सत्यमेव जयते

Landscape Approach and Role in Disaster Management

Moving Beyond Conventional Concepts Towards Implementation Frameworks



nidm

Resilient India - Disaster Free India

National Institute of Disaster Management (NIDM)
Ministry of Home Affairs, Government of India

सत्यमेव जयते

LANDSCAPE APPROACH AND ROLE IN DISASTER MANAGEMENT

Moving Beyond Conventional Concepts Towards Implementation Frameworks

2022

nidm
Resilient India - Disaster Free India

National Institute of Disaster Management (NIDM)
(Ministry of Home Affairs, Government of India)

Plot No.15, Pocket 3, Block-B, Sector-29, Rohini, Delhi-110042
Website: https://www.nidm.gov.in

Landscape Approach and Role in Disaster Management: Moving Beyond Conventional Concepts Towards Implementation Frameworks

ISBN No: 978-81-957965-6-4

Copyright © 2022, National Institute of Disaster Management, Delhi

Edition: 2022

Authors:

Ms Mahak Agrawal
Prof Anil K Gupta
Ms Pritha Acharya

Published by:

National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India, Delhi-110042

Citation:

Agrawal, M., Gupta, A.K. and Acharya, P. (2022). Landscape Approach and Role in Disaster Management: Moving Beyond Conventional Concepts Towards Implementation Frameworks. National Institute of Disaster Management, Delhi, India. Pages 26

Disclaimer:

This publication is based on the research case study carried out by National Institute of Disaster Management, Ministry of Home Affairs, Government of India. The study is based on various published, unpublished literature, reports, documents and web-resources and data collected through primary survey. Authors gratefully acknowledge the contributors and their original sources. This report-full or in parts, can be freely referred, cited, translated and reproduced for any academic and non-commercial purpose, with appropriate citation of authors and publishers.

Dr. Akhilesh Gupta
Secretary, SERB and Senior Advisor

सत्यमेव जयते

Department of Science and Technology (DST)
Government of India
Technology Bhavan, New Mehrauli Road,
New Delhi-110016



MESSAGE

To estimate the human impact on climate change and developing effective strategies for mitigation and adaptation, landscape approach has become very important. The integrated land-sharing philosophy as an alternative to sectoral land-use planning, policies, governance and management strategy of this approach makes it a strong tool to address pressing global challenges of poverty alleviation, biodiversity conservation and food production.

I compliment all the authors and National Institute of Disaster Management (NIDM) for documenting key insights of the study while using examples from ground case studies globally. I am sure that "Landscape approach and role in disaster management: moving beyond conventional concepts towards implementation frameworks" being published by the NIDM, Ministry of Home Affairs, Government of India will be useful to all practitioners exploring, implementing or studying science and policy-based studies for landscape approach and disaster risk reduction.

(Akhilesh Gupta)

nidm
Resilient India - Disaster Free India

ताज हसन, भा. पु. से.
कार्यकारी निदेशक
Taj Hassan, IPS
Executive Director

सत्यमेव जयते
आज़ादी का अमृत महोत्सव

राष्ट्रीय आपदा प्रबंधन संस्थान
National Institute of Disaster Management
(गृह मंत्रालय, भारत सरकार)
Ministry of Home Affairs, Govt. of India
प्लॉट नं. 15, ब्लॉक बी, पॉकेट 3,
सेक्टर 29, रोहिणी, दिल्ली – 110042
Plot No. 15, Block B, Pocket 3,
Sector 29, Rohini, Delhi-110042



FOREWORD

Landscapes are mosaics of interconnected ecosystems having diverse stakeholders and values including the physical, social, economic and environmental aspects. As ecosystems are the structural and functional units of landscapes, it is important to understand how humans interact with landscapes. A healthy landscape ensures a resilient society for the future. The landscape approach is gaining immense prominence with respect to reducing disaster risks and mitigating climate change impacts. The holistic, interdisciplinary and cross-sectoral aspects of this approach make it a potential tool for long term climate adaptation.

This publication focuses on the role of implementation of the landscape approach in disaster management and moving beyond the conventional concepts towards implementation frameworks and discusses case studies on the subject.

I congratulate the authors for bringing out such a timely publication. This publication is brought out under the CAP-RES project supported by DST and holds much relevance given on the increasing climate change and degradation of land resource within the country. I hope that this publication will turn out to be a good resource material for researchers, academicians and other professionals.

tajhassan

(Taj Hassan)

Dr. Anil Kumar Gupta
Project Director: CAP-RES (DST)
Professor and Head - Environment, Climate and Disaster Risk Management Division

राष्ट्रीय आपदा प्रबंधन संस्थान
(गृह मंत्रालय, भारत सरकार)
National Institute of Disaster Management
(Ministry of Home Affairs, Govt. of India)
Plot No. 15, Pocket-3, Block-B, Sector-29,
Rohini, Delhi-110042



PREFACE

The landscape approach has gained a lot of attention in the recent years for its ability adapt to climate change and enhance community resilience. Understanding the facets of interaction of humans with landscape is integral for implementing effective disaster risk reduction strategies and efficient models for developmental planning. Landscape approaches are suitable for realizing social, economic and ecological objectives linked to a landscape, thus it holds a lot of opportunity to contribute towards achieving the Sustainable Development Goals (SDGs).

This thematic paper tries to highlight the key facets of landscape approach in disaster management planning by integrating it in sectoral plans. The study revolves around two important questions of a. Effectiveness of the landscape approach for disaster risk reduction and b. Characteristics of effective implementation of the landscape approach.

(Anil K. Gupta)

ACKNOWLEDGEMENT



The thematic paper on “Landscape Approach and Role in Disaster Management: Moving Beyond Conventional Concepts Towards Implementation Frameworks” is carried out under the Project Climate Adaptive Planning for Resilience and Sustainable Development in Multi-Hazard Environment (CAP-RES) supported by Department of Science & Technology (DST), Government of India. A special note of thanks to Dr. Akhilesh Gupta, Senior Advisor and Secretary, Science and Engineering Research Board (SERB) for entrusting NIDM with the opportunity to take up and work on the CAP-RES project. The project team is thankful to Shri Taj Hassan, Executive Director, NIDM, Dr Nisha Mendiratta, Advisor and Head of Climate Change at the Department of Science and Technology, Dr Susheela Negi, Principal Scientist, and Dr Rabindra Panigrahi, Senior Scientist of Department of Science andTechnology, Government of India for their support to this study.

Contributions of the authors Ms Mahak Agrawal (Steering Board Member & amp; Activity Group Lead: Urban Adaptability, ITACUS) and Ms Pritha Acharya (Research Associate, CAP-RES, NIDM) are acknowledged for joining hands with us in undertaking this study which takes into account both technical understanding and policy interventions at the same time.

A special thanks to Ms Pritha Acharya for designing and coordinating this study. The project team also extend thanks to Shri Surendra Thakur Ji (Consultant & I/C, Admin & HR), Shri S.K. Tiwari (Librarian, NIDM) and the entire publication cell of NIDM including Ms. Karanpreet Kaur Sodhi and Ms. Sonali for helping in printing and publication of this report.

Prof. Anil K. Gupta
Project Director
CAP-RES, NIDM

TABLE OF CONTENTS

1. Introduction 1
   - Overview of the Landscape Approach 2
   - Disaster Resilience and Landscape Approach 5
   - Characteristics and value of Landscape Approach 6
   - Steps for adopting a Landscape Approach 8
   - Frameworks of the Landscape Approach 11

2. Implementation of the Landscape Approach 14
   - Restoring Degraded Landscapes in Guatemala 14
   - Landscape Returns for Businesses in Spain's Altiplano 16
   - Post-Disaster Reconstruction in Pakistan 18
   - Bonn Challenge and Forest Landscape Restoration in India 19

3. Challenges for the Adoption of Landscape Approach 21

4. Recommendations for Action 22

5. References 24

Abstract

Understanding human interactions with landscape is important for conservationists, environmental scientists, urban and regional planners, and disaster risk reduction specialists. In the past few decades, the need to better understand and manage these interactions via the landscape approach has become more important than ever before — to estimate the human impact on climate change and develop strategies for adaptation and mitigation. This approach places communities at the center and identifies the landscape as the unit of action and incorporates all aspects of land use, land cover and societal needs for effective natural resource and risk management. The approach is built on integrated land-sharing philosophy as an alternative to sectoral land-use planning, policies, governance and management — to address pressing global challenges of poverty alleviation, biodiversity conservation and food production. It provides a framework to balance competing productive, social and environmental demands on land to address the increasing complexity of pressing environmental, social and political challenges that extend beyond traditional governance and management boundaries.

The need for understanding and integrating a landscape approach for disaster management stems from the fact that sectoral approaches to land management are insufficient to manage disasters or balance competing demands and multiple policies for land use and management. This paper thus seeks to respond to two key questions: one, what is the effectiveness of landscape approach in disaster risk reduction; and, two, what are the characteristics of effective implementation of landscape approach. Responding to these two questions, the paper is structured into four broad sections. The first section highlights the key characteristics of landscape approach and key steps for adopting and implementing the approach. The second section documents key findings from four case studies of landscape approach implementation. Third section highlights key challenges for adoption of the landscape approach, including the approach's limitations in mobilising investments and finance; plus, conventional policies that assume that land can have only one priority objective and other objectives need to be fulfilled by trade-offs. The paper concludes to highlight policy recommendations for effective adoption and implementation of the landscape approach. The section highlights the need for collaborative planning, negotiation and implementation at landscape scale for disaster risk reduction and realisation of Sustainable Development Goals.

Keywords: Landscape-approach, Disaster management, Climate adaptation, Community-led planning, Land management

Introduction

The term landscape is used to denote part of the Earth's surface that can be viewed at one time from one place and comprises of geographical features that are characteristic of a particular area. The term landscape finds its origin in the Dutch word landschap — a term originally used for paintings of the countryside. While earliest landscape paintings were found in the form of frescoes in the ruins of Roman civilisation's Pompeii, this form of painting regained momentum during the Renaissance in northern Europe. During the latter period, painters began to paint landscapes while ignoring people and making the land the sole subject on the canvas. Soon after, geographers borrowed the term from artists and defined geography as landscape science (Rutledge, et al., 2011).

Geographer Otto Schlüter was one of the first few scientists to study landscapes within the discipline of geography and the linkages between human activities and landscapes. In his 1906 essay titled The Goals of a Geography of Man, Schlüter identified elements of the landscape as geography's objects of investigation. He categorised landscapes as natural and cultural landscapes. Natural landscapes comprise of a collection of landforms — such as plains, plateaus, hills, lakes, natural vegetation, streams, soil and other features — and vary across space (Leighly & Speth, 1995). For instance, a desert landscape typically consists of sandy soil and sparse vegetation of a few deciduous trees and waxy-leaved shrubs. But these deserts can vary too. The cold desert of Ladakh in northern India has a very different landscape from that of the Thar desert in western India. Some geographers also define a natural landscape as a landscape with minimal human activity and predominance of natural conditions.

A cultural landscape is used to denote a landscape modified by human activities via animal rearing, agriculture and plantation, building up of physical structures, etc. In 1992, the World Heritage Convention emerged as the first international legal instrument to recognise and protect cultural landscapes (Fowler, 2002). Much like natural landscapes, cultural landscapes vary greatly across space and time. For instance, a farm in India has a very different landscape from a similar-sized farm in the United States or any other part of the world. Similarly, an agricultural landscape is very different from an urban landscape — in any part of the world.

These cultural landscapes are defined in three ways by the World Heritage Committee of UNESCO. The first is a clearly defined landscape created intentionally by man, such as the tea plantations of Assam in India. The second form of the cultural landscape is an organically evolved landscape where the spiritual, economic and cultural significance of the area develops along with its physical characteristics. For instance, the Indo-Gangetic plains were used by early human settlements of India for pastures and farming and are still used for food production — apart from inhabiting nearly 50% of the country's population. An associative cultural landscape is the last category which is similar to organically evolved landscape, except for physical evidence of historical human activities, which may be missing in such landscapes (UNESCO World Heritage Centre, 2008). Apart from natural and cultural landscapes, some works of literature further divide landscape to include primaeval landscape - a landscape that is untouched by human activities (Jones, 2003).

Understanding how humans interact with landscape has long been important for conservationists, environmental scientists, urban and regional planners, and disaster risk reduction specialists; it has become more pressing today than ever before — to estimate the human impact on climate change and develop strategies for adaptation and mitigation. Several human activities not only alter the landscape directly but indirectly as well — by accentuating the rate at which natural processes of weathering and erosion shape the landscape. For instance, deforestation, pollution-induced acid rains and damming of water bodies increase the rate at which weathering and erosion occur — and thus the rate at which landscapes change. With time, technological advancements and increasing human demands for natural resources, negative implications on natural and cultural landscapes have amplified as well — at local, regional, national and global scales (Grantham, et al., 2020).

Overview of the Landscape Approach

The study of how people interact with landscapes helps understand challenges and opportunities for resource and risk management — and protecting the delicate balance of Earth's ecosystems. For instance, land use and land cover change by humans — primarily for agriculture and timber — has reduced the density and area of forest landscapes across the world.

From 1990 to 2015, the global forest area has reduced by over 3 million square kilometres— with the most significant loss occurring in South America and Sub-Saharan Africa where the natural landscape is paying the price of increasing gross domestic product per capita, as indicated in Figure 1 (Routley, 2018). These measurements are sensitive to changes in methodologies of calculation, improvement in remote-sensing and other such technologies. Despite these changes, the human impact on landscapes is amplifying across the world — but the scale of impact and activities differ from region to region.

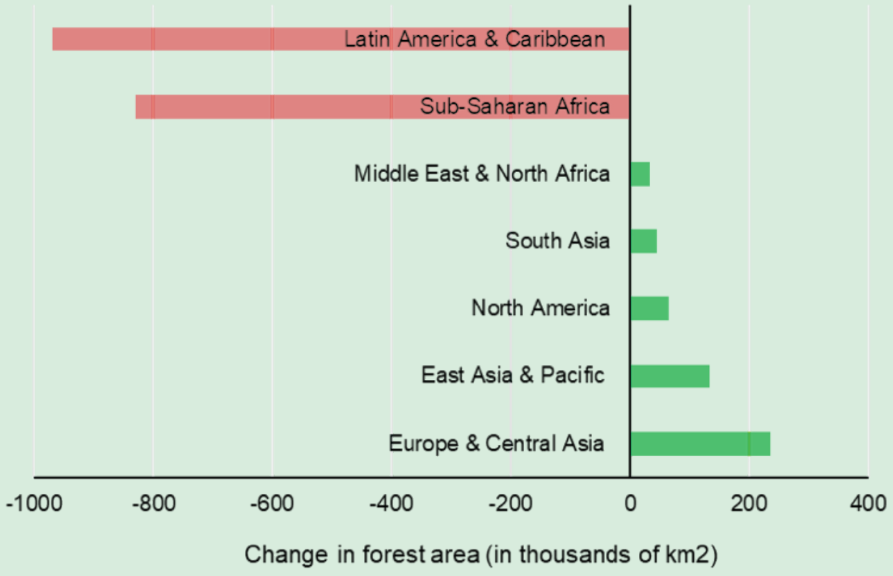


Figure 1: Change in forest area around the world, 1990-2015
Developed by the author based on data sourced from the World Bank Group (2022)

In the case of India, nearly 30% of the total geographical area is degraded land — with more than half of these degraded landscapes including rainfed farmland or forest landscape. A positive trend in this dismal trend is the increasing cognisance and protection of these environmentally sensitive landscapes by governments. The amount of nationally protected terrestrial land, for instance, has nearly doubled since the 1990s, as indicated in Figure 2 (Khokhar & Tabary, 2016).

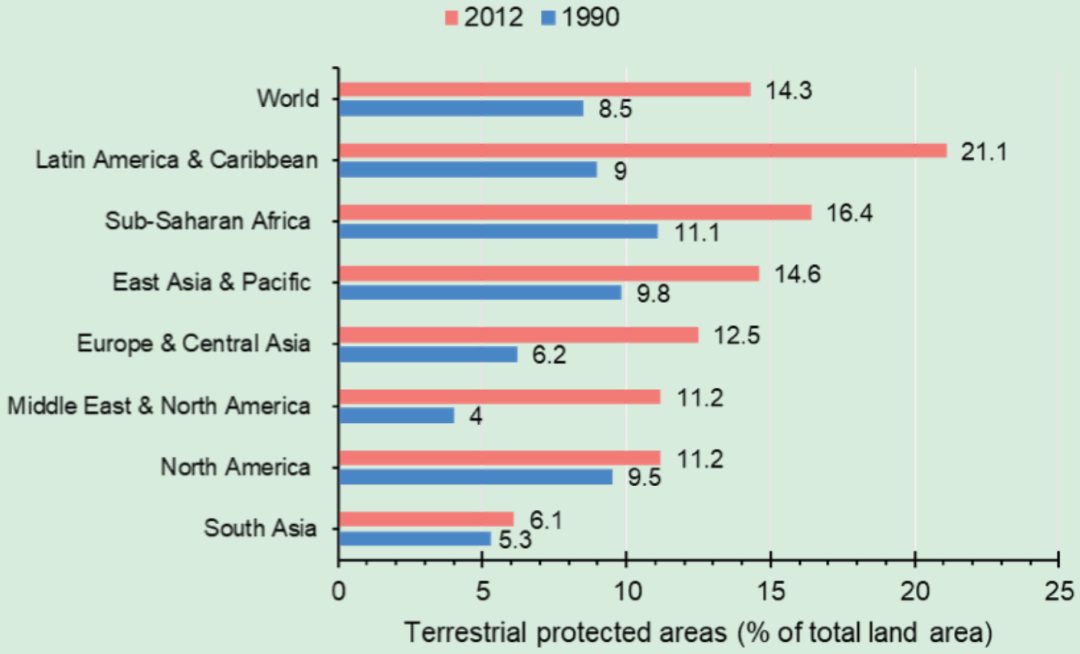


Figure 2: Change in forest area around the world, 1990-2015
Developed by the authors based on data sourced from the World Bank Group (2022)

Amid these discourses and debates on climate change, disaster risk reduction, nature conservation, landscape restoration, ecosystem services, resource management, sectoral-land use policies, and sustainable development — amplified post-1980s — landscape approach has regained popularity since its origin in nineteenth-century landscape science or geography (Arts, et al., 2017). It finds its roots in landscape ecology and biodiversity conservation (Lindenmayer, et al., 2008).

The landscape approach identifies the landscape as the unit of action and incorporates all aspects of land use, land cover and societal needs for effective natural resource and risk management. The approach is built on integrated land-sharing philosophy as an alternative to sectoral land-use planning, policies, governance and management — to address pressing global challenges of poverty alleviation, biodiversity conservation and food production (Sayer, 2009).

It provides a framework to balance competing productive, social and environmental demands on land — via integrated and adaptive management systems — and integrate policies and practices for diverse land uses in a given area for equitable and sustainable use of land, disaster risk reduction and climate adaptation and mitigation (Mainka & McNeely, 2011). Essentially, it seeks to address the increasing complexity of pressing environmental, social and political challenges that extend beyond traditional governance and management boundaries (Reed, et al., 2014).

The landscape approach works by involving all stakeholders across sectors- placing communities at the centre. In doing so, the approach ensures social inclusion, cross- sectoral integration, transparency and accountability through stakeholder capacity building, participation, consultation and ownership and making informed choices (Sapkota, et al., 2021). It contributes to shared risk understanding effective risk management and risk intervention planning- enforcing integration of advocacy and work around governance (CARE, 2017). Moreover, landscape approach aligns and strategically influences the achievement of the global development goals including the SFDRR, SDGs and UNFCCC (refer to the Table 1).

Table 1: Linkages of the the landscape approach to developmental policy

Sendai Framework on Disaster Risk Reduction	Priority 3: Invest in DRR for resilience. Article 2: Integrate both DRR and Resilience Building into policies, plans, programmes & budgets at all levels Article 11: Ensure credible links between these processes to build resilience and eradicate poverty Article 14: Invest in the economic, social, health, cultural and educational resilience of persons-communities-countries- environment. Article 17: Prevent & reduce hazard exposure & vulnerability to disaster, increase preparedness, & thus strengthen resilience. Article 18: Develop the resilience of critical infrastructure and basic services by 2030.
United Nations Sustainable Development Goals	Preamble: Shift the world onto a sustainable & resilient path. Article 7: A world where human habitats are safe, resilient and sustainable. Article 29: Strengthen the resilience of communities hosting refugees, particularly in developing countries. Article 33: Promote resilience and disaster risk reduction. Goal 1.5: Build the resilience of the poor/ vulnerable and reduce their exposure and vulnerability to climate-related extreme events. Goal 2.4: Implement resilient agricultural practices. Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation. Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable. Goal 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.
United Nations Framework Convention on Climate Change	Article 2: Climate resilience in the context of adaptation and vulnerability reduction. Increase the ability to adapt to adverse impacts of climate change and foster climate resilience. Make finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. Global Goal on Adaptation to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change. Article 7: Adaptation: Building the resilience of socioeconomic and ecological systems. Article 8: Loss and damage: resilience of communities, livelihoods and ecosystems. Article 10: Technology cooperation: technology development and transfer to improve resilience to climate change

Summing up, there are various programs and purposes where the landscape approach finds utility. This thematic paper, however, focuses on the role of the landscape approach in augmenting community resilience and better management of disaster risks — by highlighting key characteristics and values of the approach, key steps for adopting it, followed by case studies from around the world and ways forward for India.

Disaster Resilience and the Landscape Approach

Ecosystems are the structural and functional units of landscapes (Blair, J. M., Collins, S. L., & Knapp, A. K. , 2000). The health of ecosystems determines the health of the landscapes which they comprise. It is the services of these ecosystems that landscapes utilize to promote societal benefits like social well-being availability of resources, water, food, quality of life etc. External factors like climate change and social characteristics impacts and shape landscape dynamics (CARE and Wetlands International, 2017). Such factors often influence each other and lead to extreme scenarios ultimately leading to ecosystem and environmental degradation. External factors like climate change and social characteristics shape landscape dynamics by impacting the underlying ecosystems. Landscapes rely on the self-healing powers of their supporting ecosystems. Imbalances in these factors degrade ecosystem health and ultimately increase disaster risk through increased socio-ecological vulnerability making the landscapes unsustainable (CARE and Wetlands International, 2017).

The landscape approach exercises the intricate relationship connecting environment, people, economy and external factors to promote ecosystem resilience and facilitates an inclusive and participatory process for understanding risks and promoting scope for effective risk intervention planning (CARE and Wetlands International, 2017).

Landscape changes exacerbate disasters:

Landscapes consist of a mosaic of natural and modified ecosystems and are influenced by the interaction between the landscape layers- social economic activities, geo-ecological processes- and external factors which surround the landscape (CARE and Wetlands International, 2017). Ecosystems are central to a landscape and the smooth flow of the various ecosystem services is essential to maintaining the health of the landscape. The dynamic nature of landscape layers and external factors modify over time and influence disaster risks within a landscape. Landscape degradation is both, a driver and a consequence of disasters (UNDRR, 2022). Ecosystems within a landscape are extensively being modified to increase the supply of specific services. Such modifications result in a decrease in flow of other services as ecosystems produce multiple services simultaneously (UNDRR, 2022). Environmental degradation spanning landscape transformations reduces its capacity to meet ecological and social needs. Thus influencing the hazard vulnerability and exposure as well as hazard frequency and intensity. For example when landscape mosaics are altered, hampering their diversity, their adaptability is hampered, making them fragile and redundant to disasters.

Landscape restoration can help reduce disasters:

The UNISDR defines DRR as the practice and concept to reduce risks associated with disasters through systematic efforts that encompass analysis and management of causal factors including reduced-hazard exposure, reduced vulnerability of property and people, improved preparedness for adverse events and effective environment land and management (UNISDR, 2019). The duplexity of environmental degradation as a driver and consequence of disasters has been well established.

Environmental degradation diminishes its capacity to meet the socio-ecological needs by influencing: (i) frequency and intensity of hazards; and (ii) vulnerability and exposure to hazards. Improving the degraded environment through landscape restoration rebuilds the ecological integrity of the land. In addition, it reconnects fragmented landscape elements and improves biodiversity through enhancing ecological habitat mosaics, involving interest groups and communities (Whitbread-Abrutat, et al., 2013). Effective restoration strategies reduce if not, reverse degradation pressures by entailing a balance between and across a mosaic of interdependent land uses and providing multiple benefits and co-benefits. Restoration, thus, complements ecosystem conservation efforts by recognizing a suite of possible localised interventions (social, economic and ecological) intervention working within a holistic framework with long-term perspectives. Here the landscape approach also sets its role and relevance to DRR benefits.

Landscape approach for addressing extreme events risks:

'Disaster risk in a landscape will evolve due to climate change and other factors and dynamics, such as geo-ecological processes, social rules, economic trends, and development patterns' (Whitbread-Abrutat, et al., 2013). It is important to recognise that on a temporal scale, climate change is an aggravating factor that increases disaster risk and uncertainty in a landscape (WRI, 2022). In similar ways, climate change also is aggravating extreme event conditions. The landscape approach considers the entire landscape in which risks originate and manifests themselves; all the actors and factors which are influenced or impacted by risks, seeking robust solutions through interventions which are flexible to future changes (Whitbread-Abrutat, et al., 2013).

Characteristics and Value of Landscape Approach

The landscape approach helps deal with complex issues with high levels of uncertainties, including climate change and biodiversity loss (Arts, et al., 2017). It is also valued for its ability to make policies, governance and management more space and scale sensitive, particularly for cases where the multiscale nature of issues make it tough to address disaster risks and challenges as per jurisdictions of local decision making. Also, the landscape approach helps better understand interactions between humans and their surroundings (Görg, 2007).

Apart from these values, CARE Nederland and Wetlands International have identified eight key characteristics of the landscape approach, including:

1. The approach places communities at the centre, particularly disadvantaged and most vulnerable communities whose lives and livelihoods are increasingly threatened by the rising frequency and intensity of disasters, climate change risks and degraded ecosystems.

2. It takes into account all stakeholders impacted by disaster risks or contributing to it. It also accounts for factors influencing disaster risks, such as land and water use, infrastructure, climate change, and any other factor originating from within or outside the boundaries of community-facing risk.

3. It analyses the entire landscape in which risks emerge and manifest — as well as the interactions and interdependencies between ecosystems, humans and associated socio-economic systems. For instance, in responding to flood risks, the approach analysis target community's catchment upstream as well as area downstream to avoid unintended consequences outside the geographic area of interest.

4. The approach focuses on an analysis of surface water and groundwater hydrology and how it affects the community — as nearly 50% of all disasters are linked to water, weather and climate-related (World Meteorological Organization, 2021).

5. It integrates ecosystem management and restoration into disaster risk reduction while focusing on ecosystem provisioning services — which directly support livelihoods — and regulatory services which affect risk drivers.

6. The approach focuses on a long-term time horizon of 10 to 20 years to ensure long-term impact. In most cases, several projects form a part of one program for effective risk reduction and climate adaptation.

7. It manages trade-offs and seeks synergies between building resilient systems, development efforts and improving livelihoods.

8. The approach embeds flexibility to future changes in the disaster risk landscape by identifying solutions that are robust to deal with uncertainty.

In essence, the value of the landscape approach is linked to its interdisciplinary, multifaceted, holistic, and integrated strategy that brings together multiple stakeholders from different sectors to provide solutions for disaster risk reduction at multiple scales— facilitating an inclusive and participatory learning approach for understanding shared risk and planning risk intervention scenarios.

Steps for Adopting a Landscape Approach

There are various ways in which the landscape approach can be tailored, adopted and implemented. It differs across sectors and challenges the approach seeks to address. For disaster management, particularly disaster risk reduction, a seven-step approach was published by CARE Nederland and Wetlands International in 2017. These steps (indicated in Figure 3) do not follow a strict order and can occur simultaneously. Steps 1 and 2 are led internally by an organisation — with local experts and representatives — that aims to improve resilience in a given landscape. These initial two steps guide the organisation on how to proceed with the landscape approach. Local stakeholders take a lead from step 3 onwards — to collaboratively influence processes of the landscape approach, with possible facilitation by the initiating organisation (CARE Nederland & Wetlands International, 2017).

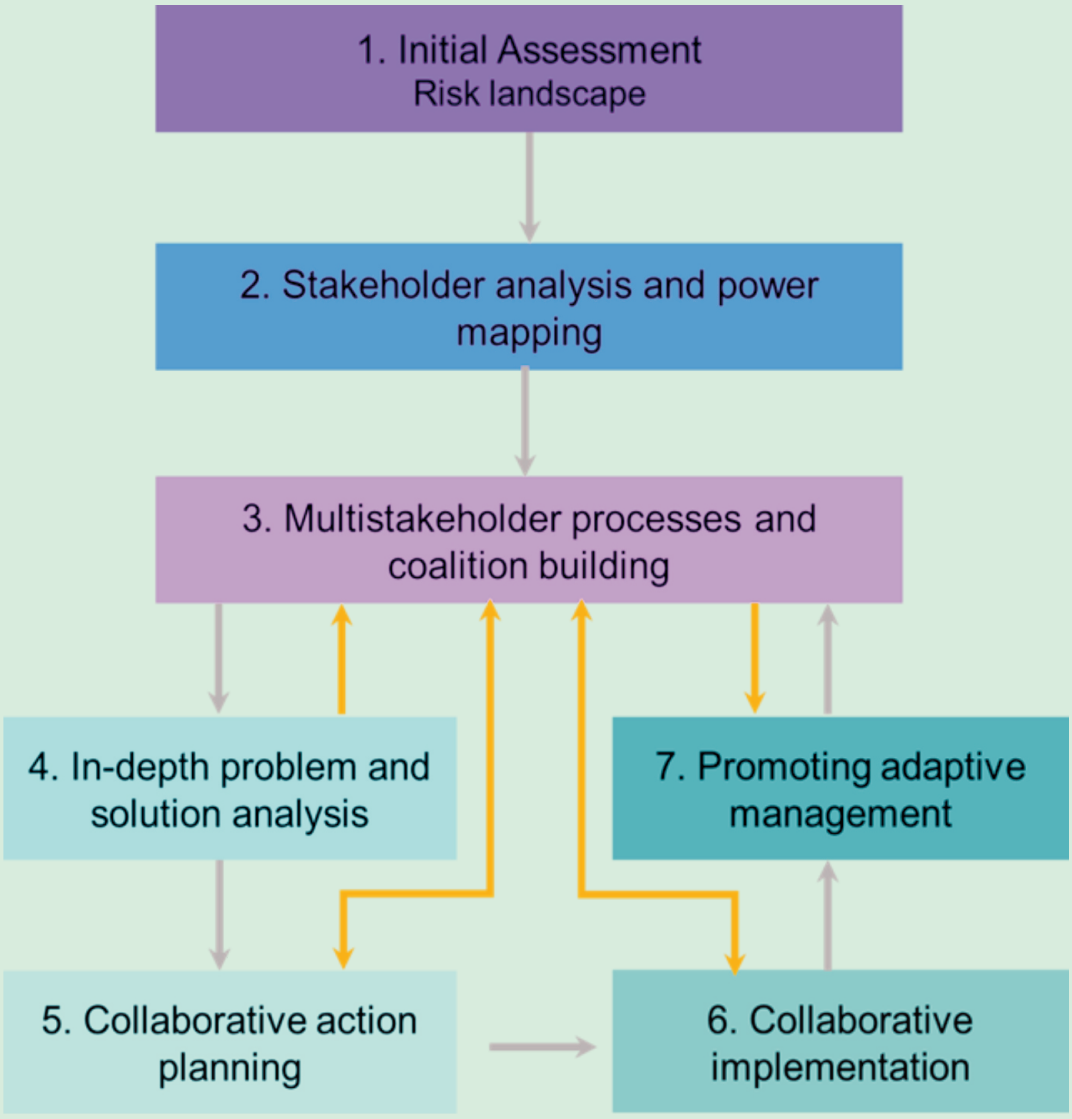


Figure 3: Steps for adopting landscape approach in disaster risk reduction
Developed by the author based on CARE Nederland & Wetlands International (2017)

These 7 steps — for the adoption of the landscape approach in climate change adaptation and disaster risk reduction — are guided by the Integrated Risk Management (IRM) framework of CARE Nederland and refer to all three key elements of this framework, including risk drivers, capacities and assets of communities to deal with shocks and stresses, and the enabling environment (indicated in Figure 4).

Risk drivers, within the IRM framework, focus on climate change, ecosystems degradation and natural hazards. Capacities to build community resilience focus on capacities to anticipate and foresee disasters, absorb shocks, adapt to evolving conditions and transform enabling environment and risk drivers to create systemic and individual changes on behaviours, local governance, market economics, decision making structures, policies and legislation. The sub-element of assets includes human potential, social capital, physical capital, economic resources, and natural resources (CARE Nederland, 2017).

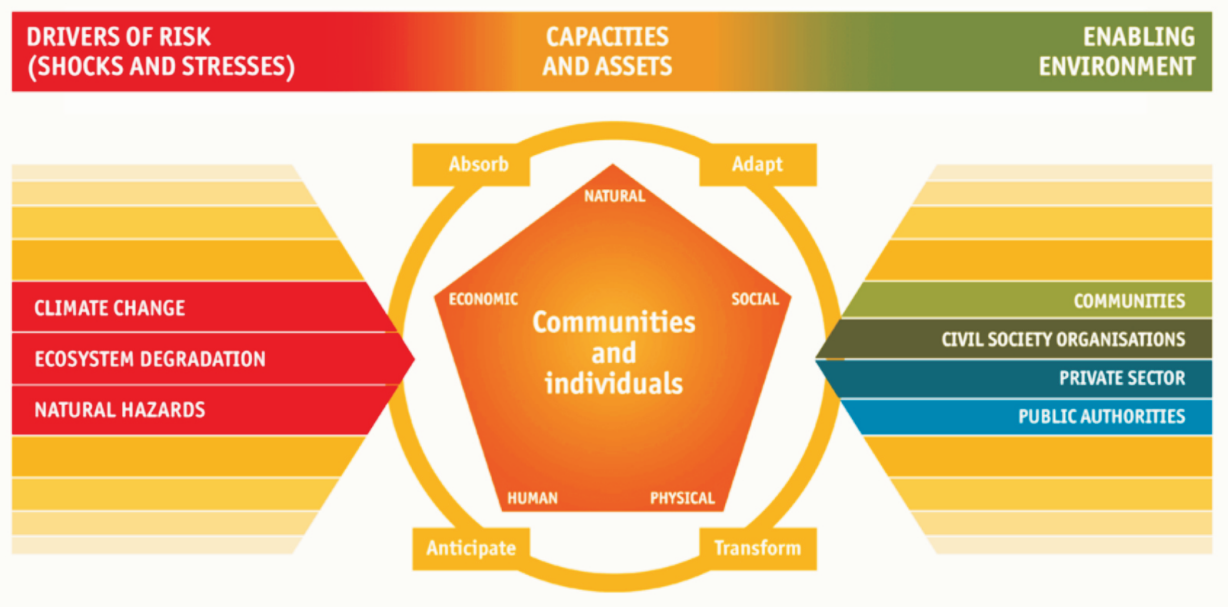


Figure 4: Integrated Risk Management (IRM) framework for increasing community resilience Image source: CARE Nederland (2017)

Embedding these three elements, the adoption of the landscape approach focuses on seven steps, including:

Step 1: Conducting an initial assessment of the risk landscape to determine a basic outline of a potential programme, concerns and root causes to address, the scale of landscape activities, achievable targets, stakeholders and experts to involve in various stages, and the vulnerabilities of the specific landscape and surrounding environment. This step determines whether or not a landscape approach should be adopted.

For this initial assessment, the starting point is the identification of a common concern that needs to be addressed in a landscape—such as a flood risk—followed by a determination of why and where the identified disaster originated, occurred and impacted people, places, ecosystems and economy. Additionally, a hydrological assessment plus soil and vegetation

analysis are conducted to understand interactions between disaster and livelihoods. Next, the socio-economic setting of the landscape is identified to determine the broad spatial boundaries of the landscape.

Next, the implementing organisation analyse its strengths and weaknesses in regards to the collected information to determine which expertise should be better organised to effectively address risks. Finally, spatial scales for risk management are defined which should be broad enough to respond to root causes of disaster risks and deliver multiple functions to stakeholders with diverse — and often competing — interests, and sufficiently small to effectively implement actions. In essence, the scale of the landscape can vary — it may be as small as a community or a watershed or as large as an entire river basin.

Step 2: Conduct an in-depth stakeholder analysis and power mapping to identify diverse motivations and develop value propositions for engaging these stakeholders in the process. This step also aims to explore if prior landscape initiatives exist, who are the stakeholders engaged in these pre-existing initiatives and for what purposes.

In this step, stakeholders are identified as per their relation to disaster risk, i.e. whether they are impacted by a disaster risk and/or contributing to it. Next, a capacity and vulnerability assessment is conducted to analyse stakeholders' vulnerabilities and capacities which can be strengthened. Spatial relations between different users of landscapes are also mapped to understand how land use by one actor can drive risks to livelihoods or businesses of another. In this mapping exercise, other external factors — including social, political, economic and institutional factors — are also considered.

Step 3: Stimulate multistakeholder processes to build on existing initiatives such as networks, roundtables, platforms, etc., or evolve bottom-up to foster ownership, and create a coalition of the willing and agree on core problems. Since the essential element of the landscape approach is stakeholder engagement in decision making through a multistakeholder, transparent and accountable process, this step is critical in the entire 7-step process.

In this step, it is important for all stakeholders to communicate with one another and consent on core problems from diverse perspectives. These problems can be selected and further prioritised based on their urgency, challenges and opportunities, and willingness of stakeholders to invest time, knowledge and/or monetary resources.

Step 4: Conduct a collaborative, in-depth problem and solution analysis to identify root causes without assigning blame, explore stakeholders' roles in relation to core problems and embed traditional, local and scientific knowledge. Essentially, this step revisits elements of the first two steps with deeper involvement of all stakeholders. Key elements of the step include the landscape of interest, external factors, common concerns, disasters, hydrology and land use, socioeconomic setting of the landscape and all actors who contribute to or are impacted by disaster risks.

The key outcome of this step is an improved and shared understanding of risk drivers and increased awareness of landscape—and associated challenges and opportunities—as well as

possible solutions and interventions to reduce disaster risk. Building on this, maps are produced to highlight risk drivers, trends of disaster risk, interventions and spatial effectiveness of these interventions.

Step 5: Collaborative action planning to develop landscape scenarios and agree on tasks, responsibilities and communication strategies in line with project or program funding, and division of the landscape into smaller and more manageable units to monitor risks.

The landscape scenarios are used to discuss and negotiate goals, vision and responsibilities, visualise integration of different land uses and identify and agree upon interventions — to reduce risks, enhance capacities and assets, and strengthen an enabling environment. These interventions are ranked in accordance with their costs and benefits, direct and indirect implications, trade-offs and synergies between interventions. Additionally, a plan seeking external support and resources is also drafted as all problems cannot be addressed in their entirety by one organisation.

Step 6: Organise the collaborative implementation of interventions that address drivers of disaster risk, capacities and community assets, and the enabling environment. In addition, the step aims to secure quick wins at the start of the implementation and link long-term risk reduction goals to socio-economic benefits. It uses synergies while avoiding negative impacts and trade-offs.

This step promotes stakeholder ownership and handover of the implementation process by stimulating stakeholder participation as change drivers, highlighting their achievements and reminding them of the predefined goals and targets. This handover is essential to ensure sustainable implementation of the landscape-scale efforts once the facilitating organisation has left the geography of interest.

Step 7: Promote adaptive management to deal with the complexity and uncertainty of increasing resilience at a landscape level. This step focuses on developing indicators to track changes in risk drivers, capacities and assets of communities, and the enabling environment. It often involves research institutions in monitoring and evaluation and uses the outcome of this monitoring and evaluation to improve and adapt landscape management plans and develop alternative strategies for collaborative action. In the process, the outcomes of the monitoring and evaluation exercise are communicated to all relevant stakeholders to preserve the momentum and keep them informed.

Throughout this step, flexible project management is emphasised. At the landscape level, monitoring and evaluation are often challenging due to multi-scale interventions, a large number of stakeholders, cross-sectoral nature of the approach. Yet, it needs to be conducted effectively by splitting the large landscape into projects that are easier to manage.

Frameworks of the Landscape Approach

The landscape approach can be used in practice in a variety of ways and using different frameworks. Two frameworks used for disaster risk reduction are the landscape governance framework and the landscape capability framework. The landscape governance framework

analyses relations between governance processes and landscapes. The capability framework elaborates on the capabilities required to achieve effective collaboration at the landscape level along with a package of strategic guidelines (Arts, et al., 2017).

The landscape governance framework builds on the notion of environmental governance whereby a set of regulatory processes, mechanisms, organisations and political actors influence environmental outcomes and actions. Apart from political actors, this form of governance comprises communities, businesses, NGOs and actions of governments (Lemos & Agrawal, 2006).

Institutional arrangements and governance mechanisms for landscapes vary widely and thus there is no single formula for good landscape governance. Irrespective of these differences, the framework comprises three key dimensions — discourse, institutions, and natural spatial conditions. Understanding the interrelationships between these dimensions helps strengthen the analysis of how politics and interactions among different actors at various levels of governance transform the local landscape (Görg, 2007).

Inherently, the framework is multi-level, multi-sector, and multi-actor in nature and thus requires mechanisms and strategies for aligning rules and coordinating decisions among these different levels, sectors and actors (Kozar, et al., 2014). For effective implementation of the framework, four performance criteria and corresponding indicators exist to monitor and evaluate progress in line with inclusive and sustainable development (de Graaf, et al., 2017). These include:

- Performance criterion #1: Inclusive decision making in the landscape, and it applies to decision making processes led by the government, businesses, and society. To evaluate performance as per this criterion, four indicators of inclusive decision making — transparency, participation, equity and accountability — in the landscape are used.

- Performance criterion #2: Collaborative culture. Rules and decision making in a landscape are guided by the corresponding social context. Effective landscape governance thus benefits from a collaborative culture in the landscape wherein stakeholders at different levels work towards the well-being of all members in the landscape community, and address exclusion. This culture also supports information sharing and the development of shared understanding of issues in the landscape — and thus initiation of collective action. Four indicators that can be used to evaluate the performance of this criteria are conflict resolution, resilience and innovation, knowledge sharing and learning, and sense of community.

- Performance criterion #3: Coordination across landscape sectors, levels and actors to amplify synergies and opportunities for collaborative action in the landscape. Five indicators are used to evaluate this criterion—including coordination of customary and formal governance, connectivity to national and international developments, vertical coordination among levels, horizontal coordination across sectors and jurisdictions, and integrated landscape planning.

- Performance criterion #4: Sustainable landscape thinking and action are critical elements of the framework that focus on nature-based solutions for using land and resource management. Five indicators are used to measure sustainable landscape thinking and action—including sustainable practices, presence of enabling rules, perceptions and knowledge of sustainability, implementation and enforcement, and promotion of sustainable practices.

Conceptualising landscape governance as a capacity, the Wageningen Centre for Development Innovation—and its partners—developed the landscape capability framework to reflect the ability of a landscape to overcome institutional barriers and power disparities via public-private dialogues, building consensus on stakeholders' interests, and crafting mechanisms for a particular landscape's stakeholders to meet, deliberate and learn. This capability framework identifies five specific capacities to:

- Understand the natural-ecological characteristics of a landscape as well as its socio-cultural identity and sense of place associated with the landscape;
- Embrace stakeholder diversity and facilitate multistakeholder collaboration across governance and spatial scales;
- Acknowledge and capitalise on landscape institutions and build new ones connected to wider policy frameworks and markets;
- Create marketable landscape values by fostering entrepreneurship, sustainable landscape business models, and attracting finance for various landscape initiatives;
- Scientifically manage resources and move towards participatory spatial planning and decision making.
- Summing up, various frameworks exist for the adoption and implementation of the landscape approach. One aspect that remains key across all the frameworks is that they are place-based.

Implementation of the Landscape Approach

The landscape approach has been implemented across the world for wide purposes such as integrated rural development, resource management, watershed management and floodplain management, to name a few. Often, organisations around the world are using the landscape approach for resource management and disaster risk reduction at different spatial scales but labelling it with different terminologies or labelling the approach differently. This has led to fragmentation of knowledge, slow progress in policy traction and unrequired reinvention of practices. In this section, a few of the many case studies of the landscape approach are elaborated.

A. Restoring Degraded Landscapes in Guatemala

Guatemala is home to the world-renowned Maya Biosphere Reserve where indigenous communities protect and sustainably manage nearly 450,000 hectares of forest ecosystems. Situated in Central America, 33% of the land area in Guatemala is covered by forests. However, outside the boundaries of community-managed protected areas, these forests have been suffering for a long time; more than 18,000 hectares of the forests are axed annually for their natural resources, expansion of agriculture, and livelihoods (Zamora-Cristales, et al., 2019).

In Guatemala's Southeastern Petén and San Marco, the Food and Agriculture Organization partnered with several stakeholders—including the National Forest Institute (INAB) and the Ministry of Agriculture, Livestock and Nutrition (MAGA)—to promote and engage in policy reform and develop pilot sites for restoration of degraded forest and other lands in the highlands of San Marco and Petén. A work plan covering 2015-16 was developed for project implementation by FAO in partnership with INAB and MAGA to regain the functionality of degraded ecosystems through forest-based restoration and improvement of local livelihoods—by enhancing food production, crop diversity and creation of value chains for the local rural communities (Food and Agriculture Organization, 2017).

This local landscape approach was aligned with the country's commitment to restore 1.2 million hectares of land by 2020. It relied on using local agroforestry systems that use traditional knowledge of the Maya Q'eqchí culture and combine local tree species with an understory of shrubs and crops. As participating communities are rooted in their Q'eqchí culture, restoration activities integrate these cultural values and traditions for an improved agroforestry system using the ramón tree (Brosimum alicastrum), banana, yuca and other crops. In this system, ramónis are used with nitrogen-fixing trees of Leucaena leucocephala and Gliricidia sepium. Other indigenous species used in the system include nutritious foods such as maize, chaya (Cnidoscolus chayamansa), cassava, and magical (Xanthosoma sagittifolium).

Progress is reported on several fronts and multiple forest and landscape restoration projects have been implemented as per the guidance of INAB. For instance, by imitating the structure of a forest and providing major food sources, this system has also created a habitat for wild animals. Moreover, the population of pollinators have recovered owing to the increased diversity of insects. In terms of policy progress, the program has supported the implementation of a forest policy PROBOSQUE or Promotion of the Establishment, Recovery, Restoration, Management, Production and Protection of Forests in Guatemala. This policy focuses on the restoration of the forest landscapes and provided a basis for the preparation of Technical Guidelines for practices and systems of forest landscape restoration (Valenzuela, et al., 2016). These guidelines guide forest dwellers and farmers on restoration practices.

INAB is also helping local landholders and indigenous communities—improve local incomes and food security, safeguard rare plants and animals, and expand carbon sequestration— by paying them to plant and manage millions of trees in damaged or at-risk areas via the PROBOSQUE program. Aiming for a win-win on poverty alleviation and landscape restoration, the PROBOSQUE program pays $2.45 per tree to reforest the land and $1.92 per tree that is grown along and within their farms in agroforestry systems. For every hectare of forest conserved, the government also pays $900 to encourage farmers to protect the remaining trees on their land.

Furthermore, the program has amplified exchange visits, knowledge exchange and learning between communities to promote landscape restoration on the ground. Both men and women were noted to be equally participating in the exchange of ideas with other farmers. In Petén, field trips have focused on restoration through production systems of cocoa, cardamom, and species such as achiote (Bixa orellana), cinnamon and vanilla, integrated with timber trees such as mahogany, cedar and other native timber species. In the pilot area of San Marcos, an exchange of restoration experiences was organized between community leaders of Ixchiguán, San José Ojetenam, Tacaná, Quetzaltenango and Totonicapán. Community leaders visited agroforestry combinations and plantations of an endemic tree called pinabete (Abies guatemalensis), which is used as a Christmas tree and can easily grow on degraded soils. Another trip was organized to learn about the recovery process of communal areas using white pine (Pinus pseudostrobus) and pinabete in order to protect water sources.

One of the key activities prioritised in this program was the training of technicians who will promote restoration activities. As part of PROBOSQUE, technicians were also hired at the municipality level to prepare management plans for landscape restoration and fulfil the target of restoring 100 hectares of degraded land in San Marcos and 300 hectares in Southeast Petén with the support of MAGA technicians.

At technical and political levels, Guatemala has made significant progress in strengthening decision-making in forest landscape restoration and strengthening the collaboration between communities, municipalities, academia and international organizations. In the entire landscape approach for Petén, cultural values are embedded into land management. This initiative sets a precedent for the conversion of unfertile land into a productive environment for food production while developing a functioning ecosystem, reducing disaster risks and value chains for local communities.

B. Landscape Returns for Businesses in Spain's Altiplano

The landscape approach is often used to reduce disaster risks for specific geography and community living in this geographic landscape. Use cases highlighting the utility of the landscape approach in reducing disaster risks to businesses are limited. One of these limited examples is documented for southwest Spain wherein the landscape approach was used to guide business model for a local landscape of farmers, nature organisations, entrepreneurs and governments—with the support of an impact organisation called Commonland that works on large-scale ecological restoration projects by involving investors, companies and entrepreneurs in long-term partnerships with land users and farmers (KPMG, 2020).

This local landscape, called the Altiplano Esteporia landscape, is affected by water scarcity, extreme climate conditions and soil erosion. Yet, there is a potential to restore a million hectares of land-based on landscape approach and sustainable business practices. Altiplano is characterized as a semi-arid steppe landscape—a transition between desert and forest landscape. The landscape receives too little rain to grow a forest but the soil is too moist to support a desert landscape. In this high plateaued landscape, 600-to-1200 metres above sea level, water has always been scarce. The region has relatively smooth relief and skeletal soil that has low organic matter content and low depth—thereby limiting the capacity to retain water. Extreme climate conditions such as high temperature and intense rainfall erode nearly 20 tons per hectare of topsoil every year.

Despite these unfavourable conditions, the Altiplano has a long-lived history and cultural significance. The landscape has caves in the mountains which have evidence of human settlements dating back to the 19th century. Also, the landscape has long been used for dryland farming of cereals, herding sheep and cultivation of Esparto grass that is used for basket making. Since the introduction of synthetic fibres in 1950, the esparto industry has collapsed and forced many to move away from the region to find a living elsewhere. With time—and cumulative impact of deforestation, depopulation, intensified land use and changing weather patterns—the landscape has degraded significantly and led to increased desertification and risk of soil erosion.

Despite various social, economic and environmental challenges limiting the production of food and regeneration of vegetation—amplified by rural abandonment and lack of management of soil—the landscape is still used for agriculture. In fact, the Altiplano landscape is known for having the largest area in the world dedicated towards rain-fed almond production—across 100,000 hectares. It is also known for the herding of Segureño lamb. In essence, there is a huge potential for the landscape to reduce risk reduction, establish sustainable business cases and move towards a more sustainable, resilient and economically viable future of the landscape.

AlVelAl—a farmer association—has been working on an initiative in the Altiplano that unites 5 regions in the Southeast of Spain, including Altiplano de Granada, Los Veléz, Alto Almanzora, Guadix and the Northeast of Murcia. This region inhabits approximately 250,000 people. The initiative gathered momentum in 2014 when Common land hosted a workshop to co-create a large-scale restoration plan for the landscape using its 4 returns approach for the landscape—focusing on inspiration, social capital, natural capital and financial capital. By

2034, Commonland and AlVelAI aim to create a regenerative landscape where nature and agriculture co-exist with people living and working in the region; the depopulation of the landscape is reversed and young people return to the Altiplano (Marin, 2022).

Since 2014, AlVelAI and Commonland have been working in collaboration with other local stakeholders to realise this long-term vision. In this process, the group divides the landscape into three zones: natural zone, combined zone and economic zone. The natural zone of the territory is vast and critical for ecological services—such as the provision of clean water, habitat for biodiversity, and a stable climate. Many parts of this natural zone of the Altiplano landscape are significantly degraded and need restoration based on scientific understanding of the landscape. A myriad of projects is being led by AlVelAI and Common land and other stakeholders to regenerate this natural zone. For instance, AlVelAI has been working on substituting pine forests with endemic species and creating water harvesting infrastructure. It is also restoring public lands to create biodiversity hotspots.

The combined zone in this landscape primarily consists of rain-fed 100,000 hectares of almond groves that are affected by degraded soils, poor water infrastructure and loss of biodiversity. To reverse the ecological demand, the group is applying green production and regenerative farming techniques that restore soil and retain water. Some practices include the use of compost, covering crops and perennial plants so that the soil is never exposed. By 2034, the group aims to move from 'niche to norm' and thus normalise restoration.

For the economic zone, unlocking market demand for the four returns—on financial, social and natural capital, and inspiration—is key for the group. AlVelAI has been working with local producers to develop the almendrehesa concept, an integrated agroforestry system wherein the production system combines the production of almonds, local trees, aromatic oil crops, as well as beekeeping, and lamb rearing. The production of this concept allows farmers to generate a higher margin on their sustainable produce and invest further in landscape restoration. Other business cases for olive oil and compose are in development. In addition, AlVelAI is establishing and expanding supply and value chains for local produce to tourist destinations. Apart from these zone-dedicated projects, AlVelAI has launched a myriad of projects and landscape initiatives on the restoration of terraces, creating windbreaks to retain soil and water while enhancing local biodiversity and expanding the green cover.

Across the three zones, the landscape approach focuses on natural zone restoration, facilitating the transition to regenerative agriculture, four returns business development, and inspiration. In terms of progress, the landscape approach led by 300 AlVelAI members and local stakeholders has roped in 80 farmers to restore the landscape, another 45 farmers to capture water in the landscape, and 12 farmers to roll out regenerative practices on the entire farm. Overall, more than 85,000 trees have been planted in the region since 2017 and 25,000 hectares of the 1 million hectare landscape have been improved with regenerative management. The range of products sold in the market has expanded as well—to include organic almonds, wine, cereals, honey, aromatic herbs and olives (Dudley, et al., 2020).

In 2020, KPMG published a study—commissioned by Commonland—highlighting the returns from this landscape approach. Financial returns were evident in increased earnings of farmers, traders and the tourism sector, job creation, tax generation and reduced unemployment costs and losses from disaster risks. Natural capital returns were noted in improved water retention and local water availability, restoration of the natural landscapes, increased carbon sequestration—which can be monetised if a voluntary carbon market is accessible in the near future—and increase in crop yield from pollination and reduction in soil erosion. By 2034, 60,000 hectares are envisaged under regenerative farming, and another 25,000 hectares are proposed for corridors between three established parks in the landscape.

The social capital returns were calculated using proxy indicators of education, security, employment and job diversification. Inspirational returns were evident amid local communities for whom restoration ignited a sense of purpose. By 2034, the initiative aims to inspire and mobilise 800 farmers to regenerate the landscape (KPMG, 2020).

Embedding key principles of the landscape approach, this project's focus on landscape restoration amplified positive returns for key stakeholders—including private investors, farming communities and governments. It provides a model for calculating the monetary value of multifaceted returns emerging from landscape restoration.

C. Post-Disaster Reconstruction in Pakistan

The landscape approach is an effective approach to reduce disaster risk, as evident in the case of Pakistan which applied the approach for management of its watersheds to increase the resilience of communities that were affected by an earthquake on October 8, 2005. Measuring 7.6 on the Richter scale, the earthquake shook the Kashmir region, along with sections of India, Afghanistan and Pakistan. Over 80,000 lives were lost and another 4 million were left homeless. In the aftermath of this earthquake, landslides and landslips affected 10% of hillside arable land, forests and rangelands in Pakistan (Food and Agriculture Organization, 2006). Flash floods and mudslides destroyed crops, plantations and livestock. Critical infrastructure was disrupted as well.

As part of the response to the 2005-earthquake, FAO led a program for disaster risk reduction and rehabilitation in Pakistan through watershed management from 2007 to 2011. It was executed by the Pakistan Earthquake Reconstruction and Rehabilitation Authority in collaboration with FAO and with funding from the Swedish International Development Agency (Marquis, 2015). Central to the project was controlling hydrogeological hazards through collaborative watershed management at the village level and across 17 watersheds.

For each of these 17 watersheds, a landscape approach was followed and combined landslide stabilisation, improved natural resource management and agricultural production. For project implementation, each watershed was first delineated and damage, hazard and resourced were mapped using participatory rural appraisal methods. Next, community-based watershed management committees (WMC) were formed and integrated watershed management plans (IWMP) and land use plans were developed. Once the mapping and planning exercise was done,

priority activities were implemented and capacities were developed of beneficiary members and staff of technical agencies of the government.

On the ground, slopes were stabilised through check dams, retention walls and bioengineering. Other projects implemented at varying scales included forest regeneration, repair of irrigation channels and agricultural terraces, improvement of livestock health, the establishment of tree nurseries, fruit tree orchards and kitchen gardens. Innovations across institutions and governance systems were tested as well. Traditionally, District Forest Offices (DFO) planned and implemented forest management efforts. With WMC established, communities were empowered to plan and prioritise activities while DFOs and other government agencies provided support in implementation (Food and Agriculture Organization, 2012).

Blending participatory planning into a landscape approach, the project embedded local resilience to reduce disaster risks. Though floods in 2010 again damaged the region significantly, communities were better prepared to cope with the disaster. In fact, flood damage in the project's watersheds was comparatively low because of the restored landscapes. Communities gained confidence in their ideas, skills and ability to influence positive changes in their local environment while improving livelihoods. WMCs tested by the FAO continues to meet on a regular basis to assess and identify activities that need to be carried out in the landscape. With women and other vulnerable groups playing a stronger role in the WMCs, local communities are now better equipped to voice their concerns and request support from line agencies.

D. Bonn Challenge and Forest Landscape Restoration in India

Committed to achieving the targets of 'The Bonn Challenge", India pledged to restore 13 million hectares of degraded and deforested land by 2020 with an additional 8 million hectares by 2030. The country's important ecosystems including forests, coasts and grasslands face threats of degradation, deforestation, habitat modifications and fragmentation. Pan India a total of 9,810,944.2 hectares of land was restored between 2011 to 2017 (Borah, B., Bhattacharjee, A., & Ishwar, N. M, 2018). The government, private and non-government sectors have taken up Forest Landscape Restoration (FLR) as a potential tool to strike a balance between social and environmental needs. Foundation for Ecological Society (FES), an NGO committed to reviving, strengthening or restoring land conservation, water resources and forest in the country took up the forest landscape restoration by working with community institutions in three Indian states.

The forests Andhra Pradesh, Odisha and Madhya Pradesh are mostly broad leaves deciduous. Local communities are dependent on them and reap the benefits of provisional, cultural, supporting and regulatory services of these ecosystems. However, they are exploited for resources, extraction of fodder, fuelwood and Non-Timber Forest Products (NTFPs). A gamut of complex reactions triggered by the forest and land degradation impacted the local people, biodiversity and ecological processes (Borah, B., Bhattacharjee, A., & Ishwar, N. M, 2018).. Soil erosion, water table depletion and loss of habitat for local flora and fauna were the most common challenges. Habitat loss at an alarming rate surged the rate of man-animal conflicts.

More so, invasion by Lantana camara, an Alien Invasive Species (AIS), and frequent forest fire instances were reported which hampered the native biodiversity by altering local soil and moisture properties. It aggravated the existing disaster vulnerability of the three states to drought and floods. The higher dependence of the local communities on the adjoining forests made it more challenging, as any threat would have made the situation more vulnerable. Building upon this reliance, restoration activities were planned, collaborating with the local forest dependent communities.

Following the landscape restoration approach, Forest Landscape Restoration (FLR) was takenup. Community inclusive restoration planning promoting suitable plantation models, addressing stressors like grazing, food and fodder collection and uncontrolled fires was considered. In addition, models for fair and equitable sharing of profits and benefits generated form revived forest lands among all stakeholders were also chalked out. Involvement of local communities was imperative at every stage; local work force carried out site specific restoration work with fixed wages under government schemes. Village communities were engaged in a blend of on-ground initiatives, capacity development and awareness generation actives for the forest dependent activities. Local biodiversity and climate data was collected to set reference points. Site preparation by soil treatment followed by removal of invasive species was done and introduction and plantation of native species was carried out. Nursery of native saplings were established and reported a sapling survival rate of 70% (Borah, B., Bhattacharjee, A., & Ishwar, N. M, 2018).

A total of 1,002,446 hectares of forest land was restored in all three states (Borah, B., Bhattacharjee, A., & Ishwar, N. M, 2018). Substantial ecological and socio-economic changes were reported. With an observed increase of native vegetation cover; water resource degradation, soil erosion and man animal conflicts reportedly reduced (fig gives the state wise distribution of restored lands). The restoration efforts led to increase in forest productivity, which enhanced the local livelihood conditions. Villagers had more access to fodder, fuelwood and NTFPs elevating their social and economic status.

Challenges for the Adoption of Landscape Approach

1. The landscape approach looks at ecosystem services provision not just for sites or a specific biome or an ecosystem—it encompasses all. To restore the entirety of a landscape, the approach looks at ecosystem services, optimisation of different land uses and trade-offs at scale. Implementation of landscape approach requires integration of different sectors and interests. It is a long-term process that requires the understanding of multifaceted functions of ecosystems, water and nutrient cycles, land management practices, and the interaction between all these processes. It can be used to optimise land use and management at local, subnational and national levels and thereby contribute towards multiple Sustainable Development Goals.

2. Despite the multifaceted benefits of the landscape approach, its adoption around the world is limited and slowed by a number of challenges. One key challenge is the conventional policy approach that assumes that land can have only one priority objective and other objectives need to be fulfilled by trade-offs. Landscape initiatives also often fail to mobilise investments and finance to implement activities aligned with landscape approach action plans.

3. Sectoral policies siloed planning and decision making further hinder the adoption of the landscape approach and development of territories that aim to achieve multiple and cross-sectoral objectives. Even with the decentralisation of governance, there is often a lack of clarity on the roles and responsibilities of government agencies at various levels of governance. Moreover, negotiation and engagement processes that involve diverse stakeholders at a landscape scale are not adequately supported by current policy and institutional frameworks in most parts of the world.

4. Lastly, public investment, management incentives or policy and financial investments for land and resource management are often counterproductive. For instance, for local farmers, environmentally degrading practices may be more profitable in the short run. They may also lack access to financial resources to reduce disaster risks.

Recommendations for Action

Landscape approaches are suitable for realising social, economic and ecological objectives linked to a landscape. Since the approach involves a range of stakeholders, the approach can easily contribute to achieving a range of Sustainable Development Goals and objectives. (Schütz, 2019). For an effective adoption and implementation of the landscape approach, however, policymakers and government agencies need to initiate a cocktail of systemic changes and actions at various levels of governance (Shames, et al., 2017). Some of the key recommended actions include:

Setting a vision for sustainable landscape into strategies and policies can help manage conflicts between economic growth and landscape conservation or protection. As a way forward, governments can take the first lead to create a strong shared vision for multiple objectives of a sustainable landscape—in consultation with key stakeholders—and embed this vision into relevant strategies and policies at different jurisdictional levels or levels of governance.

Active participation of public institutions, national governments, authorities, and ministries in the planning and implementation of the landscape approach. Public institutions can initiate a landscape approach and with partner government agencies support multistakeholder processes. Concerned government agencies can thus provide technical advisory for policy options, raising awareness, etc.

Harmonising sectoral plans and institutional frameworks at national and state levels to eliminate unintended negative interactions, such as competition, linked to multiple sectoral plans. Governments can further this harmonisation by aligning objectives, budgets and capacities across agencies responsible for different sectors. In addition, the national government would need to establish incentives to promote cross-sectoral corporation and coordination between state institutions at the sub-national level.

Empowering civil society and other local actors in multistakeholder processes to build partnerships for landscape approach and associated initiatives. Public policies can strengthen civil society's engagement in landscapes by supporting and shifting local decision-making power to local levels while empowering relevant stakeholders to participate in these local decision-making processes.

Ensuring equal partnership of women and young people, particularly in planning and decision-making processes. In the agriculture landscape, women play a large role. Disadvantages to marginalised groups of women and youth should be offset by capacity development.

Recognising negotiation and security of rights and responsibilities over land and resources as key components of landscape-scale planning and management. A combination of negotiation and security is representative of who is allowed to use a particular resource, to what extent,

and whether the allowed use will prevail in the long term. Depending on the landscape and local circumstances, the ownership pattern, access, use, rights, ecosystem services may vary. For landscapes where stakeholders do not clear division of rights and responsibilities, governments should establish mechanisms for conflict resolution.

Developing a regulatory framework that supports sustainable land use in general as well as coordinates and enforces collaborative landscape action. This can be realised by governments by aligning land-use zoning and planning as per landscape goals. Incentives and performance-based regulations can also amplify the adoption of the landscape approach—provided that governments establish requisite mandate at national and subnational levels, build capacities and coordinate regulations across sectors and different scales of a landscape.

Incentivising public and private investments for landscape initiatives through policy support and public finance. Governments can help by developing fiscal and tax policies, screening criteria for landscape investments, and allocating a portion of public revenues for the landscape approach.

Building capacities for adoption and implementation of landscape approaches. Training and education can help build capacities for the planning, coordination and implementation of landscape approaches. Public institutions, governments should support capacity building for the analysis and dissemination of production methods.

Summing up, collaborative planning, negotiation and implementation at landscape scale are critical for the identification of synergies and management of trade-offs among diverse stakeholders. Countries shall thus develop development strategies that highlight national and subnational priorities on disaster risk reduction via the landscape approach— in the context of Sustainable Development Goals.

References

Arts, B. et al., 2017. Landscape Approaches: A State-of-the-Art Review. Annual Review of Environment and Resources, Volume 42, pp. 439-463.

Borah, B., Bhattacharjee, A., & Ishwar, N. M. (2018). Bonn challenge and India: Progress on restoration efforts across states and landscapes. New Delhi, India: IUCN and MoEFCC, Government of India. doi: https://doi. org/10.2305/IUCN.

CARE Nederland & Wetlands International, 2017. A landscape approach for disaster risk reduction in 7 steps, CARE Nederland & Wetlands International: Hague, The Netherlands.

CARE Nederland, 2017. Integrated Risk Management explained, Hague, Netherland: CARE.

de Graaf, M., Buck, L., Shames, S. & Zagt, R., 2017. Assessing landscape governance: a participatory approach, Wageningen, the Netherlands: Tropenbos International & EcoAgriculture Partners.

Dudley, N., Smallwood, M. & Chatterton, P., 2020. Landscape Sourcing: Sustainable business using the sustainable approach, Vienna, Austria: Landscape Finance Lab.

Food and Agriculture Organization, 2006. Project to assist ERRA and its partners in restoring livelihoods in the earthquake-affected areas of Pakistan, Rome, Italy: Food and Agriculture Organization.

Food and Agriculture Organization, 2012. Mainstreaming climate-smart agriculture into a broader landscape approach: background paper for the Second Global Conference on Agriculture, Food Security and Climate Change, Hanoi, Vietnam: Food and Agriculture Organization.

Food and Agriculture Organization, 2017. Landscapes for life: approaches to landscape management for sustainable food and agriculture, Rome, Italy: Food and Agriculture Organization of the United Nations.

Fowler, P., 2002. World Heritage Cultural Landscapes, 1992-2002: a Review and Prospect. In:

P. Ceccarelli & M. Rössler, eds. Cultural Landscapes: the challenges of conservation. Ferrara, Italy: UNESCO World Heritage Centre, pp. 16-32.

Görg, C., 2007. Landscape governance. The “politics of scale” and the “natural” conditions of places.. Geoforum, Volume 38, pp. 954-966.

Grantham, H.S. et al., 2020. Anthropogenic modification of forests means only 40% of remaining forests have high ecosystem integrity. Nature Communications, Volume 11, pp. 1-10. Jones, M., 2003. The Concept of Cultural Landscape: Discourse and Narratives. In: H. Palang &

G.Fry, eds. Landscape Interfaces: Cultural heritage in changing landscapes. Dordrecht, Netherlands: Springer-Science+Business Media, pp. 21-51.

Khokhar, T. & Tabary, M. E., 2016. Five forest figures for the International Day of Forests, Washington, D.C.: World Bank.

Kozar, R. et al., 2014. Toward Viable Landscape Governance Systems: What Works?, Washington, D.C.: EcoAgriculture Partners, on behalf of the Landscapes for People, Food, and Nature Initiative..

KPMG, 2020. The true returns of large-scale holistic landscape restoration (4 Returns), Amsterdam, Netherlands: KPMG & Commonland.

Leighly, J. & Speth, W. W., 1995. The Emergence of Cultural Geography. Yearbook of the Association of Pacific Coast Geographers, Volume 57, pp. 158-180.

Lemos, M.C. & Agrawal, A., 2006. Environmental Governance. Annual Review of Environment and Resources, Volume 31, pp. 297-325.

Lindenmayer, D. et al., 2008. A checklist for ecological management of landscapes for conservation. Ecology Letters, 11(1), pp. 78-91.

Mainka, S.A. & McNeely, J., 2011. Ecosystem Considerations for Postdisaster Recovery: Lessons from China, Pakistan, and Elsewhere for Recovery Planning in Haiti. Ecology and Society, 16(1).

Makino, Y., Hofer, T., Azdad, M. & Bari, F., 2020. Resilient Watershed Management: Landscape Approach to Climate Change and Disaster Risk Reduction. In: K. Sassa, et al. eds. WLF 2020: Understanding and Reducing Landslide Disaster Risk. Kyoto, Japan: Springer, pp. 499-506.

Marin, E., 2022. Revitalizing land and community in the Altiplano. [Online] Available at: https://4returns.commonland.com/landscapes/revitalizing-land-and-community-in-the-altiplano/ [Accessed 28 February 2022].

Marquis, G., 2015. Reducing disaster risk in Pakistan through watershed management. Unasylva, 66(243/244), pp. 19-24.

Reed, J., Deakin, L. & Sunderland, T., 2014. What are 'Integrated Landscape Approaches' and how effectively have they been implemented in the tropics: a systematic map protocol. Environmental Evidence, 4(2), pp. 1-7.

Routley, N., 2018. This is how humans have impacted the world's forests, Geneva, Switzerland: World Economic Forum.

Rutledge, K. et al., 2011. Landscape. [Online] Available at: www.nationalgeographic.org/encyclopedia/landscape/. [Accessed 18 February 2022].

Sapkota, L. M., Jihadah, L., Sato, M., Greijmans, M., Wiset, K., Aektasaeng, N., ... & Gritten, D. (2021). Translating global commitments into action for successful forest landscape restoration: Lessons from Ing watershed in northern Thailand. Land Use Policy, 104, 104063.

Sayer, J., 2009. Reconciling conservation and development: are landscapes the answer?. Biotropica, Volume 41, pp. 649-652.

Sayer, J. et al., 2013. Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. Proceedings of the National Academy of Sciences of the United States of America, 110(21), p. 8349–8356.

Schütz, K., 2019. Landscape approaches: Background paper, Bonn, Deutschland: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Shames, S.A., Heiner, K. & Scherr, S. J., 2017. Public policy guidelines for integrated landscape management, Virginia, USA: EcoAgriculture Partners.

UNESCO World Heritage Centre, 2008. Operational guidelines for the implementation of World Heritage Convention, Paris, France: United Nations Educational, Scientific and Cultural Organisation.

Valenzuela, O., Rodas, O. & Hillbrand, A., 2016. The Forest and Landscape Restoration Mechanism. [Online] Available at: www.fao.org/in-action/forest-landscape-restoration-mechanism/436577/ [Accessed 1 March 2022].

World Bank Group, 2022. Forest area (sq. km). [Online] Available at: https://data.worldbank.org/indicator/AG.LND.FRST.K2 [Accessed 21 February 2022].

World Meteorological Organization, 2021. Water-related hazards dominate disasters in the past 50 years, Geneva, Switzerland: World Meteorological Organization.

Zamora-Cristales, R. et al., 2019. 7 Ways Governments Can Invest in Farmer-led Land Restoration, Washington D.C.: World Resources Institute.

About the Authors

Ms Mahak Agrawal, Officer of Research, Center on Global Energy Policy, Columbia University, New York City



Prof Anil Kumar Gupta, Director of Projects & Head, Environment Climate & Disaster Risk Management Division, NIDM, Government of India, Delhi



Ms Pritha Acharya, Research Associate, CAP-RES, NIDM, Government of India, Delhi



Cover Photo & Design Credit:
Pritha Acharya, Research Associate, CAP-RES, NIDM

About CECR:

The National Institute of Disaster Management (NIDM) was constituted under an Act of Parliament with a vision to play the role of a premier institute for capacity development in India and the region. Under the Disaster Management Act 2005, NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management.

NIDM has a dedicated division for Environment, Climate and Disaster Risk Management (ECDRM) which has been designated as a Centre of Excellence on Climate Resilience (CECR) under the National Action Plan for Climate Change and Human Health (NAPCCHH). The CECR is implementing six research projects namely Climate Adaptive Planning for Resilience and Sustainable Development in Multi-hazard Environment (CAP- RES) with support of DST-Govt of India, National Agriculture Disaster Management Plan (NADMP) funded by the Ministry of Agriculture & Farmers Welfare, Health Resilience and Capacity Building (HER- CAP) with WHO, Crisis Management Plan for Dealing with Contamination of Water Bodies (CMP-WB) funded by CPCB, Disaster Management Plan for Ministry of Environment, Forest and Climate Change (NEFC-DMP) with the support of MoEFCC and Disaster Management Plan for the Dept. of Chemicals and Petrochemicals (NCPC-DMP) supported by DCPC, MoC&F. It also collaborates with a number of international and national organizations working in the areas of climate change adaptation, resilience, disaster management and disaster risk reduction.

About CAP-RES Project:

“Climate Adaptive Planning for Resilience and Sustainable Development in Multi-Hazard Environment (CAP- RES)” aims at developing and implementing capacity building including a knowledge and training support system for wider use by related institutions and training centres across sectors and regions. The CAP-RES focuses on three specific regional contexts, i.e. Indian Himalaya Region (special reference to North East), Coastal region and Central-western region. Region-specific climate-related hazard complex, including flood, drought, water scarcity, forest fire, cyclone/storm surge, coastal erosion, slope erosion/landslide, windstorms, heat wave, disease epidemics, industrial/chemical risks, etc.

CAP-RES aims at value-addition to programme sub-areas of the NMSKCC by engaging with the institutions/research centres and network of experts, researchers and practitioners, across the following 5 key sub-sets of the project focus:

- Green Growth and Disaster Risk Reduction
- Resilient Agriculture Systems
- Public Health Resilience
- Climate Proofing Disaster Relief and Recovery
- Environmental Policy Instrument in Disaster Risk Reduction

Other publications under CAP-RES

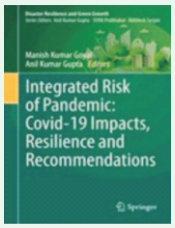


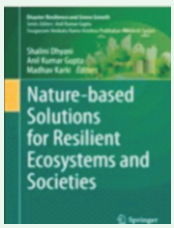




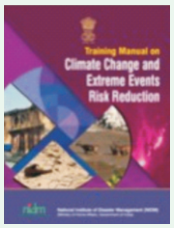


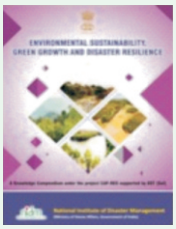


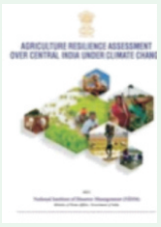


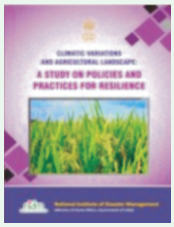








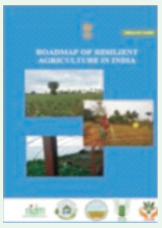






























Resilient India - Disaster Free India

National Institute of Disaster Management
(Ministry of Home Affairs, Government of India)
Plot No.15, Pocket 3, Block-B, Sector-29, Rohini, Delhi-110042
Email: ed.nidm@nic.in | Website: https://nidm.gov.in

ISBN No.: 978-81-957965-6-4
9 788195 796564