information and monitoring infrastructure through periodic forest inventories and carbon stock assessments; and forest fire management and rehabilitation of degraded and barren forest lands.

The activities such as sustainable management of forests, conservation and enhancement of forest carbon stock through management and restoration of degraded and barren forest lands are the activities which could very well qualify for REDD+ and thus, REDD+ in Bhutan has been perfectly integrated with NDC. This is mainly because of the fact that the government of Bhutan has clear policy guidance and vision to align all programmes and initiative with the national goals and visions.

The primary objective of REDD+ initiative is to reduce emission, of course from forestry sector, is also perfectly complementary to Bhutan's objective of offsetting millions of tonnes of CO_2 eq through hydropower. This is yet another strategy reflected in NDC and that Bhutan is committed to. Presently, the hydropower generation from run-of-the-river schemes accounts for almost 100% of electricity generation in Bhutan with almost 100% access to electricity in urban areas and 99.9% in rural areas as reported by the Hon'ble Prime Minister of Bhutan through the state of nation report in 2018. Thus, Bhutan projects in the NDC that it can offset up to 22.4 million tonnes of CO_2 eq per year by 2025 in the region through the export of electricity from our clean hydropower projects. Hence, REDD+ is well integrated with NDC of Bhutan.

3.6 Future Prospects of Implementing REDD+ Activities

With respect to future prospects of implementing REDD+ activities in the country, Bhutan views optimistically for multidimensional benefits, not just limited to carbon money. For its size, even with 71% forest cover, Bhutan may not stand to gain substantially in monetary terms. However, the environment is very conducive with many of the required frameworks under the REDD+ being established either fully or partially, thus setting a very ideal foundation for implementation of REDD+. Therefore, implementation of REDD+ activities will only strengthen the existing system and will be a great success story.

Not only this, the other critical advantage would be the trickling down of global resources to local communities, by rewarding them for the sacrifices and hard work made and opportunities forgone in protecting and conserving the community forests and protected areas.

The potential of the small nation of Bhutan is limited considering its size and the therefore limited financial amounts at stake. Nevertheless, it might trigger a local funding mechanism by way of ploughing-back of hydropower revenue for nature conservation and enhancement of carbon stock and sustainable forest management, offering a much easier pathway to fund similar forestry activities, which is yet another opportunity for Bhutan.

Above all, implementation of REDD+ activities will further improve and strengthen the existing policies, programmes, systems and capacity of the Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan. On its endeavour to protect and conserve Bhutan's pristine environment and uphold the Constitutional mandate of maintaining 60% forest cover for all times to come. This is to meet the demand for both tangible and intangible goods and services of both the present and our posterity for many more years to come. Therefore, Implementation of REDD+ activities has a huge potential to contribute towards climate change mitigation and adaptation, good forest governance and growth of Bhutan, particularly in the environmental sector.

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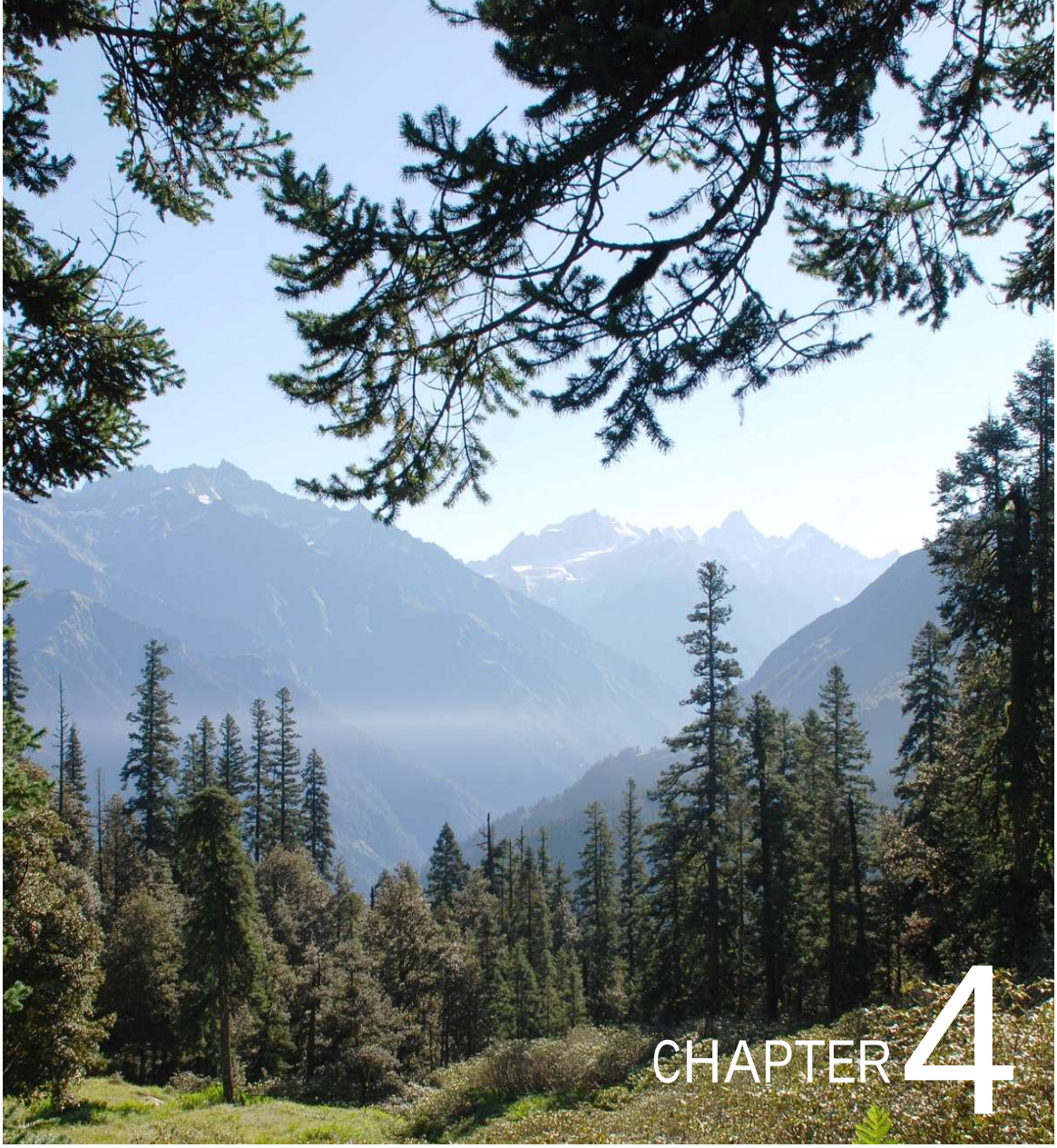

CHAPTER 4

REDD+ READINESS IN INDIA AND IMPLEMENTATION OF REDD+ ACTIVITIES IN INDIAN HIMALAYAN REGION

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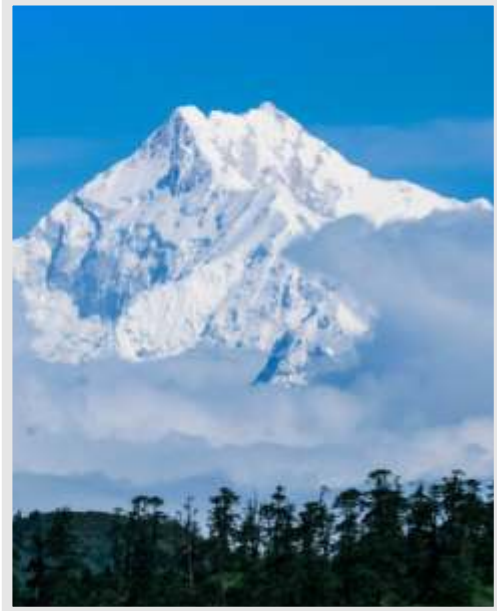


4.1 Introduction

India has 2.4% of the world's land mass and holds 17% of the world's human population and 18% of the world's livestock population. About 45,968 species of plants and 91,364 species of animals are recorded from India which constitute 11.18% of world's flora and 7.44% of world's fauna. Four of the 34 globally identified biodiversity hotspots, namely the Himalaya, Indo-Burma, the Western Ghats-Sri Lanka and Sundaland, are represented in India. India ranks 10th amongst the most forested nations of the world (FAO, 2020). As per India State of Forest Report 2019, the total forest cover is 7,12,249 sq km which is 21.67% of the total geographical area. The tree cover is estimated as 95,027 sq km which is 2.89% of the total geographical area. The total forest and tree cover in India currently is 8,07,276 sq km or 24.56% of its geographic area (FSI, 2019). Champion and Seth (1968) classified Indian forests into 221 forest sub-group types based on location specific climatic and edaphic conditions.

The difference in existing forest and tree cover, and the target area suggests that an additional of about 29.58 mha need to be brought under the forest and tree cover to achieve 33% of forest and tree cover target as envisaged in National Forest Policy, 1988. Most of the forests are under open forest category of 10-40% canopy density, is either patchy or degraded and needs restoration efforts. The additional land area of 29.58 mha needs to be targeted under various programmes like National Afforestation Programme, Green India Mission, National Agroforestry Policy, National Green Highway Mission etc.

As per the Global Forest Assessment Report 2020, total global forest carbon stocks is 662088 million tonnes in 2020 with an average of 163.10 tonnes/ha. The global forest carbon stock decreased between 1990 and 2020 from 668399 million tonnes to 662088 million tonnes (FAO, 2020). From 1994 to 2017, carbon stocks stored in India's forests are estimated to have increased from 6071 million tonnes to 7124.6 million tonnes, thereby registering an increment of 1053.68 million tonnes of carbon or 15155.89 million tonnes of CO_2 eq (FSI, 2019). At national level, 31.68% of forest carbon stocks stored in above ground biomass while 56.21% of forest carbon stocks are stored in soil and rest in the remaining three carbon pools i.e., below ground biomass, dead wood and litter. In India forests are net sink of carbon emission and are offsetting about 11% of total greenhouse gas emission. Trends of carbon stocks in different years in forests of India are given in Table 1.

About 1,73,000 villages are identified as forest fringe villages having more than 300 million people largely dependent on forests for their

livelihood (MoEFCC, 2018 a). Concept of Joint Forest Management in India was initiated in 1990 with the aim to improve quality of forests besides improving economic status of local communities involved in the protection and management of forests. About 22 mha forests of the country are being managed by more than 1,18,000 Joint Forest Management Committees (JFMCs) with the involvement of more than 20 million people. JFMCs target conversion of low productive forests to high productive forests.

Table 1: Forest carbon stocks in India

Year	Forest Cover (sq km)	Tree Cover (sq km)	Forest Carbon Stocks (million tonnes)	Forest Carbon Stocks (million tonnes CO_2 eq)
2004	677,088	91,663	6,663.00	24453.21
2011	697,898	91,266	6,941.00	25473.47
2013	701,495	92,572	7,044.00	25851.48
2015	708,273	93,815	7,083.00	25994.61
2017	7,12,249	95,027	7124.68	26147.58

Sources: FSI, 2011, 2013, 2017 and 2019)

4.2 REDD+ and India

India had proposed a potential policy approach based on socio-environmental and technological perspectives and requirements of the country to Subsidiary Body for Scientific and Technological Advice of United Nations Framework Convention on Climate Change (UNFCCC) on reducing emissions from deforestation and forest degradation in developing countries (REDD) in 2007. India proposed that countries who have implemented strong conservation measures and regulations be suitably compensated under the instrument of REDD. The policy approach presented by India was named as "Compensated Conservation". The Indian proposal was intended to compensate the countries for maintaining and increasing their forests as carbon pools as a result of conservation and increase/ improvement in forest cover backed by a verifiable monitoring system.

The Indian approach was discussed at greater length at COP 13 of UNFCCC held in Bali in 2007. India's push for inclusion of conservation and increment of forest cover as a policy approach to reduce emissions from deforestation, was finally recognized and given effect to in the Bali Action Plan (Para 1(b) (iii) of Bali Action Plan) as *".....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 above paragraph of Bali Action Plan {paragraph 1(b) (iii)} is collectively referred to as 'REDD-plus' or 'REDD+'.

India has played key role in shaping the concept of REDD+ at the international level, and doing efforts to ensure the effective implementation of REDD+ activities at national and sub-national levels. India is under readiness phase of REDD+ and in the process of development of key elements required for implementation of REDD+ activities.

4.2.1 Reference Document for REDD+

Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India has prepared a reference document for REDD+ in 2014 for facilitating the implementation of REDD+ activities in India. This document has laid broad contours of the policies, processes, methodologies, roles and responsibilities (to different government and other organizations including MoEFCC, Forest Survey of India, Indian Council of Forestry Research and Education (ICFRE), State Forest Department, Joint Forest Management Committees, Van Panchayats and Gram Sabhas), governance and safeguards to ensure that REDD+ implementation supports the rights of the local communities as also conservation of biodiversity in natural forests and institutional framework for implementation of REDD+ activities in accordance with UNFCCC decisions. Reference document comprehensively addresses the need of capacity building on REDD+ across all levels of the government, expert organizations, civil society, other organizations and local communities. It also highlighted the necessity of National REDD+ policy and strategy, national forest reference level, processes and methodologies for quick, accurate and cost effective MRV of forest carbon stocks, and required institutional framework of national and sub-national REDD+ architecture for effective implementation of REDD+. It also brings out the necessity of a comprehensive approach which gives equal importance to all forest ecosystem goods and services. REDD+ incentives whenever become available will flow in totality to the local communities in proportion to their REDD+ performance (MoEFCC, 2014).

4.2.2 Stocktaking of REDD+

Study on stocktaking of REDD+ in India was conducted by ICFRE under REDD+ Himalaya Project in 2016. The study concluded that REDD+ needs to be institutionalized at national and state levels. Although, REDD+ is a component of new National Working Plan Code 2014 (MoEF, 2014), however, Working Plan Officers and other front line forest staff needs to be sensitized on various aspects of REDD+. Massive capacity building of local institutions and stakeholders are required to get ready for implementation of REDD+ activities. Strengthening of local community institutions is required to pass on REDD+ actions at the community level. In order to tap REDD+ finance available through variety of sources including Green Climate Fund, India needs to develop key elements (National REDD+ Strategy, National Forest Reference Level, National Forest Monitoring System and Safeguards Information System) in accordance to Cancun Agreements for implementation of REDD+ activities (Singh *et. al.*, 2016).

4.2.3 National REDD+ Strategy

India has prepared its National REDD+ Strategy which was released in 2018 and submitted to UNFCCC. India's National REDD+ Strategy has been aligned with the precepts of the National Forest Policy. The overarching objective of National REDD+ Strategy is to facilitate implementation of REDD+ programme in the country in conformity with relevant decisions of UNFCCC, in particular the Cancun Agreements, Warsaw Framework for REDD+, Paris Agreement, and the national legislative and policy framework for conservation and improvement of forests and the environment (MoEFCC, 2018 a).

The National REDD+ Strategy defined all the REDD+ activities in the country context, highlighted the new initiatives for enhancement of forest carbon stocks, drivers of deforestation and forest degradation, and also highlighted

appropriate strategies for addressing these drivers. As per the Strategy, intensive and need based research need to be undertaken for enhancing the capacity of forest ecosystems for carbon sequestration and community benefits on forest inventory including growth yield assessment, forest productivity enhancement through forest genetic resource management and tree improvement, ecosystem services, biodiversity conservation, reclamation of degraded and mined areas for ecological security, integrated pest management, invasive alien species management, forest fires, forest hydrology and carrying capacity of ecosystems.

The National REDD+ Strategy addresses a road map for addressing drivers of deforestation and forest degradation and issues like safeguards for rights of local community, gender equity, creation of green jobs to the local youths etc. The REDD+ incentives may be generated internationally through wide variety of sources (public and private, bilateral and multilateral including Green Climate Fund), and also at national level in the form of performance-based awards and financial devolution from Government of India to State Governments and down to the local communities.

National REDD+ Strategy proposes to establish a National Governing Council for REDD+ to coordinate and guide REDD+ related actions at the national level. A National Designated Entity for REDD+ shall also be established at the Ministry of Environment, Forest and Climate Change that to liaise with UNFCCC and states. The strategy devolves major responsibility for execution of REDD+ activities on the State Forest Departments. Each State shall create a State REDD+ Cell in the State Forest Department. States are also encouraged to develop their State REDD+ Action Plan for implementation of National REDD+ Strategy. Creation of State REDD+ Cells is under progress and about 13 states (Mizoram, Meghalaya, Manipur, Odisha, Haryana, Rajasthan, Bihar, Karnataka, Tamil Nadu, Assam, Chhattisgarh, Punjab and Uttarakhand) have created State REDD+ Cells for implementation of REDD+ activities in the states.

The strategy proposes to revisit the Green India Mission objectives and timeframe in the light of new developments under global climate change regime, especially India's NDCs to UNFCCC. The strategy focuses on creation of trained human resource capable of carrying out forest related measurements at all levels of REDD+ implementation. The strategy will support empowerment of youth cadres as Community Foresters to lead the charge at the local level. In order to keep forest well adapted to climate change impacts, some of the activities where Community Foresters can be engaged effectively are: (i) assisted natural regeneration, (ii) soil and moisture conservation, (iii) harvesting, thinning, and hygienic removals, (iv) forest nurseries and raising of quality planting stocks, and (v) control of forest fires, pest and disease and invasive species.

4.2.4 National Forest Reference Level

Government of India has submitted the National Forest Reference Level to UNFCCC in January 2018 which has been technically reviewed by Assessment Team of the UNFCCC. The process of development of Forest Reference Level (FRL) draws strength from data and information from Forest Survey of India's National Forest Monitoring System. The available data and information about forest area change in area and greenhouse gas inventories were analysed and necessary calculations and changes were carried out in order to construct relevant FRL. On analysis

of forest cover assessment between 2000 to 2004 and 2004 to 2008, it has been observed that activities such as deforestation, forest degradation, enhancement of canopy densities and afforestration have been observed in significant forest area. In India, practices of sustainable management of forests are being followed and "all the forests are to be managed under the prescriptions of a working plans which are prepared on the basis of principles of sustainable management of forests, conservation of biodiversity, maintenance and enhancement of ecosystem services including carbon sequestration, and the participation of local communities in management of forests" (MoEF, 2014). REDD+ activity on sustainable management of forests and all the five carbon pools (above ground biomass, below ground biomass, dead wood, litter and soil organic carbon) have been selected for construction of FRL.

Carbon dioxide has been taken into account for construction of FRL. The historical method to calculate FRL has been considered. The activity data and emission factors have been derived from National Forest Monitoring System. The activity data taken for construction of FRL is forest cover assessment for the years 2000, 2004 and 2008. The FRL has been constructed at the National Level as the activity data used for construction of FRL is based on wall-to-wall mapping using satellite data and emission factors derived from national forest inventory spread over entire country. India's Forest Reference Level is (-)49.70 million tonnes CO_2 eq/year.

4.2.5 National Forest Monitoring System

India is among the few countries which are regularly using satellite based remote sensing technology in detecting forest cover changes. India is assessing its forest cover since 1987 using remote sensing satellite data. Over the years, much technological advancement has been taking place in the field of remote sensing and mapping. Forest Survey of India (FSI) uses latest Indian satellite data to produce forest cover change maps and has also regularly upgrades its methodology with technological advancement. Over the years, there have been improvements both in the quality of remote sensing data and the accuracy of interpretation techniques (Table 2).

India has robust forest monitoring system and regularly using satellite-based remote sensing technology for detecting forest and tree cover changes. FSI has been assessing the forest cover of the country on a two-year cycle since 1987. FSI is following the tier 2 and tier 3 approach of IPCC Good Practice Guidance for carbon estimation in forests of India through a combination of remote sensing and ground-based forest carbon inventory.

FSI has been conducting the National Forest Inventory (NFI) since 2002, following a standardized sampling design by which sample plots for field observations are laid across the country. Under NFI, data is being collected regularly from sample plots in forest lands distributed across the country in different physiographic and climatic zones. As per the design, the cycle of the NFI is 2 years. Thus, the first NFI pertains to the period 2002-2004, second NFI to 2004-2006 and third NFI to 2006-2008, fourth NFI to 2008 to 2010 and so on. FSI has adopted a new grid based NFI design since the year 2016. The latest NFI was published in the year 2019. NFI data are electronically stored and results are published biennially in the form of State of Forest Report which is fully accessible to the public. The information on carbon accounting

is comprehensive which includes forest type wise and state wise carbon stocks.

Methodology followed by FSI for estimation of biomass carbon and soil organic carbon has the potential of being developed and adopted as a general REDD+ methodology for assessing changes in forest carbon stocks at national and sub-national levels over a stipulated period.

Table 2: Forest cover mapping in India

Assessment	Year	Data Period	Satellite & Sensor	Spatial Resolution	Scale	Minimum Mappable Unit (ha)	Mode of Interpretation
1st	1987	1981-83	Landsat-MSS	80	1:10,00000	400	Visual
2nd	1989	1985-87	Landsat-TM	30	1:250,000	25	Visual
3rd	1991	1987-89	Landsat-TM	30	1:250,000	25	Visual
4th	1993	1989-91	Landsat-TM	30	1:250,000	25	Visual
5th	1995	1991-93	IRS-1B LISS II	36.25	1:250,000	25	Visual
6th	1997	1993-95	IRS-1B LISS II	36.25	1:250,000	25	Visual/ Digital
7th	1999	1996-98	IRS-1C&1D LISS III	36.25 23.5	1:250,000	25	Visual/ Digital
8th	2001	2000	IRS-1C&1D LISS III	23.5	1:50,000	1	Digital
9th	2003	2002	IRS-1D LISS III	23.5	1:50,000	1	Digital
10th	2005	2004	IRS-1D LISS III	23.5	1:50,000	1	Digital
11th	2009	2006	IRS-P6 LISS III	23.5	1:50,000	1	Digital
12th	2011	2008-09	IRS-P6 LISS III	23.5	1:50,000	1	Digital
13th	2013	2010-11	IRS-P6 & IRS-Resourcesat-2 LISS III	23.5	1:50,000	1	Digital
14th	2015	2013-14	IRS-P6 & IRS-Resourcesat-2 LISS III	23.5	1:50,000	1	Digital
15th	2017	2015-16	IRS-P6 & IRS-Resourcesat-2 LISS III	23.5	1:50,000	1	Digital
16th	2019	2017-18	IRS-Resourcesat-2 LISS III	23.5	1:50,000	1	Digital

Source: FSI, 2019

4.2.6 Safeguards Information System

The Government of India has always made positive efforts through framing suitable policies, laws and regulations (PLRs), and by amending them from time to time to conserve and protect environment and natural resources including forests of the country. The first Forest Policy adopted by British Colonial Government in 1894 aimed at a custodial and timber-oriented management. The main thrust areas were to ensure maintenance of adequate forest cover for general well-being of the country, meeting needs of local people and revenue collection. First Forest Policy of independent India in 1952

recommended that 33% of the total geographical area of the country should be brought under forest or tree cover. It provided detailed guidelines for management and protection of forests and wildlife. The policy was revised in 1988 and emphasized on extension of forests beyond the traditional forest areas. This gave impetus to social forestry, agroforestry and farm forestry. Various policies, laws and regulations related to environment, forest, biological diversity, and right of local communities viz. Indian Forest Act, 1927; Wildlife (Protection) Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Forest (Conservation) Act, 1980; Air (Prevention and Control of Pollution) Act, 1981; Environment (Protection) Act, 1986; National Forest Policy, 1988; Panchayats (Extension to the Scheduled Areas) Act 1996; Guidelines for Joint Forest Management, 1990; Protection of Plant Varieties and Farmers' Rights Act, 2001; Biological Diversity Act, 2002; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; National Environment Policy, 2006; National Agroforestry Policy, 2014; National Working Plan Code-2014; Compensatory Afforestation Fund Act, 2016; National REDD+ Strategy 2018 etc. are in place in India which will also in consonance in addressing and respecting the Cancun Safeguards for implementation of REDD+ activities.

India has more than 150 years old history of scientific management of forests and due care has been given to the environmental and social safeguards in forest management practices. Over the period of time, the priorities of forest management in India have changed which have also been reflected in the three National Forest Policies, the country had so far. The distinct feature has been gradual shift in priorities of forest management from production forestry to the conservation and participatory forestry. Various policies, laws and regulations related to forest conservation and management address directly and indirectly to various environmental and social safeguards for successful

implementation of the various forestry programmes in the country. National REDD+ Strategy, 2018 of India endorsed that Cancun Safeguards principles shall be adhered during the implementation of REDD+ activities, and SIS is being developed through existing policies, law and regulation of forest governance. A Safeguards Information System (SIS) through combination of existing forest governance

structures, existing legal & institutional frameworks and sources of information is being developed to meet the objectives of SIS as per the UNFCCC requirement for implementation of REDD+ activities. Stakeholder consultations processes across the country for finalization of safeguards information system are being followed.

4.2.7 Capacity Buildings of Stakeholders

The National REDD+ Strategy has felt the necessity of trained human resources for carrying out forest related measurements at all levels of implementation of REDD+ activities. ICFRE has been designated as a nodal organization for capacity building of all cadres of the State Forest Departments, other relevant departments, civil societies and local communities on various aspects of REDD+. Capacity buildings of the forest working plan officers on assessment of forest carbon stocks, measurement, reporting and verification (MRV) and other REDD+ related issues are needed for incorporating the REDD+ implementation in the Working Plans of the Forest Divisions. As per National REDD+ Strategy, a Technical Working Group under the Chair of Director General, ICFRE has been constituted and advise on the matters related to safeguards, policy, finance and capacity building.

ICFRE is regularly conducting capacity building programmes on REDD+ for the Indian Forest Service Officers of State Forest Departments. Capacity buildings on REDD+ Measurement, Reporting and Verification of the local communities and other stakeholders of Mizoram and Uttarakhand states have been done under REDD+ Himalaya Project and Uttarakhand REDD+ Project.

ICFRE has initiated a project component on Capacity Buildings of State Forest Departments for Developing State REDD+ Action Plans under National Compensatory Afforestation Fund Management and Planning Authority (CAMPA) funded scheme titled 'Strengthening Forestry Research for Ecological Sustainability and Productivity Enhancement'. The main objective of this project component is to build the capacity of the State Forest Departments for preparation of their State REDD+ Action Plans. Ministry of Environment, Forest and Climate Change, Government of India has provided financial support from National CAMPA to ICFRE for scheme on Execution of Readiness Activities for Implementation of REDD+ in India. Capacity buildings of the stakeholders on various aspects of REDD+ including safeguards at regional level will be done besides developing safeguards information system (SIS) and REDD+ knowledge sharing platform.

4.3 Nationally Determined Contribution

India as a Party to the Paris Agreement has communicated its Nationally Determined Contribution (NDC) to the UNFCCC on 02 October 2016, keeping in view its development agenda, particularly the eradication of poverty coupled with its commitment to following the low carbon path to progress and being sanguine about the unencumbered availability of clean technologies and financial resource from around the world (UNFCCC, 2016). India's NDC has following climate change actions which outline the post-2020 climate change actions of the country:

1. To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.

2. To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.

3. To reduce the emissions intensity of its GDP by 33 to 35% by 2030 from 2005 level.

4. To achieve about 40% percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).

5. To create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030.

6. To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.

7. To mobilize domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.

8. To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies

A preliminary estimate suggests that at least USD 2.5 trillion is required to meet its climate change actions under NDC by 2030.

India's forestry sector climate change action/ target is to create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030 which is quite ambitious target. As per National REDD+ Strategy, improvement and increase in the natural forest cover with concerted focus on trees outside forests are required for achieving the NDC target. This target can be met by assigning appropriate targets of afforestation and reforestation with the target of improving the existing forest cover to each State and Union Territory. Implementation of REDD+ activities can also accomplish NDC target (MoEFCC, 2018 a).

Forest Survey of India has suggested that activities such as restoration of impaired forests, restoration of open forests, afforestation on wastelands, agroforestry, planting of trees on both sides of national highways and state highways in 50 m wide strips in each side forming green corridor, plantations along other roads in strips of width 10 m on both sides, plantations along railway tracks in strips of width 10 m on both sides, plantation on railway lands,

plantations along rivers and canals, expanding urban green spaces including avenue plantations, parks etc. need to be considered for achieving the forestry sector climate change action of NDC (FSI, 2019).

REDD+ is one of the cost effective way for climate change mitigation and adaptation which will facilitate in achieving forestry sector climate change action under NDC. It brings a close linkage in biodiversity, ecosystem functioning and services apart from carbon sequestration. Moreover, effective implementation of REDD+ activities will provide a variety of income generation opportunities, livelihoods security, resilience and social wellbeing.

4.4 Opportunities and Challenges for REDD+ Implementation

Rawat *et al.*, 2020 highlighted opportunities (such as strong policy and legislative frameworks, scientific management of forests through approved working plans, existing forestry research and training institutions, forest governance and management, community participation in sustainable management of forests, ongoing major programmes and projects in forestry sector, national action plan on climate change, green skill development, commitments under International Conventions and Agreements) and challenges (such as lack of readily available finance for REDD+, role of private sector, lack of capacity of stakeholders, availability of quality planting stocks, control of forest fire and invasive alien plant species) for implementation of REDD+ activities in India. Existing policies, laws and regulations related to conservation of forests, biodiversity and wildlife, and environment protection are supportive for implementation of REDD+ activities in India (Table 3).

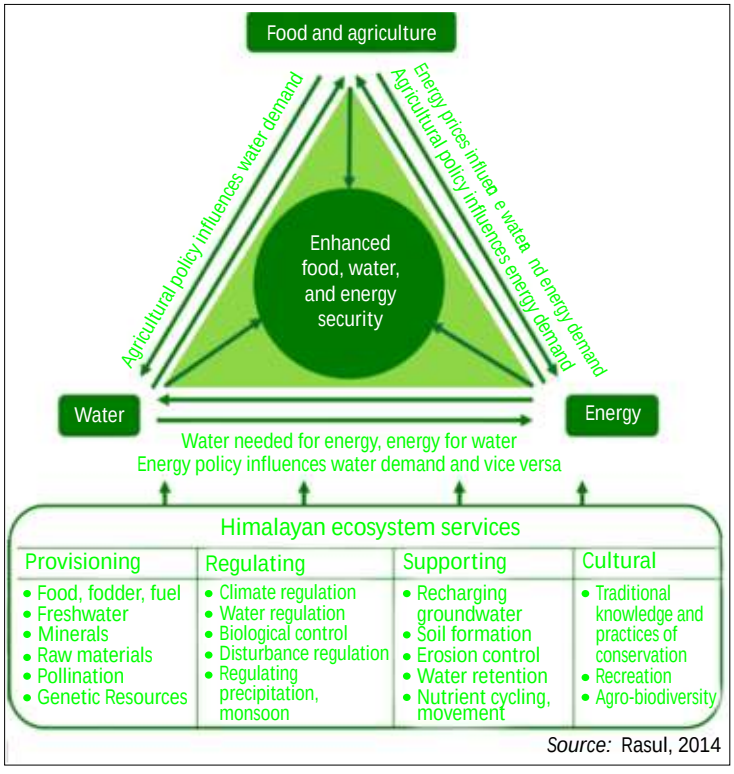
Table 3: Existing policies, laws and regulations related conservation of forests, biodiversity, wildlife and environment protection

Act / Policy	Supportive Role in implementation of REDD+ activities
Indian Forest Act, 1927	The Act consolidates the law relating to forests, the transit of forest-produce and the duty leviable on timber and other forest-produce. Proper implementation of the provisions of this Act is capable of ensuring conservation of forests as also enhancing the quality and extent of the forest and tree cover in the country, which, in turn, contribute to enhance REDD+ performance.
Wild Life (Protection) Act, 1972	The Act provides protection to wild animals, birds and plants. It perfectly synergises with the adherence to safeguards of REDD+ relating to conservation of biodiversity.
Forest (Conservation) Act, 1980	The Act was enacted to reduce indiscriminate diversion of forest lands for non-forestry purpose and also to regulate and control the land use changes in forests. Ultimately it reduces deforestation through controlling the diversion of forest lands.
Environment (Protection) Act, 1986	The Act provides protection and improves the environment through prevention of pollutions and to tackle specific environmental problems.
National Forest Policy, 1988	Main aim of National Forest Policy is to ensure environmental stability and maintenance of ecological balance. It ensures that the rights of the forest dependent communities are protected. The policy aims for maintaining one-third of the country's geographical area under forest and tree cover and calls for massive afforestation and social forestry programmes with people's participation for increasing the forest and tree cover in the country.
Panchayat (Extension to Scheduled Areas) Act, 1996	It gives special powers to the Gram Sabhas in scheduled areas especially for the management of natural resources.
Biological Diversity Act, 2002	The Act provides for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources.
National Environment Policy, 2006	It builds on the existing policies related to preservation of natural resources and is intended to guide action in developing regulatory reforms, and programmes and projects for environmental conservation. People depending on natural resources for their livelihood get better livelihood from conservation than from degradation of natural resource is the main theme of this policy.
The Scheduled Tribes and Other Traditional Forest Dwellers (Reorganisation of Forest Right) Act, 2006	It helps to recognise and vest the forest rights and occupations in forest land in forest dwelling scheduled tribes and other traditional forest dwellers who have been residing in such forests for generations. It will also contribute towards adherence to the safeguards related to rights of the local communities with respect to their proprietorship of land and non-timber forest products.
National Agroforestry Policy, 2014	The policy underlines the environmental contribution of agroforestry by preventing deforestation, and promoting carbon storage, biodiversity conservation and soil & water conservation.
Green Highways Policy, 2015	To provide vision of developing eco-friendly and green national highways. This afforestation drive has a target to plant 100 million trees along national highways.
Compensatory Afforestation Fund Act, 2016	The important feature of this act is that any forest land being diverted to non-forest land, should be afforested equal to the size of the forest initially being converted. This act has been enacted by the government to systematically channelize the funds accrued on account of diversion of forest land. Funds are to be utilised for raising plantations, undertaking natural regeneration, protection of forests, Green India Programme, wildlife protection and other related activities.

Source: Rawat *el al.*, 2020

4.5 Indian Himalayan Region

Indian Himalaya Region (IHR) is an important pillar to India's ecological security and provides valuable ecosystem goods and services for the sustenance of the human being. Figure 1 has categorized Himalayan ecosystem services by denoting the relationship between food and agriculture, water and energy. Himalaya is also called as third pole and water tower of the earth. IHR is known for its distinct geographical and ecological entity and stands out for youngest mountain chain and known to be as most fragile regions of the world. IHR extends over 2,500 km from Jammu & Kashmir in the northwest to Arunachal Pradesh in the north-east. The Indian Himalayan Region covers about 17% of the total geographical area of the country and housing approximately 6% of the country's total human population. The region is spreading in thirteen states & union territories namely Jammu & Kashmir, Ladakh, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Tripura and hill districts of Assam and West Bengal states (Figure 2). It has high forest cover with more than 41.5% of its geographical area. It constitutes a significantly large proportion (70%) of the Himalayan biodiversity hotspot, and having rich biodiversity of endemic flora and fauna. The IHR harbours about 8000 species of flowering plants supporting nearly 50% of the total flowering plants in India of which 30% are endemic to the region. There are over 816 tree species, 675 edible plant species and nearly 1743 species of medicinal plants (Samant *et al.*, 1998). In the IHR, a total of 190 invasive alien plant species belonging to 112 genera have been recorded (Sekar, 2012). Invasive alien plant species are one of the major threats to indigenous biodiversity, and also affect the ecosystem services.



Source: Rasul, 2014

Figure 1: Categorization of Himalayan ecosystem services

About 17% of the area of IHR is under permanent snow cover and glaciers and about 30-40% under seasonal snow cover, form a unique water reservoir. This feeds several important perennial rivers that provide water for drinking, irrigation, and

hydropower. Over 9,000 Himalayan glaciers and high altitude lakes form a unique reservoir storing about 12,000 cubic kilometre of fresh water (Valdiya, 1998). Major rivers such as Indus, Sutlej, Ganga, Yamuna, Kali and Brahmaputra arise from the Himalayan region.

Climate change is posing varied challenges on forest of Indian Himalayan region. IHR is known for its uniqueness and fragility and therefore it is sensitive of the alterations made by climate change. There is higher probability of shifts and changes in the structure, composition, and function of forest ecosystems (Gottfried *et al*., 2012). Species found near the timberline are highly sensitive to slightest changes in climate variables and are likely to migrate towards the upper slopes (Telwala *et al*., 2013). The consequence of the likely effect of climate change would result in increased risks of presence of invasive species and pathogen outbreaks (Negi *et al*., 2012). Additionally, due to warmer scenario, forest fire frequencies will also increase and rise in fire prone areas. These adverse effects will have a profound impact on the livelihoods of people living Himalayan region that are dependent on forest resources for their subsistence. Himalaya is important for ecological security of the country and Government of India attaches highest priority to protect the Himalayan ecosystem.

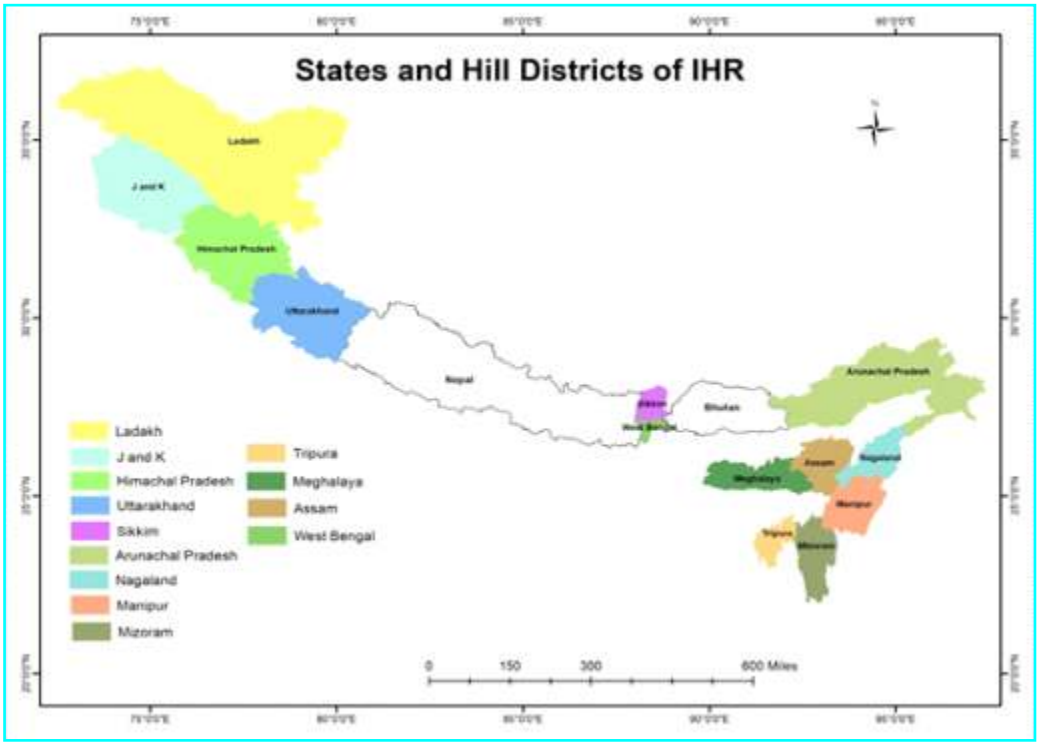


Figure 2: Indian Himalayan region covering states and Hill districts of Assam and West Bengal

Following two National Missions on Himalaya are being implemented in India for conservation and sustainable management of Himalayan ecosystem:

National Mission for Sustaining the Himalayan Ecosystem: It is one of the eight missions under the National Action Plan on Climate Change and contributes to the sustainable development of the country by enhancing the understanding of climate change, it's likely impacts and adaptation actions required for the Himalaya: a region on which a significant proportion of India's population depends for sustenance (DST, 2010). This mission intends to evolve suitable management and policy measures for sustaining and safeguarding the Himalayan ecosystem along with developing capacities at the national level to continuously assess its health status. The main goal of this mission is to assess scientifically the vulnerability of the Himalayan region to climate change in physical, biological and socio-cultural context. It also aims to build and support capacities at the central and state levels to assess climate change and formulate adequate response measures to the challenges in the Himalayan region.

National Mission on Himalayan Studies: The National Mission on Himalayan Studies targets to provide much needed focus, through holistic understanding of system's components and their linkages, in addressing the key issues relating to conservation and sustainable management of natural resources in Indian Himalayan Region. Goal of this mission is to improve quality of life and maintain ecosystem health of the region to ensure long-term ecological security to the country. It's vision to support the sustenance and enhancement of the ecological, natural, cultural, and socio-economic capital assets and values of the IHR. It has six broad thematic thrusts viz. sustainable management of land and water resources, environmental assessment and management, conservation and sustainable use of biodiversity, sustainable infrastructure and energy security, supplementary livelihood options, and awareness and capacity building.

4.6 Status of Forest in Indian Himalayan Region

IHR is known for its forested landscapes and rich biodiversity elements. Forest is a major natural resource in IHR which has an immense contribution in ecological, social, economic and cultural aspects and providing life supporting system to adjoining areas including plains and downward landscapes. IHR region contributes about 41.10% forest cover of its total geographical area whereas it represents 31.01% forest in national forest cover. As per the Champion and Seth (1968), forest vegetation in Himalayan region ranges from semi evergreen forest to tropical dry deciduous forests in the foothills to alpine meadows above timberline. As per India State of Forest Report 2019, IHR is represented by 39.96% very dense forest (>70% canopy density), 31.82% moderately dense forest (40-70% canopy density), 27.28% open forest (<40 % canopy density) (FSI, 2019). Details about forest cover and forest canopy density classes for IHR from 2009-2019 are given in Table 4.

Forest Carbon Stocks: IHR has vast green cover and act as sink for carbon dioxide. Carbon sequestration by the forests of IHR is one of the important ecosystem services being performed by the Himalayan forests. As per India State of Forest Report 2019, IHR contribution is 39.99% in

Table 4: Decadal changes in forest canopy density classes and forest cover of IHR

Geographical area (km^2)	Year	Contribution of IHR to total forest cover of India at different canopy classes			
		Very dense (% of total)	Moderately dense (% of total)	Open (% of total)	Total (% forest cover of IHR area)
537435	2009	45.19	30.90	29.22	41.53
	2011	45.10	31.49	29.14	41.40
	2013	45.10	31.44	28.46	41.31
	2015	43.68	31.46	28.25	41.24
	2017	39.68	31.98	27.74	41.17
	2019	39.96	31.82	27.28	41.10

India's total forest carbon stocks which has increased from 33.35% from the previous assessment of 2017. Forest carbon stocks of IHR are given in Table 5. Trends of forest carbon stocks of Indian Himalayan region from 2017 to 2019 is given in Table 6.

Table 5: Forest carbon stocks of IHR

States of IHR	Area in sq km	Forest carbon stock (000' tonnes)						Carbon density (tonne/ ha)
		AGB	BGB	Dead wood	Litter	SOC	Total	
Arunachal Pradesh	66,688	3,30,856	1,00,379	7,816	15,436	5,96,836	10,51,323	157.65
Assam	28,327	85,844	21,148	1,102	7,223	1,54,832	2,70,149	95.37
Himachal Pradesh	15,434	1,10,045	30,745	2,559	2711	1,06,300	2,52,360	163.51
Jammu & Kashmir including Ladakh	23,612	1,70,222	47,806	3,813	3,706	1,64,648	3,90,195	165.25
Manipur	16,847	44,723	13,317	508	3,924	1,16,251	1,78,723	106.08
Meghalaya	17,119	52,302	14,963	731	4,328	1,08,642	1,80,966	105.71
Mizoram	18,006	44,973	9,925	451	4,516	96,689	1,56,554	86.95
Nagaland	12486	35,850	9,612	522	2,897	86,646	1,35,527	108.54
Sikkim	3342	17,645	5,372	505	664	32,994	57,180	171.04
Tripura	7726	25,061	5,513	297	2,169	43,017	76,057	98.44
Uttarakhand	24303	1,52,540	40,975	2948	4,904	1,69,545	3,70,912	152.62
West Bengal	16,902	40,388	12,193	447	2,533	92,144	1,47,705	87.39

Source: FSI, 2019

Table 6: Trends in forest carbon stocks (in million tonnes) in IHR

Carbon pools	Carbon tock in 2017	Carbon tock in 2019	Net change in carbon stock	Annual change in carbon stock
Above ground biomass	645373	984217	338844	169422
Below ground biomass	132117	278607	146490	73245
Deadwood	10841	20150	9309	4654.5
Litter	44311	45255	944	472
Soil	1502489	1521568	19079	9539.5
Total	2361885	2849797	487912	243956

4.7 Implementation of REDD+ Programmes in IHR

High livelihood dependence on forests leads to overgrazing, unsustainable collection of fuelwood and fodder, illicit felling, unsustainable management practices, shifting cultivation etc. directly impact forest cover and loss in carbon stocks in IHR. Moreover, forest fires, illegal mining and non-wood forest products collection and unemployment are also underlying factors of forest degradation in IHR (ICFRE, 2018 a; ICFRE, 2018 b). Shifting cultivation is prevalent in North-East region of the country bringing loss to forest and is a main cause for forest degradation in North-East region (ICFRE, 2018 a). Status of shifting cultivation in North Eastern states is given in the Table 7.

Table 7: Status of shifting cultivation in North Eastern states

S.No.	States	Shifting Cultivation Area (sq km)		Decadal change (sq km)
		2005-06	2011-12	
1.	Arunachal Pradesh	988.09	893.69	-94.40
2.	Assam	150.28	122.83	-27.45
3.	Manipur	490.63	453.54	-37.09
4.	Meghalaya	322.49	233.04	-89.45
5.	Mizoram	919.57	790.52	-129.05
6.	Nagaland	1135.15	1165.67	+30.52
7.	Tripura	80.89	125.52	+44.63

Source: FSI, 2019

Forests in IHR are vulnerable to the threats posed by invasive alien plant species. Invasive species have been identified as a direct driver of forest degradation in the consultation process of State REDD+ Action Plans preparation in Uttarakhand and Himachal Pradesh. The direct causes of forest degradation in the Himalaya have also been attributed to disturbances in the undergrowth through removal of leaf litter; low-intensity fires both accidental and intentional; soil compaction by grazing cattle and damage to tree seedlings through grazing (CEDAR, 2011). Major drivers of deforestation and forest degradation in IHR are listed in Table 8.

Table 8: Status of shifting cultivation in North Eastern states

S.No.	Direct and Indirect Drivers	Areas of IHR	References
1	Agricultural expansion	North-eastern states of IHR	ICFRE (2018 a)
2	Unsustainable fuelwood and fodder collection	Almost whole area covered in IHR	ICFRE (2018 a); ICFRE (2018 b); CEDAR (2011)
3	Forest fire	Uttarakhand and Himachal Pradesh	ICFRE (2018 a); Rawat (2012)
4	Shifting cultivation	North-Eastern state of IHR	ICFRE, (2018 a)
5	Expansion of invasive species	Almost whole area covered in IHR	ICFRE (2018 a); ICFRE (2018 b); Mooney *et al.,* 2004
6	Overgrazing	North-western states of IHR	ICFRE (2018 a); ICFRE (2018 b)
7	Natural causes e.g. flooding, landslides, and other abiotic factors	Almost whole area covered in IHR	DST (2010); Brown *et al*., 1996
8.	High insect and pest infestation	Almost whole area covered in IHR	ICFRE (2018 a)
9.	Demographic factor (population pressure, high population density)	Almost whole area covered in IHR	ICFRE (2018 b) and Geist and Lambin (2001)

4.7.1 State REDD+ Action Plans

India's National REDD+ Strategy strongly recommends for preparation of State REDD+ Action Plans (S-RAPs) and will be helpful in implementation of the National REDD+ Strategy in the states and also helpful in institutionalizing REDD+ at Sub-national Level.

ICFRE in collaboration with ICIMOD and Department of Environment, Forests & Climate Change, Government of Mizoram has prepared State REDD+ Action Plan for the state of Mizoram through multi-stakeholders consultation processes under REDD+ Himalaya Project. Direct drivers of deforestation, forest degradation and barriers to enhancement have been identified during the consultation process. Drivers of deforestation and forest degradation have been prioritized and necessary intervention packages (sustainable land management and cropping pattern, adoption of horticulture crops, sustainable energy supply creating habitat mosaic for biodiversity conservation, livelihood improvement, forest fire control and management, market linkages for agriculture, and demonstrations of private plantation and agroforestry), strategies alongwith necessary activities for addressing the drivers of deforestation and forest degradation as well as strategies for addressing the barriers for enhancement of forest carbon stocks have been identified (ICFRE, 2018 a).

ICFRE, in collaboration with ICIMOD and Uttarakhand State Forest Department has also prepared the State REDD+ Action Plan for the state of Uttarakhand through multi-stakeholders consultation processes under the REDD+ Himalaya Project. Direct drivers of deforestation, forest degradation and barriers to enhancement have been identified and prioritized, and a set of

REDD+ intervention packages (effective implementation of forest legislation/policies and working plan prescriptions, preparation of comprehensive land use plan, deforestation free urbanisation and other settlements, planning of development activities to avoid biodiversity rich areas and hot spots, incentivizing agroforestry and horticulture with appropriate agriculture technologies, sustainable management of forest products, prevention of forest fire and provision of rewards, adaptation to extreme climatic conditions and simplified approaches for promoting forest carbon enhancement activities) strategies along with necessary activities for addressing the drivers of deforestation and forest degradation as well as strategies for addressing the barriers for enhancement of forest carbon stocks have been identified (ICFRE, 2018 b).

4.7.2 REDD+ Working Group for North-Eastern States of India

In order to initiate and scale up REDD+ actions in the North Eastern states of India, a REDD+ Working Group has been formed to facilitate REDD+ actions in North Eastern states under the 'REDD+ Himalaya Project'. This REDD+ Working Group is providing a platform for providing guidance, knowledge sharing and support for implementation of REDD+ initiatives/ actions in these states. Secretariat of the Working Group has been established at Rain Forest Research Institute, Jorhat (Assam). The working group is acting as an information hub for dissemination of information and knowledge on REDD+ and also providing technical assistance for implementation of REDD+ activities in the North Eastern states.

4.8 REDD+ Demonstrative Pilots in IHR

In IHR some REDD+ project are being executed which are described in brief as under:

4.8.1. REDD+ Himalaya Project

In the year 2015, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) funded the regional programme "REDD+ Himalayas: Developing and using experiences in implementing REDD+ in the Himalayas". The programme is jointly implemented by ICIMOD and GIZ in partnership with REDD+ focal points in four Himalayan countries: Bhutan, India, Myanmar and Nepal with the basic aim to improve the framework conditions for socially and ecologically appropriate REDD+ measures to mitigate climate change. This project focuses on capacity building of stakeholders, technology sharing and knowledge dissemination on REDD+ through South-South cooperation. The project focused in North Eastern states of India whereas Mamit District of Mizoram was chosen as REDD+ pilot project site for implementation of various field activities. Shifting cultivation, fuel wood collection and over exploitation of non-wood forest products were identified as major direct drivers whereas lack of sufficient employment opportunities and awareness were identified as major indirect drivers of deforestation and forest degradation. Strategies were also identified to address the drivers of deforestation and forest degradation. Feasibility study showed that implementation of activities such as promotion of agroforestry, shaded coffee plantation, use of improved cook stoves and solar energy etc. can address the drivers of deforestation and forest degradation which will also provide carbon and non-carbon benefits to the local communities.

Demonstration plots of shaded coffee plantation were established in degraded community forest areas of Ailwang and Reiek Villages, Mamit District (Mizoram) for addressing the shifting cultivation as well as for providing an alternate income generation activities to the local communities. Farmers of the project area are cultivating organic turmeric which is playing an important role towards income generation activities of the local communities. A solar drier for drying of raw turmeric and turmeric powdering unit with cooking unit were provided to the local communities of the project areas. Cooking unit has reduced the consumption of fuel wood for cooking of raw turmeric. Such type of modern facilities is promoting the local communities to grow more turmeric on their permanent agricultural land and can also play a significant role in improving the economy of the local communities. Such activity will also be helpful in reducing the extent of shifting cultivation. Necessary hands on trainings on handling of solar drier, turmeric powdering unit and cooking unit alongwith awareness on REDD+ were also organized for the local communities of the project areas.

Capacity buildings of stakeholders on various aspects of REDD+, livelihoods support/ alternate income generation activities of local tribal communities, gender mainstreaming for REDD+ implementation, biodiversity conservation and other co-benefits of REDD+ were some cross cutting issues addressed under the project. Following knowledge products were also generated under the project:

- Stocktaking of REDD+ in India
- Scoping Study for REDD+ in Kailash Sacred Landscape of India
- Identification of Drivers of Deforestation and Forest Degradation in Mizoram
- Strategies for Addressing the Drivers of Deforestation and Forest Degradation in the state of Mizoram
- Estimation of Biomass and Carbon Stock of Bamboo Species through Development of Allometric Equations
- Identification and Adoption of Appropriate Technology for REDD+ Implementation in Mizoram
- Forest Carbon Stocks of REDD+ Project Area in Mizoram : Baseline Report
- Mainstreaming of REDD+ Activities in Forest Management Plan
- Strategies for High Conservation Networks and Biodiversity Indicators for REDD+ in Mizoram
- Manual on Species for Implementation of REDD+ Activities in Mizoram
- Training Manual on REDD+ Measurement, Reporting and Verification
- A Framework for Model Project Idea Note and Project Design Document: Mamit Community REDD+ Project (Mizoram, India)

Rawat *et al.*, 2019 emphasized that learning of the REDD+ Himalaya project need to be up scaled in other states for implementation of REDD+ activities facing similar challenges.

4.8.2. Khasi Hill Community REDD+ Project

The Khasi Hills Community REDD+ Project is India's first community-based REDD+ programme. This project aims to slow, halt and

reverse the loss of community forests by providing support, new technologies and financial incentives to conserve existing forests and regenerate degraded forests. This project also aims to protect and restore 27,000 ha of cloud forest. The project is operational since 2011 and is registered under Plan Vivo Standard- a certification body. The primary objective is to deliver long-term strategies to address extreme poverty facing rural families and is involved in the establishment of women-run microfinance institutions. It also focuses on reducing the number and severity of forest fires and reduces fuelwood collection. Implementation of soil and water conservation measures to check soil erosion and to improve the hydrological function of the Umiam River sub-watershed through payments for ecosystem services or carbon sales. For example through improvement of environmental services including the protection of endangered flora and fauna found in the area. Installation of fuel-efficient cook stoves and plans to subsidize the majority of the 5,000 households in the project area are some of the objectives of this project. The project is run by Community Forestry International with Mawphlang tribal community. The project seeks to support indigenous communities to conserve dense forest and restore degraded forest through assisted natural regeneration and afforestation activities along with income generation activities. The project anticipates generating 13,761 carbon credits each year, which it hopes to sell for between USD 42,000 and USD 80,000 (MoEFCC, 2018 b).

4.8.3. Uttarakhand REDD+ Pilot Project

Indian Council of Forestry Research and Education has implemented a REDD+ pilot project in the *Van Panchayat* (Village Community Forests) of Uttarakhand (India). Community managed forest like *Van Panchayats* (Community Forests) in Uttarakhand are example of community control over forests. Following are the objectives of the project:

a. Estimation of carbon status in different carbon pools in the selected *Van Panchayat* forest of Uttarakhand.

b. Estimation of enhancement in forest carbon stocks as a result of conservation efforts in *Van Panchayat* forest.

c. Empowering forest dependent communities for forest carbon conservation and developing an MRV system for REDD+ actions.

d. Capacity building of participating communities for developing a transparent MRV system at small project level.

e. Developing a system of respecting and reporting of safeguards in accordance with the international agreements at UNFCCC.

f. Feasibility study for getting the project registered for carbon credits and developing a system of payment for environmental services to the participating communities.

All the five carbon pools of the project area were estimated. Baseline report of the forest carbon stocks for the project area was developed. Capacity building of the local communities of the project area was built on REDD+ MRV, safeguards as well as on carbon enhancement activities and conservation of forests. Project Idea Note and Project Design Document of the project had also been developed as per the carbon standard of the voluntary carbon market.

4.9 Future Prospects of Implementing REDD+ Activities in IHR

Himalayan ecosystems are vulnerable to climate change and play an important role in global carbon cycle because of their large carbon stocks and potential sensitivity to climate change. High altitude forests have greater potential of carbon sequestration compared to forests at lower altitudes (Charan *et al*., 2012). Forests in the IHR are already subjected to multiple stresses, including over-extraction, livestock grazing, forest fires, and other anthropogenic pressures. Effective implementation of REDD+ activities in IHR will addresses drivers of deforestation and forest degradation, lead to climate change mitigation, enhancement in the ecosystem services along with livelihood benefits to the local communities. Involvement of local communities and gender mainstreaming will support successful implementation of REDD+ activities in IHR.

State REDD+ Action Plans (SRAPs) preparation processes have to identify the state specific drivers of deforestation and forest degradation, and barriers for conservation of forests and enhancement of forest carbon stocks. Accordingly, necessary state specific locally acceptable intervention packages and activities have to be identified for addressing identified drivers for deforestation and forest degradation, and barriers for conservation of forests and enhancement of forest carbon stocks. SRAPs need to be developed for all the states as well as need to be implemented so that ecological services emanating from Indian Himalayan Region can be recognized and suitably incentivized as well.

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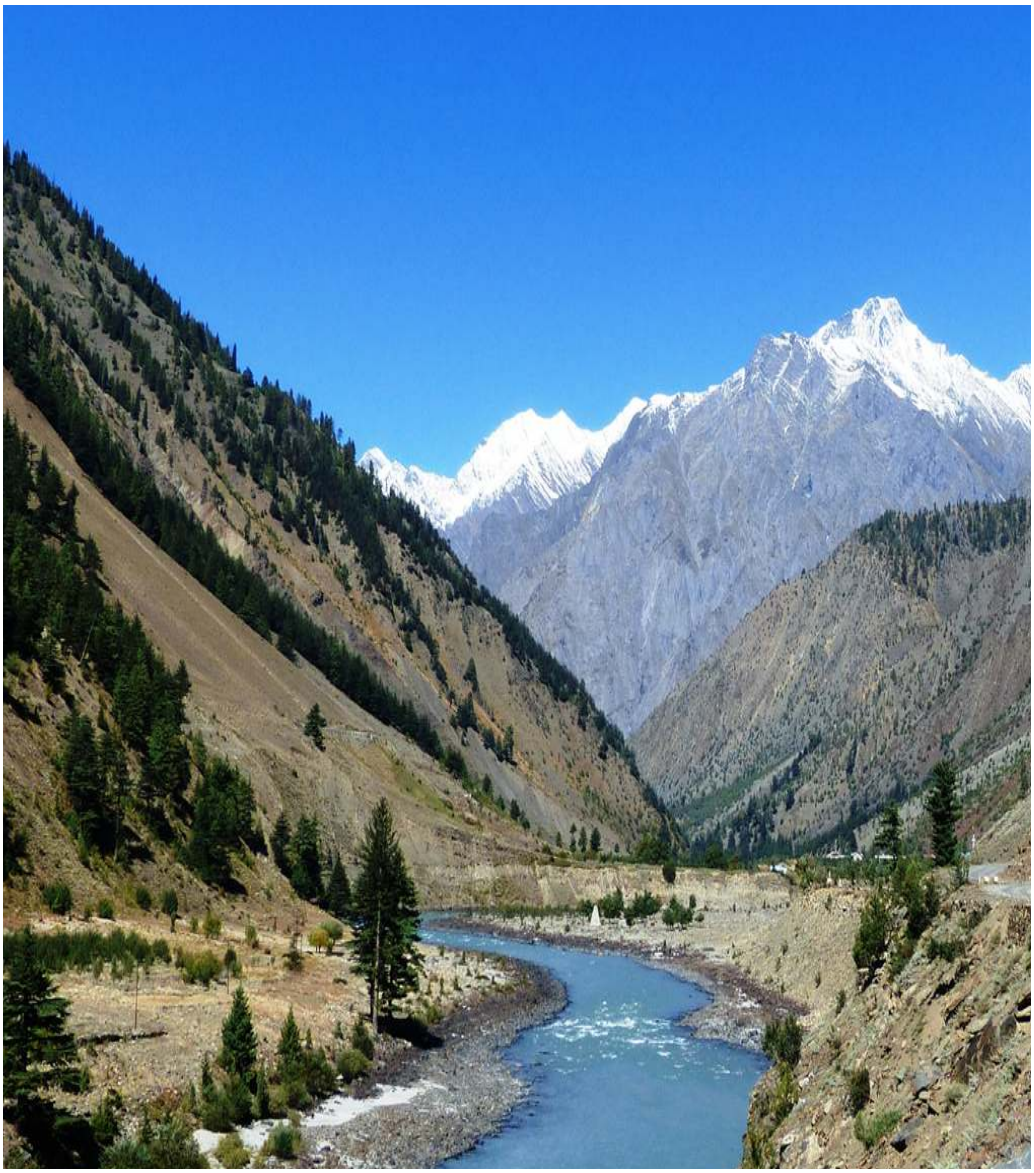

CHAPTER 5

REDD+ READINESS IN MYANMAR

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5.1 Introduction

The Republic of the Union of Myanmar is a tropical country possessing rich biodiversity and having large forest area in South East Asia. It is situated between the latitudes of 9°32'N and 28°31'N and the longitudes of 92°10'E and 101°11'E. The neighboring countries are China in the north and north east, Laos and Thailand in the east and south east, and India and Bangladesh in the east. The south of Myanmar is bordered by the Andaman Sea and the Bay of Bengal. The total geographical area of the country is 676,577 sq km with a population of 54.79 million (DOP, 2020). A wide range of topography is found in Myanmar ranging from the high mountains to valleys, coastal areas and islands. The average annual rainfall varies from 762 to 5000 mm and the average annual temperature varies from 22° to 27°C.

Forest cover of the Myanmar is 42.19% of the country's total area (FAO, 2020). As per the Global Forest Assessment Report 2020, open forests are 24.07% and closed forests are 18.12% of the total forest cover (FAO, 2020). Due to a wide range of topography and rainfall patterns, different forest types such as mangrove forests, tropical evergreen forests, mixed deciduous forests, dry deciduous forests, dipterocarp forests and temperate forests are found in Myanmar. Among the six forest types, the mixed deciduous forests cover 38.20% of all forest types and the remaining five forest types, scrub and grassland comprises of 60.80% (FD, 2019). The forests are managed under the sustainable forest management system. As 75% of Myanmar's population live in rural areas and highly depending on the forests for their daily needs such as water, housing materials, fodder, compost materials, timber, posts and poles, wild foods and indigenous medicines. The forest is a source of seasonal income for rural people and is also a safety net of resources, with up to 17% of the population being classified as 'forest dependent' in 2016. Therefore, the intensifying pressures of livelihood needs along with the change in land use due to population growth and high levels of commercial timber harvesting led to decline of the forests in Myanmar, which is evident from the fact that since 2010 the land allocated for large scale agriculture increased by 170%. Agricultural expansion has particularly affected the Mangrove forests, and further damage was caused to forests due to natural disasters such as cyclone Nargis in 2008.

5.2 Objectives and Scope of REDD+ Activities

REDD+ is one of the climate change mitigation mechanisms under UNFCCC and is encouraging developing countries to contribute to climate change mitigation efforts by implementing measures on reducing emission from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks. Myanmar became signatory of UNFCCC in 1994 and its Kyoto Protocol in 2003. Since then, Myanmar has been emphasizing on climate change regulation activities. The REDD+ activities were initiated in 2012, and the Myanmar National REDD+ Roadmap was developed in 2013. Myanmar is now implementing and taking rapid steps in REDD+ readiness Phase 1 activities and at the same time trying to initiate some piloting under Phase II.

The REDD+ Himalaya project also implemented in Myanmar and has supported the national REDD+ readiness by implementing gap analysis in REDD+ and the capacity development of relevant stakeholders. The project contributed in developing national REDD+ readiness through implementing the main components of: a) gap analysis including the stock taking on the current status of REDD+ readiness process, particularly of free prior informed consent, social and environmental safeguard assessment and biodiversity; undertaking and identifying gaps in REDD+, supporting in developing a biodiversity monitoring system; timber value chain analysis; drivers of deforestation and forest degradation analysis; setting up demonstration sites and strengthening forest governance; b) capacity development including need based assessment, formation of working groups and core unit meeting, regional workshops, public talks, training, communication and knowledge products, exchange visits to improve capacity and benefit sharing mechanisms in community managed forest.

Since the National REDD+ Strategy has been under development in Myanmar, the basic outline inputs such as the analysis and prioritization of drivers, the problem and solution trees of those drivers, and defining policies and measures are the major core aspects of REDD+ in Myanmar. At the same time, consultations with stakeholders and experts are still ongoing for developing national REDD+ strategy. Therefore, the results of REDD+ activities at the sub-national/regional scale from the support of ICIMOD have been very supportive for preparation of national REDD+ strategy through identifying the major drivers, the information gaps and capacity development as well as community forestry development.

5.3 Status of REDD+ Readiness

The national REDD+ programme, which is supported by UN-REDD Programme, is consists of four key elements of REDD+ viz. National REDD+ Strategy, National Forest Monitoring System, Forest Reference Level and Safeguards Information System. The National REDD+ Strategy has been finalized through several multi-stakeholder consultations and technical meetings. Currently the final draft of the National REDD+ Strategy is under the process of adoption by the Union Government. Regarding the national forest monitoring system, the

government endorsed it in 2015 taking two main actions on Satellite Land Monitoring System and National Forest Inventory (NFI). The field methodology for national forest inventory has been revised and the updated version as of December 2019 is available. The second field testing of NFI methodology and NFI work are currently ongoing. For the Web portal, OneMap Myanmar will be used as a basic platform for National forest monitoring systems (NFMS). The draft NFMS module is now available in OneMap Myanmar web.

Along with the endorsement of NFMS, developing the action plans for forest reference levels started in 2015. Myanmar's forest reference emission level (FRL) has been submitted to the UNFCCC in January 2019 passing through technical assessment by UNFCCC. The emissions from deforestation and enhancement of forest carbon stocks by reforestation and afforestation are included in the FRL report calculating three carbon pools: aboveground biomass, below ground biomass and litter. Based on availability of updated data and information, Myanmar will update the report and submit the revised report to the UNFCCC in 2021.

Myanmar's safeguard road map has been developed in 2017, and the national clarification of the UNFCCC REDD+ safeguards (Cancun Safeguards) for Myanmar has been published in May 2019. The development of the safeguards information system, operationalization plan and summary of information are ongoing and planned to be completed in the current year 2020.

5.3.1 National REDD+ Strategy

One of the key elements, under Cancun Agreements *i.e.*, the National REDD+ Strategy, has been developed in Myanmar. The technical working group on drivers and strategy led the development of the REDD+ strategy through the consultations with different stakeholders across the country. Over 50 consultations such as line ministries consultations, state/region consultations (country wide), expert review committee meetings, public consultations, workshops on policy and measures, ethnic group consultations and consultations with civil society organizations and private sectors were held for developing Myanmar REDD+ Strategy. The national consultation and validation workshop was held in October 2019 and finalized the National REDD+ Strategy. The main goal of Strategy of Myanmar is "to contribute to the achievement of a climate resilient, low carbon and sustainable development path of the country through transformational change in the land-use and forestry sector by reducing deforestation and forest degradation while enhancing livelihoods, sustainable growth and development". As per the National REDD+ Strategy, the Myanmar's emission reduction target for forestry sector is "reduction in 50% of net deforestation by 2030, subject to receiving significant international financial and technical assistance to implement the required policies and measures. In the absence of significant international assistance, Myanmar will seek to achieve reduction of 25% of net deforestation by 2030".

The major drivers and barriers were listed and prioritized for developing Policy and Measures (PAMs) in the REDD+ Strategy. The large scale agriculture, small scale agriculture, timber (over-) harvesting, illegal logging, fuelwood collection, charcoal production, shifting cultivation, mining, infrastructure development, hydropower development and forest grazing (in some specific areas) have been found as the major drivers of deforestation in Myanmar. Along with this, the

seven REDD+ action packages and its PAMs have been developed for each of the major drivers and barriers, and those packages are (i) Legal/ regulatory reform, (ii) Land management rationalization, (iii) Finance and incentivization, (iv) Awareness, capacity development and training, (v) Governance improvement, (vi) Diversification of energy supplies and addressing demand for biomass energy, and (vii) Technical support.

5.3.2 Forest Reference Level

Based on a government endorsed Forest Reference Level (FRL) Action Plan of 2015, and extensive work at the level of technical working groups and technical teams, representing a cross-section of ministerial agencies, of the Measuring Reporting and Verification (MRV) of the REDD+ Programme, Myanmar developed its Forest Reference Level for REDD+ and submitted it to the UNFCCC in January 2018. By the end of 2018 the Myanmar FRL has been fully technically assessed. At present, Myanmar's initial FREL is complete and the final FRL version including the Technical Assessment report was posted on the UNFCCC website in January 2019.

The objectives of Myanmar's FRL are to support the climate change mitigation efforts in the national context of Myanmar and specifically to reduce emissions from the forest and land use sector, to assess and evaluate the performance of REDD+ policies and measures and sustainable forest management practices, to provide information on emissions to stakeholders including policy makers, government line departments, technicians and members of the public on a transparent and consistent basis, and to facilitate access to potential funding sources for results based payments.

The scale of Myanmar's FRL is at national level and its initial scope currently includes two main REDD+ activities: (i) reducing emission from deforestation and (ii) enhancement of forest carbon stock through reforestation and afforestation. Three carbon pools i.e., (i) aboveground biomass, (ii) below ground biomass and (iii) litter are included for deforestation while the aboveground biomass is included for the enhancement of forest carbon stocks. According to the FRL results, the annual carbon emission from deforestation is 53,807,463 tonnes of CO_2 (± 15.1%) and the national aggregated emission factor for deforestation is 125.43 tonnes of CO_2 per ha (± 13%). The updated FRL will be planned to submit in 2021.

5.3.3. National Forest Monitoring System

Myanmar is trying to get a robust and concrete monitoring system for the national inventory in order to check the changes but also support good governance and measures of deforestation and forest degradation. FAO is supporting for the set up and development of the national forest monitoring system in Myanmar which is one of the four main elements of REDD+. The national forest monitoring system (NFMS) was endorsed by the Government in 2015, and at present, Myanmar is designing and planning the NFMS by testing pilot areas for the feasibility of the method to be used and the risks and limitations in implementing the proposed method.

Myanmar NFMS is based on two components (i) a Satellite based Land Monitoring System (SLMS) and (ii) a National Forest Inventory (NFI) which will be the prime information system to produce relevant data for UNFCCC reporting. A draft NFMS module on OneMap was established in September 2019 and the process of uploading REDD+ and NFMS relevant information layers is ongoing.

5.3.4 Safeguards Information System

Myanmar's safeguard roadmap has been developed in 2017 and the national clarification of the UNFCCC REDD+ safeguards (Cancun Safeguards) for Myanmar has been declared and published in May 2019. It is a core and essential step in the safeguards roadmap of Myanmar. The clarification composed of seven principles and 29 criteria are set up in consideration with UNFCCC guidelines. Besides, the report, namely, "Analysis of the potential benefits and risks of policies and measures (PAMs) proposed for the 'Myanmar Summary by Safeguard', has been developed and updated in July 2019 giving an overview of the potential benefits and risks of Myanmar REDD+ PAMs.

The three core elements included in national approach to safeguards are (i) Policies, laws and regulations in the country that address the safeguards issues; (ii) Institutional mandates, procedures and capacities to ensure that the safeguards are being respected; and, (iii) A safeguard information system that makes information available on how REDD+ safeguards are being addressed and respected. The current laws and regulations regulating in Myanmar such as the environmental conservation law, the environmental impact assessment, social impact assessment, and the strategic environmental/ social assessment are relevant and supportive in developing REDD+ safeguards. A set of information relevant for SIS has been identified and those are the socioeconomic data (e.g. poverty rates, types of employment), sociological/ demographic data (e.g. ethnic minorities, gender disparities), data on land tenure and governance, data on land use change, including agricultural production, data on uses of the forest (e.g. harvesting of timber, fuelwood, NTFPs), environmental data (e.g. biodiversity and ecosystem services), REDD+ implementation data (e.g. where and how have REDD+ PAMs been implemented), information on actions undertaken to implement the safeguards (e.g. procedures for stakeholder engagement), and information on grievances raised in relation to REDD+. Myanmar is now preparing Summary of Information (SOI) on safeguards. The technical meetings are being held to identify the key areas and data, to finalize the SOI on safeguards.

5.4 Community Forestry and REDD+

Measures and activities have been carried out through several plans and programmes, of which, the Community Forestry (CF) programme is one of the most significant programmes for reducing deforestation and carbon enhancement through implementation of REDD+ activities in Myanmar. It gives benefits not only to fulfill the REDD+ targets but also to improve local livelihoods. From a management point of view, CF is more conducive to sustainability, with a systematic management plan. The reason is that most of the forests are situated in remote and less accessible areas and could not be managed by the staff alone, and if the local communities living in the surrounding area of forests manage the forests systematically, the sustainability of the forest is ensured, and there is no way as efficient as CF. CF in Myanmar is backed by the Community Forestry National Working Group (CFNWG) and each Forest Department has a Community Forestry Unit.

Community forestry was launched in Myanmar in December 1995. The main areas of CF in Myanmar are in the states of Shan, Mandalay, Magway and Ayeyarwady as these are the places

witnessing most of the deforestation eventually resulting into fuel wood shortages. Shan state is located on high plateaus and so suffers from deforestation and severe soil erosion as well. Mandalay, Magway and Sagaing Divisions have a barren landscape where forest products are limited and the local population struggles to meet its needs for forest products. Ayeyarwady state has fertile land, but the dense population has led to high levels of encroachment onto the mangroves for agricultural and settlement purposes. This has led to high deforestation rates and scarcity of forest products, including firewood. This shows that CF practices were needed in Myanmar. When CF practices began to take hold worldwide in the 1970s, the focus was on afforestation but by the 1990s the focus has shifted to increasing local participation and Myanmar has made significant efforts to include participation of local communities in forestry. Up to 91% of rural households use wood and non-timber forest products from the CF areas, indicating need for active involvement of local people in conservation of forests. The new Community Forestry Instructions (CFI) was issued by the Forest Department in 2019 replacing the CFI of 1995 and 2016. The new CFI focuses on a significant development in the aspects of partnership, participation and decentralization as well as encouraging production from the small scale to the commercial scale. Additionally, the Government of Myanmar set a target in 2001 stating that 919,000 hectares of forest would be under community management by 2030, with 12% achieved by 2016. These legislative measures show the importance the government has placed in CF and highlights how CF is at the forefront of forest restoration measures. With the active involvement of local communities in forest conservation and establishment of plantations, the forest cover increases, while at the same time, the local communities get an opportunity to fulfill their needs and own the land use rights for 30 years by participating in CFs. Data suggests that forest regeneration is taking place in virtually all the rural areas in Myanmar. Local communities are drawn to CF not just for timber but also for ecosystem services benefits such as watershed protection, tenure security, coastal protection and as mentioned previously, for their subsistence needs.

CF has also been beneficial for gender dynamics. Men usually do the physical work in the community forests, women are equally involved in management decisions, can act as household leaders and often accompany the men into the forest. The Forest Department plays a leadership role by supporting the CF with technical assistance and the development of CF based enterprises. This is in line with a more market oriented approach to CF which is gaining momentum in Myanmar. This approach aims to restore forest landscapes based on: securing commercial tenure, improving technical skills and knowledge, business skills development and strengthening the organisational capacity of producers. CF can be expanded through this model as there is a strong convergence of the aims of REDD+ and of a more market led approach to CF, and while CF has been successful even without market incentives, interest in participation will likely increase if monetary benefits are seen to be growing.

The assessments of CF also reflect some weak points regarding the understanding of CF and in convincing locals to follow the CFI. The REDD+ Himalaya project supported the development of CF by establishing CF plantations as a pilot activity, knowledge sharing workshops/ trainings and on-site visits to CF and the capacity development of local people, especially in Shan State of Myanmar.

5.5 Challenges and Opportunities in Implementation of Community Forestry and REDD+ Activities

There are still some challenges and opportunities in implementing CF and REDD+ activities despite the policy reforms that have already taken place in Myanmar. Limited awareness, attention and a lack of skills amongst the local people on conservation and climate change related issues are some of the difficulties faced in implementation. In some cases the locals still favour their customary practices over the directives of the CF management plan, indicating that there is an issue with implementation of CF. Local forest users also feel that forest staff are not committed to the conservation and improvement of the forests and though forest staff are powerful, they are often remain socially distant from the locals, which can lead to conflict and corrupt practices for resources in areas where they are scarce. Community participation, especially from the poorest households is low and the threat of outsiders misusing forest resources is also prevalent.

Effective communication networks need to be strengthened among various departments, communities, NGOs, and administrative authorities. While decentralisation has occurred in Myanmar, it needs to be made more effective through strengthening participation of local community efforts in forestry, promoting forest governance and clear governmental procedure. It is also essential to establish strong forest-farm producer organisations, because these can serve as a critical conduit for channeling pro-poor REDD+ finance for forest restoration, and can also act to mobilise the local people and put the resources back in the hands of locals, thus allowing them to generate additional income. In addition to that, livelihood development of the local community should not be neglected, while at the same time, it is necessary to strengthen not only forest officers' but also the communities' capacity for effectively managing CF and REDD+ activities to ensure its successful

implementation. There are also barriers to successful REDD+ development due to the policy pertaining to land tenure rights in Myanmar. There is a feeling of uncertainty amongst the population regarding the land tenure rights and user property rights given to them. The strictness of the land tenure rules mean that forest users are often short sighted in how they view the land, and this can lead to overexploitation and unsustainable land use, which can lead to further degradation in the land and also increase hardship for the communities who are dependent upon the forest. This has resulted in locals viewing long term CF policies with skepticism, because the law favours rice cultivation over forestry. It is only in areas where plantation land is not suitable for agricultural purposes locals have a high level of commitment to the protection of the forest. Political will and support, national programmes and actions such as Myanmar Reforestation and Rehabilitation Programme and other plans are the major opportunities to help achieve the goals of REDD+. There are still limited budget and financial resources for REDD+ implementation at domestic level.

5.6 REDD+ and NDC Targets

The climate change and its impacts al global level been clearly seen in the recent decades and the intensity of impacts is greater and greater (Allen *et al.* 2010; IPCC 2014; FAO 2016). Therefore, special attentions on climate change mitigation and adaptation and global efforts in this direction have been intensified with an inclusive approach involving all sectors.

Myanmar submitted its Intended Nationally Determined Contribution to UNFCCC in 2015 (MONREC, 2016). The main mitigation actions concerning forest and land use are (i) fulfillment of the national Permanent Forest Estate (PFE) target by 2030 with an increase of Reserve Forests (RF) and Protected Public Forests (PPF) to 30% of the national land area and the Protected Area System (PAS) to 10% of the national land area and (ii) energy efficient cook stoves in order to reduce fuel wood for energy purposes, especially for the dry zone of Myanmar. The target is to distribute 260,000 new cook stoves between 2016 and 2030.

An update of the NDC to be submitted to UNFCCC in 2020, using more concrete, quantifiable data currently in hand. As per the updated NDC, the climate change mitigation targets (with conditional and unconditional) to forest and land use are (i) reducing deforestation by 50/25% by 2030 and (ii) distribution of 4.7 million energy efficient cook stoves by 2030.

The forests have a great potential of carbon storage (Oo, 2009; Khaine, 2018) and REDD+ has been widely accepted and developed to address forestry based mitigation actions (Corbera and Schroeder, 2011; Korhonen-Kurki *et al.*, 2012). Myanmar REDD+ strategy and programme totally support the NDC target, reducing deforestation by 50/25% by 2030. The definition of forest, deforestation and enhancement of forest carbon stocks are defined to be consistent with those in Second National Contribution (SNC) of Myanmar and NDC report. For example, 'Forest' is defined as 'Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10% or trees able to reach these thresholds *in-situ*' in either FRL in REDD+ or SNC and NDC. An effective coordination between the Forest Department and Environmental Conservation Department which is the leading department for NDC supports is needed to avoid the inconsistency of data sources and forest classification.

5.7 Future Prospects of REDD+ Implementation

The significance efforts and achievement have been seen through the time, taking rapid steps to implement the REDD+ readiness activities. Several activities for Phase 1 have been conducted in Myanmar and trying to initiate the Phase 2 activities from now to the future. The early implementation will be initiated and some ongoing pilot or sub-national level activities will be continued. In Bago Yoma and some mangrove areas have the pilot REDD+ projects with the help of international organizations such as Korea Forest Services and FAO. The inventory counting soil organic carbon in Mangroves areas will be conducted in the coming days.

The international and inter-sectoral cooperation and coordination will be encouraged together with other developmental plans. Additionally, the existing stakeholder network will be enlarged through in-depth stakeholder analysis.

Although the drivers and barriers for REDD+ have been identified and the leading agency for each policy and measure (PAM) has been proposed, a review and update will be continued during REDD+ implementation.

In the future, strengthening REDD+ activities will be paid more attention and the role of community forestry will increase, along with the acceleration of REDD+ development. It is essential to involve, empower and incentivise locals on the forestry related aspects in order to combat deforestation and degradation effectively. Along with improving the damage of deforestation and forest degradation, a successful REDD+ initiative which involves CF will contribute in reducing poverty, increase in food security, strengthen rural livelihood resilience, offer livelihood diversification and provide off-farm income to rural residents. The finance will also be mobilized to implement policies and measures (PAMs) in some areas as so that we can apply the results from the initiatives in adjusting or updating the PAMs. This can be followed by scaling up activities which will continue to ensure that REDD+ will continue to be an effective climate change mitigation approach while also bringing financial and social benefits to the people of Myanmar.

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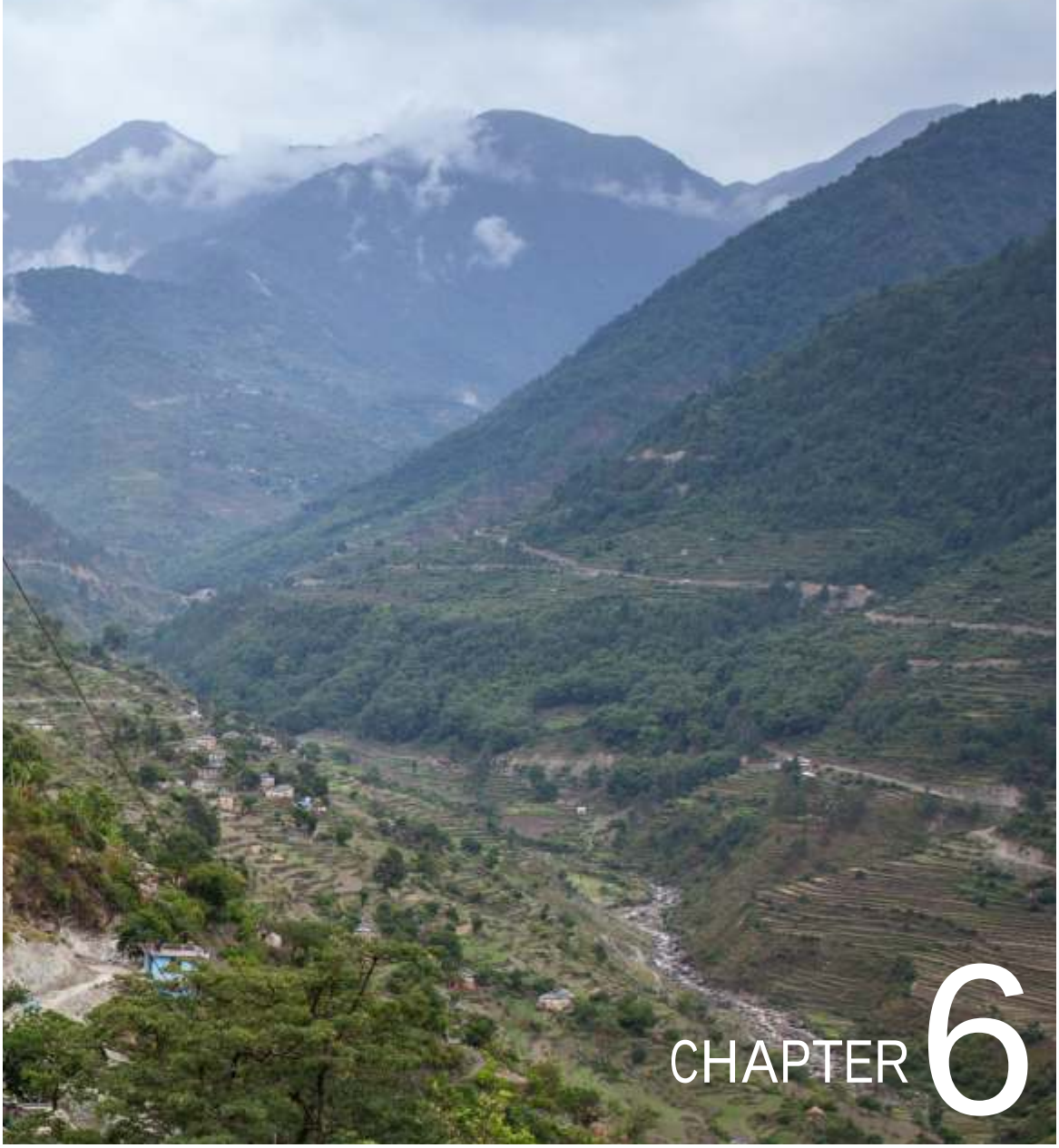

CHAPTER 6

A DECADE OF REDD+ PROGRAMME IN NEPAL

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6.1 Introduction

The importance of forests to climate change mitigation and adaptation is universally recognized. Deforestation and forest degradation are responsible for about 15% of total global greenhouse gas emissions (FCPF, 2020). REDD+ is a climate change mitigation programme developed by Parties to the UNFCCC to incentivize developing countries to reduce emissions and enhance removals of greenhouse gases in forestry sector. As per the Cancun Agreements on REDD+, a country should have a national strategy/action plan, a forest reference level, a national forest monitoring system and a safeguards information system for implementation of REDD+ activities. REDD+ is implemented in three phases: readiness, implementation, and result-based payments. In Nepal, the readiness phase began in 2008. During this phase, Nepal has completed a number of activities, including the development of National REDD+ Strategy and forest reference level, various studies, and capacity building activities.

Nepal is a pioneer country to implement REDD+ programme. The Government of Nepal considers REDD+ as one of its priority programmes in the forestry sector. Community-based forest management and participatory biodiversity conservation models of Nepal are well known nationally and internationally. Therefore, Nepal has adopted community-based, participatory and inclusive approach for REDD+ programme both in policy and implementation level. For last ten years, Nepal has been carrying out various readiness activities with support from national and international organizations. REDD+ programme is now transitioning from readiness to implementation phase. In this backdrop, it is time to revisit past decade of REDD+ programme to draw important lessons for Nepal's future REDD+ programme.

6.2 National Context

Nepal, a small yet diverse country situated in between the giant neighboring counties India and China, comprises of 26.5 million populations (CBS, 2011). Nepal's GDP growth rate was 6.81% in the year 2018/19 and 6.3% in 2017/18 (NPC, 2019) whereas human development index value for 2019 was 0.579 (UNDP, 2019). Nepal has five physiographic regions, namely (i) Tarai, (ii) Siwalik, (iii) Middle Mountain, (iv) High Mountain, and (v) High Himal. Forests represent the largest land use in Nepal, covering 40.36% of the total land area, whereas other wooded land covers 4.38%. Forest and other wooded land represent 44.74% of the total area of the country (DFRS, 2015). The total stem volume in Nepal's forests is estimated to be 982.33 million m^3, with an

average stocking of 164.76 m^3/ha. The total carbon stock in the forest is estimated as 1,054.97 million tonnes, with an average stock of 176.95 t/ha. Most forest is covered by national forest, with private forests occupying less than one percent of total forest area. National forests are further divided into government managed forests, community forest, collaborative forest, leasehold forest, forest conservation areas and religious forest. About 23.39% of the country's land is under protected area (DNPWC, 2019). Nepal has 118 ecosystem types and 55 forest types and high species diversity with known floral species of 13,067 and faunal species of 17,097 (BPP, 1995; Miehe *et al.*, 2015; MoFE, 2018).

Nepal as a Party to the UNFCCC, the Kyoto Protocol and the Paris Agreement is committed to address climate change. Nepal is one of the least contributors to the emission of greenhouse gases (MoPE, 2016) which is 0.027% of the global GHG emission (MoSTE, 2014). Similarly, average CO_2 emission per capita is 0.31 tonnes/year (Ritchie and Roser 2019). In its Nationally Determined Contribution (NDC) to address climate change, Nepal has committed to reduce GHGs emissions from deforestation and forest degradation (MoPE, 2016).

6.3 REDD+ Related Policy and Legal Provisions

After the promulgation of Constitution of Nepal in 2015, Nepal has been restructured into three-tiered federal governance system: Federal, Provincial (seven provinces), and Local (753 local government units). The Constitution has clearly defined and distributed power and jurisdiction for three main levels of government. For example, the Schedule 5 (27) of the Constitution has identified carbon as a service. According to article 57(1) and Schedule 5 (27) of the Constitution, carbon services shall be regulated by the Government of Nepal.

The National Forest Policy 2019 and the Forestry Sector Strategy (2016 – 2025) describe "potentials of forest ecosystems, biodiversity and watersheds are fully optimized for peoples' prosperity" as a vision of forestry sector in Nepal. Further, forest ecosystems and watersheds are managed to be sustainable and climate resilient through a decentralized, competitive, and well-governed forest sector providing inclusive and equitable incomes, employment, and development opportunities. Sustainable forest management is considered as a strategy to achieve the vision of "Forests for Prosperity". National Climate Change Policy, 2019 and National Environment Policy, 2019 emphasize the REDD+ as a mechanism to generate carbon finance and to distribute the financial resources in a just manner.

The Forest Act, 2019 and Environment Protection Act, 2019 incorporate provisions to address the drivers of deforestation and forest degradation. The Forest Act recognizes carbon services as one of the environmental services generated from forest ecosystems. According to Section 44 (1.a) of the Forest Act, the Government of Nepal shall make an appropriate arrangement for the management, utilization and distribution of benefits arising out of the environmental services, including carbon stock and emission reduction programme. The Environment Protection Act defines emission reduction as any programme or activity that stop or reduce

greenhouse gases emission resulting from human activities. Section 28 of the Act authorizes the Government of Nepal to take part in carbon trading for emission reduction and carbon stock enhancements with international mechanism, foreign Governments or entity or professional entity or private sector established under international conventions.

Nepal National REDD+ Strategy 2018 aims at enhancing carbon and non-carbon benefits of forest ecosystem for the prosperity of the country and its people.

6.4 REDD+ Institutional Arrangements

A three-tiered institutional mechanism has been established to oversee and implement REDD+ in Nepal. It includes: (1) Multi-sectoral national REDD+ steering committee (NRSC) under the chairmanship of the Minister for Forests and Environment, (2) multi-stakeholder national REDD+ coordination committee (NRCC) under the chairmanship of the Secretary of the Ministry of Forests and Environment, and (3) REDD Implementation Centre (REDD IC) led by a Joint Secretary.

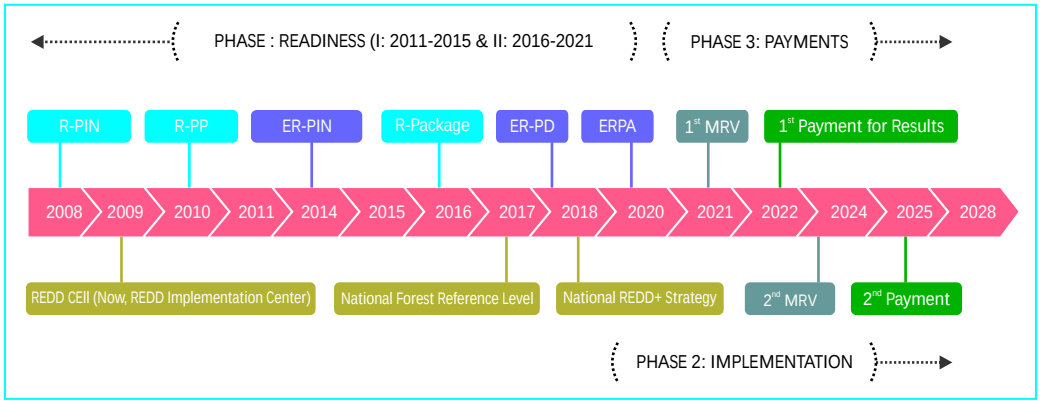
NRSC provides policy guidance and high-level coordination among different sectors, whereas NRCC support implementation and supervise the effectiveness of REDD+ programme. Similarly, REDD IC functions as the primary operational body to provide national programme leadership, coordinate emission reduction (ER) programme planning, and bridge state and district-level planning and priorities under the National REDD+ Strategy.

REDD IC will be restructured into National REDD+ Centre and its three technical sections will be transformed into: (1) Planning and Monitoring Section, (2) Forest Carbon Accounting, Monitoring, Reporting and Coordination Section, and (3) Social and Environmental Safeguards Section. In addition, Forest Research and Training Centre has been recognized as a national monitoring, reporting and verification (MRV) implementing agency. At Province level, seven REDD+ Desks have been established in each of the seven Forest Directorate under the Ministries of Industry, Tourism, Forest and Environment. REDD Desks are working as coordinating, implementing and monitoring agencies of REDD+ programme within their jurisdiction. Moreover, focal officers are assigned in different departments under the Ministry of Forests and Environment.

A multi-stakeholder forum has been established to engage a wide range of stakeholders in the entire REDD+ process. Nepalese civil society organizations (CSO) and indigenous people's organizations (IPO) working in the field of REDD+ have formed a REDD+ CSO and IPO Alliance. The Alliance serves as a common platform to develop a common understanding on REDD+ issues, and to advocate on their behalf (RIC, 2018 a). Major CSOs/IPOs include Federation of Community Forest Users Nepal (FECOFUN), Association of Collaborative Forest Users Nepal (ACOFUN), Himalayan Grassroots Women's Natural Resource Management Association of Nepal (HIMAWANTI), Dalit NGO Federation (DNF), Association of Family Forest Owner's Nepal (AFFON), Network of Leasehold Forest User Group, Nepal (NLFUG), Nepal Federation of Indigenous Nationalities (NEFIN), Nepal Indigenous Women's Federation (NIFW), Rastriya Dalit Network (RDN), Federation of Forest based Industry and Trade, Nepal (FENFIT), and major NGOs includes Nepal Foresters' Association (NFA), Forest Action, Green Governance Nepal (GGN), Dalit Alliance for Natural Resources Nepal (DANAR) etc.

6.5 REDD+ Programme in Nepal

REDD+ programme is being planned and implemented in three phases in Nepal: readiness (Phase 1), implementation (Phase 2), and result-based payments (Phase 3). During Phase 1, Nepal prepared REDD+ strategy and action plans, established institutions, conducted several studies and baseline/reference scenario. The Phase 2 implement sub-national emission reduction programme and conduct measurement, monitoring, reporting and verification activities in 13 districts of the Tarai Arc Landscape (TAL), Nepal. Receiving and sharing ER payments to beneficiary groups as per the Benefit Sharing Plan will be done in the Phase 3 of the REDD+. There is some overlap between Phase 1 and Phase 2 (Figure 1).



Abbreviations: R-PIN= Readiness Plan Idea Note; R-PP = Readiness Preparation Plan; ER-PIN = Emission Reduction Programme Idea Note; R-Package = Readiness Package; ER-PD = Emission Reduction Programme Document; ERPA = Emission Reduction Payment Agreement; MRV = Measurement, Reporting and Verification

Figure 1: Status of REDD+ in Nepal

6.6 REDD+ Readiness Activities in Nepal

Nepal has been implementing REDD+ programme for the last 10 years. Nepal's journey on REDD+ started with the preparation of a REDD+ Readiness Plan Idea Note (R-PIN) in 2008. It was submitted to the World Bank/ Forest Carbon Partnership Facility (FCPF) for financial support. FCPF approved the R-PIN and provided financial assistance to prepare Readiness preparation proposal (R-PP) in August 2009. Meanwhile, REDD- Forestry and Climate Change Cell was established under the then Ministry of Forests and Soil Conservation in 2009 to spearhead the programme at the national level. Once the R-PP was approved in 2010, then it was put into implementation starting from March 2011.

6.6.1 Readiness Phase I

R-PP activities were implemented between March 2011 and August 2015. During this readiness phase I, the following major activities were conducted:

- REDD Forestry and Climate Change Cell was upgraded to REDD Implementation Centre.

- REDD+ Multi-stakeholder Forum (Apex body) and REDD+ Working Group established and made functional.
- Emission Reduction Programme Idea Notes (ER-PIN) prepared.
- Consultation, awareness, capacity building, training and outreach activities were carried out at national, regional and districts level.
- Several studies were conducted to prepare National REDD+ Strategy including (a) demand and supply of wood products, (b) drivers of deforestation and forest degradation in Nepal, (c) timber value chain, (d) invasive species and climate change.
- REDD+ strategy was drafted.
- Nepal REDD+ implementation framework prepared.
- Strategic environmental and social assessment of Nepal's REDD+ strategy prepared.
- National forest reference level developed.
- Study for designing a robust MRV system for Nepal's REDD+ process conducted.
- Study on forest carbon ownership conducted.
- REDD+ social and environmental standards prepared.
- Guidelines on stakeholder engagement in REDD+ readiness prepared.
- Feedback and grievance redress mechanism for REDD+ developed.

6.6.2 Readiness Phase II

Nepal prepared the R-Package and multi-stakeholder self-assessment of Nepal's REDD+ readiness to assess REDD+ preparedness of the Government of Nepal, indigenous peoples, civil society and private sector to access result-based carbon finance in 2016. Out of the 34 criteria, assessment showed that significant progress was made on 16 criteria (green), satisfactory progress on 12 criteria (yellow), and less progress on 6 criteria (orange), indicating that further work is required to proceed to the implementation phase.

In January 2017, FCPF provided additional grant to execute the additional readiness preparation activities for readiness, which consists of: (a) Readiness coordination and consultation, (b) National REDD+ strategy preparation, (c) Reference scenario formulation and national forest monitoring, and (d) Project management. During this readiness phase II, the following major additional activities were carried out:

- Nepal's national REDD+ strategy approved in April 2018.
- Nepal submitted ER programme document "People and forests - a sustainable forest management-based emission reduction programme in the Tarai Arc Landscape, Nepal" to FCPF and it was selected into the Portfolio of the Carbon Fund of the FCPF.
- Preparation of sustainable forest management plan of community forests (55 Nos.).
- Preparation of land use plan of local level municipality/rural municipality (50 Nos.).
- Revision and update of forest operational plan of community forests, buffer zone community forests, and leasehold forests (2110 Nos.).
- Establishment and measurement of permanent sample plots for national forest inventory (580 plots out of over 2200 were measured by using readiness fund).

- Capacity building, training, and outreach activities for Government and related stakeholders on REDD+, gender, SFM, biodiversity and MRV.
- Preparation of forest investment plan (FIP) and forests for prosperity project and submitted to FIP Sub-Committee of the World Bank.
- Studies on emissions to update Nepal's forest reference level.
- Preparation of benefit sharing plan for the emission reduction programme of 13 TAL district.
- Preparation and approval of Environmental and social management framework of the emission reduction programme.

Nepal has received financial support and cooperation in REDD+ process from Readiness Fund of the FCPF/ World Bank. In addition, Intergovernmental organizations such as UNDP,

FAO, UNEP (UN-REDD Programme) and ICIMOD; development partners such as DFID, USAID, SDC, NORAD, GIZ, JICA and Finland; INGOs such as WWF Nepal have also supported Nepal's REDD+ process by supporting to implement various readiness activities. ICIMOD, FECOFUN and ANSAB implemented a pilot forest carbon trust fund project financed by NORAD in three watersheds of Dolakha, Gorkha and Chitwan districts of Nepal. ICIMOD and REDD Implementation Centre of the Government of Nepal has implement a pilot project REDD+ Himalaya in Nepal on these districts. Apart from national and international experts, indigenous people, forest dependent communities, local NGOs, civil society organizations and national level federations are also engaged in Nepal's REDD+ process.

Nepal is currently implementing the REDD+ Readiness Preparation Support Project funded by the Readiness Fund (RF) of the FCPF/ World Bank.

The FCPF's Readiness Fund, which was supposed to expire by December 31, 2020 has now been extended to December 31, 2022. In light of the extension of the FCPF RF, Nepal will undertake additional activities especially (i) preparation of tree volume and biomass allometric equations of 16 species; (ii) a safeguard information system, and (iii) database management system linking to the Central Transaction Registry (CATS – Carbon Assets Tracking System) of the Carbon Fund/ FCPF and MRV system with the national forest information system under the FCPF project until June 2021. Moreover, Nepal will update the forest reference level by conducting research/ studies during this readiness phase II.

6.7 Major Progress and Prospects

Nepal has made considerable progress in REDD+ architecture required for the implementation. One of the major accomplishments is the preparation of Nepal National REDD+ Strategy 2018, and establishment of three-tiered institutional mechanism to implement REDD+ programme. Nepal's REDD+ process is exemplary for others due to its participatory and inclusive approach. Adequate attention is given on managing environmental and social risks and impacts of REDD+ by developing country-specific safeguard standards and applying common environmental and social management framework. Table 1 presents the major progress and scope for further improvement on four key elements of REDD+.

Among the major progresses into four categories (Table 1), some of the key areas are briefly discussed as follows.

Table 1: Major progress on four key elements of REDD+

A. Strategy and action plan	B. Safeguards
• Nepal national REDD+ strategy (2018) • ER programme document (2018) • Nepal REDD+ implementation framework (2015) • Nepal REDD+ monitoring and evaluation framework (2013) • Plans - community forests/buffer zone community forests/leasehold forest operation/management plan (regular) • Capacity building activities (regular)	• Environmental and social management framework for the emission reduction programme in the Tarai Arc Landscape (2019) • Preparation of biodiversity monitoring protocol for REDD+ (2018) • Gender integration in REDD+ and the ER programme in Nepal (2017) • Feedback and grievance redress mechanism for REDD+ (2016) • Strategic environmental and social assessment of Nepal's REDD+ strategy (2014) • Nepal specific REDD+ social and environmental standards (2013)
C. Forest reference level	**D. National forest monitoring system**
• National forest reference level (2017) • Study on development of a measurement, reporting and verification system for emissions and removals (2014)	• Establishment of measurement of national forest inventoryplots (2018 – 2019) • Study on Development of national database and national forest information system in Nepal (2016)

6.7.1 National REDD+ Strategy

National REDD+ Strategy 2018 is one of the main guiding documents to REDD+ process in Nepal. Approved in 2018, the strategy was prepared for the period of 5 years from 2018 to 2022. Overall vision of the strategy is to enhance carbon and non-carbon benefits of forest ecosystems and ultimately contribute to the prosperity of the people of Nepal. In order to achieve this vision, the strategy has its own mission, objectives, guiding principles and strategies. Altogether, the

strategy encompasses twelve strategies and seventy priority actions together with the implementation arrangements. The strategy adopts a multi-stakeholder, community-based, people-centric, multi-faceted, gender and socially inclusive approach to REDD+ (Figure 2). Details can be accessed on web at www.redd.gov.np.

Figure 2: Principles underpinning the Nepal's National REDD+ Strategy

6.7.2 Forest Reference Level

Nepal's national forest reference level (FRL) covers three activities: 1) reducing emissions from deforestation, 2) reducing emissions from forest degradation from fuel wood collection, and 3) enhancement of forest carbon stocks from afforestation and/or reforestation. The annual emissions due to deforestation and forest degradation due to unsustainable fuelwood extraction are estimated at 929,325 t CO_2 eq and 408,500 t CO_2 eq, respectively. The annual removals from afforestation is estimated at -151,077 t CO_2 eq in Nepal (MoFSC, 2017). FRL includes above ground biomass and below ground biomass and one gas (CO_2). The period 2000-2010 was selected as the historical reference period. Although it is mostly transparent and partially complete, which included significant activities and significant pools (UNFCCC, 2018), improvements are required on data, methods and scope (REDD+ activities, pools and gases). More accurate, reliable and consistent data required on activity data and emission/ removal factors to be eligible for tier 2 and tier 3. Scope of FRL can be expanded by including more activities such as forest degradation due to forest fire, degradation resulting from grazing, enhancement from improved forest management and forest restoration, sustainable management of forest, collecting direct data on degradation due to fuel wood collection, and use of high-resolution images for assessment and inclusion of small-scale deforestation and afforestation), non-CO_2 gases, and other pools (soil organic carbon, dead wood, litter and debris, climber, shrub, herb, seedling and saplings).

6.7.3 National Forest Monitoring System

National Forest Monitoring System (NFMS), one of the four requirements are required to be developed in order to participate in REDD+ programme. Therefore, a robust and transparent NFMS should be required for REDD+. This is one of the areas where Nepal has to work on to expedite the REDD+ process. Forest Research and Training Centre (FRTC), a national authority mandated to conduct national forest survey and forest resource assessment in Nepal, is national MRV agency. FRTC is carrying out forest cover monitoring and national forest inventory, which provide activity data and emission/removal factors. To strengthen NFMS and updating FRL,

Nepal is now conducting various studies. Most of these studies will be completed in the readiness phase with the stepwise approach (by June 2021).

6.7.4 Safeguards Information System

While implementing REDDD+ activities in the field, it is likely to generate social and environmental benefits as well as emission reductions on the one hand, and negative social and environmental effect on the other hand, therefore, it is important to design and implement REDD+ actions to mitigate or avoid the risk of negative impacts and bring additional benefits. These can be ensured by a specific set of safeguards measures. Safeguard Information System (SIS) should be designed and developed to explain how these social and environmental safeguards are being addressed and respected in implementation of REDD+ activities. SIS is also one of the four key components of REDD+ process.

Even though Nepal has prepared different safeguard related documents such as strategic environmental and social assessment, and environmental and social management framework; SIS as such is yet to be developed. It is however planned to design and develop the SIS through this fiscal year programme and budget, and if things goes as planned, SIS will be in place by the end of June 2021. With the SIS in place, it will help gather all the safeguard related information in one portal.

6.8 Implementation Phase

Nepal prepared an Emission Reduction Programme Idea Notes (ER-PIN) for the sub-national REDD+ programme in 13 districts of Tarai Arc Landscape (TAL) (Figure 3) and submitted it for consideration to the FCPF Carbon Fund (CF) in March 2013. In June 2013, Nepal decided to pilot the second phase of REDD+ at the landscape level in 13 districts of the TAL. FCPF CF decided to select the Nepal's ER-PIN into its pipeline for results-based payments in April 2014 and provided assistance to develop Nepal's ER programme document (ERPD).

Figure 3: ER program area: Tarai Arc Landscape-13 districts in the southernmost part of Nepal

In June 2015, Nepal and the World Bank signed the Letter of Intent (LoI) for potential purchase of emissions reduction, resulting from the Nepal's ER programme. ER Programme Document was selected into the CF portfolio on 22 June 2018. The ER Programme covers an area of about 2 mha, including 1.17 mha of forests. It comprises 144 local jurisdictions (sub metropolitans, municipalities and rural municipalities). The ER programme aims to achieve an ER of around 34.2 Mt CO_2 eq in 10 years, with 2018 as the start year (RIC, 2018 b).

Nepal is now preparing to have an Emission Reduction Payment Agreement (ERPA) with FCPF/ World Bank within 2020. For the first place, the agreement will be held for the ER of some 9 Mt CO_2 eq to be generated from the 13 Tarai districts within the ER programme of TAL. As a pre-requisite for ERPA, Nepal has already prepared and approved Environmental and Social Management Framework whereas other required documents such as Benefit Sharing Plan, ERPA Term Sheet, ER Reversal Management

Mechanism, Letter of Approval, ER Title Transfer Documents have already been prepared and under review and approval process.

As part of REDD+ implementation, seven emission reduction programme interventions will primarily be carried out in 13 Tarai districts (Table 2). Nepal has been implementing some of the interventions specified in the ER programme, especially improved forest management (intervention 1), among others, in ER programme area. With an aim of increasing the production of timber and fuel wood, the scientific forest management programme has been introduced since last eight years (DoF, 2014). Under this programme, silviculture system-based forest management is being undertaken in most of the productive forests, including community forests, collaborative forests and government-managed forests (block forest) in ER programme area. In line with the ER programme intervention 1, much focus has been given on improved forest management in ER programme area in recent years.

Nepal will officially enter into the implementation phase with ERPA signature. However, some of the activities being carried out have already supported the ER intervention in the ER area, therefore Nepal going to account the ER starting from ERPD approval date (*i.e.*, June 2018). Considering this fact, safeguard consistency and gap assessment of the ongoing ER activities, a requirement for the retroactive accounting of ER from 22 June 2018, ER programme selected into the CF portfolio, is undergoing in the ER programme area (Table 2). This will allow Nepal to receive payments for verified emission reductions generated since June 22, 2018 in the third phase (Phase 3).

Table 2: Major emission reduction program interventions (RIC, 2018 b)

S. No.	Intervention	Target (10 yrs)
1.	Improve management practices on existing community and collaborative forests	336,069 ha
2.	Localize forest governance through transfer of national forests to community and collaborative forest user groups	200,937 ha
3.	Expand private sector forestry operations through improved access to extension services and finance	30,141 ha
4.	a. Expand access to alternative energy with biogas	60,000 units
	b. Expand access to alternative energy with improved cookstoves	60,000 stoves
5.	Scale up pro-poor leasehold forestry	12056 ha
6.	Improve integrated land use planning to reduce forest conversion associated with infrastructure development	9,000 ha
7.	Improve management of existing Protected Areas (PA)*	6 PAs

**This activity will not directly contribute towards ER but enhance non-carbon benefits and environmental safeguards.*

6.9 Future Prospects of REDD+ Implementation in Nepal

Nepal will build on progress made to date by continuing to implement the REDD+ programme, involving indigenous people and local communities, institutionalizing MRV system, improving national forest monitoring system, updating forest reference level, investing in ER

programme, and taking actions to address the drivers of deforestation and forest degradation at national scale.

The focus has now changed from readiness to implementation and REDD+ finance. The next steps for REDD+ programme in the future would be to implement the ERPD in the ER program area. It includes implementation of seven major interventions to enhance the carbon stock in the forest. It is expected that after having ERPA with FCPF in 2020, first and second round of MRV of REDD+ interventions will be carried out in 2021 and 2024, respectively. This will unlock the door of ER payment as carbon credit based on the performance demonstrated through the verified emission reduction. As a result, based on the MRV 2021 and 2024, first and second installment of ER payment will be claimed from CF of the FCPF in 2022 and 2025 respectively. The payment received as a carbon credits would be distributed among the beneficiaries in accordance with the approved benefit sharing plan.

Emission reduction achieved from the implementation of 10-year ER programme in the 13 TAL districts after 2025, can be sold to any buyers. However, given that the REDD+ costs are higher (USD 25/t CO_2 eq), carbon prices are lower (USD 5/t CO_2 eq), the question arise whether REDD+ can be attractive mechanism for developing country (Rakatam *et al.*, 2017). Nepal, therefore, emphasizes the non-carbon benefits of ER programme by improving livelihood opportunities, governance reform, community empowerment and social change, as depicted in the ERPD (RIC, 2018 b). Nepal will continue to conduct follow-up studies on REDD+ and apply the results of the previous studies in practice.

In addition to the carbon and non-carbon benefits, another potential area where REDD+ can contribute in the future is to help achieve the NDC target set by the government. Even if we get the carbon credit from the verified emission reduction, significant portion of those emission

reductions can still be accounted for the emission reductions target submitted to UNFCCC. Nepal's first NDC 2016 has one commitment related to emission reduction from REDD+ which aims to pilot a sub-national project on REDD+ to reduce about 14 million tons of CO_2 eq by 2020 by addressing the drivers of deforestation and forest degradation. Nepal is preparing to submit its enhanced NDC in 2020 which will include Nepal's emission reduction programme.

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GENDER MAINSTREAMING IN REDD+ IMPLEMENTATION IN HINDU KUSH HIMALAYA

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7.1 Introduction

Women in the Himalaya are accounted as 'poor rural women' due to their significant reliance on forests (IUCN, 2013). However, if analyzed carefully, women are the forest conservators, managers, guardians of indigenous knowledge and supporters of biodiversity conservation and sustainable management of forests (Dhakal and Leduc, 2010). The Hindu Kush Himalaya (HKH) being one of the ecologically fragile regions in the world, are quite vulnerable to climate change. Since the mountain people have high dependence on forests and natural resources, they are under constant threat due to impacts of changing climate. Mountain women, who are the actual pillars of livelihood sustenance and play significant role in forest management, are mostly under represented and frequently marginalized from decision making processes (Gurung, 1999; Resurreccion *et al.*, 2019). Since, the gender-based data of HKH region is scarce and impacts of changing climate on women is most difficult to assess (Gurung, 1999).

Women in many parts HKH region are still leading very primitive, stressful and draining lifestyle. Women for generations, as their role in a subsistence economy have had to bear burden of collecting firewood, fodder and leaf litter and are therefore exposed to all kind of stress and hazard. The manifestations of this stressful existence include physical injuries, which include falling from trees and steep slopes and are prone to attack from wild animals. The drudgery of hard labour over 10-12 hours a day leads almost no time for their family and children.

Since ancient times, traditional perspective of gender, their roles and relations within the society has always hampered the progress and growth of women. This embarked the concept of gender mainstreaming in several REDD+ decisions. REDD+ can be sustainably implemented only through reduction in emissions and developing a performance-based benefit sharing system which can help in better management of forests. The dispersal of benefits of REDD+ implementation activities should meet necessities of all stakeholders including women (Gurung *et al.*, 2011) considering gender equity significant for sustainable management of forests in order to achieve the climate change mitigation targets through implementation of REDD+ activities.

7.2 Gender Mainstreaming Dimensions of REDD+

Gender mainstreaming is a gender equality strategy that suggests equal treatment of women and men in laws and policies, and equal access to resources and services within families, communities and society at large (WHO, 2001). Gender and climate related impacts are given wide recognition as well as inclusion in REDD+ safeguards which can be tracked from the UNFCCC's Cancun Agreements on safeguards (UNFCCC, 2011). Later, gender-responsive climate policy has also been emphasized in the Paris Agreement (UNFCCC, 2016 a) and on the basis of which, UNFCCC decision (Decision 21/CP.22) on Gender and Climate Change has been agreed by the COP (UNFCCC, 2016 b). After the inclusion of 17 Sustainable Development Goals (SDGs) under the 2030 Sustainable Development Agenda, the gender issue has been addressed and recognized globally for development of an individual, community and nation. SDG 5 which aims to achieve gender equality and empower all women and girls, not only addresses gender equality but also acts as a precursor for attaining other SDGs (UN, 2015). Gender is still arbitrated and often put aside, therefore, inclusion of gendered benefit in REDD+ mechanism is necessary to ensure well-rounded and inclusive sharing and reaping of benefits from REDD+ activities (Larson *et al*., 2018).

It must be noted that women are amongst the 70% of the world's poorer populations (UNDP, 1995) but not enough data on women of HKH region is available to be put into implementing space of REDD+ decisions and benefit sharing mechanism. This retrogressive approach in REDD+ policies, excludes feminocentric groups from participation in decision making and climate governance (Resurreccion *et al*., 2019), thus making the mountain women prone to being glass ceiled without being addressed for gender differentiation. In spite of several agreements and laws being put in place in different countries, no comprehensive law concerning gender mainstreaming has found its way and acceptance towards their significant role in climate change mitigation in REDD+ activities. Thus, fully involving, participating and gaining benefits from REDD+, is a major task as well as a challenge especially for mountain women to prove themselves in a male dominated socio-economic, political and decision-making ownership (Agarwal, 2001; Resurreccion *et al.*, 2019).

7.3 Significance of Women in Forest Conservation

The relationship of women with environment can be observed in their role in forest management (Setyowati, 2012), thus making them the real forest managers. Traditional knowledge that they have acquired in the form of managing ecosystem services, not only highlights their ability to survive in harsh climatic conditions of HKH but also explains the challenges faced by mountain women in playing such critical social roles (Gurung, 1995; Resurreccion *et al.*, 2019). The physical hardship faced by women for performing regular livelihood activities such as collection of fuelwood, water etc. from forests and then carrying them on their heads in vertical mountain terrains, is the prominent feature of HKH region (Gurung, 1995). The estimates have shown that among 850 million people engaged in fuelwood collection, around 83% are women (FAO, 2018). Fuelwood collection is one of the many chores performed by them and it is reported that women spend 3-4 hours in collecting one headload of fuelwood (IUCN, 2013). Since, women are the prime users of forests, their role in sustainable forest management and natural resource management should not be neglected (IUCN, 2009).

In Himalayan region of Uttarakhand (India) the women's groups are known for their immense role in conserving forests through the famous Chipko Movement (which later pioneered Joint Forest Management in India). The *Chipko* Movement emphasized significance of mountain women in conserving and protecting their natural entities, and developing afforestation programmes which helped in reducing landslides, made fuelwood and fodder available in the area and, enhanced tree survival rates up to 60-80% (Joshi, 1982). *Mahila Mangal Dal* (Women's Welfare Groups) are very successful in Uttarakhand as women have full autonomy over the forests and are able to conserve and even regenerate them from their collective efforts. This resulted in reduced workload and saved time which was earlier spent on fodder and fuelwood collection. Since *Mahila Mangal Dal* cover civil lands, women make their own decisions regarding patrolling and penalty measures (Lokgariwar and Das, 2015). A case study regarding the indigenous knowledge of Wancho communities in Tirap district, Arunachal Pradesh (India) reports that women are more involved in

management of natural resources as compared to their male counterparts. (Aumeeruddy-Thomas and Pei, 2003).

In Nepal Himalayas, women give religious significance to mountains by worshipping them which is actually an act of conserving the environment (Sherpa, 2007). Progressive participation of women at community forest management level is observed in their presence in more than 14,000 Community Forestry User Groups (CFUGs) in Nepal and managing over 1.2 mha of country's forest area. Despite gaining recognition as key forest users and recommendation of one-third women members in CFUG committees, incessant gender-exclusion from gaining economic benefits, use of forest resources and decision-making can be observed. Gender inequity can be further noticed in terms of lesser number of women holding officer positions in CFUGs, and only 17% households allowing women to attend committee meetings (Ghimire-Bastakoti and Bastakoti, 2004). However, changes in traditional gender-based dynamics have been observed in Nepal as a result of globalization and national political inclinations (Suzuki, 2012).

In China, women led communities are acknowledged and encouraged for halting advancing deserts by planting willows and poplars and also for making the land fertile enough for vegetable production. The Bhutanese women are given significance with regards to their economic freedom, food security and use of resources. Bhutan promoting sustainable use of forest resources, promotes gender recognition in the implementation of activities supporting their livelihoods and enhanced income (IUCN, 2013). In Bangladesh, shifting cultivation is practiced which includes sequence of procedures and activities involving both men and women.

Gaura Devi - A global inspiring woman leader of India's *Chipko* Movement

Chipko movement is best remembered for the collective mobilisation of women for the cause of preserving forests, which also brought about a change in attitude regarding their own status in society. Gaura Devi led the first all-women action to save their community forest and mobilised the women of the region to protect their natural heritage. The *Chipko* movement was initially started in 1970s in Garhwal Himalaya of Uttarakhand but was actually highlighted on 25 March, 1974 when a group of 27 courageous and vigilant women of Lata and Reni villages, Chamoli district (Uttarakhand) led by Gaura Devi saved many forests by hugging the trees and the movement emerged as a peasant movement in defense of reclamation of traditional forest rights, enduring a century-long tradition to struggle towards state encroachment. The movement became an inspiration for many protests all over India which not only articulated sensitivity of communities towards their forests but also put a halt on many open felling of trees in India.

However, the role of women is more as compared to men, especially in labour works (Khadka and Verma, 2012).

Since, the forest management-based data on mountain women is very scarce, with the reliable data only available for few HKH countries, hence creates a grim situation for conducting a cross-country gendered forest management assessment. However, the data accumulated by Sunderland *et al.* (2014), establishes gendered differences in use, collection and management of forest resources and reports that women play much significant role in contribution to forest products and sustainable rural livelihoods.

7.4 National REDD+ Strategy- Addressing Gender Gaps

Cancun Agreements (paragraph 72 of Decision 1/CP.16) set a prerequisite for individual countries to consider several elements including gender, while preparing their National REDD+ Strategy (UNEP, 2015). The role of women in ensuring forest management is considered critical as their domestic and economic responsibilities restrict their agility and involvement in REDD+ activities. This has further marginalized women politically as well as culturally from decision-making processes and has even impacted their forest rights. It is true that women's participation in forestry activities is welcomed but when it comes to their participation in planning and decision-making processes that outline their admittance to forest rights and resources, land and property; the involvement of women has been found marginal (Gurung *et al.*, 2011). Gender mainstreaming in REDD+ is extremely important especially for HKH countries as livelihood dependency of mountain communities, particularly women, on forest resources is very high. Efforts of some of the HKH countries in mainstreaming gender have been briefly discussed below:

- India has moved forward in relating policies and national interests by including gender and social inclusion with REDD+ (Karki *et al*., 2014). India has addressed gender considerations and safeguards with full and effective participation of relevant stakeholders in its National REDD+ Strategy. The Strategy discusses policy measures regarding gender approach in India's existing national laws and policies such as National Mission for Empowerment of Women (2010), National Environmental Policy (2006) and National Policy on Education (1986). Reservation for women in Joint Forest Management Committees and Eco-development Committees, and in *Panchayati Raj* Institutions are good indicators of government's intention to ensure meaningful participation of women in the local decision-making mechanisms including management and development of forests (MoEFCC, 2018). India's REDD+ Strategy proposes to build a cadre of Community Foresters to lead the charge at the local level.
- Myanmar's National REDD+ Strategy states the significance of gender equality and involvement along with monitoring and reporting on gender mainstreaming for effective implementation of REDD+. Since Myanmar is signatory to Convention on All Forms of Discrimination against Women and an active member of the Association of Southeast Asian Nations' Committee on Women and Children, hence ensures gender inclusion in REDD+ framework. The policies and measures of the strategy under its Action Package 4 i.e. Awareness, capacity development and training, includes establishment of participatory and gender equitable land use planning approaches at regional/state level. Likewise, the policies and measures of the strategy under its Action Package 5 *i.e.* Governance improvement, involves establishment of gender-responsive forestry and agroforestry extension services in rural and hill areas. Gender and ethnicity have also been accounted under Myanmar's REDD+ communications and knowledge management strategy (MONREC, 2018).

- The National REDD+ Strategy of Nepal mentions governance challenges including inadequate gender and social inclusions in institutions and decision-making processes. However, Nepal has addressed the gender equity in its National REDD+ Strategy. Policy initiatives, such as the Gender and Social Inclusion Strategy (2009), have been followed to acknowledge gender roles in forestry. These initiatives have focused on areas of reform to make more gender inclusive and sensitive policies, programmes and institutions. This has resulted in better representation in some of the Community-Based Forest Management institutions, such as community forests, where 50% of women are represented in executive committees and key positions (MoFE, 2018). However, there are gaps in gender and equity at all levels of forest governance. In particular, women are struggling to get fair access to decision making, resource allocation, opportunities, and sharing benefits from forest management. A more nuanced framework and targeted investments are required to establish women's role in forestry institutions, forest management, resource use and benefits sharing (MoFE, 2018).
- In Pakistan, improved governance of natural resources is the major challenge which is further aggravated with lack of livelihood and employment opportunities; dependency on fuel wood; high rates of poverty; gender issues and lack of women participation (Bukhari, 2014). The National REDD+ Strategy of Pakistan depicts non-participation of women in decision-making processes in forest management, projects and programmes. Absence of community-based forest management committees in the provinces further deteriorate the situation. Regarding the institutional arrangements, policies and governance, the Strategy depicts gender neutrality in the forest laws and policies but also accepts that women participation in forestry decisions is very rare (FMCC, 2018).

7.5 Prevalent Gender Laws in HKH Countries

The world is changing as far as present social and economic norms of the society are concerned. If we talk about gender mainstreaming, in the global context, the ubiquitous similarity in the condition of women cannot be denied. Thus, countries have altogether started working for mainstreaming gender in all sectors with the holistic approach of women empowerment and unification of mindsets and approach towards gender rights. Prevalent gender laws and policies of the HKH countries exhibiting their commitment and presenting their approach towards gender mainstreaming and women empowerment have been elaborated as under:

- The Constitution of Bangladesh, includes Article 9, 10, 28(1), 28(2), 28(3) and 28(4) which ensure non-discrimination against women, promotion of women participation, gender equality and women representation in local government institutions. The Land Reforms Action Programme (1987), 1997-2002 Fifth-Five Year Plan for rural development, Rural Development Policy and National Agriculture Policy Draft (2007), aims towards capacity building, development of women-friendly

institutions, gender equality and women empowerment. Bangladesh has also ratified Convention on Elimination of all Forms of Discrimination against Women (CEDAW) and optional Protocol to the CEDAW as a part of its international agreements (FAO, 2020).

- The Constitution of China, in its Article 4 and 48 confers gender equality in political, economic, cultural, social and family life, and ensures equal pay for equal work. The Women's Act (1992), ensures protection of rights and interests of women regarding education and property. The Labour Act (1994) ensures equal employment rights to women. The Organic Law of the Villagers' Committees (1998) suggests setting of women quotas in village elections. The 2001-2010 Programme for the Development of Chinese Women, focuses on promotion of women's participation in economic and social development, education, wellbeing, safeguarding of women's rights and interests. The National Working Committee on Children and Women (1992), implements national programmes to support women and children, and gender mainstreaming in government departments and organizations. China has also ratified CEDAW and International Covenant on Economic, Social and Cultural Rights (ICESCR) as a part of its international agreements (FAO, 2020).
- India is signatory to UN Conventions such as CEDAW and Beijing Platform for Action and

Convention on Rights of the Child, where the nation's commitment towards protection and empowerment of women and girls is clearly marked. The ratification of 2030 Sustainable Development Goals (SDGs) by India will further help to address the challenges such as poverty, inequality, and violence against women. Such laws aim to bring women under the umbrella of gender mainstreaming rather than being observed as benefit recipients. The first women policy (National Policy for the Empowerment of Women) was laid down in 2001 and was later formulated as a mission (2010) of the country to reduce gender disparity and for development and empowerment of women (GOI, 2016). The Constitution of India has entrenched women rights in Article 14, 15(1), 15(3), 39(a), 39A, 42 and 44 which ensure gender equality, women empowerment, right to adequate means of living, equal pay, justice, equal opportunities and wellbeing. The Equal Remuneration Act (1976), the National Commission for Women (1992), the National Policy for the Empowerment of Women (2001), strive for gender equality (FAO, 2020).

- The Constitution of Myanmar, includes Article 21, 347, 348 and 349 mandating equal justice, rights, gender opportunities, prohibits discrimination and promotes equal pay for women. Myanmar's National Committee on Women Affairs (1996) is a policy and decision-making body for women advancement. National Myanmar's Women Affairs Federation (2003), assists national affairs for implementation of CEDAW and Beijing Platform for Action. The National Strategic Plan for the Advancement of Women (2013-2022) has 12 priority areas addressing women livelihoods, poverty, education, participation, rights and social protection. The National Land Use Policy (2016), ensures gender equality regarding land tenure.
- Nepal has included Gender and Social Inclusion Strategy (GESI) in 2009 to acknowledge gender roles in forestry and gender equality by strengthening governance and improving policy, and legal frameworks (MoFE, 2018). The Labour Act (1992), Agriculture Policy (2004), Gender Equity and Environment Division established in 2004, Annual Finance Acts (2005), Small Farmers Development Programme (2000), Local Self-governance Act (1999) and National Woman Commission Act (2006) are the policies and institutional mechanisms which include gender mainstreaming with an aim towards overall development of women. Nepal has also ratified CEDAW -Optional Protocol as a part of its international agreements (FAO, 2020).
- The Constitution of Pakistan, includes Article 25, 32, 34, 37(e), 51 and 106 ensuring gender equality, women participation, wellbeing and women representation in legislatures. The National Commission on the Status of Women (2000) and National Policy for Women's Development and Empowerment (2002) are amongst the institutional mechanisms for protecting women rights. Pakistan has ratified ICESCR as a part of its international agreements (FAO, 2020).

7.6 Addressing Gender and Climate Change in HKH

Climate change has become a global concern over the last few decades. The impacts of changing climate on the mountain people cannot be denied due to their huge dependency on natural resources (Huddleston *et al.*, 2003). The increased vulnerability of mountain ecosystems which are under a constant threat due to climate change, has further made the future sustainability of mountain communities more challenging. Dependency on forest derived natural resources has made the mountainous people more vulnerable to any future impacts of climate change. It is believed that mountain people will be more exposed to environmental stressors in near future but the ones who will be most impacted by changing climate are women. This can be explained from the gender specific practices which show the dependence of mountain women on forest resources to meet their daily needs such as fuel wood, fodder, water and minor forest produce etc. (Rawat, 2017).

Climate change has resulted in socio-economic uproar which has directly or indirectly impacted the inhabitants of the remote mountainous regions and added as a thrust factor to increased outmigration from the mountain regions. The increased outmigration of males has overburdened the mountain women with the household responsibilities which involves more dependency on forest based natural resources, rainfed agriculture, etc., thus decreasing their adaptive capacity to impacts of changing climate. Being less literate is an additional factor for mountain women to be more susceptible towards being vulnerable in near future (Rawat, 2017).

Gender mainstreaming aspect in climate change mitigation is still in developing phase, as women are rarely considered as leaders (Brody *et al.*, 2008). The gender equality gap is due to under representation of women in policy framing and decision-making processes (IUCN, 2009). Since REDD+ aims to protect the environment and forests in context to changing climate, with a gender-sensitive approach, thus, REDD+ has the potential to emerge as a forest-climate change mitigation option along with enhancing and improving condition of women (Suzuki, 2012). Correspondingly, observing the targets of 2030 Agenda for Sustainable Development, REDD+ acts as a linkage between SDG 13 (i.e. climate change mitigation and adaptation) and other SDGs such as SDG 1 (poverty eradication), and SDG 2 (sustainable food security). However, gender glass ceiling is still inevitable due to lack of forest rights, forest resource use and land tenure issues, which prevents gender mainstreaming in REDD+ regarding equitable access to benefits. Thus, if gender mainstreaming is implemented in REDD+ without being prejudiced, it integrates rights, concerns and aspirations of forest dependent communities, it can achieve SDG 5 i.e. gender equity and women's empowerment (Lima *et al.*, 2015).

Data on gendered vulnerabilities of HKH region is still lacking, which points towards absence of understanding in the direction of gendered gaps and dynamics in our society. Also, it has been assessed that women have not been acknowledged as stakeholders in REDD+ initiatives and related activities, hence it can be said that gender issues have not yet been given relevance in REDD+ by the key actors (Gurung *et al.*, 2011).

Many case studies have accounted the robust role of mountain women in managing ecosystem services and food security via their knowledge, skills and their ability to carry out responsibilities (Nellemann *et al.*, 2011). In India and Nepal,

increased women participation has led to improvements in local natural resources and their governance as well as in forest conservation efforts (Leisher *et al*., 2016). Women efforts in forest improvement can be observed in India where a study has related 28% greater likelihood of forest regeneration due to women participation in forestry projects (Agrawal *et al*., 2006). The World Bank study (2009)states that forest ingenuities involving the participation of women and poor communities in forest management activities i.e. reforestation, forest surveillance etc. can significantly improve their livelihoods. Also, a research from Nepal showed that gender inclusive forest governance led to increased income for poor communities, especially poor women (McDougall *et al*., 2013).

Use of Improved Cook Stove: An Effort to Reduce Women Drudgery in Mizoram (India)

Improved Cook Stoves were distributed among the villagers of Chungtlang and Kanghmun (District Mamit, Mizoram) under REDD+ Himalaya project for addressing the drivers of forest degradation as well as a model for safe cooking and clean environment. During interaction with the women of these villages, it was found that drudgery of women for collecting fuelwood and time expenditure was reduced from daily collection and consumption of 20 pieces of wood to only 5-6 pieces after using ICS.

Source: Rawat *et al*., 2018

However, study done in HKH region and other mountainous regions of the world show that increased environmental degradation has impacts on women in context to educational and economic opportunities. It has also been found that women are less acknowledged and their involvement in the policy framing and decision-making related to REDD+ is very limited. In Myanmar, in spite of women playing a key role in subsistence agriculture and food security along with carrying out all household tasks, their control over funds is lesser than men (Pender, 2009). Similarly, studies done in Nepal and India highlighted that women were deprived of equal cash allocation and funds (Agarwal, 2001). Thus, along with social, economic and cultural inequalities, the policy prejudice within forestry sector, gender biasness and social exclusion of women with respect to their participation, contribution in forest conservation efforts and REDD+ approach cannot be denied (UNDP, 2016). A research states that if women will be allowed to participate equally in the economy, they could add as much as USD 28 trillion or 26% to annual global GDP in 2025 (MGI, 2015). Therefore, in spite of the valuable contribution and efforts of mountain women towards forest conservation, their relevance in benefit sharing and decision-making is comparatively very less.

Replacement of firewood with LPG or providing other source of clean energy for cooking and keeping their home warm during winters at an affordable cost can help in making life easy for rural women. Infusion of fuel-efficient cook stove can also contribute a lot in making women's life easier so that they can devote time with their family. Government of India's Ujjwala Scheme to provide free LPG connections to Poor families will be big leap in this direction as it will give relieve rural people's dependence on firewood as

cooking fuel. In Himalayan region people do not have capacity to repay even for its refill. In order to save fragile Himalayan ecosystems LPG refills can also be distributed to the communities subsidized rates.

7.7 Gender Mainstreaming and Avoiding Marginalization

Involvement of women in decision-making processes will recognize their significance in forest conservation and rights on access to forest resources. REDD+ provides equal economic opportunities to women and will certainly avoid marginalization of the economic prospects of mountain women. REDD+ implementation being core of the existing and future management and developmental initiatives and activities in forest, will ensure adherence to gender centred sensitivity and transparency in forest governance (MoEFCC, 2018). Thus, it is necessary that women should be trained and empowered to take part in forest conservation activities and make REDD+ programmes successful (Gurung *et al*., 2011).

There is a need to identify vulnerable groups in HKH region so that disparity created with respect to age, social, political, religious, climatic, economic and legal impediments against vulnerable groups, particularly women, can be avoided. Capacity building of feminocentric groups under REDD+ activities will enhance the ability of mountain women to get technical advancements in terms of socio-economic and decision-making responsibilities. It will also avoid exploitation of women and contribute towards receiving equal benefits from REDD+ gender-inclusive approaches. The involvement and commitment of mountain women towards their surrounding forests and natural resources is such that mainstreaming of gender via incorporating their knowledge, skill sets and experience will increase efficacy, sustainability and success of REDD+ implementing activities in HKH regions.

As women are more sensitive towards environment, their involvement in forest conservation is known to considerably reduce deforestation levels (UNDP, 2011) and act as a catalyst in attaining sustainable development. However, in spite of all the efforts for gender mainstreaming at country level in HKH region, the policies and programmes at local forest governance institutions have been found to do little for the cause (Agarwal, 2000). Thus, even if most of the HKH countries claim to have mainstreamed gender, the way in which gender is interpreted in climate change interventions and policies, is still vague (Resurreccion *et al*., 2019).

Gender mainstreaming has been at the forefront of all the decisions but its implementation has always been circumvented. Thus, it is important that the REDD+ activities are taken up after proper ground level analysis of issues related to gender mainstreaming and distribution of funds in HKH region. The REDD+ payment benefits earned by mountain women will make them economically viable, motivate them to take active part in REDD+ activities and will encourage them in taking their own decisions and thereby empowering them. Gender mainstreaming activities involving forest conservation and sustainable forest management will not only benefit women but will also get benefitted from women. Gender mainstreaming should not be about number of women participants but about meaningful women participation and their effective involvement in REDD+ activities (UNEP, 2016).

7.8 Conclusion

The vitality of gender equality and women empowerment for building resilient societies and nations cannot be denied. However, in spite of laying down many gender-inclusive approaches in REDD+ policy frameworks, gender equality is still an unfulfilled and intangible goal which directly and indirectly affects the society and people (UNDP, 2015). Thus, there is a need to fill the gender gap in REDD+ approaches and policy frameworks and to mainstream gender through equitable sharing of REDD+ benefit payments. This will further help in devolution of mountain women towards social, environmental, economic, educational, wellbeing and decision-making processes. REDD+ policies and framework can create more gender-inclusive opportunities in HKH region via:

- Mainstreaming gender equality, women's empowerment and leadership in REDD+ and climate change mitigation and adaptation related actions, plans and policies;
- Safeguarding REDD+ benefits in the form of gender equality, sustainable growth and poverty alleviation for making REDD+ efforts to thrive globally;
- Persistent assessment and monitoring of REDD+ implementation and modifications in legislative frameworks such that association between legal framework and REDD+ performance can be prolonged;
- Ensuring consented gender participation and decision-making processes on REDD+ implementation activities;
- Ensuring that mountain women may be equally benefitted from sustainable forest management, employment generation activities, awareness campaigns and capacity building programmes.

Maximum gender participation in HKH region is only possible when the mountain women are involved in decision making process and empowered enough to make their decisions. Their consent to partake in REDD+ implementation activities for attaining mutual REDD+ benefits should also be valued. However, this approach can only be executed when the existing REDD+ policies and institutions are more gender mainstreamed, mountain women are educated, have good state of wellbeing, and the gender biased economic inequality gap is narrowed.

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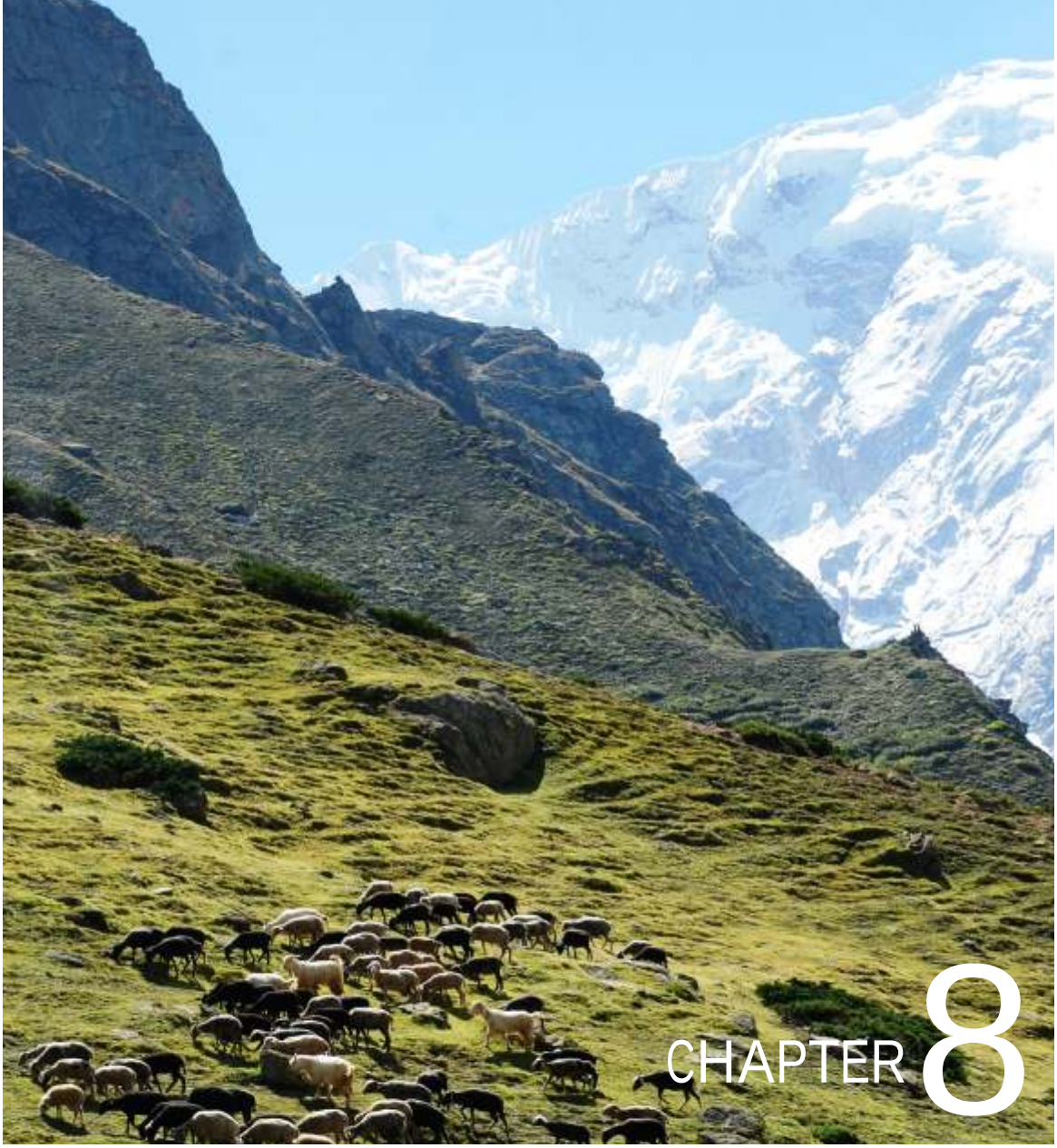

CHAPTER 8

SOIL ORGANIC CARBON STOCK AND ITS CHANGES IN HINDU KUSH HIMALAYAN'S GRASSLANDS

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8.1 Introduction

Grassland is one of the most widely distributed ecosystems on earth and plays an important role in the global terrestrial carbon cycle (Scurlock *et al.*, 2002). About 34% of the global terrestrial carbon is stored in grasslands and a significant (89%) amount of the carbon sequestered by the grassland vegetation is stored in the soil (Ajtay *et al.*, 1979; White *et al.*, 2000). Grasslands in Hindu Kush Himalaya (HKH) are an important component of the world's grassland ecosystems. Natural grasslands in HKH cover an area of 2.29 × 106 sq km (Joshi *et al.*, 2013), accounting for ~60% of the HKH area (Miller, 1996). Due to the large carbon stock, grasslands may play a key role in HKH's terrestrial carbon cycle. Thus, our knowledge of carbon stock and its dynamics in grassland ecosystems not only helps our understanding of the potential role of grassland ecosystems in carbon cycle, but also provides a basis for sustainable use of limited grassland resources in HKH.

Among the countries in HKH region, China occupies 67.48% of grassland area, which is mainly in Tibet, Qinghai, Sichuan, Gansu and Yunnan provinces. The other 32.52% of grassland is distributed in Pakistan, Afghanistan, India, Nepal, Bhutan, Myanmar and Bangladesh (Joshi *et al.*, 2013). During the past several decades, a number of studies on soil organic carbon cycling, particularly on soil organic carbon stocks and its changes, have been conducted for China and India's grasslands at different scales. However, there is still lack of systematic and overall research on soil organic carbon in other countries of HKH, and these studies have usually examined soil organic carbon stock or its dynamics for specific grassland types (e.g., temperate or alpine grasslands). Consequently, regional or national scale assessments of the soil organic carbon balance are still lacking. A comprehensive regional or national assessment of soil organic carbon stock and their changes as well as the potential factors that influence soil organic carbon dynamics in HKH's grasslands are highlighted in this chapter.

8.2 Methodology for Assessment of Soil Organic Carbon Stock

The calculation of soil organic carbon stock (SOCS) in grassland of a region is mainly based on the method provided by Tang *et. al.* (2018), by summing up the products of soil organic carbon density (organic carbon amount of the soil profile per unit land area, SOCD) and total area of each grassland types of that region. Since there is lack of uniform classification system of grassland types in HKH countries, total SOCS may have large deviations due to grassland classification and area. In this situation, researchers would not assign the same SOCD to a certain grassland type, but adopt the pixel by pixel method, that is, each grassland pixel corresponds to a SOCD, by summing the product of pixel area and SOCD to get SOCS. In order to avoid the error caused by grassland area, the SOCD was used instead of SOCS.

The calculation of SOCD at different soil depths (0-10, 10-20, 20-30 cm) is described in Equation (1):

$$SOCD = \sum (1 - \delta_i) \times \rho_i \times C_i \times T_i / 100 \quad (1)$$

where SOCD is the soil organic carbon density (kg C/m^2) i represents the soil layers (0-10, 10-20, 20-30 cm), δ_i is the volume percentage of gravels with a diameter of >2 mm, ρ_i is the bulk density (BD) (g/cm^3), C_i is the soil organic carbon (SOC) content (SOCC) (g C/kg), and T_i is the thickness (cm) of the th layer, which is 10 cm in this study.

There are two main methods for extracting SOCD data: For articles that directly provide data (such as table 1 and table 2), SOCD extracted according to the depth requirements; for articles that provide data indirectly in the form of images, engauge digitizer software can be used to extract the information.

Previous studies on SOC in HKH's grasslands: There are several SOC studies available from all around the world in the public domain. A total of 553 articles referred on "grassland" or "rangeland" in "HKH/ Himalaya/ Himalayan" (88 of 553), "India/ Indian" (311 of 553), "Nepal/ Nepalese" (68 of 553), "Pakistan/ Pakistani" (57 of 553), "Burma/ Myanmar/ Burmese" (1 of 553), "Bangladesh/ Bangladeshi" (5 of 553), "Bhutan/ Bhutanese" (14 of 553), "Afghanistan/ Afghan" (9 of 553). Further filtering, 36 articles are directly or indirectly related to soil carbon in HKH grasslands. The detailed data are listed in Table 1. Although Afghanistan and Pakistan occupy 12.74% and 8.22% of the grassland area of HKH respectively (Ahmad *et al.,* 2006), their SOC research in grassland is relatively poor, and part of the literature describes vegetation carbon. In Myanmar, Bhutan and Bangladesh, there is no literature on grassland SOC. The main part of HKH in China is the Tibetan Plateau. Considering that there are many studies on SOC in the grassland of the Tibetan Plateau, "Web of Science" portal was used to collect articles on the SOC of the Tibetan Plateau. The searched keywords were "Tibet, soil, carbon, grassland", and the time range is from 2000 to May 2020, a total of 712 articles have been retrieved. After filtering, a total of 40 articles were related to SOC in HKH grasslands. Additionally, University of Chinese Academy of Sciences (UCAS) and ICIMOD with the financial support from Natural Science Foundation of China also conducted a research study to understand the SOCD of grasslands/ rangelands from China, India, Myanmar and Nepal. Figure 1 below shows the locations of SOCD data published as well as the research locations conducted by ICIMOD and UCAS.

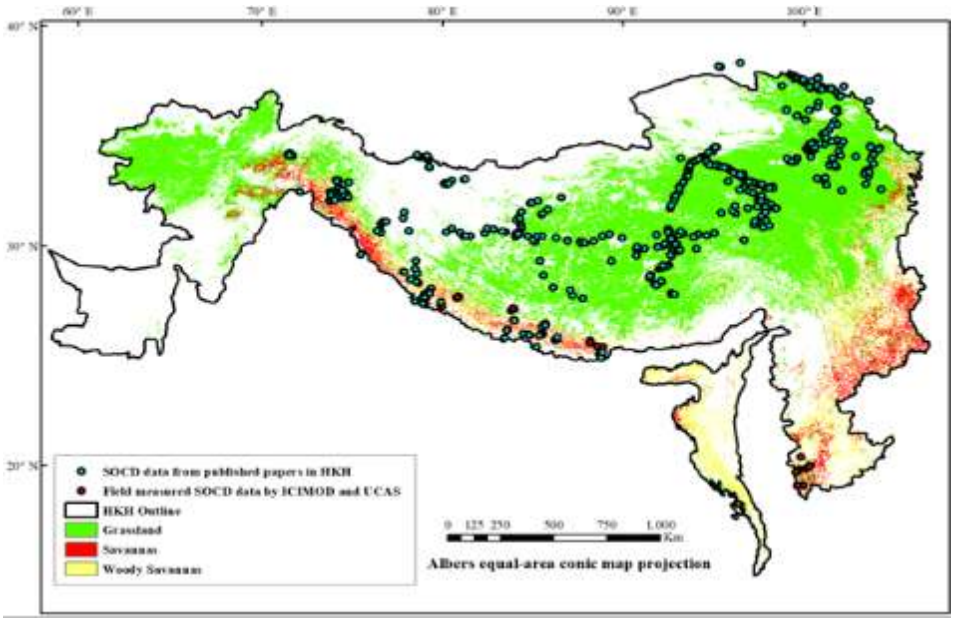

Figure 1: The distribution of sampling points from published papers and field measurement

8.3 Distribution of SOCD in HKH's Grasslands

SOC is one of the indicators of soil quality. SOC determines the soil fertility and productivity. So, it is essential to know and preserve the SOC while addressing the climate change problems and food security. The table 1 below shows specific studies on SOCD from India, Nepal and Pakistan in the HKH region. The SOCD of grassland in Tibetan Plateau is summarized in Table 2. Furthermore, the field measured data and literature collected data are summarized. Figure 2 illustrates the frequency distribution of SOCD of the top 30 cm layer. At the same time, the trend analysis of these data was drawn according to the location (Figure 3).

Table 1: SOCD data of the top 30 cm surface layer collected from published papers in HKH's grasslands

ID	SOCD (kg C/m^2)	Nation	Reference	ID	SOCD (kg C/m^2)	Nation	Reference	ID	SOCD (kg C/m^2)	Nation	Reference
1	9.17	India	(Sharma *et al.*, 2011)	53	3.33	Pakistan	(Shah *et al.*, 2015)	105	8.49	Nepal	(Shrestha, 2016)
2	8.54	India	(Sharma *et al.*, 2011)	54	3.80	Pakistan	(Shah *et al.*, 2015)	106	5.42	Nepal	(Shrestha, 2016)
3	14.54	India	(Sharma *et al.*, 2011)	55	3.91	Pakistan	(Shah *et al.*, 2015)	107	4.80	Nepal	(Kafle, 2019)
4	5.83	India	(Sharma *et al.*, 2011)	56	3.93	Pakistan	(Shah *et al.*, 2015)	108	5.82	Nepal	4
5	11.40	India	(Sharma *et al.*, 2011)	57	2.86	Pakistan	(Shah *et al.*, 2015)	109	5.08	Nepal	4
6	10.17	India	(Sharma *et al.*, 2011)	58	3.68	Pakistan	(Shah *et al.*, 2015)	110	8.12	Nepal	(Pandey *et al.*, 2019)
7	10.92	India	(Sharma *et al.*, 2011)	59	3.38	Pakistan	(Shah *et al.*, 2015)	111	3.35	Nepal	(Mandal *et al.*, 2017)
8	16.15	India	(Kumar *et al.*, 2012)	60	3.42	Pakistan	(Shah *et al.*, 2015)	112	2.22	Nepal	(Aryal *et al.*, 2019)
9	6.39	India	(Arora *et al.*, 2014)	61	3.39	Pakistan	(Shah *et al.*, 2015)	113	2.89	Nepal	(Aryal *et al.*, 2019)
10	6.30	India	(Arora *et al.*, 2014)	62	2.96	Pakistan	(Shah *et al.*, 2015)	114	2.66	Nepal	(Aryal *et al.*, 2019)
11	6.54	India	(Arora *et al.*, 2014)	63	2.61	Pakistan	(Shah *et al.*, 2015)	115	0.52	Nepal	(Aryal *et al.*, 2019)
12	6.78	India	(Arora *et al.*, 2014)	64	3.01	Pakistan	(Shah *et al.*, 2015)	116	0.76	Nepal	(Aryal *et al.*, 2019)
13	7.13	India	(Arora *et al.*, 2014)	65	3.00	Pakistan	(Shah *et al.*, 2015)	117	1.01	Nepal	(Aryal *et al.*, 2019)
14	7.17	India	(Arora *et al.*, 2014)	66	3.09	Pakistan	(Shah *et al.*, 2015)	118	4.19	India	(Kukal *et al.*, 2014)
15	7.22	India	(Arora *et al.*, 2014)	67	7.31	Pakistan	(Uddin *et al.*, 2019)	119	0.88	India	(Rekha *et al.*, 2010)
16	7.39	India	(Arora *et al.*, 2014)	68	8.05	Pakistan	(Uddin *et al.*, 2019)	120	1.32	India	(Rekha *et al.*, 2010)
17	7.57	India	(Arora *et al.*, 2014)	69	7.34	Pakistan	(Uddin *et al.*, 2019)	121	11.70	India	5
18	7.95	India	(Arora *et al.*, 2014)	70	6.65	Pakistan	(Uddin *et al.*, 2019)	122	1.39	India	(Jangra *et al.*, 2015)
19	8.38	India	(Arora *et al.*, 2014)	71	5.21	Pakistan	(Uddin *et al.*, 2019)	123	5.59	India	6
20	12.50	India	1	72	5.72	Pakistan	(Uddin *et al.*, 2019)	124	5.73	India	6
21	11.04	India	1	73	8.18	Pakistan	(Uddin *et al.*, 2019)	125	4.15	India	(Dad, 2019)
22	11.94	India	1	74	8.13	Pakistan	(Uddin *et al.*, 2019)	126	2.71	India	(Dad, 2019)
23	5.35	India	1	75	6.99	Pakistan	(Amir *et al.*, 2019)	127	2.73	India	(Dad, 2019)
24	4.38	India	1	76	7.81	Pakistan	(Amir *et al.*, 2019)	128	2.81	India	(Dad, 2019)
25	6.16	India	(Kumar *et al.*, 2013 a)	77	8.26	Pakistan	(Amir *et al.*, 2019)	129	4.24	India	(Dad, 2019)
26	2.28	India	(Kumar *et al.*, 2013 b)	78	7.76	Pakistan	(Amir *et al.*, 2019)	130	4.05	India	(Dad, 2019)
27	4.11	India	2	79	6.90	Pakistan	(Amir *et al.*, 2019)	131	3.44	India	(Dad, 2019)

ID	SOCD (kg C/m^2)	Nation	Reference	ID	SOCD (kg C/m^2)	Nation	Reference	ID	SOCD (kg C/m^2)	Nation	Reference
28	3.91	India	2	80	6.64	Pakistan	(Amir *et al.*, 2019)	132	4.58	India	(Dad, 2019)
29	6.23	India	2	81	5.95	Pakistan	(Amir *et al.*, 2019)	133	3.21	India	(Dad, 2019)
30	6.72	India	2	82	4.69	Pakistan	(Amir *et al.*, 2019)	134	6.50	India	(Dad, 2019)
31	6.26	India	2	83	6.95	Pakistan	(Amir *et al.*, 2019)	135	2.68	India	(Dad, 2019)
32	6.13	India	2	84	6.77	Pakistan	(Amir *et al.*, 2019)	136	4.62	India	(Dad, 2019)
33	9.14	India	2	85	1.27	Pakistan	(Shahzad *et al.*, 2017)	137	5.56	India	(Dad, 2019)
34	3.90	India	3	86	1.85	Pakistan	(Begum *et al.*, 2020)	138	4.32	India	(Dad, 2019)
35	4.58	India	3	87	5.31	Nepal	(Ghimire *et al.*, 2007)	139	4.50	India	(Dad, 2019)
36	4.78	India	3	88	2.07	Nepal	(Ghimire *et al.*, 2007)	140	6.46	India	(Dad, 2019)
37	5.38	India	3	89	3.39	Nepal	(Adhikari *et al.*, 2019)	141	3.57	India	(Dad, 2019)
38	5.84	India	3	90	12.04	Nepal	(Bhatt, 2013)	142	4.11	India	(Dad, 2019)
39	7.43	India	3	91	4.10	Nepal	(Shrestha *et al.*, 2004)	143	2.33	India	(Dad, 2019)
40	8.49	India	3	92	8.20	Nepal	(Shrestha *et al.*, 2004)	144	3.29	India	(Dad, 2019)
41	11.64	India	(Dinakaran *et al.*, 2018)	93	2.10	Nepal	(Shrestha *et al.*, 2004)	145	10.81	India	(Longbottom *et al.*, 2014)
42	4.969	India	(Dinakaran *et al.*, 2018)	94	6.70	Nepal	(Shrestha *et al.*, 2004)	146	4.74	India	(Longbottom *et al.*, 2014)
43	19.78	India	(Dinakaran *et al.*, 2018)	95	3.87	Nepal	(Gami *et al.*, 2009)	147	3.32	India	(Longbottom *et al.*, 2014)
44	19.205	India	(Dinakaran *et al.*, 2018)	96	2.34	Nepal	(Gami *et al.*, 2009)	148	6.51	India	(Longbottom *et al.*, 2014)
45	0.88	India	(Dervash *et al.*, 2018)	97	6.48	Nepal	(Dhakal *et al.*, 2010)	149	2.59	India	(Longbottom *et al.*, 2014)
46	1.38	India	(Dervash *et al.*, 2018)	98	4.11	Nepal	(Dhakal *et al.*, 2010)	150	4.82	India	(Longbottom *et al.*, 2014)
47	1.78	India	(Dervash *et al.*, 2018)	99	3.31	Nepal	(Dhakal *et al.*, 2010)	151	5.12	India	(Longbottom *et al.*, 2014)
48	2.60	India	(Dervash *et al.*, 2018)	100	6.86	Nepal	(Khanal *et al.*, 2010)	152	2.59	India	(Longbottom *et al.*, 2014)
49	2.86	Pakista	(Shah *et al.*, 2015)	101	4.25	Nepal	(Khanal *et al.*, 2010)	153	1.27	India	(Longbottom *et al.*, 2014)
50	3.29	Pakista	(Shah *et al.*, 2015)	102	7.20	Nepal	(Shrestha, 2016)	154	4.19	India	(Yam *et al.*, 2019)
51	3.26	Pakista	(Shah *et al.*, 2015)	103	8.49	Nepal	(Shrestha, 2016)	155	9.40	India	(Meena *et al.*, 2018)
52	3.09	Pakista	(Shah *et al.*, 2015)	104	8.48	Nepal	(Shrestha, 2016)				

("1" means (Chaturvedi and Melkania, 2013); "2" means (Dar and Sundarapandian, 2015); "3" means (Verma and Garkoti, 2019); "4" means (Bhattarai and Mandal, 2018); "5" means (Gupta and Sharma, 2013); "6" means (Thokchom and Yadava, 2016))

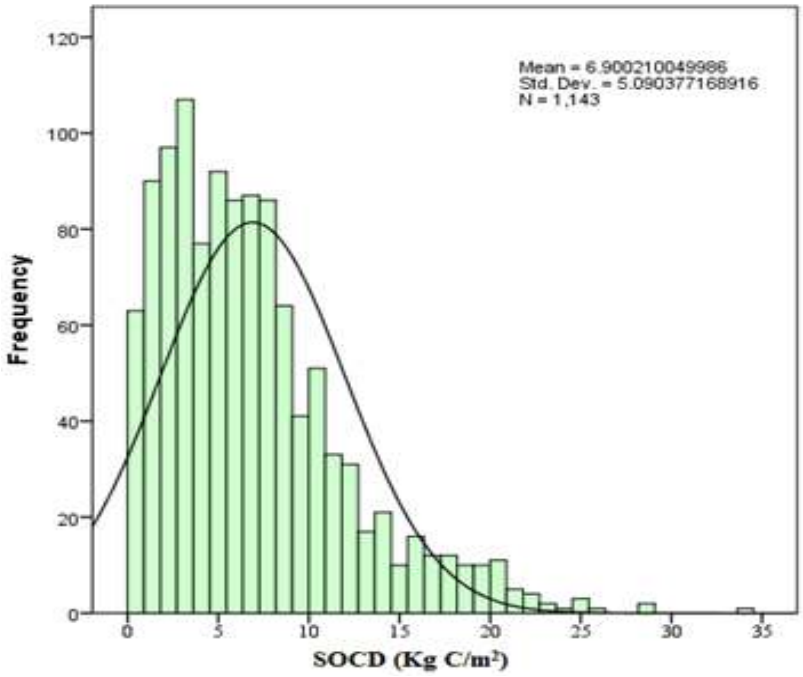

Figure 2: The frequency distribution of SOCD of the top 30 cm layer

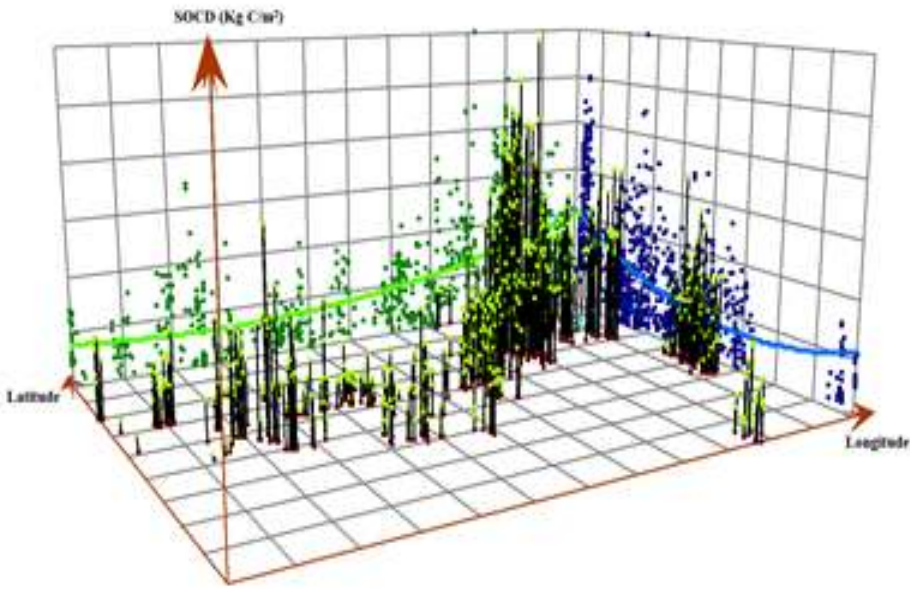

Figure 3: The trend analysis of SOCD of the top 30 cm layer

According to Figure 2, it can be seen that the average SOCD of HKH grassland is 6.90 kg C/m2, and its numerical range is (0, 35). According to the trend analysis (Figure 3), it can be roughly seen that the SOCD gradually increases in the west-east direction, and its value also shows a gradual upward trend in the south-north direction. The higher value area mainly corresponds to the Tibetan Plateau in China. Considering the perennial low temperature, more rainfall and sufficient sunlight, it is more conducive to the accumulation of SOC in Tibetan Plateau's grassland by limited decomposition and more CO2 fixation. Literature showed that the SOCD of grassland across these five countries doesn't have a significant difference (Figure 4).

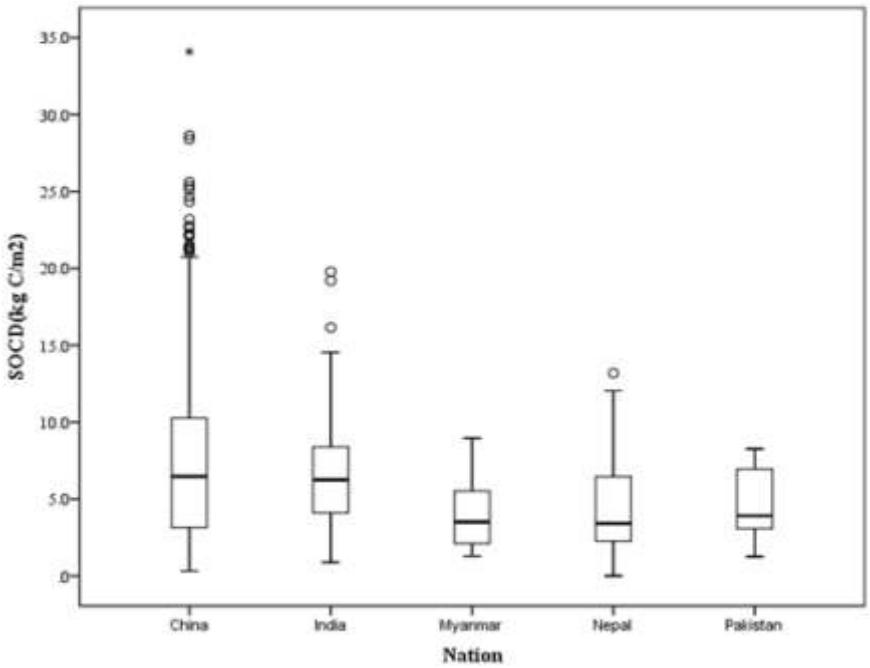

Figure 4: SOCD of the top 30 cm layer in different countries

8.3.1. Attribution of differences in research results

Many studies have been conducted to evaluate SOCD in grassland ecosystems, especially at Tibetan Plateau. Field data are the basis for SOCD estimation. Especially in China researchers have systematically sorted out the distribution and estimation methods of SOCD using the field data. Based on the data of SOCD in 405 profiles collected from 135 sites across the Tibetan Plateau and a satellite-based dataset of enhanced vegetation index (EVI), Yang *et al.* (2008) estimated SOCD in the top 30 cm, which is about 4.99 Pg C, with an average SOCD of 4.42 kg C/m^2. Sampling sites for the study were mainly located in the middle and eastern part of the Tibetan Plateau with well-grown grasslands but the sample size was not enough in the northwest of the Tibetan Plateau which has implications for using the remote sensing model. Although there was a stable correlation between EVI and SOCD.

To solve this problem, Yang *et al.* (2009) re-estimated the SOCD of the top 30 cm layer in alpine steppe and alpine meadow based on the spatial auto-correlation principle and Kriging interpolation technique. After 2010, the research on the spatial distribution of SOCD in the Tibetan plateau has become more extensive and in-depth. Researchers expanded the field samples in the northwest of the Tibetan Plateau and increased the sampling depth to 2 m; even the samples were enriched in the northeastern margin of the Tibetan Plateau. Ma *et al.* (2016) updated the SOC information in the Tibetan plateau's north-south and east-west direction in 2011. In the northeast region of the Tibetan Plateau, Yang *et al.*, (2016) systematically sampled and estimated the SOCD; Liu *et al*., (2018) further supplemented and improved the data in this area. To assess the impact of terrain on SOCD, Zhu *et al.* (2017) sampled at different locations on multiple mountains to deepen the understanding of the mechanism of SOCD distribution. There are numerous Chinese journal/research papers/articles in SOCD apart from English language journals. Ma *et al.* (2016) and Xu *et al*. (2019) compiled the published literature and integrated data to estimate the SOCD of grassland and vegetation in China.

Studies on grassland carbon stocks in India are mainly concentrated in Odisha state and northwest regions. Among them, Rekha *et al.* (2010) measured the bulk density and carbon content of the north western sodic grassland soil from

the surface to 100 cm, where SOCD was between 1.66 to 2.47 kg C m^{-2}. In the grasslands of Uttarakhand, the soil carbon storage and average SOCD is estimated to be 26.77 million tonnes and SOCD is 11.7 kg C/m^2 (Gupta and Sharma, 2013). Different grassland types usually have different SOCD, Thokchom and Yadava (2016) reported the SOCD of Imperata grassland was between 5.5-5.7 kg C/m^2. Dad (2019) conducted a comprehensive measurement of the carbon storage in the mountain grassland soil of north western Kashmir Himalaya up to 50 cm depth. The SOCD ranged between 2.885 and 9.476 kg C/m^2, with mean value of 5.452 kg C/m^2, which was stored as 30.63, 22.98, 21.06, 14.89, and 10.41%, respectively at five depths (0-10; 10-20; 20-30; 30-40 and 40-50 cm). Comparing these studies in northwestern India, SOCD of Uttarakhand grasslands is significantly higher than the other studies. Grassland soil carbon research in Nepal is mainly concentrated in the central and eastern parts. Ghimire *et al*., (2013) measured the soil organic carbon storage of degraded grassland at 0-10 cm as 2.63 kg C/m^2. Limbu *et al*. (2013) measured the soil carbon density at different depth of 0-5, 5-10, and 10-15 cm and found that a more appropriate method for calculating the carbon density for 0-15 cm will be to use each layer samples rather than combining the all three layers samples and aggregating. This study showed that the density of soil organic carbon varies greatly between Jaljale (9.4 kg C/m^2) and Gorujure (4.9 kg C/m^2).

Table 2: SOCD data based on field measurement collected from published papers in Tibetan plateau's grasslands

study region	vegetation Type*	area (10^4 km^2)	depth (cm)	SOCD (kg C/m^2)	Upscale methods	Sampling period	reference
Tibetan plateau	AS	61.08	30	2.54	Empirical linear model by SOCD and NDVI	2001-2004	Yang *et al.*, 2009
	AM	51.74	30	5.48			
	TG	112.82	30	3.89			
Tibetan plateau	AS	72.29	30	3.11	Kriging interpolation	2001-2005	Yang *et al.*, 2010
	AM	53.47	30	8.44			
	TG	125.76	30	5.37			
Tibetan plateau	AS	64	30	2.95	Support vector machine model by SOCD and other factors	2013-2014	Ding *et al.*, 2017
	AM	50.4	30	7.37			
	TG	114.4	30	4.63			
Tibetan plateau	AS	-	30	4.55	-	2011	Chen *et al.*, 2017
	AM	-	30	6.86			
	TG	-	30	5.56			
Tibetan plateau	AM	58.16	30	7.25	Same SOCD in same grassland type	2009-2013	Zhao *et al.*, 2018
	AS	33.15	30	2.85			
	AD	23.38	30	1.27			
	BL	28.12	30	0.74			
	AWM	5.03	30	15.48			
	TG	148	30	-			
Northeast of Tibetan plateau	TG	-	30	5.54	random forest model by SOCD and other factors	2012-2013	Yang *et al.*, 2016
Tibetan plateau	Total	153.8	100	9.221	Kriging/Inverse Distance Weighted interpolation	2003-2014	ma *et al.*, 2016
China	Steppe	138.2	100	6.497	Same SOCD in same grassland type	2003-2014	ma *et al.*, 2016
China	Meadow	119.19	100	11.633	Same SOCD in same grassland type	2003-2014	ma *et al.*, 2016
China	Desert	61.61	100	5.617	Same SOCD in same grassland type	2003-2014	ma *et al.*, 2016

China	Shrub-tussock	34.77	100	7.292	Same SOCD in same grassland type	2003-2014	ma *et al.*, 2016
China	Total	355.05	100	7.96	Combine same SOCD in same grassland type with Kriging	2003-2014	ma *et al.*, 2016
Tibetan plateau frigid arid regions	Total	41.34	20	2.36	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
Tibetan plateau temperate arid regions	Total	37.08	20	2.25	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
Tibetan plateau temperate semi-arid regions	Total	41.86	20	5.03	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
Tibetan plateau subfrigid semi-arid regions	Total	62.80	20	2.14	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
Tibetan plateau subfrigid semi-humid regions	Total	28.51	20	6.20	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
Tibetan plateau temperate humid and semihumid regions	Total	37.71	20	6.36	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
Tibetan plateau	Total	249.3	20	3.78	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018
China	Total	280.44	20	3.63	Same SOCD in same ecosystems in each ecological region	2004-2014	xu *et al.*, 2018

AS means alpine steppe; AM means alpine meadow; TG means total grassland; AD means alpine desert; BL means barren land; AWM means alpine wet meadow; Total means all vegetation type.

In terms of SOC research of grassland in Pakistan, the result from Shah *et al.* (2015) is very representative. Sampling from the Kumrat Dir Kohistan grassland was done where the SOCD of undisturbed grassland, grassland close to farmland, and grassland close to a forest were determined to be 3.269, 2.977, 3.562 kg C/m^2 respectively, revealing the importance of land use for SOC sequestration. Later, Uddin *et al.* (2019) and Begum *et al*. (2020) sampled in the same grassland, found that the SOCD of *Abies pindrow* dominant community was 7.075 kg C/m^2, which was significantly higher than the SOCD determined by Shah *et al.* (2015). Begum *et al.* (2020) also found through actual measurement that forest had significantly higher values of SOC stock (7.05 kg C/m^2) as compared to agriculture (5.5 kg C/m^2) and grassland (5.2 kg C/m^2). To understand the influence of elevation on the distribution of SOCD in Pakistan, Amir *et al.* (2019) measured the mixed forest and grassland areas of Kumrat valley and found that the SOCD in high altitude areas is 6.20 kg C/m^2 whereas in low altitudes it is 7.545 kg C/m^2 which indicates low altitude consists higher SOCD as compared to higher altitudes.

The reason for the difference in SOCD depends largely on the grassland type, grassland depth, altitude, soil type, soil pH, and soil fertility (Wiesmeier *et al*., 2019). However, from the perspective of regional carbon stock estimates, the large differences among these estimates might be due to the following four aspects:

- The sources of data and most regional estimates were ground-based measurements at large spatial scales. Although the national or regional soil survey in HKH' countries provided the most comprehensive soil information, few soil profiles were sampled from core areas of HKH's grasslands, such as the Tibetan Plateau and Himalaya mountain regions. In contrast, Yang *et al*. (2008, 2009), Ding *et al.* (2017), Tang *et al*. (2018) obtained a much larger number of soil profiles across the Tibetan Plateau. Dad *et al*. (2019) and Longbottom *et al.*, (2014) conducted more field surveys and collected more samples in the Himalayan grasslands, potentially resulting in a more accurate estimate. Nevertheless, some uncertainties still exist due to insufficient soil profiles in certain regions, such as the northwestern part of the Tibetan Plateau and Afghanistan (Yang *et al.*, 2008). On the other hand, the original data might get changed to some extent when the data from various pieces of literature are used. For example, different studies have different sampling depth settings, the commonly used ones are "0-10, 10-20, 20-30 cm" and "0-20, 20-40 cm". To convert the SOCD of "20-40" to "20-30 cm", the former is usually divided by 2, which causes an underestimation to a certain extent.

- A lack of data on bulk density, SOC content, and rock fragments may produce different estimates. It is well known that many of soil profiles in HKH do not contain information about bulk density (Wu *et al.*, 2003; Yang *et al*., 2008). Previous studies used average soil bulk density by soil categories or the relationship between bulk density and SOC concentration to estimate bulk density. The different treatment of bulk density data could lead to potential differences in soil C estimates. Recently, Chai *et al.*, (2015) proposed a depth and SOCC model based on big data analysis, which can obtain the vertical distribution of SOCC according to

sampling locations and vegetation types. Alternatively, most estimates used average values of rock fragment as a substitute. However, a few studies did not deduct rock fragments, resulting in larger estimates. According to Wu *et al.* (2003), ignoring rock fragment will overestimate soil C stock by 10%, but in grasslands, a larger error could occur due to the larger proportion of rock fragments in grassland soils.

- Different scaling-up approaches were used in various studies. Previous studies usually calculated SOCS by averaging SOCD by soil categories or grassland types. This approach could be constrained by a limited number of soil profiles and large soil heterogeneity. Accordingly, spatial interpolation or satellite-based approaches have been developed to scale up site-level observations to regional-scale estimates, which could reduce the uncertainty induced by soil heterogeneity (Yang *et al*., 2008) Recently, Ma *et al*., (2016) compared three interpolation methods with other three methods based on grassland classification, found that SOCS calculated by the grassland classification methods (18 grassland types) was closer to the mean value than those calculated by the spatial interpolation methods. The introduction of machine learning methods makes carbon storage estimation more accurate. Currently, commonly used machine learning methods mainly include support vector machines (SVM) and random forests (RF). Combining the measured SOCD, vegetation, meteorology, and soil information from 2013 to 2014, Ding *et al.*, (2017) used SVM to estimate the SOCD distribution of grassland 3 m in the Tibetan Plateau. Geographically weighted regression and regression Kriging and other geostatistical methods have also become important tools for SOC mapping. This method performs Kriging interpolation on the estimated residuals of the model to modify the model and improve the estimation accuracy.

- The grassland area might be inaccurate as the current grassland area is mostly obtained by accumulating grassland pixel data in land cover products. However, complicated terrain might have affected remote sensing images to show different spectral characteristics on shaded and sunny slopes, which will affect the classification of grassland (Sola *et al*., 2016). Simultaneously, this method ignores the relief of the terrain in the pixels, making the calculated grass area smaller than the real grass area. Chen and Arrouays, (2018) analyzed the Harmonized World Soil Database (HWSD) data and found that when the terrain slope in the pixel is less than 20°, the ratio of the true area to the pixel area is within 1.1. Once the slope is greater than 30°, the real area will be significantly larger than the pixel area, resulting in a serious underestimation of SOCS. Besides, the current classification algorithms are mostly based on existing grassland classification standards, and the classification of grassland types is relatively coarse. For example, the optimal classification of grassland by MCD12Q1 data is grassland, savanna, and woody savanna, but the measurement of vegetation carbon density mostly corresponds to the grassland types such as alpine grasslands and alpine meadows. Grassland classification level mismatch will also affect the estimation of carbon storage.

8.3.2. Soil C dynamics during the past several decades

A number of studies reported changes in soil C in Tibetan alpine grasslands. However, both the magnitude and direction of the soil C changes differed among these studies. For example, Zhang *et al*. (2007) simulated soil C dynamics during 1960–2002 using the CENTURY model and found that SOCS in Tibetan alpine grasslands exhibited large fluctuations during that time period but significantly decreased in the recent 20 years. In contrast, based on data from 405 soil profiles from a large-scale field soil survey and ~100 soil profiles derived from the Second National Soil Survey in China, Yang *et al.* (2009) demonstrated that soil C stock in Tibetan alpine grasslands did not change significantly during the past two decades. Across all 41 repeat sites in the alpine grasslands, Chen *et al*. (2017) found SOCD exhibited a significant increase from 2002 to 2011 at an overall rate of 4.66 g C m^{-2} yr^{-1}. Ding *et al.* (2017) assessed decadal changes in soil organic carbon stocks in the uppermost 30 cm of permafrost soils across Tibetan alpine regions, based on repeated soil carbon measurements in the early 2000s and 2010s at the same sites. They observed an overall accumulation of SOC irrespective of vegetation type, with a mean rate of 28.0 g C m^{-2} yr^{-1} across Tibetan permafrost regions and SOC accrual occurred only in the 10-30 cm soil. Recently, Xu *et al*. (2019) collected SOCD information in China from papers published between 2004 and 2014, and found SOCD in Tibetan Plateau showed an increase trend with 17.4 g C m^{-2} yr^{-1} in 0-20 cm and 29.8 g C m^{-2} yr^{-1} in 0-100 cm.

In India, a few studies have been carried out on the SOC distribution in different grassland types but little information is available on SOC dynamics in the grasslands. Pathak and Dagar (2016) found that after 15 years of fencing, the SOC content of the alkali soil at a depth of 0-90 cm increased by an average of 67%. Jangra and Gupta (2015) used the 0-30 cm SOC data sampled by Gupta *et al.* (1990) combined with the SOC data sampled in 2006, to analyze the changes in grassland SOCD. The study found that long-term protection of grassland can significantly increase the grassland soil carbon reserves and SOCD increased by 0.03 kg C m^{-2} yr^{-1}. Longbottom *et al.* (2014) found SOC stocks in the Indian Himalaya are more sensitive to moisture availability than temperature and the average annual SOC accumulation rates between 1.9 g C m^{-2} yr^{-1} and 47.3 g C m^{-2} yr^{-1}. Except for China and India, no literature on the dynamic changes of grassland SOC storage in HKH's other countries could be searched.

8.4 Effects of Environmental Factors on SOC

SOCS in grasslands is closely correlated with environmental factors. For instance, Yang *et al*. (2008) reported that SOCD in Tibetan alpine grasslands was largely determined by precipitation and soil texture. Specifically, SOCD in Tibetan alpine grasslands increased with both precipitation and clay content but decreased with sand content. Temperature played a minor role in shaping soil C density in these grasslands. In total, these environmental factors explained 72.1% of the variations in soil C density. However, by integrating the grassland SOC literature in China, Xu *et al*. (2018) found that climate influenced the spatial patterns of vegetation C and SOCD via different approaches, vegetation C was mainly positively influenced by mean annual

precipitation, whereas SOC was negatively dependent on mean annual temperature.

In addition to precipitation and temperature, Topography is an important factor to influence the distribution of SOC (Wiesmeier *et al.*, 2019). Current researches often use three terrain factors—aspect, slope, and elevation to characterize complex terrain. The aspect of the slope affects the intensity of the incident solar radiation and the duration of sunlight, which in turn affects its ecological processes and creates a microclimate that is different with regional climate conditions (Zhang *et al*., 2015). These microclimate conditions have a certain effect on the vegetation communities and species distribution (Astrom *et al.*, 2008). In the mountains of southwestern China, Pu *et al.*, (2008) found that the carbon storage on the windward slope (east slope) was more than leeward slope (western slope). In general, the sun-aspect can get more solar radiation and generate higher temperature and water loss, which is not conducive to the growth of plants and fixation of SOC. Zhu *et al*. (2017) suggested the transformed aspect should be a good continuous variable in predicting the SOC in the semiarid alpine region. There is a common positive correlation between SOC and elevation (Peng *et al*., 2013). Dad, (2019) also found the same conclusion of an increase in elevation result in increased precipitation and decreased temperature. This will increase vegetation carbon input while inhibiting soil carbon decomposition, which will be beneficial to SOC accumulation (Wiesmeier *et al.*, 2019). A recent study by Zhou *et al.* (2020) found that in Tibetan plateau cold temperate and frigid zone, elevation is negatively correlated with SOCD. It has been speculated that when the elevation exceeds a certain boundary, with the limited plant litter on the ground, the dominant factor of SOC is changed from decomposition rate of organic matter to the input of biomass. Slope affects water flow paths, water accumulation, and discharge and therefore contribute significantly to erosional processes (Wiesmeier *et al.*, 2019). Generally, in areas where vegetation water use is limited, there will be more soil erosion on the slope, which is not conducive to SOC accumulation. However, in areas with sufficient moisture, slopes will reduce disturbance from human and livestock, which is beneficial to SOC accumulation (Li *et al*., 2018).

Soil C dynamics may also be closely related to global environmental change. Effects of climate warming may depend on the tradeoff between its effects on plant growth and microbial decomposition (Davidson and Janssens, 2006). Global warming may accelerate plant growth and thus increase C input into soils (Fang *et al*., 2018). It may also stimulate microbial decomposition and thus increase C release from soils to the atmosphere (Feng *et al*., 2008). However, a quantitative assessment of potential effects of climate warming on SOC dynamics in HKH grasslands is still lacking. Alternatively, human activities such as grazing and fencing may induce SOC changes in grassland ecosystems. A meta-analysis suggested that grazing can lead to a large amount of C loss from soils, while other factors such as fencing can result in an increase in soil C stock (Shi *et al*., 2009). In addition, land use change can lead to significant changes in soil C stock (Piao *et al.*, 2018). However, our understanding of potential effects of land use change on soil C dynamics is still limited.

8.5 Conclusion

Based on a comprehensive review of current literature and field work, this study examined SOC stock and its changes in HKH's grasslands and analyzed the potential effects of natural factors and human activities on SOC dynamics. SOCD ranged from 0 to 35 kg C/m^2 and the mean value is 6.90 kg C/m^2 on the grassland of HKH. This also revealed that the SOCD is roughly increasing from the west to the east and the south to the north of the HKH's grassland.

The differences between the studies are based on: differences in data sources and upscale methods, completeness of measured data information (bulk density, organic carbon content, gravel ratio), grassland classification and accuracy of area. Both spatial and temporal dynamics in soil C stock was largely determined by climate and topography. In the grassland of HKH, the role of terrain is particularly important. It not only affects the judgment of the grasslands of remote sensing image, but also directly affects the area of grassland. In addition, human activities such as grazing and land use changes also have a great impact on grassland carbon storage. This should be considered in the large-scale estimation of HKH grassland carbon storage factors.

Therefore, select basic sampling data with higher quality, select appropriate scale expansion methods, eliminate the topographic effect of remote sensing images to more accurately estimate the grassland area and retrieve remote sensing parameters, consider the underestimated grassland area due to ground tilt, and comprehensively consider climate and topography, grazing, land cover and other factors are the key to accurate modeling and estimation of grassland soil carbon storage in the future. Sustainable management of grasslands in HKH will enhance the carbon sequestration potential besides conserving the biodiversity of endemic species and REDD+ benefits can also be tapped.

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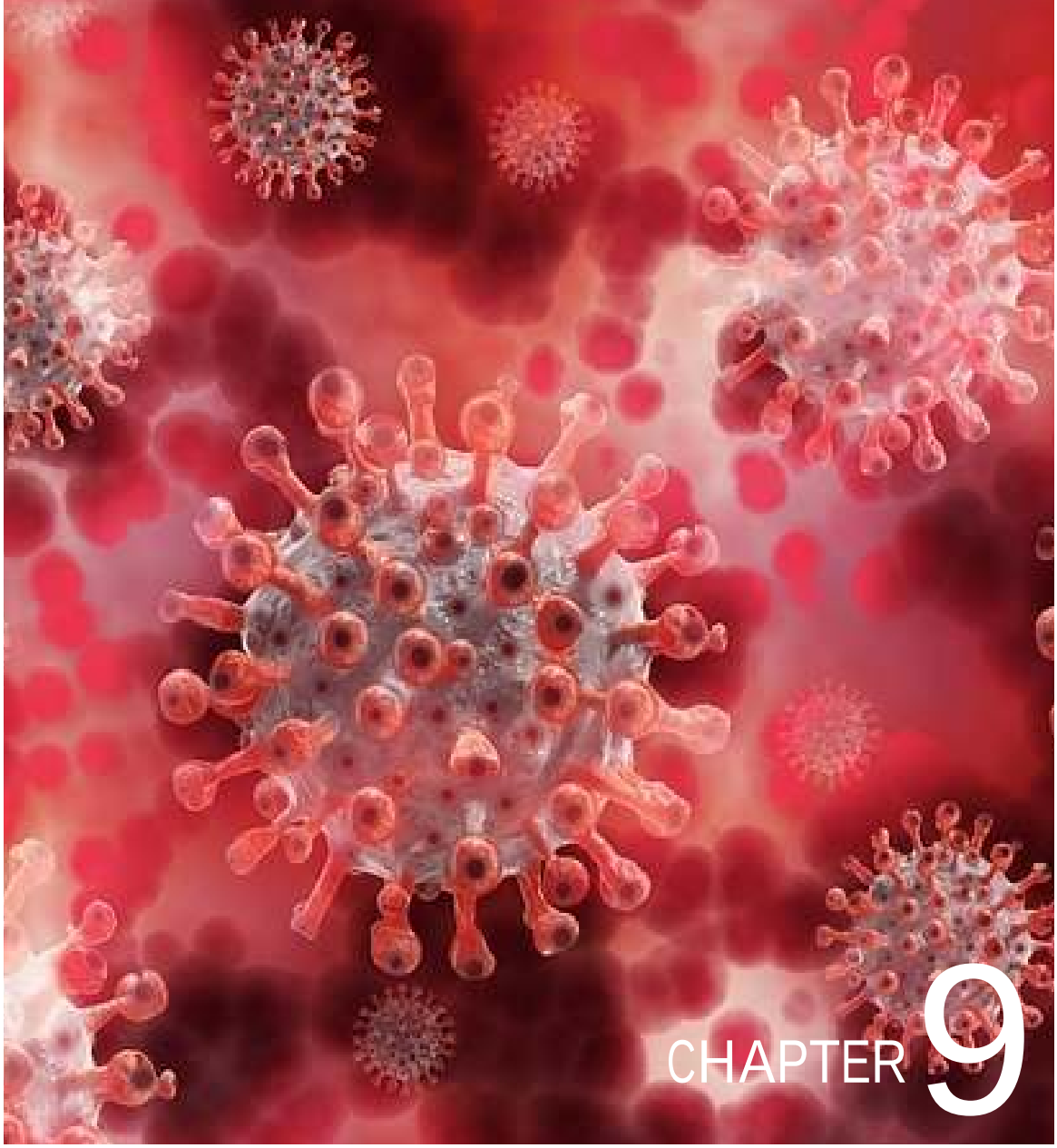

CHAPTER 9

RESPONDING TO PANDEMICS: FROM MEDICAL EMERGENCY, TO ECONOMIC STIMULUS, TO NATURE BASED SOLUTIONS

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9.1 Introduction

The Novel Coronavirus COVID-19 is most likely an example of zoonoses, meaning that it is a disease which was transmitted from animals to humans (UNEP, 2020). Since it emerged in China in late 2019, the virus has gone on to infect over 45 million people by end of October 2020. The pandemic has been unlike any seen in living memory, and has had effects on every country and every industry in the world. In the Hindu Kush Himalayan (HKH) region the disease has infected large swathes of the population and has killed many (Table 1).

Table 1: Effects of COVID-19 in the HKH countries as of end-October 2020

Country	Number of infected person	Number of death
Afghanistan	41334	1533
Bangladesh	406364	5905
Bhutan	348	-
China	91893	4746
India	8137119	121641
Myanmar	51496	1219
Nepal	168235	920
Pakistan	332186	6795

(Source: WHO 2020: Coronavirus Disease COVID-19 Dashboard, https://covid19.who.int/)

These are staggering numbers which will have long term impacts on the economies of HKH countries, a fact made worse when we consider that is not just a problem faced by the HKH countries but by the whole world. When the COVID-19 pandemic started, it was natural for governments to react by declaring a pandemic emergency to fight the crisis. This medical emergency phase started in the last week of March 2020 when governments imposed a lockdown of the entire country and focused on the upgrading of health care infrastructure to prepare for treatment of large volumes of COVID-19 patients. The lockdown cut the transmission rate of the virus and avoided a surge of patients in hospitals. Equally, the lockdown had an impact on the economy as the entire economic activity of the country came to a halt. Economic impacts have been felt on a global scale, as have impacts on ecosystem integrity and human wellbeing been felt worldwide.

While nations were under global lockdown, the governments began to shift their attention from the medical emergency to devising an economic stimulus for their population as businesses, factories, farms, hotels, markets, offices and schools were shut and this caused unprecedented economic losses. The main aim of the economic stimulus was to relieve the economic hardship faced by the entire population from conglomerates to medium and small enterprises, from salaried workers to wage earners.

The rich and the poor alike were disproportionately affected by the economic

shutdown as the poor are dependent on daily wages and have no access to insurance and finance. The stimulus package developed mainly focuses on the formal sector and catering to the informal sector remains a challenge. As the pandemic spreads exponentially in the developing countries marred with fragile healthcare systems and remittance dependent economies, the economic depression that will follow is going to put a huge stress on the natural resource base and also erode numerous achievements of sustainable development goals (SDGs), taking the countries back by a few years. It must also be noted that a lacking commitment to global goals such as the SDGs has also made the world more vulnerable to the current pandemic, and strengthening commitment to these goals should be a priority moving forward. The FAO report forecasts 265 million people globally could face acute shortages of food by the end of 2020, more than doubling from last year.

9.2 Challenges with Economic Stimulus

In a globalized world, no one has seen an economic distress like the one brought about by COVID-19 pandemic, leaving the countries to fend for themselves. Fences have gone up restricting movement of capital, goods and population across borders of the once globalized world. No central banks have a clear idea on how to pull out of this economic tailspin; every country is in uncharted waters. While it was clear that the initial economic priority should be in the mobilisation of the health sector, in order to boost efforts to cope with and eventually eradicate the disease, in the longer term additional measures are required. However, no matter how noble and benevolent the stimulus packages are, as with most novel concepts, there will always be pockets or areas or sectors or populations that the one size fits all policies of aid will fail to reach. In the HKH economy, an overwhelming section of the population is employed in the informal sector. Direct economic aid packages will not reach them. In the context of the pandemic, geographical remoteness, weak governance, broken supply chains and dearth of finance will make the recovery process for the mountain population prolonged. They are prone to destitution already. Economic recovery from the pandemic focuses on debt postponement, agriculture and continued employment in infrastructure development projects. However, there is no targeted programme that directly puts money or food into the hands of the poorest.

Taking Nepal as an example, it is the fifth-most remittance dependent economy in the world, in 2019 it received USD 8.1 billion in remittance while the foreign aid stood at USD 1.62 billion. With oil prices low, migrant labour layoffs in the oil producing countries are unavoidable, leading to lost remittances. With over 4 million labourers outside Nepal, this source of remittance was the lifeline for the country to get over the decade long insurgency, the 2008 global financial crisis and the 2015 earthquake. It also provided the national economy with foreign reserves and liquidity and almost half of the government revenue was based on tax imposed on the import of goods financed by remittance income. With this life line now dwindling, there is a clear need to move beyond immediate economic relief. Developing a plan to absorb the immigrants in the national economy and generate liquidity for the

necessary imports by shifting the focus from remittance dependent economy to agriculture production economy would be a needed paradigm shift. Taking on nature-based solutions is one viable approach for the recovery plan post pandemic.

9.3 Nature Based Solutions for Pandemic Recovery

Nature based solutions are defined by IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits". The importance of Nature Based Solutions and working alongside the environment rather than against, Nature based solutions for climate change for HKH are summarised in the Figure 1.

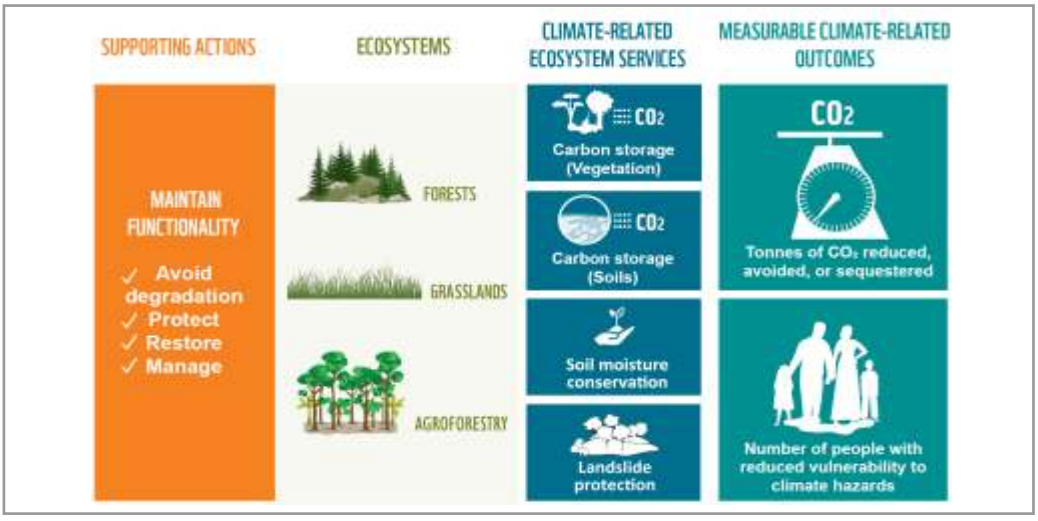

Figure 1: Nature based solution for climate change (adopted from WWF: Martin *et al.*, 2020 and customized for Hindu Kush Himalaya)

In order to harness the dividends of nature based solutions, we have to manage the natural resource base by taking actions that link principles of environmental sustainability with livelihood improvement; and this approach can be taken by governments to design their long term response to the COVID-19 pandemic. In the HKH region, interventions for nature based solutions lie around the agriculture, forestry, energy and tourism sectors as they are the natural resources endowed to the Himalayan watersheds. The pandemic has resulted in sever shocks to the supply side and in the near future, economic growth must be thought of from a new perspective, such as from a nature-based viewpoint. This response to the pandemic is an opportunity for governments to embrace the notion of green economy. Taking on more green policies in regards to the economy should be a priority for governments; the UN Environment Programme noted on May 11 2020 that while there have been noticeable improvements in air quality at the local level, this is in fact misleading. In reality, data shows that CO_2 emission levels are increasing and accelerating. While it was widely assumed that since vehicular and air travel had reduced substantially, this would have positive impacts on the environment, in truth the high consumption of electricity and use of heating systems have resulted in greater consumption of

energy (Peduzzi, 2020). This indicates that a turn to nature-based solutions is necessary not just due to the economic, but also the environmental, shockwaves generated by COVID-19. Barbier (2020) highlights that the world cannot simply return to the old ways which exacerbate climate change and damage biodiversity, and the economies of the HKH, and the world at large, would now do well to incorporate more long term nature based economic solutions. Pursuing nature-based solutions would also contribute to improving progress towards sustainable development goals. Direct impacts will be made in improving life on land, life below water, climate action, responsible consumption and production, zero hunger and sustainable cities and communities. Indirectly the improvements brought to the economy and environment through nature-based solutions will also contribute to other the SDGs such as: no poverty, good health and wellbeing, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, aviation and infrastructure, reduced inequalities, peace justice and institutions and partnerships, leading to overall positive progress for countries in the HKH region.

9.4 Land is the only Resource

Land is the only resource we have and is one of the three factors of production. In a rural landscape, this is not only a source of production and employment but also a form of social security and insurance. How we use land and how we maintain the ecosystem will determine the returns gained from this resource, it can degrade and deplete or it can improve and support sustainable enterprises for many generations. The interaction between agriculture, forest, water and livestock will determine the productivity and sustainability of the land. The vast majority of the redundant labour who were formerly a part of the global labour market and from domestic cities will be absorbed in the agrarian sector. Promoting sustainable land based interventions will go a long way in supporting the unemployed rural population who will also contribute to strengthen the national agriculture production economy and watershed management. Appropriate land use planning at watershed levels can optimize returns from the landscape by bringing underutilized arable and range lands under sustainable production. Nepal, like Bhutan, has the chance to go carbon neutral and fully sustainable and link agricultural and forest production systems while retaining its position as a tourism destination in preparation for the post COVID-19 phase.

9.5 Safe Haven in the Rural Landscape

Global transmission rates and deaths from the COVID-19 pandemic, including lessons from the 1918 Spanish flu have shown that densely populated cities are the epicenters of the pandemic. Migration to urban centers due to employment opportunities is the main driver. This can only be reversed if there are ample land based economic activities in the rural landscape to retain the population in these areas. Though rural landscapes do not provide an appealing lifestyle for the youths, they can provide a safe haven throughout the pandemic, especially for the migrant returnees who can avoid living in densely populated cities while waiting for the labour market to rebound. This strategy not only provides self-employment in the farms but also ensures food security when markets are not functioning for rural and marginalized communities.

9.6 Strengthening Mountain Agriculture Production

The pandemic has renewed government focus on strengthening domestic food production systems. Therefore, it is imperative that all solutions to food production and nutrition as a part of health care and subsequent immune system responses to the virus in a healthy population are considered and taken.

This calls for agriculture development programmes to be increased and broadened in scope, with a clear focus on land use options for food production and employment for the landless. This is imperative given that poverty must be alleviated in order to bring about improvements in the health of the population, but this must be approached in a sustainable manner. Some methods which can be adopted include: subsidised irrigation to improve water and sanitation services, promoting mountain agriculture products and strengthening their value chain (Barbier, 2020). Promoting agro-biodiversity including traditional crops is also a form of long term resilience building of the farming sector against unforeseen shocks in the future. This could be shared work for food programmes on government land together with support from the agricultural extension system and food warehousing and storage options. Furthermore organic agriculture solutions are still highly dependent on labour inputs and many farms with a full nutrient cycle demand skilled and educated managers and returning migrants could fill this gap.

9.7 Forest and Landscape Restoration

Rural households were mainly dependent on remittances, with labour markets shrinking, more than half the remittance will cease. The rural households that were already adopting a consumerism lifestyle will now renew their dependency on natural resource base. With larger populations of returnees, the pressure on forests will increase. Fuelwood dependency will increase and so will reliance on the timber economy. Forest encroachment, forest fires for livestock grazing and demand for timber will put pressure on the sustainability balance. Forest restoration needs to be a continuous long term priority of the government so that a short term pandemic coping strategy does not turn into a long term and permanent forest loss and ecological imbalance. Maintaining forest and landscape restoration is also about planning resilience against future shocks, be it economic, climatic or another pandemic. Maintaining forest cover in the slopes checks soil erosion, maintains soil nutrients and enhances farm productivity. Therefore, local communities and governments must collaborate and invest in forestry and landscape restoration with a view to long term sustainability of the entire ecology of the landscape and settlements. Global programmes such as REDD+ can be instrumental in leveraging climate finance for maintaining forest cover and for forest restoration. Low and middle income countries need to find ways of reducing land use change and move towards increased investment in natural climate solutions and less reliance on larger countries who are struggling themselves. The restoration of the forests will also lead to an improvement in the habitat condition of wildlife so that wildlife is contained within the forests resulting in reduced damage to agriculture crops

in the countries that adopt such policies. It has been suggested that even though COVID-19 likely circulated from wildlife to humans, in many instances protecting wildlife diversity can reduce the risk of infectious disease due to the dilution effect. The reduction of wildlife diversity can lead to a monoculture of animals which increases the likelihood of these animals becoming disease transmitters, meaning that in reducing the likelihood of such events happening in the future, there is a clear role for forest and landscape restoration and wildlife conservation (Bett, 2020). Maintaining healthy forest is vital for keeping wildlife in forests and contributes to limiting the transmission of zoonotic diseases.

9.8 Human Capital back in Villages

One of the major bottlenecks in the development of mountain agriculture was the lack of human resources. This has changed in the post pandemic situation and until the global economy recovers and international labour markets reopen. Abundant labour in the rural landscape can make farming profitable again. The returnee migrants have many skills and competencies that are essential for the overall development of the villages. They can be utilized to construct village infrastructure such as drinking water and irrigation, electrification and contribute to enriching the already existing community institutions. Provincial and local level public spending should go into village development projects that revive the local economy by seizing opportunities for implementing community development initiatives with local human resources.

The responses at the local level also tests leadership capability and require clear roles and responsibilities between different administrative tiers that need to avoid overlaps in responsibility and duplication in efforts. The local leadership should use this human capital to revive local economies and make a leap forwards on the path to a green economy as the migrants will be returning with some skills and capital.

9.9 Seed Sovereignty

In a span of four months, crops and vegetables can be grown to meet the basic needs of rural households. In a remittance dominant economy, farming was conducted with imported seeds through traders in cities. Many countries are imposing a ban on food exports, the mountain communities will face challenging times to meet their food and nutrition requirements. To meet sovereignty in food production and nutrition security, seed production is a precondition. Mountain agriculture in the post pandemic era must focus on developing seeds to build resilience to economic shocks and or other climatic shocks or new pandemics in the future. The rural farming communities already possess rich traditional knowledge in breeding and exchanging open sources seeds for livestock and agriculture and this must be supported and further upscaled. This should be a major impetus for nature based solutions as a long term recovery strategy and should be supported by public private partnerships.

9.10 Tented Tourism

In 2019 tourism contributed to 10.4% of global GDP, however tourism is the most sensitive sector to global perturbations and consequently it is the hardest hit sector throughout the Himalaya. In 2018 wildlife tourism alone contributed USD 120.1 billion to the world economy, but now with the COVID-19 crisis tourists worldwide have stopped travelling (Robinson, 2020). The World Trade Organisation (UNWTO) map (Figure 2) shows how international tourist arrival has dropped worldwide, with a 31% drop in Asia when compared to the same period in 2019. Most of the redundant workforces during the COVID-19 pandemic are from the tourism sector given that tourism was a major contributor to the GDP.

(*Source:* UNWTO, 2020)

Figure 2: UNWTO Map showing fall in international tourists travelling

Tourism is a major source of income for many and so there should be efforts made to strengthen this sector as quickly, safely and sustainably as possible in the post COVID-19 world. While it will take much longer for this sector to return to business as usual, adventure tourism should focus on less crowded and high value tourism. Exploring tented camps and taking less crowded pathways could help sustain Himalayan tourism through the period of pandemic and global economic depression. Rural communities can play a role in developing campsites alongside their villages or in community forests or river sides; this can bring a trickle down effect of the tourism revenue. Contribution of tourism to the economies of HKH countries is given in Table 1.

The core of village tourism is the beauty and serenity of rural life as opposed to the hardships and unhealthy living in cities. In light of this, a tourism system which benefits human welfare and wildlife must be considered. In order to ensure that biodiversity is conserved alongside

growing tourism, locals must invest in sustainable land use which can also lead to economic repair. The idea of sustainable living in harmony with nature and culture will be instilled in a larger population and increase their willingness to stay in villages. This kind of celebration and marketing of tourism to the middle class, and in the long term to foreign tourists again, can be promoted strongly keeping in mind that the tourism sector will bounce back after a year or so. As UNWTO predicts, domestic tourism is likely to pick up again in the final quarter of 2020 and in the first quarter of 2021, with estimates on international tourism being a bit more conservative (UNWTO,

Table 2: Contribution of tourism to economies of HKH Countries

Country	Tourism contribution to national economy	Source
China	6.63 trillion Yuan/ 0.95 trillion USD	CTGN, 2020
India	16 trillion Indian Rupees	FE Online, 2019
Pakistan	793 billion Pakistani Rupees	Ali *et al.*, 2019
Afghanistan	50 million USD	CEIC, 2018
Nepal	240 billion Nepali Rupees	Prasain, 2019
Myanmar	4.9 billion USD	Thomas, 2019
Bhutan	79.8 million USD	Pek-Dorji, 2018
Bangladesh	97.05 million USD	Rahman and Chakman, 2018

9.11 Cooking with Induction Stove

The COVID-19 pandemic has brought with it an economic recession that is likely going to turn into a depression. With remittance and tourism ceasing, the trade deficit is only going to increase; this will bring a long term economic constraint for the macro-economy. The rapid development of the hydropower sector is a harbinger of change. If carbon revenue can be utilized to leverage finance for the widespread promotion of induction cook stoves across the rural landscape, fuel wood will be saved, while the foreign reserve exchange saved from LPG imports could lead to far more long term economic gains for the country.

Another aspect is easing life in villages, making it more comfortable for locals and visitors. The technologies needed for rural living can be provided by electricity and widespread rural electrification can be used to further beautify hard but healthy lifestyles.

9.12 Conclusion

As the pandemic brings about global economic depression, communities in the Hindu Kush Himalayan region will have to fend for themselves searching for local solutions to this global problem. Relying on nature based solutions by exploiting human capital and natural capital can be one strategy forward. This strategy makes local economies resilient to future shocks, strengthens domestic production and balances the marco-economy and leads the country towards a green economy trajectory.

Migrant returnees are going to add pressure to the already fragile mountain landscape and its production systems need to be viewed as essential human capital. Extra effort is going to be required to develop long term and sustainable actions for managing natural resource base for producing dividends in the form of employment, food security and energy security for riding out the global depression. This is possible only with strong commitments through public finance and private sector investment, because now the pandemic has brought back the required human capital while the abundant natural resources base of the Himalaya has always been there. In order for this pathway to be socially inclusive, carbon free and sustainable, appropriate monitoring indictors and tools based on accountability and good governance need to be developed to keep the nature based solutions on track.

These points call for a rapid extension of services to rural areas with increased human resources posted and paid to work there. Keeping track of the well-being of returnees, the villages they return to and the land resources they rely on is also essential. Implementation of REDD+ activities in the HKH will provide a nature based solution for COVID-19 like pandemic in the future.

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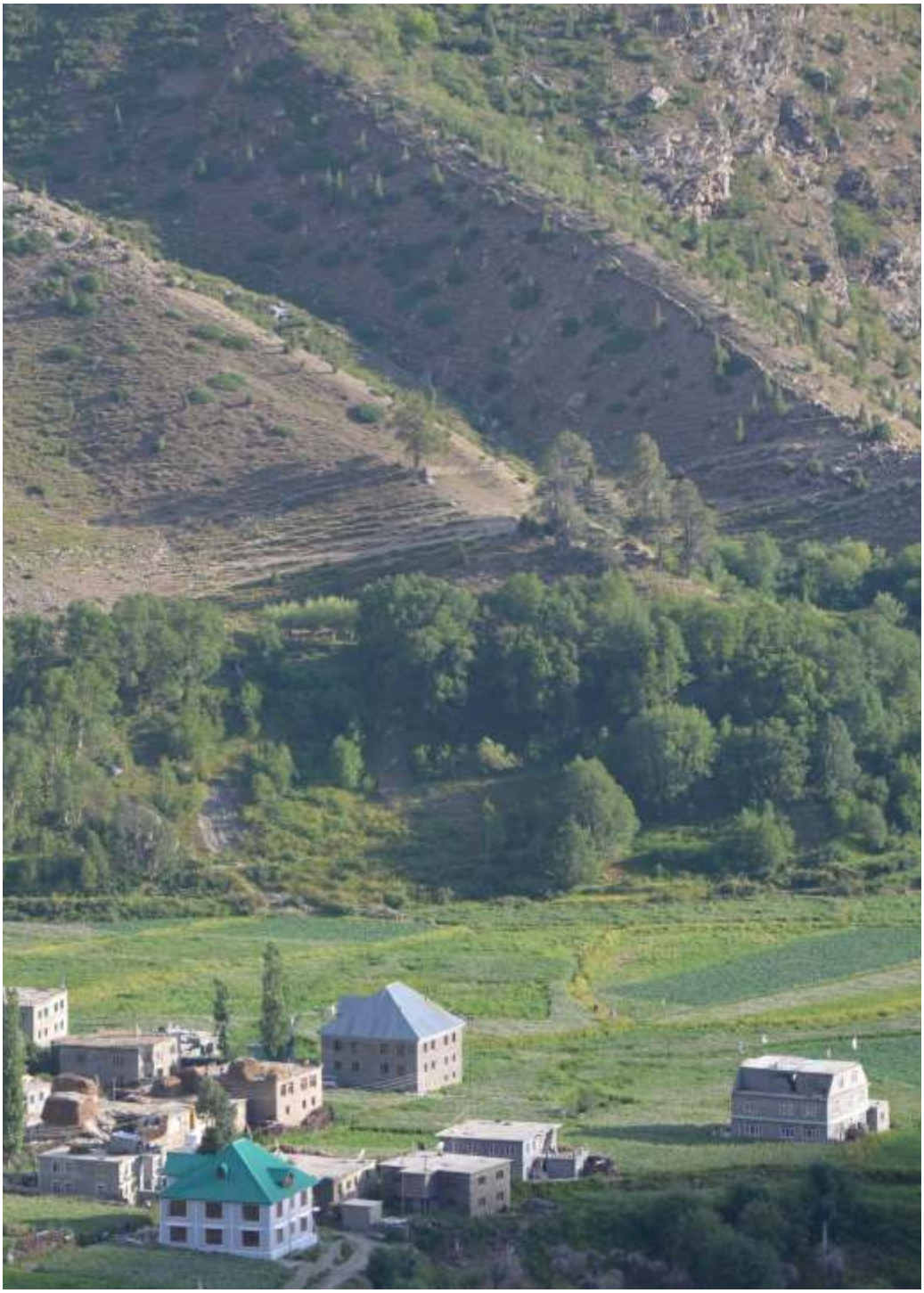

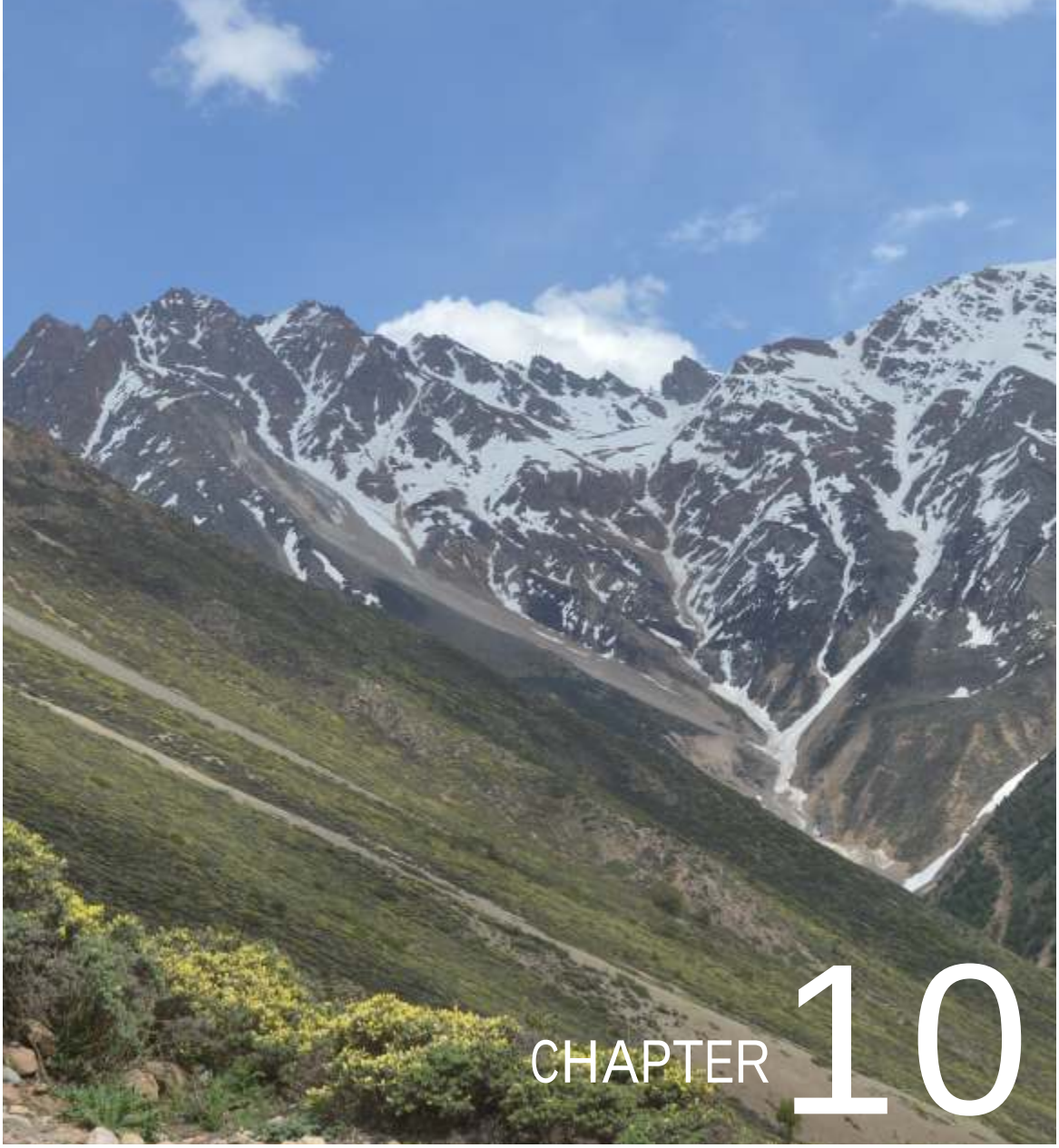

CHAPTER 10

MOBILIZING FINANCE FOR REDD+ IN HINDU KUSH HIMALAYA

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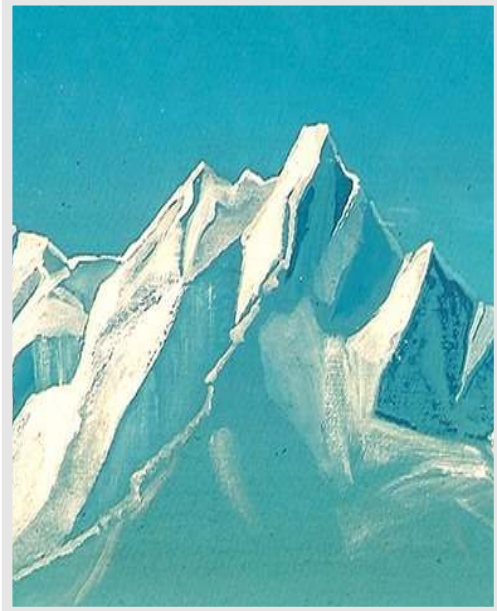


10.1 Introduction

Role of forests has now been increasingly recognised as an option to achieve the climate change mitigation and adaptation objectives. Forest sector is important in the context of climate change due to four reasons namely: i) deforestation and land degradation currently contributing to about 9-11% of global CO_2 emissions, ii) forest sector provides a large opportunity to mitigate climate change, iii) restoring healthy forest ecosystems lead to ecosystem-based adaptation and iv) forests are projected to be adversely impacted by climate change, affecting biodiversity, biomass growth and forest regeneration. Terrestrial vegetated ecosystems are recognised by the UNFCCC through its various decisions, protocols and agreements. General obligations stated in Article 4 paragraph 1(d) of the UNFCCC requires all Parties to promote sustainable development, and promote and cooperate in the conservation and enhancement, as appropriate of sinks and reservoir of all greenhouse gases including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems. Article 5.1 of the Paris Agreement also recognises that Parties (to the Convention) should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1(d), of the Convention, including forests (UNFCCC, 2016). The Paris Agreement also encourages Parties to implement and support the existing framework of guidance and decisions that has been elaborated on REDD+ under the Convention.

The HKH region is one of the most vulnerable regions from climate change, the need to stabilize global climate is the most urgent challenge in coming decades. The poor mountain populations and the ecosystem suffer disproportionally from the adverse impacts of climate change. Under the Paris Agreement, it is accepted that the contribution of countries to climate change, and their capacity to prevent and cope with its consequences, greatly differ. The UNFCCC and the Paris Agreement has committed financial assistance from Parties with more resources to those less endowed and more vulnerable. Developed country Parties (Annex II Parties) shall provide financial resources to assist developing country Parties in implementing the Convention. To facilitate this, the Convention established a financial mechanism to provide funds to developing country Parties.

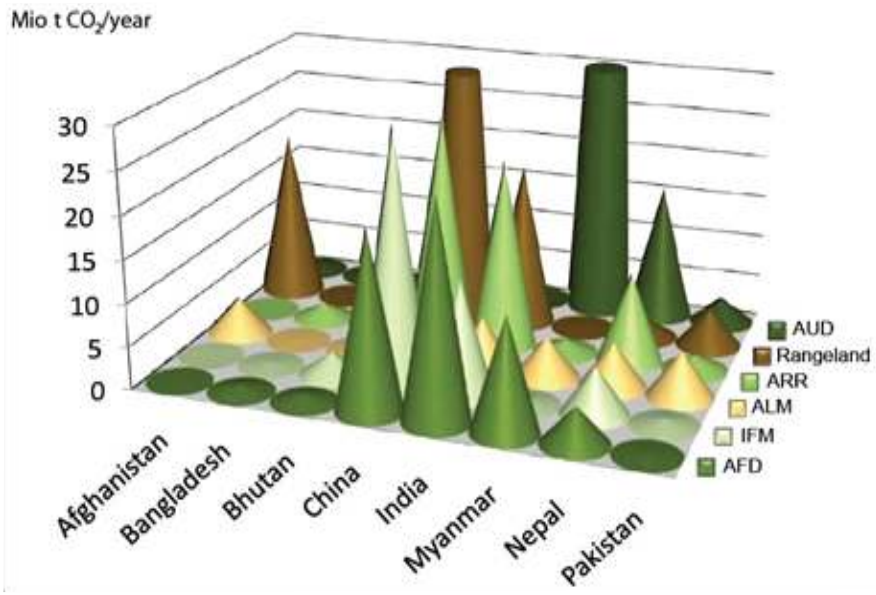
Article 9 of the Paris Agreement stipulates that developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under

the Convention. Other Parties are encouraged to provide or continue to provide such support voluntarily.

Furthermore, as part of a global effort, developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, noting the significant role of public funds, through a variety of actions, including supporting country-driven strategies, and taking into account the needs and priorities of developing country Parties. Such mobilization of climate finance should represent a progression beyond previous efforts.

10.2 Carbon Potentials in HKH

The HKH region is a mosaic of different land use and therefore various different carbon mitigating activities can be undertaken in the form of different projects. Carbon finance projects under the Paris Agreement offer the possibility to mitigate climate change while at the same time address social and economic challenges, strengthen sustainable mountain development and enhance ecosystem services. The HKH region has the potential to generate carbon credits by undertaking different land based activities as shown in figure1.



ARR = afforestation, reforestation, revegetation; Rangeland = rangeland management; ALM = agricultural land management; IFM = improved forest management; AUD = avoided unplanned deforestation; AFD = avoided forest degradation

Source: ICIMOD, 2009

Figure 1: Annual carbon mitigation potentials in the HKH region

10.3 REDD+ as a Global Climate Finance Instrument

The inclusion of forests for rewarding financial incentives were discussed during negotiations leading to the Clean Development Mechanism (CDM) under the Kyoto Protocol of UNFCCC and only two forestry activities i.e., afforestation and reforestation were agreed for inclusion. Natural forests (avoided deforestation/ forest conservation projects) were not considered for rewarding financial incentives due to concerns of permanence, additionality and leakage; for these reason REDD+ mechanism soon followed CDM to recognize emission reduced from deforestation, forest degradation, role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries. The recognitions of REDD+ actions by the Paris Agreement will have great potential to impact future forest carbon finance.

Through the Kyoto Protocol of UNFCCC developed countries pledged to reduce their emissions. Developing countries could trade offsets approved by the Clean Development Mechanism of UNFCCC. One key difference that sets the Paris Agreement apart from previous climate change commitments is that all countries (Annex I and non-Annex) have committed to reduce GHG emissions. Now governments of all the Paris Agreement ratifying countries have submitted climate change mitigation actions in the form of their Nationally Determined Contributions.

Currently, nearly all payments for public REDD+ programmes come from other governments. But agencies with public funds are increasingly looking to engage the private sector either as a potential buyer of REDD+ offsets or to provide technical assistance with the development of jurisdictional or national programmes. Both the World Bank's Forest Carbon Partnership Facility (FCPF) Carbon Fund and BioCarbon Fund's Initiative for sustainable forest landscapes have explicitly written about their desire to increase private sector support for REDD+ programmes (Hamrick and Gallant, 2017).

REDD+ remains a critical instrument under the UNFCCC that provides financial incentive to the developing countries for unlocking their potential in mitigating GHG by intervention in the forestry sector and at the same time providing adaptation co-benefits. All the Hindu Kush Himalayan countries are taking serious steps to engage in REDD+ programmes where a large population is dependent on forest resources, but their capacity to meet various standards for participation is constrained. Many HKH countries do not have capacity to address international standards required for obtaining REDD+ financial support. The HKH countries need to build the capacity of the REDD+ focal points in their countries to develop and implement National REDD+ Strategy based on their national circumstances. Financial support for developing and implementing REDD+ projects, focusing on trainings, technology sharing and knowledge dissemination are needed to unlock the complex issue of related to REDD+. Pilot REDD+ projects established in each country will give better opportunity to share experience for each other.

10.4 Overview of Forestry Carbon Market and REDD+ Financial Mechanism

With Kyoto Protocol coming in force, a new tradable commodity was created in the form of greenhouse gas emission reductions or removals. Since carbon dioxide is the principal greenhouse gas, people speak simply of trading in carbon or carbon dioxide equivalent. Carbon markets exist both under compliance schemes as well as voluntary programmes. Compliance markets are created and regulated by mandatory national, regional or international carbon reduction regimes such as market mechanism developed under Kyoto Protocol of UNFCCC. The voluntary market has also become very important for forestry projects. Voluntary carbon credits *i.e.* verified emission reduction are mainly purchased by the private sector. Corporate Social Responsibility and public relations are the most common motivations for buying carbon credits. Other reasons are considerations such as certification, reputation and environmental and social benefits. Some companies offer clients to neutralize their carbon. The private sector can either purchase carbon credits directly from projects. Agriculture, Forestry and Other Land Use projects are usually valued highly for their social and environmental benefits, as they deal with people's livelihoods and the protection of important ecosystems.

10.5 Sources of Finance for Various Phases of REDD+

Since 2008 when REDD+ was agreed as climate mitigation action under Bali Action Plan (UNFCCC, 2008), over USD 5 billion has been pledged to multilateral climate funds that support efforts to reduce emissions from deforestation and degradation plus conservation (REDD+). There is and remains a longstanding interest in the potential to harness market-based mechanisms to support REDD+ programmes. Cumulatively, USD 2.4 billion has been approved for dedicated REDD+ activities since 2008. The Amazon Fund with USD 720 million approved for 103 projects in Brazil and the Amazon biome remains the largest dedicated REDD+ fund[9]. Various multilateral REDD+ funds supporting REDD+ actions are given in Table 1.

In accordance with the Cancun Agreements (UNFCCC, 2011), in order to obtain and receive results-based finance for results from the implementation of REDD+ activities, developing country Parties should have the following elements in place:

- A national strategy or action plan
- An assessed forest reference emission level and/or forest reference level
- A national forest monitoring system
- A system for providing information on how the safeguards are being addressed and respected

Cancun Agreements on REDD+ further decided that REED+ activities undertaken by Parties should be implemented in three phases: (i) Phase 1 is the development of national strategies or action plans, policies and measures, and capacity-building; (ii) Phase 2 is the implementation of national policies and measures and national strategies or action plans

[9] *https://climatefundsupdate.org/publications/publanguage/english/pubtheme/redd/*

Table 1: Various multilateral REDD+ funds supporting REDD+ actions (as on February 2019)

Fund	Fund focus	Pledge (USD million)	Deposit (USD million)	Disbursement (USD million)
Amazon Fund	Mitigation - REDD	1748.37	1217.95	437.40
Bio Carbon Fund	Mitigation - REDD	351.93	190.64	-
Congo Basin Forest Fund	Mitigation - REDD	186.02	164.65	62.55
Forest Carbon Partnership Facility - Carbon Fund	Mitigation - REDD	889.51	538.33	-
Forest Carbon Partnership Facility Readiness Fund	Mitigation - REDD	430.03	416.51	447.13
Forest Investment Program	Mitigation - REDD	735.74	735.74	168.07
UN-REDD	Mitigation - REDD	319.55	308.46	289.48

Source: https://climatefundsupdate.org/the-funds/

and results-based demonstration activities; and (iii) Phase 3 is the evolvement into results-based actions that should be fully measured, reported and verified (UNFCCC, 2011). Various financial instruments (Multilateral, bilateral, Public, Private) are now available for implementing different phases of REDD+. And the results-based actions should also be fully measured, reported and verified (MRV).

10.5.1. Financing Phase I of REDD+

Most of the funds received so far by REDD+ countries have been allocated for (i) strengthening the institutional capacity of REDD+ countries to more effectively and sustainably manage their forests by developing national REDD+ strategies or action plans and aligning policies and laws to reduce deforestation and forest degradation; (ii) developing FRLs/FRELs, National Forest Monitoring Systems, and implementing safeguards-related processes. UN-REDD, together with two trust funds managed by the World Bank- the Forest Investment Program (FIP) and the Forest Carbon Partnership Facility (FCPF) Readiness Fund—are the three largest multilateral forest and climate funds for Phase 1 of REDD+ (Table 2). Among the bilateral arrangements between donor countries and REDD+ countries the United States, Norway, Germany and United Kingdom have been supporting for Phase 1 of REDD+. Besides these, few Phase 1 support has also been provided by private sector and private foundations. Many REDD+ country governments are using their own resources to support REDD+, including budgetary allocations to support general operations of REDD+ related government agencies. For example, India has developed its National REDD+ Strategy, FRL through domestic resources and it is also developing national Forest Monitoring System (NFMS) and Safeguard Information System (SIS) through domestic funding.

Table 2: FCPF Readiness Fund Grant disbursements through the World Bank and other delivery partners, FY10–FY20 (USD in Thousands) for HKH countries

World Bank by Region/Country	Allocation	% Disbursed	Signed Grant	Total Disbursed
Bhutan	8,600	86%	8,600	7,380
Nepal	8,233	74%	8,233	6,095
Pakistan	7,814	43%	7,814	3,336

Source: Forest Carbon facility 2020 Annual Report. Available at: https://www.forestcarbonpartnership.org/system/files/documents/FCPF%202020%20Annual%20Report_Web.pdf

10.5.2 Finance for Phase 2: Implementation

Phase 2 of REDD+ is generally referred to as the "Implementation" phase. Support for this phase includes funding for activities that contribute to emission reductions from deforestation and forest degradation through implementing national policies, measures, strategies and activities. It also includes demonstration or piloting activities included in national REDD+ strategies

Up to now, a limited amount of funding has been committed or disbursed for Phase 2, when compared to REDD+ finance dedicated to Phase 1 and Phase 3 (Lee and Pistorius, 2015). Increased funding for implementation, however, is most likely necessary to generate anticipated results. The Global Environment Facility (GEF), the Green Climate Fund (GCF), and the Forest Investment Programme (FIP) are among the multilateral sources of funding providing support for Phase 2 activities.

UN-REDD Programme recognizing that a number of UN-REDD's 64 partner countries are advanced in REDD+ readiness and are requesting further technical support to move into the Implementation Phase, UN-REDD has also started focusing on implementation support. In addition to providing support for REDD+ readiness, bilateral government arrangements between donor and developing countries also provide

FCPF Carbon Fund
Country Programme NEPAL

Programme name: People and Forests: A Sustainable Forest Management-Based Emission Reduction Program in the Terai Arc Landscape

Programme location: Twelve districts of Nepal's Terai Arc Landscape

Programme area: 2.2 million ha

Programme ER LOI volume: 14 $MtCO_2eq$

Status: Discussing commercial terms of ERPA with the World Bank

Nepal Building on almost two decades of Nepal's successful Terai Arc Landscape Program, the country's ER program will deliver forest conservation results and emission reductions at scale by addressing the pressures and threats to forests across the programme area. The programmes interventions include improving management practices in existing community based forest groups, transferring national forest management to community-based forest groups, improving integrated land use, and strengthening capacity for protected area management.

Source: Forest Carbon Partnership Facility, 2020 Annual Report

funding (Table 3) for REDD+ implementation (EU-REDD Facility, n.d.). The European Union, Germany, Japan, Norway, the UK, and the US are among the largest contributors for supporting phase 2 of REDD+ implementation. Forest Plus was one such bilateral programme for REDD+ implementation in India supported by The United States through USAID. Forest-Plus programme aimed at accelerating India's transition to a low-carbon economy by taking the United Nations collaborative programme on REDD+ actions to scale began in 2012.

10.5.3. Finance for Phase 3 of REDD+ *i.e.* Results Based Finance

Under the Warsaw Framework for REDD+, REDD+ results are achieved through the implementation of REDD+ activities, which are measured against FRELs/FRLs and expressed in tonnes of carbon dioxide equivalent per year (t CO_2 eq). The measuring, reporting and verification (MRV) for REDD+ activities is a two-step process: first, there is a technical assessment of the proposed forest reference emission level and/or forest reference level (FREL/FRL). Second, the actual results compared to the assessed FREL/FRL are submitted by the developing country Party seeking to obtain and receive payments for results-based actions, and these results undergo a separate technical analysis (UNFCCC, 2014).

The Results-based Finance i.e., Phase 3, therefore, entails the full implementation of REDD+ activities for the purposes of receiving payments for verified net emission reductions achieved in accordance with the Warsaw Framework for REDD+ (Graham, 2016). Disbursements of results based finance have been limited, as most REDD+ countries are still in the process of establishing required systems and policies for REDD+ implementation and are yet to generate quantified results. In this context, the COP 17 of the UNFCCC affirmed that the progression of developing country Parties towards results-based actions occurs in the context of the provision of adequate and predictable support for all phases of REDD+ implementation. The COP 17 of UNFCCC also reaffirmed that results-based finance provided to developing country Parties for the full implementation of REDD+ may come from a variety of sources, public and private, bilateral and multilateral, including alternative sources (UNFCCC, 2012).

Table 3: REDD+ Support from UN REDD to the partner countries in HKH region

UN-REDD Partner country	Amount Approved USD	Actions	UN Agency Providing Support
Bhutan	103,250	MRV and Monitoring Governance Safeguards and Multiple Benefits	FAO UNDP UNEP
India	-	-	-
Myanmar	128,000	Governance	FAO, UNDP
Pakistan	107,000	MRV and Monitoring	FAO
Nepal	85,000	Governance	UNDP

Source: www.un-redd.org

10.6 Financial Support for Various REDD+ Activities in the HKH

While India is mostly banking on domestic finance for Phase I and Phase 2 activities of REDD+, countries like Bhutan, Myanmar and Nepal have been main beneficiary of multilateral financial support for REDD+. None of the HKH countries has so far approached for result based finance (Phase 3)

Bhutan started REDD+ programme in 2010 with support from the UN-REDD Programme. REDD+ Readiness Preparation Proposal (R-PP) for Bhutan was approved by FCPF in 2013. This support from UN-REDD and FCPF helped Bhutan in developing the following key elements of REDD+:

- National REDD+ Strategy
- National Forest Reference Emission Level/Forest Reference Level
- National Forest Monitoring System
- National REDD+ Safeguards Frameworks

The national REDD+ programme of Myanmar is also supported by UN-REDD Programme. The UN-REDD programme is supporting preparation of National REDD+ Strategy, National Forest Monitoring System and Safeguards Information System.

Nepal received financial support from the World Bank Forest Carbon Partnership Facility (WB-FCPF) for Phase I and Phase II activities of REDD+ since 2011. Through this support Nepal carried out consultation, awareness, capacity building, training and outreach activities at national, regional and districts level which led to drafting REDD+ Strategy for the country. In 2017, FCPF provided additional grant to execute Phase 2 related additional readiness preparation activities, which consists of: (a) Readiness coordination and consultation, (b) National REDD+ Strategy preparation, (c) Reference scenario formulation and national forest monitoring, and (d) Project management. In addition, Intergovernmental organizations such as UNDP, FAO, UNEP (UN-REDD Programme) and ICIMOD; development partners such as DFID, USAID, SDC, NORAD, GIZ, JICA and Finland; INGOs such as WWF Nepal have also supported Nepal's REDD+ process by supporting to implement various readiness activities.

UN-REDD Programme provided initial targeted support to Pakistan to the preparation of the R-PP in 2013. Follow up support has assisted Pakistan with the development of a national Forest Monitoring System (NFMS) Action Plan and capacity development activities.

REDD+ Himalaya Programme

German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) funded the regional programme "REDD+ Himalaya: Developing and using experiences in implementing REDD+ in the Himalaya". The programme is jointly implemented by ICIMOD and GIZ in partnership with REDD+ focal points in four Hindu Kush Himalayan countries namely Bhutan, India, Myanmar and Nepal. The project aims to prepare these countries for results-based REDD+ approaches. One priority area is supporting the national REDD+ focal points to continue developing national REDD+ strategies. This is being combined with piloting REDD+ in conjunction with local forest users and indigenous groups. Cooperative agreements are being established with actors involved in the voluntary carbon market as well as other donors to fund compensation payments. The results are

translated at national level into policy recommendations and fed into international negotiations in cooperation with the participating national REDD+ focal points and are also used to raise awareness.

Among multilateral finance, Green Climate Fund (GCF) is part of the financial mechanisms of the UNFCCC. The GCF funds climate change mitigation and adaptation in developing countries, with an emphasis on result based finance (Goldstein and Franziska, 2016). Although the GCF has established a results framework to track and incentivize investments in REDD+ consistent with the Warsaw Framework for REDD+, the financial mechanism has approved 4 result-based payments for phase 3 of REDD+. The FCPF Carbon Fund was developed to build upon countries' readiness achievements under the FCPF Readiness Fund, by rewarding countries through performance-based payments for emission reductions achieved through forest conservation. BioCarbon Fund Initiative for sustainable forest landscapes aims to incentivize emission reductions from the land sector—including those resulting from avoided deforestation and forest degradation, and sustainable agricultural practices and other land use policies. (BioCarbon Fund Initiative for Sustainable Forest Landscapes (nd).

The governments of Norway and Germany are among those entities providing result based finance for emission reductions under bilateral financial mechanism. Under these bilateral arrangements, payments are only disbursed upon achievement of results-based activities resulting in fully measured,

International Climate Initiative (IKI) for REDD+ Readiness

The International Climate Initiative (IKI) by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) provides support for projects that aim to conserve, restore and sustainably use forests as well as ecosystems such as wetlands and savannahs. Within the context of REDD+, the IKI carefully targets its support for partner countries to practically implement ambitious national REDD+ policies and strategies.

Through activities in this funding area, important synergies between climate- and biodiversity protection are created while main drivers of deforestations are identified and partners are supported to develop counteraction strategies.

Since 2008, the IKI has been financially supporting projects which contribute to the conservation, restoration and sustainable use of forests worldwide. Up to now, the IKI has supported over one hundred projects with a total funding volume of more than 350 million Euros – positioning BMUB as a major global REDD+ donor. Project examples range from the support for the development of regional monitoring, reporting and verification (MRV) systems, data generation and capacity building to developing decision-support tools for reference level establishment. Starting off with readiness support the portfolio broadened over time and included the transformation towards deforestation free business models, the restoration of forest landscapes and leveraging private investment that protect and restore forests at landscape level.

Source: BMUB (2017)

reported, and verified emission reductions. The German government through the KfW, a German ODA initiative on behalf of the German Ministry for Economic Cooperation and Development, has been implementing REDD Early Movers Program (REM) with technical support from the GIZ (REDD Early Movers (REM) Programme (nd)). Some private sector entities are also engaging with voluntary and compliance markets.

10.7 Financial Mechanism for REDD+ under UNFCCC

Since the start of REED+ negotiations under UNFCCC, decision on financing REDD+ has not been very clear. COP decision of financing REDD+ ..... *'Agrees that results-based finance provided to developing country Parties that is new, additional and predictable may come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources'.* As such there is no UNFCCC decision as to constitutes financing for REDD+.

Cancun Agreements also established the Green Climate Fund (GCF), to be designated as an operating entity of the financial mechanism of the Convention. Further COP decision on its seventeenth session (COP 17) decided that all developing country Parties to the Convention are eligible to receive resources from the Fund. The Fund will finance agreed full and agreed incremental costs for activities to enable and support enhanced action on climate change adaptation and mitigation including REDD+ (UNFCCC, 2012).

GCF's investments are aimed at achieving maximum impact in the developing world, supporting paradigm shifts in both mitigation and adaptation. The Fund aims for a 50:50 balance between mitigation and adaptation investments over time. It also aims for a floor of 50 percent of the adaptation allocation for particularly vulnerable countries, including Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States.

10.7.1. Green Climate Fund (GCF) Support for REDD+ Programmes

The Green Climate Fund (GCF) is a new global fund created under UNFCCC to support the efforts of developing countries to respond to the challenge of climate change. GCF helps developing countries limit or reduce their greenhouse gas emissions and adapt to climate change.

The Conference of the Parties to the UNFCCC encouraged the Green Climate Fund to play a key role in collectively channelling adequate and predictable results-based finance in a fair and balanced manner, taking into account different policy approaches, while working with a view to increasing the number of countries that are in a position to obtain and receive payments for results-based actions (UNFCCC, 2014)

GCF's Financial Mechanism for REDD+ : As per the Governing Instrument for the GCF, the GCF will provide financing in the form of grants and concessional lending, and through other modalities, instruments or facilities. GCF may employ results-based financing approaches, including, in particular for incentivizing mitigation actions, and payment for verified results, where appropriate.

The concept of results-based finance includes payments directly for verified results achieved. In the case of REDD+, results are defined as

mitigation outcomes that is GHG emission reductions and/or enhancements in forest carbon stocks (sinks) measured and verified against a benchmark (FREL/FRL) expressed in tonnes of CO_2 eq per year. In addition, 'results-based finance' may include incentives for intermediate, predefined, and measurable milestones or outputs (such as policy performance and results from REDD+ phase 2 activities) that will be necessary in order to effectively reduce deforestation and forest degradation, and ultimately leading to phase 3 results. This will allow a greater number of countries at national and/or subnational levels to gain access the necessary finance in order to catalyse actions towards achieving REDD+ results.

The GCF currently provides support to maintain and amplify efforts to implement the early phases of REDD+ in recognition that REDD+ offers a cross-cutting approach to contribute to global efforts to reduce emissions and contribute to low-emission and climate resilient development pathways in developing countries, while simultaneously generating local benefits, which in some cases could assist with adaptation to climate change.

GCF Readiness and Preparatory Support Programme: In its 17th Board meeting[10] GCF agreed on support for the early phases of REDD+ on Readiness and Preparatory Support Programme. Resources are available in the form of financial and technical support and up to USD 1 million per country per year (not exclusive for REDD+, but for all activities identified by the National Designated Authority (NDA). Readiness Funding can be accessed for a variety of readiness activities, as appropriate. As an example of some REDD+ activities that could be supported through the readiness programme are:

- Establishing and strengthening NDAs or Focal Points (FPs): Under this category, the NDA/FP may strengthen its national coordination and consultation mechanisms. All key relevant actors in climate change including the REDD+ national entity/focal point to the UNFCCC are expected to be involved in this process to ensure effective engagement with the GCF.
- Strategic framework, including the preparation of country programmes: This category includes developing a country programme, which may extend to a national REDD+ strategy/action plan (e.g. analysis of policies and measures, stakeholder consultations, analysis of drivers of deforestation, financial analysis and assessment to identify financial gaps, barriers and needs, and so on).
- Support for accreditation and accredited direct access entities: The NDA/FP may use the GCF readiness resources to support national or regional entities specialised in REDD+ activities that are candidates for accreditation for direct access, to understand the GCF accreditation process and build their capacity in fiduciary standards and environmental and social safeguards or the Cancun safeguards.
- Information sharing, experience exchange and learning: The readiness programme may support information and knowledge

[10] *GCF document No. GCF/B.17/16 dated 2 July 2017*

sharing, including conducting regional workshops with NDAs/FPs, existing and potential accredited entities, REDD+ national entity/focal points, civil society and other stakeholders to raise awareness of the modalities of the fund and opportunities to engage in REDD+ implementation.

- Formulation of national adaptation plans and/or planning processes: Where land-based activities are identified for addressing adaptation priorities, countries may explore possible complementarity between their adaptation plans with REDD+ activities.

As this list is not exhaustive and is subject to further revision, NDA/FP could also consider how resources made available from the readiness could support them strengthening institutional capacity to undertake some of REDD+ phase 1 activities. The activities mentioned above are only indicative examples. Countries are encouraged to formulate their activities based on their specific needs. The GCF encourages national designated authorities and focal points to access readiness support directly, or to collaborate with readiness delivery partners and accredited entities to submit readiness requests, for early phases of REDD+, using the existing modalities for accessing readiness and preparatory support.

Result Based Payment Programme: The GCF Board in its eighteenth meeting vide decision[11] B.18/07decided to set, for the REDD+ results-based payments pilot programme only, the valuation of results at USD 5 per tonne of verified emission reductions of carbon dioxide equivalent (t CO_2 eq). It also decided to allocate up to USD 500 million to the request for proposals for the pilot programme for REDD+ results-based payments. The Board further decides to adopt the request for proposals for the pilot programme for REDD+ results based payments and score card has been developed as "pass" for a proposal to be eligible for the pilot programme.

REDD+ results-based payments are ex-post payments that countries can obtain for the emission reductions achieved. Most available REDD+ results-based finance opportunities are publicly funded. These include the Green Climate Fund's REDD+ results-based payments pilot programme (running from October 2017 until 2022 with results eligible from December 2013 to December 2018 for a cumulative maximum of USD 500 million).

The GCF in 2019 also approved four dedicated REDD+ projects with results-based payments for a total of USD 229 million under its multi-year REDD+ pilot programme. These projects reflect efforts to support developing countries' move beyond readiness and capacity building to demonstration programmes and emission reductions with payments based on verified results.

10.8 Private Sector Climate Finance

Carbon credits are used by companies to compensate for their carbon emissions, by either adhering to emission allowances or contributing to sustainable projects. This is typically done through an exchange – or carbon financing – which takes the form of an annual payment to a project partner, be it public, private, NGO or other entity, for the emission reductions generated

[11] *GCF document No. GCF/B.18/23 dated 2 November 2017*

once the project is operational. Carbon financing increases the financial viability of projects, creating an additional revenue stream and enabling the effective transfer of technologies and know-how. It provides a means of leveraging new private and public investment in projects to reduce greenhouse gas emissions in developing countries and economies in transition. Carbon projects are developed by project developer and follow one of the carbon crediting standard and methodology that are globally accepted.

ICIMODs work on forestry sector relies on VCS methodology (https://verra.org/project/vcs-program/). Projects developed under the VCS Program must follow a rigorous assessment process in order to be certified. VCS projects cover a diverse range of sectors, including renewable energy (such as wind and hydroelectric projects), forestry (including the avoidance of deforestation), and others.

The VCS Program is the world's most widely used voluntary GHG program. Over 1,600 certified VCS projects have collectively reduced or removed more than 495 million tonnes of carbon and other GHG emissions from the atmosphere. RMC governments are required to issue no objection letter for registering VCS projects. ICIMOD will work with multiple partners in different RMCs to generate carbon credits for financing landscape level restoration in each country. This enables tailor making projects to address the unique drivers of deforestation and forest degradation prevalent in each pocket areas.

10.9 Conclusion

REDD+ is a positive incentive instrument by design, and not a cap-and-trade instrument, due to the voluntary nature as developing countries choose to participating REDD+. Regional distribution of approved multilateral REDD+ finance from major funds has been very skewed. A report from Climate Fund Update reflects that from 2008 to 2018 Latin American and the Caribbean countries have been the biggest beneficiary receiving 52% of total funds followed by Sub-Saharan Africa 28%. South Asia countries have been the least beneficiary receiving only 2% multilateral REDD+ finance (Watson and Schalatek, 2019).

All the Hindu Kush Himalayan (HKH) countries are preparing strategies for implementing REDD+ activities and simultaneously trying to develop relevant capacity at different levels so that REDD+ can be implemented effectively and efficiently with minimal adverse impacts. With support from multilateral, bilateral and domestic instruments HKH Countries have made progress in developing their REDD+ Strategies, FREL/FRL, designing MRV packages, better understanding of REDD+ architecture within the framework of existing policies, legislation and regulations and have identified safeguard approaches that are essential. Some of the countries are also ready in testing pilot REDD+ interventions.

While HKH countries have progressed the REDD+ agenda, supported by a small number of bilateral donors and multilateral agencies (including the World Bank and GCF) providing direct incentives for various preparatory phases of REDD+, and REDD+ has not yet delivered the transformational change culminating into result-based finance for HKH countries. Fulfilling the potential of REDD+ should be an urgent priority for the international community. Significant amount of results-based payments from both public and private sources is

needed to give HKH countries additional incentives and confidence to undertake REDD+ actions. Through the regional scale REDD+ programmes participating countries can obtain results beyond REDD+ expectations as landscapes are better conserved and managed for sustaining ecosystem goods and services to improve livelihoods and enhance ecological integrity, economic development, and socio-cultural resilience to environmental changes.

With regard to Multilateral Environment Agreements, UNFCCC is the only one that is directly linked with perpetual financing mechanism. This makes the UNFCCC more attractive to developing countries require finance for mitigation and adaptation to climate change. UNFCCC has even included the private sector for financing mitigation through carbon credits, and in the long run, this is going to be one of the most sustainable sources of financing landscape level forestry and conservation programmes. But as of now, for all HKH developing countries and its institutions, capacity building is a prerequisite for developing forestry projects with carbon finance. Although HKH region has the potential to sequestrate carbon through various land and forest management interventions, there is dearth of knowledge on methodological standards for forestry sector of the HKH to access climate finance.

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CHAPTER 11

FUTURE OUTLOOK OF REDD+ FOR CLIMATE CHANGE MITIGATION IN HINDU KUSH HIMALAYA

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11.1 Introduction

REDD+ is one the most complex mechanisms under United Nations Framework Convention on Climate Change (UNFCCC) negotiations for mitigating climate change through forest sector in the developing countries. REDD+ mechanism has the potential to bring synergies among three Rio Conventions (UNFCCC, UNCCD and CBD) for mitigating the climate change, combating desertification and land degradation and conservation of biodiversity. Since REDD+ negotiations progressed at UNFCCC many international donors initiated various funds for financing the REDD+ readiness phase as a precursor to REDD+ implementation. Forest Carbon Partnership Facility of the World Bank was the leading among the donors in supporting countries to become prepared for REDD+. The financial instrument of REDD+ is tied to incentive mechanism in the form of result based payment. Countries receive payment for quantified emission reduction that are monitored, reported and verified. This is what makes REDD+ directly linked with a perpetual financing source under the aegis of the UNFCCC and the Paris Agreement.

Hindu Kush Himalayan (HKH) countries lagged behind in receiving REDD+ finance at early stages of REDD+ with different countries receiving different forms of finance at different timings. Of late among the HKH countries, Bhutan, Myanmar, Nepal and Pakistan received finance for REDD+ readiness activities including capacity building on various aspects of REDD+. With the financial support on capacity building and institutional support and generating the necessary data, these countries are in different stages of transitioning from readiness to REDD+ implementation phase. All the REDD+ Himalaya partner countries now have their National REDD+ Strategy and some are even working further to develop Sub-national/ State REDD+ Action Plans. All the Himalayan countries where REDD+ has become their forestry sector climate mitigation measure are working with the local communities/stakeholders who are mainly dependent on forest resources. Countries are now working on defining the benefit sharing mechanism from the result based payment of REDD+ and in complying to the various environmental and social standards and safeguards set by the UNFCCC.

11.2 Supporting REDD + for Meeting NDCS Targets of HKH Countries

Actions to reduce emissions derived from deforestation and forest degradation and increase forest cover to sequester atmospheric carbon in many countries' pledges to the UNFCCC as part of their Nationally Determined Contributions. The HKH countries have also opted for various forestry based option including REDD+ in their Nationally Determined Contribution to the UNFCCC.

Nationally Determined Contributions of Afghanistan[12] focuses on land use, forests

[12] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Afghanistan%20First/INDC_AFG_20150927_FINAL.pdf*

(afforestation and reforestation, natural forests, fuelwood from forest and orchards) and rangelands (rangelands rehabilitation). However, no quantitative target for CO_2 mitigation through this process is given.

Nationally Determined Contributions of Bangladesh[13] proposed some possible conditional action-based contributions in land use, land use change and forestry sector. It includes continuation of coastal mangrove plantation, reforestation and afforestation in the reserved forests, plantation in the island areas of Bangladesh, and continuation of social and homestead forestry.

Nationally Determined Contributions of Bhutan[14] intends to remain carbon neutral where emission of greenhouse gases will not exceed carbon sequestration by its forests. Efforts will also be made to maintain current levels of forest cover, which currently stand at 70.46%, through sustainable forest management and conservation of environmental services.

Nationally Determined Contributions of China[15] proposes to increase the forested area by 40 million hectares and the forest stock volume by 1.3 billion cubic meters compared to the 2005 levels. China has determined to increase the forest stock volume by around 4.5 billion cubic meters by 2030 on the 2005 level.

Nationally Determined Contributions of India[16] proposes to create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030. A significant amount of this sink is proposed to be achieved through REDD+ programmes. Planned afforestation has been seen as a major mitigation strategy in forestry sector. India is one of the few countries where forest and tree cover has increased in recent years transforming country's forests into a net sink of carbon.

Nationally Determined Contributions of Myanmar[17] proposes to increase reserved forest and protected public forest by 30% of total national land area and 10% increase in protected area systems of total national land area by 2030.

Nationally Determined Contributions of Nepal[18] proposes to make community-based forests and watershed management climate adaptation friendly, enhance carbon sequestration through sustainable management of forests, and support programmes that reduce carbon emissions from forest areas. Nepal will maintain 40% of the total area of the country under forest cover and forest productivity and products will be increased through sustainable management of forests. Emphasis will equally be given to enhance carbon sequestration and forest carbon storage and improve forest governance. Nepal will pilot a sub-national project on REDD+ to reduce about 14 million tonnes of CO_2 eq by 2020 by addressing the drivers of deforestation and forest degradation and strengthening governance

[13] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bangladesh%20First/INDC_2015_of_Bangladesh.pdf*
[14] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bhutan%20First/Bhutan-INDC-20150930.pdf*
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mechanisms in all types of forests and protected areas. Nationally Determined Contributions of Pakistan[19] focuses on capacity building needs. Forests in Pakistan are net emitter of greenhouse gas. Contributions of 'Land Use Change and Forestry' sector in overall emissions profile of the country are merely 2%. The Khyber Pakhtunkhwa Province's afforestation programme and the Green Pakistan Programme are other noteworthy examples of the country's commitment[20].

11.3 National REDD+ Strategy of HKH Countries

The National REDD+ Strategy is a key element of National REDD+ Framework. It puts forth vision, objectives and different strategies for implementing REDD+ activities. A brief analysis of National REDD+ Strategy of some HKH counties is given as under:

Bhutan

Vision of the National REDD+ Strategy of Bhutan is to be 'a perpetually carbon neutral, climate change resilient and a prosperous society'. Aligned to this vision, the primary objective is to reduce emission from deforestation and forest degradation, the strategy document seeks to achieve far-reaching co-benefits of REDD+. The focus of the strategy is to continue and strengthen the conservation of existing forests and increases the adaptive capacity to the impacts of climate change while enhancing the livelihoods, provide ecosystem services and conservation of biodiversity without compromising opportunities for economic development. The potential funding sources are being currently explored for implementation of the strategy and all relevant stakeholders.

India

The National REDD+ Strategy builds upon existing national circumstances which has been updated in line with India's National Action Plan on Climate Change, Green India Mission and India's Nationally Determined Contribution to UNFCCC. The overarching objective of the Strategy is to facilitate implementation of REDD+ programme in the country in conformity with relevant decisions of UNFCCC, in particular the Cancun Agreements, Warsaw Framework for REDD+, Paris Agreement, and the national legislative and policy framework for conservation and improvement of forests and the environment. The Strategy has a road map for addressing drivers of deforestation and forest degradation and issues like safeguards for rights of local community, first right of use with local community, gender equity, creation of green jobs to the local youths etc.

Myanmar

Since the National REDD+ Strategy has been under development in Myanmar, the basic outline inputs such as the analysis and prioritization of drivers of deforestation and forest degradation and defining policies and measures for addressing the drivers are the core aspects of Strategy development in Myanmar. At the same time, consultations with stakeholders and experts are still ongoing for the development of national REDD+ strategy.

[19] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf*
[20] *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf*

Nepal

National REDD+ Strategy is one of the main guiding documents to REDD+ process in Nepal. Strategy has been prepared for the period of 5 years from 2018 to 2022. Overall vision of the strategy is to enhance carbon and non-carbon benefits of forest ecosystems and ultimately contribute to the prosperity of the people of Nepal. The strategy adopts a multi-stakeholder, community-based, people-centric, multi-faceted, gender and socially inclusive approach to REDD+ implementation.

11.4 REDD+ Incentives for Community based Forest Management

Forests have had all the more pivotal role in HKH countries where the economic structure and social organization are built around the primary relationship with the natural resources. Forest ecosystems provide a range of provisioning, regulating, cultural, and support services for maintaining healthy environment and sustaining livelihoods of millions of forest-dependent communities in the HKH. Forests of Himalayan regions perhaps have very old history of community participation in forest management. In the Indian mountain state of Uttarakhand community managed forest like *Van Panchayats*, are perfect example of community control over forests. Human pressures have degraded some of the formerly dense forests to open forests and scrubs. The *Van Panchayat* lands in Uttarakhand generally have a low-carbon baseline (Hooda *et al.*, 2007). These forests though are not completely immune from over utilisation and the condition of the forests varies from poor to very good (Mukherjee, 2004).

The concept of Joint Forest Management (JFM) in India helps in increasing the productivity of the degraded forests. Improving the stocking of poorly stocked forests also in turn increases their carbon stocks besides improving flow of ecosystem goods and services from such forests. All these activities and measures can be dovetailed into mitigation measures, *inter-alia*, with sizable potential for increasing the carbon sequestration. Clearly, there is scope and opportunity for integrating the REDD+ actions with JFM in HKH region of India as well.

In Nepal, success of community-based forest management such as community forestry, leasehold forestry, collaborative forestry, buffer zones and conservation areas resulted in increase in forest area and decrease in shrub area between 1994 and 2010/11 and forest area increased by 2.33 percent per annum and shrub/other wooded land decreased by 3.44 percent per annum (DFRS, 2015).

Myanmar while developing its national REDD+ Strategy at the subnational/ regional scale also attempts to identifying *inter alia*, support for community forestry development. Through community engagement, The REDD+ Himalaya project was able to support community forest management programmes and built the capacity of both professional foresters as well as local communities in context of REDD+.

Bhutan has only about 2% of its forest under community-based forest management. The ICIMOD coordinated REDD+ Himalaya project was able to support community forest

management programmes and built the capacity of both professional foresters as well as local communities in context of REDD+ enabling Bhutan came closer to the technical readiness for REDD+ programme.

All these community-based forest management activities and measures can fit into mitigation actions, with sizable potential for increasing the carbon sequestration. For this purpose, methodologies and modalities for a procedural framework will need to be worked out to ensure people's participation and sharing of the benefits accruing from REDD+ actions that are measurable, reportable and verifiable. REDD+ initiatives are more likely to succeed if they build on the interests of forest communities and indigenous people.

ICIMOD has been one of the pioneers of REDD+ in the region. ICIMOD started to engage in community carbon forestry project since 2003. It has implemented a REDD+ pilot project design and setting up a governance and payment system for Nepal's community forest management under REDD+' from 2009-2013[21]. Based on the accumulated experiences from the pilot project in Nepal and a growing interest from the ICIMOD regional member countries, a regional REDD+ Initiative is now functional in Bhutan, India, Myanmar and Nepal.

When REDD+ is implemented, it not only provides carbon mitigation benefits but also non-carbon benefits or co-benefits. These non-carbon benefits consist of adaptation, biodiversity conservation, ecosystem services, and improvement of livelihood opportunities for local communities along with a wide range of economic benefits. The Table 1 indicates the list of possible co-benefits while implementing REDD+ activities.

Table 1: List of co-benefits and their indicators

Co-benefits	Indicators
Livelihoods improvement	• Employment (forest and biodiversity based)
	• Food and nutrient
	• Water availability
	• Wood energy
Increased biodiversity value	• Reduced loss of habitat
	• Increased number of species
	• Increased income from bio-prospecting
Enhanced ecosystem resilience for climate change adaptation	• Reduced vulnerability from fire, flood, landslides, and siltation
Improved governance, institutions and polices	• Transparent and participatory decision making
	• Equitable benefit sharing
Contribution to MEAs	• Aichi targets of and other provisions of CBD, Ramsar, CITES, UNCCD

Source: Joshi *et al.,* 2013

[21] *https://www.icimod.org/initiative/about-redd/*

11.5 Future Outlook of REDD+ in HKH

The budget allocated to the forestry sector is reducing every year in comparison to other sectors. Standing forest is undervalued in our contemporary development paradigm, often making development activities one of the major drivers for deforestation. These have led to a dearth of resources required for maintain healthy mountain ecosystem. REDD+ mechanism has been complementing the concepts and approaches towards conservation by leveraging additional resources through carbon finance. A decade of testing REDD+ in Nepal has been a rewarding experience and it is realized that a long-term and holistic approach to spatial planning and analysis is needed for the success of REDD+ (Kotru and Amatya, 2019). REDD+ at scale in Hindu Kush Himalaya may be part of the solution, if well designed and implemented, it can provide the scarce resources required for watershed level conservation that have large scale benefits downstream.

ICIMOD coordinated REDD+ Himalaya project have worked on few selected regional/country specific selective activities that could be part of a future REDD+ in the region. HKH countries need to gather together for significant public and private investment, predictable finance from multilateral and bilateral donors for implementation of REDD+ programmes. Through ICIMODs experience working with partners across the HKH landscape, it is evident that REDD+ can be integrated into national community forestry programmes where good governance and devolved administration are key conditions (Maraseni *et al.*, 2019).

A scoping study conducted in Kailash Sacred Landscape of India to assess the potential and avenues of intervention for REDD+ to deliver at a landscape scale provided insights into long term needs of embedding REDD+ at national and sub-national levels. Apart from scoping study, overall analysis was done for other transboundary landscapes to reach to a set of future avenues of work (Singh *et al.*, 2016). REDD+ is not only a financing mechanism but also provides non-carbon benefits, as a broader mission to incorporate and enhance biodiversity conservation, improve the livelihoods of forest-dependent communities and better forest governance. Landscape approach in transboundary mode offers scale, stakeholdership, sustenance of ecosystem services and finally standard frameworks that can take REDD+ in HKH forward.

It is now evident that carbon service alone can neither sustain the forest ecosystem nor the livelihoods of local communities dependent on goods and services flowing from such an ecosystem. This realization must be internalized in policy, planning and actions at national government levels with a view to according equal importance to all forest ecosystem goods and services, and treating forest carbon service as one of the important services. As UNFCCC under REDD+ has started discussing methodological guidance for non-carbon benefits of REDD+ and UNFCCC will develop ways and means of putting a value on each of the other forest ecosystem goods and services. HKH countries must prepare themselves politically, technically, and institutionally to participate effectively in the

future negotiations with a view to safeguarding its national as well as the interests of its local communities dependent on forests.

HKH countries are under different stages of developing their knowledge and building the technical capacity for implementation of REDD+ programmes which can be further enhanced through sharing the knowledge and building their technical capacity under south-south cooperation with the lead of ICIMOD.

HKH countries have already set their NDC targets under the Paris Agreement of UNFCCC, national biodiversity targets and action plan under CBD, Bonn Challenge Pledge and are in the process of setting of land degradation neutrality targets to be achieved by 2030 under UNCCD. These clearly shows the commitments of HKH countries to achieve their national targets and international commitments with respect to forests, climate change mitigation and adaptation, biodiversity conservation and sustainable land management. Forest landscape restoration approach need to be followed for implementation of REDD+ activities in the HKH for making Himalayan region ecologically sound and economically viable for the prosperity of the mountain people.

11.6 Financing REDD+ in HKH

Globally many countries are now accessing REDD+ results-based payments - rewards for emission reductions from the Green Climate Fund and other similar mechanisms. A number of international initiatives have provided support to these efforts, including the United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation (UN-REDD) Programme jointly operated by FAO, the United Nations Development Programme and UNEP, the Forest Carbon Partnership Facility and the Forest Investment Program of the World Bank.

Cost of implementing REDD+ are under estimated and the price fixed by Green Climate Fund may not likely to cover the real cost. Rakatama *et al.* (2016) studied 56 REDD+ projects for opportunity cost and concluded that on average, the total REDD+ cost was 2.23 times higher than the opportunity cost and the opportunity cost was 3.28 times higher than the transaction and implementation costs. A study from CIFOR indicate that many REDD+ initiatives have been working under the assumption that the costs of reducing deforestation will be

covered by incoming funds from the international community and that REDD+ would also generate a surplus that could be equitably shared between different stakeholders. One of the most striking findings of the study was that 84% of subnational government institutions involved in the REDD+ initiatives are putting more in than they are getting out of REDD+. Many governments may be doing this because they are trying to position themselves to capture future funding streams for REDD+ or because they recognize the local benefits of forest conservation[22].

11.7 Conclusion

REDD+ will continue to be very important for HKH countries mainly to leverage additional finance for the forestry sector. Of late HKH countries are seriously engaged in REDD+ implementation with preparatory support from international donors and with domestic support as well. HKH countries have devoted energy and resources for developing their technical capacities for implementation of REDD+ such as developing REDD+ architecture in the form of national REDD+ strategies, developing PLRs to suit REDD+ implementation, the establishment of reference levels, REDD+ safeguard information system and a national forest monitoring system. In preparing for REDD+ country Parties have established a modern forest monitoring system, as well as identified the challenges and problems in the forestry sector, in terms of institutions and legal frameworks.

Although many of the HKH countries have been very active in shaping the evolution of the comprehensive concept of REDD+ at the international level, it needs much more to do domestically to ensure purposeful implementation of REDD+. They faced the challenge of constructing the National Forest Reference Level, a National Forest Monitoring System comprising independent MRV and Safeguards Information System. Small least developed countries (LDCs) can gain mutually from expertise available with the partner countries.

The Governments of HKH regions need to recognise that REDD+ will continue to play an important role in the post-2020 climate change regime and when implemented in its right earnest participating communities in the region are to be benefited from the programme with

[22] *https://forestsnews.cifor.org/41483/who-is-really-bearing-the-cost-of-redd-the-answer-may-surprise-you?fnl=*

climate change mitigation and adaptation co-benefits. Now there is everything in place that is needed to REDD+ functional on ground. The HKH countries will certainly benefit from various REDD+ actions besides providing financial incentives to the country Parties and participating communities. With countries domestic progress in REDD+, international community will also invest in REDD+. An effective REDD+ implementation in HKH region will save forests, generate ecosystem services, provide many income generation opportunities and will set countries on a sustainable development path. It is time ICIMOD assists the countries to access climate finance for restoring the entire mountainous landscape brining transformative change in the way forests are viewed. ICIMOD's experience of working for REDD+ initiative at transboundary landscapes level could be the future for supporting a concerted effort in the conservation of mountain ecosystem.

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About:

ICFRE

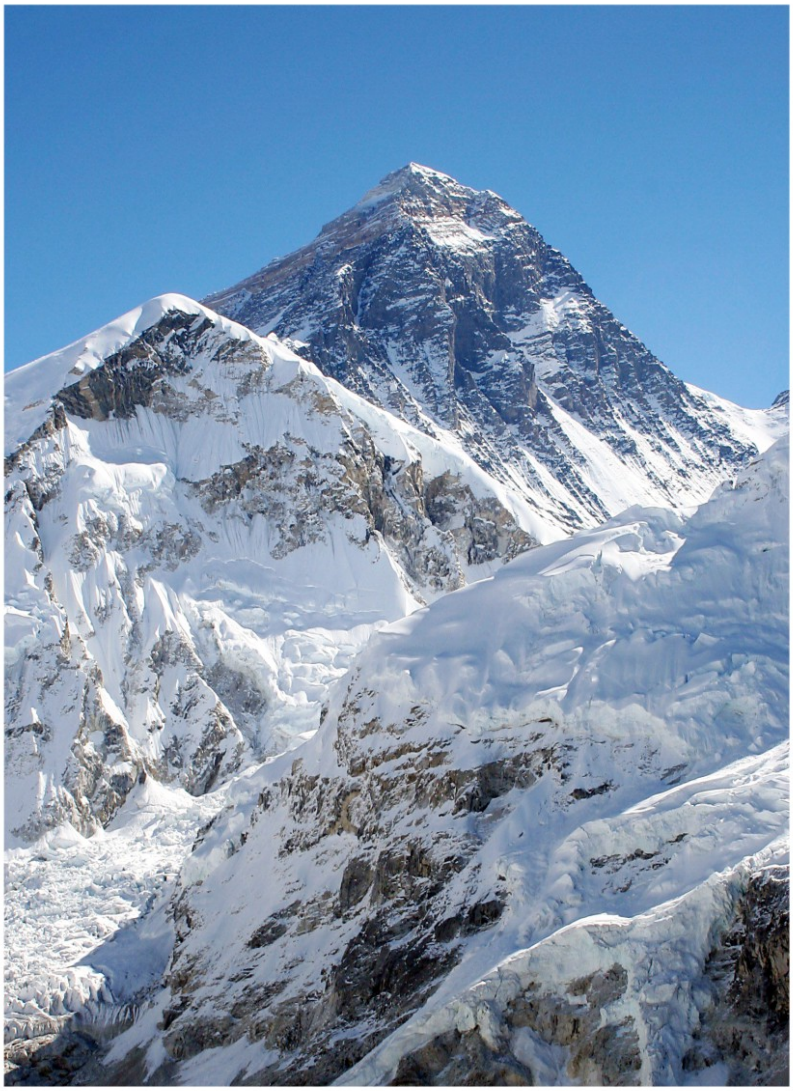
Indian Council of Forestry Research and Education (ICFRE) is an autonomous body of the Ministry of Environment, Forest and Climate Change, Government of India. Its vision is to achieve long-term ecological stability, sustainable development and economic security through conservation and scientific management of forest ecosystems. Its mission is to generate, advance and disseminate scientific knowledge and technologies for ecological security, improved productivity, livelihood enhancement and sustainable use of forest resource through forestry research and education.

ICFRE is an apex body in the national forestry research system that promotes and undertakes need based research, education and extension in the forestry sector. It has a pan India presence with its 9 research institutes (Arid Forest Research Institute, Jodhpur; Forest Research Institute, Dehradun; Himalayan Forest Research Institute, Shimla; Institute of Forest Biodiversity, Hyderabad; Institute of Forest Productivity, Ranchi; Institute of Forest Genetics and Tree Breeding, Coimbatore; Institute of Wood Science and Technology, Bengaluru; Rain Forest Research Institute, Jorhat and Tropical Forest Research Institute, Jabalpur) and 5 centers located at Agartala, Aizawl, Allahabad, Chhindwara and Visakhapatnam. Each institute are directs and manages research, extension and education in forestry sector in the states under their jurisdiction.

ICIMOD

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-Himalaya – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalisation 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.

ICIMOD support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. ICIMOD strengthen networking among regional and global centres of excellence. Overall, ICIMOD 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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