



**GOVERNMENT OF NEPAL**

# **NATIONAL ADAPTATION PLAN (NAP)**

**2021–2050**

**SUMMARY FOR POLICYMAKERS**

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# Abbreviations

ADB	Asian Development Bank
AFS	Agriculture and Food Security
B (bl)	Billion
CBD	Convention on Biological Diversity
CCA	Climate Change Adaptation
CCMD	Climate Change Management Division
CFM	Climate Finance Management
CoP	Conference of the Parties
DHM	Department of Hydrology and Meteorology
DMG	Department of Mines and Geology
DRRM	Disaster Risk Reduction and Management
EWS	Early Warning System
FBWC	Forests, Biodiversity and Watershed Conservation
GCF	Green Climate Fund
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
GESILG	Gender Equality, Social Inclusion, Livelihoods and Governance
GLOF	Glacial Lake Outburst Flood
GoN	Government of Nepal
HDWS	Health, Drinking Water and Sanitation
IPCC	Intergovernmental Panel on Climate Change
ITPI	Industry, Transport and Physical Infrastructure
LAPA	Local Adaptation Plans for Action
LDC	Least Developed Country
LEG	LDC Expert Group
LNOB	Leave- <del>No</del> -One-Behind
M (ml)	Million
MoITFE	Ministry of Industry, Tourism, Forests and Environment
MoFE	Ministry of Forests and Environment
MoFSC	Ministry of Forests and Soil Conservation
MoSTE	Ministry of Science, Technology and Environment
MoHA	Ministry of Home Affairs
MR&R	Monitoring, Review and Reporting
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NPC	National Planning Commission
NPR	Nepalese Rupee
RUS	Rural and Urban Settlements
SDG	Sustainable Development Goal
TNC	Third National Communication
TNCH	Tourism, Natural and Cultural Heritage
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VRA	Vulnerability and Risk Assessment
WASH	Water, Sanitation and Hygiene
WB	World Bank
WRE	Water Resources and Energy

# 1 INTRODUCTION

Climate change threatens to undermine the historical socioeconomic achievements of Nepal. Nepal is one of the most climate change vulnerable countries and the climate impacts are more profound due to the country's mountainous topography and its abrupt ecological and climatic transitions, combined with a low level of development and a reliance on natural resource-based livelihoods and embedded poverty. Nepal has already experienced the impacts of climate change including changes in temperature and precipitation which range from drought in Tarai region, to melting glaciers, to reductions in snowfall that impact livelihoods, tourism, and ecology in the mountain regions, to changes in the amounts and intensity of rainfall contributing to floods and landslides in the mid-hills and downstream. Nepalese life and livelihood are at high risk from these impacts that include reductions in agricultural production, food insecurity, damaged infrastructure, and reduced water supply, among many.

Adaptation to the adverse impacts of climate change is the priority for Nepal, and National Adaptation Plan (NAP) sets out a framework to integrate adaptation across sectors and levels of government. The plan sets out short-term priority actions to 2025, as well as medium-term priority programmes to 2030 and long-term adaptation strategic goals to 2050 that aims to assist Nepal to better integrate actions and strategies to address climate risk and vulnerability in development planning and implementation. The short-term and medium-term actions are designed to help the Government of Nepal achieve the adaptation actions set out in its 2020 Nationally Determined Contribution (NDC). This NAP also serves as Nepal's instrument of Adaptation Communication, a requirement of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC).

The Ministry of Forests and Environment (MoFE), Environment Protection and Climate Change Management National Council and the Inter-Ministerial Climate Change Coordination Committee, led and coordinated the development of the Nepal NAP and its associated iterative process. This NAP was formulated as an integral part of the country's NAP process, and was informed by an extensive body of research and guided by input from a range of state and non-state stakeholders. Delivering the adaptation actions will be a shared responsibility between the national, provincial, and local governments. The NAP will guide the climate change response of the three levels of government, civil society, the private sector, and other actors; and set Nepal on a pathway of socio-economic prosperity by building a climate-resilient society and reducing the risk of climate change impacts on people and ecosystems.

## 2 NATIONAL CIRCUMSTANCES

### PHYSIOGRAPHY

Nepal is a small landlocked country that lies along the slopes of the Himalayan Mountains between China and India. It has a land area of 147,516 km<sup>2</sup> and has the largest elevation gradient in the world, extending from tropical alluvial plains as low as 67 meters above sea level (masl) in the lowland Tarai to the alpine-nival earth's highest peak, Mount Everest at 8,848.84 m asl (GoN, 2021) (Figure 1).

### ENVIRONMENT AND BIODIVERSITY

The diverse terrain and topography, along with varied climatic conditions across altitudes means that various regions of Nepal have unique flora, fauna, livelihoods, and cultures (Kunwar et al., 2021). This includes more than 10,630 plants and 3,000 wildlife species growing in 118 different ecosystem types, 75 vegetation types, and 35 forest types (MoFSC, 2014).

The nation-wide forest resource assessment (2010–2014) of Nepal catalogued 5.96 million hectares (ha) of forest (40.35% of total land area) and 0.65 million ha of other wooded land (4.38% of total land area) (DFRS, 2015). Agricultural land comprised 28.75 % of total land area in 2018 (WB, 2021). Agricultural

practices, increasing population, aggressive development programmets including construction of roads, hydropower plants, and expanding urban areas are the main drivers of recent land use changes and their effects are further exacerbated by the impacts of climate change (Rimal et al., 2017). There is a change in forest and agricultural land, and water bodies have decreased with increasing built up structures (Figure 2); and urbanization is associated with habitat fragmentation (Paudel et al., 2016).

### CLIMATE

Altitudinal and physiographic heterogeneity affect temperature and rainfall patterns. The annual minimum temperature varies from -4°C to 19°C while the maximum temperature ranges from 4°C to 30°C. Manang district has the lowest (<5°C) annual average maximum temperature while most of the low-lying southern districts have the highest annual average maximum temperature above 30°C (MoFE, 2021). Nepal receives average annual rainfall of around 1,600 mm but this distribution pattern varies considerably in both north-south and east-west directions. The southern flanks of the Himalayas, such

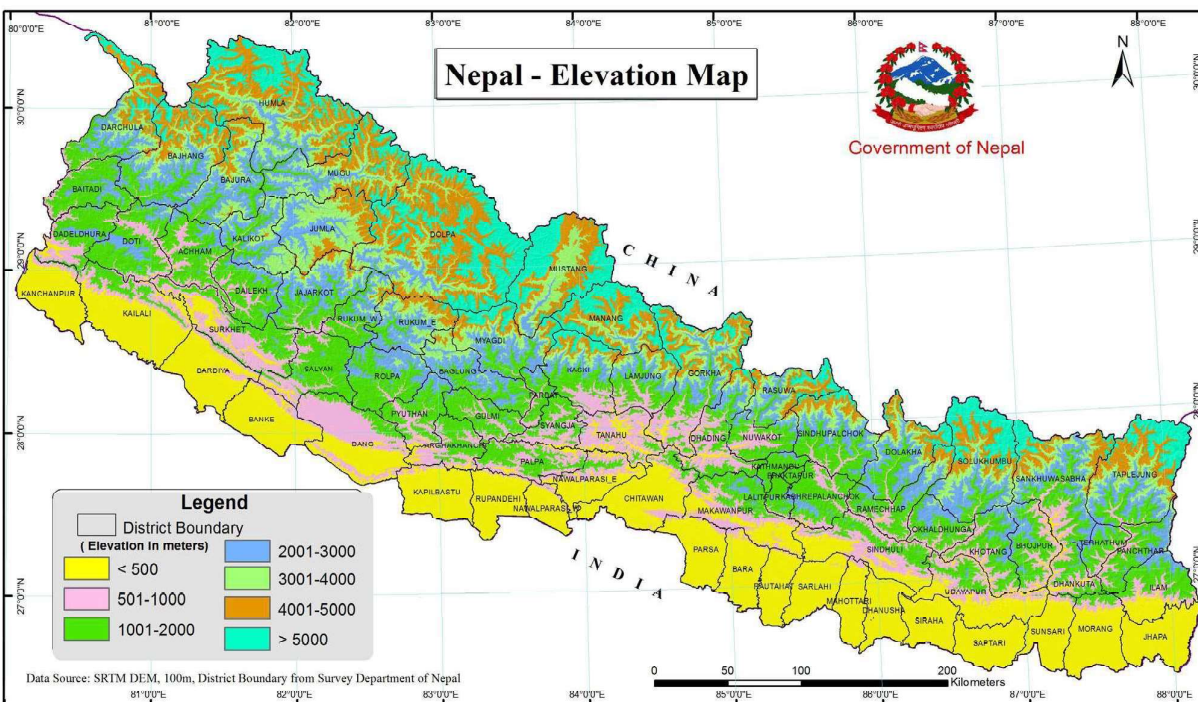


Figure 1: Physiographic Map of Nepal

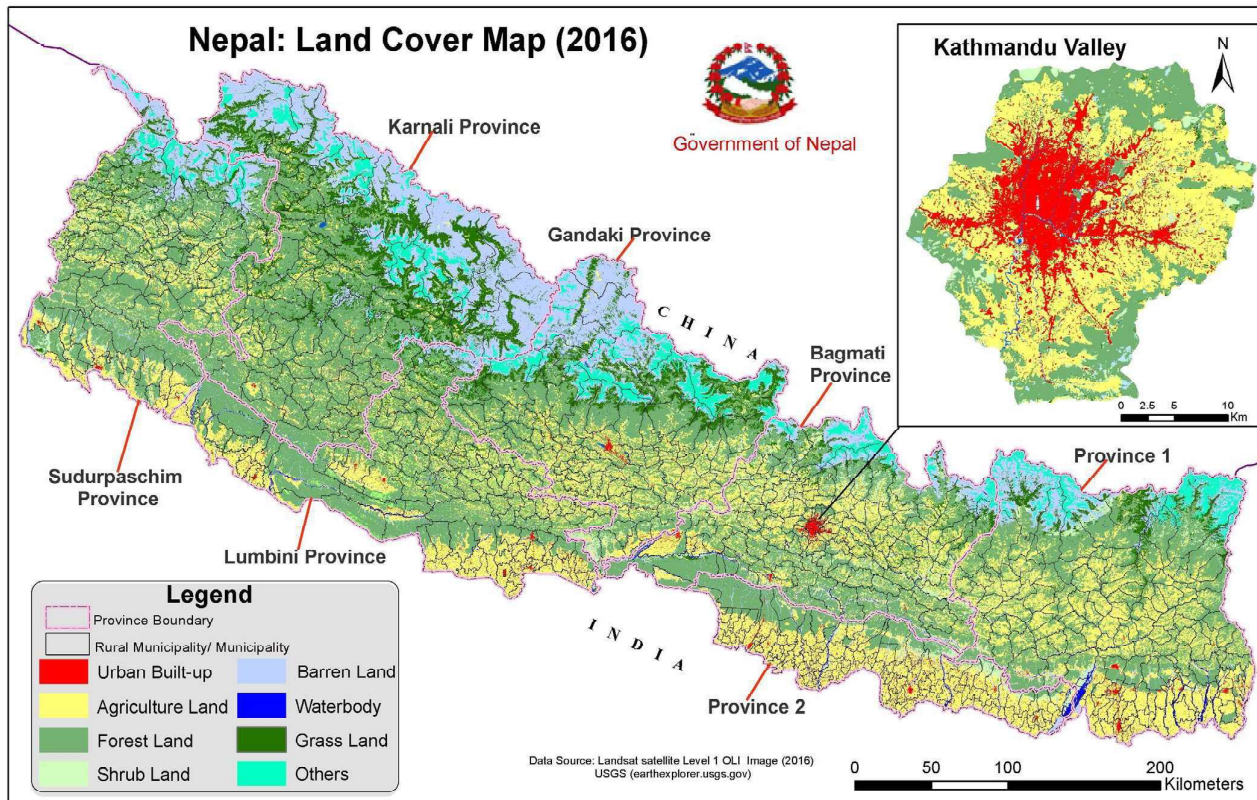


Figure 2: Land Use Land Cover Map of Nepal at Municipal Level

as Pokhara, receives the highest amount of rainfall (3,345 mm), while the rain shadow areas such as Dolpa and Mustang receive less than 10% of that amount (295 mm). Total annual rainfall increases with altitude up to approximately 3,000 m asl and then diminishes at higher elevations (MoSTE, 2014).

### DEMOGRAPHY AND CULTURE

The total population of Nepal was estimated to be 30 million in 2020 (ADB, 2021). Socio-culturally, the country has over 126 ethnic groups and castes and 123 languages. Over 50% of the population live in high-altitude regions (hills and mountains) with a fragile and remote physiography and low economic productivity (Cosic et al., 2017). The proportion of the population living in hills and mountains is projected to decrease to 47% by 2031, although the country's landmass in the mountain and hill regions is 74% (CBS, 2018). In 2020, 20.57% of the country's total population resided in urban areas (WB, 2020). Urbanization pattern of last two decades indicate that the highest population gain has occurred in the major cities of Kathmandu and Pokhara, and in the lowland Tarai region (Figure 3).

### ECONOMY AND LIVELIHOODS

Nepal's economy relies on the agricultural and tourism sectors (26% and 8% of GDP in 2020 respectively), international remittances (25% of GDP in 2020), and informal labour (UNDP, 2021). Nepal's per capita GDP in current price was USD 990 (approximately NPR 114,930) in 2020 (UN data, 2021). In 2019, 18.7% people were living in absolute poverty (NPC, 2019). Nepal is classified as a Least Developed Country (LDC) and is taking action to graduate to lower middle-income status by 2026 and achieve the national goal of *Prosperous Nepal Happy Nepali* by 2043.

### GOVERNMENT AND GOVERNANCE

The Constitution of Nepal created the devolved system of government that includes the federal government, seven provincial governments, and 753 local government units (urban and rural municipalities). The Constitution advances gender equality. Women hold at least one-third of the seats in government and various ethnic groups, minorities, and deprived communities are represented.

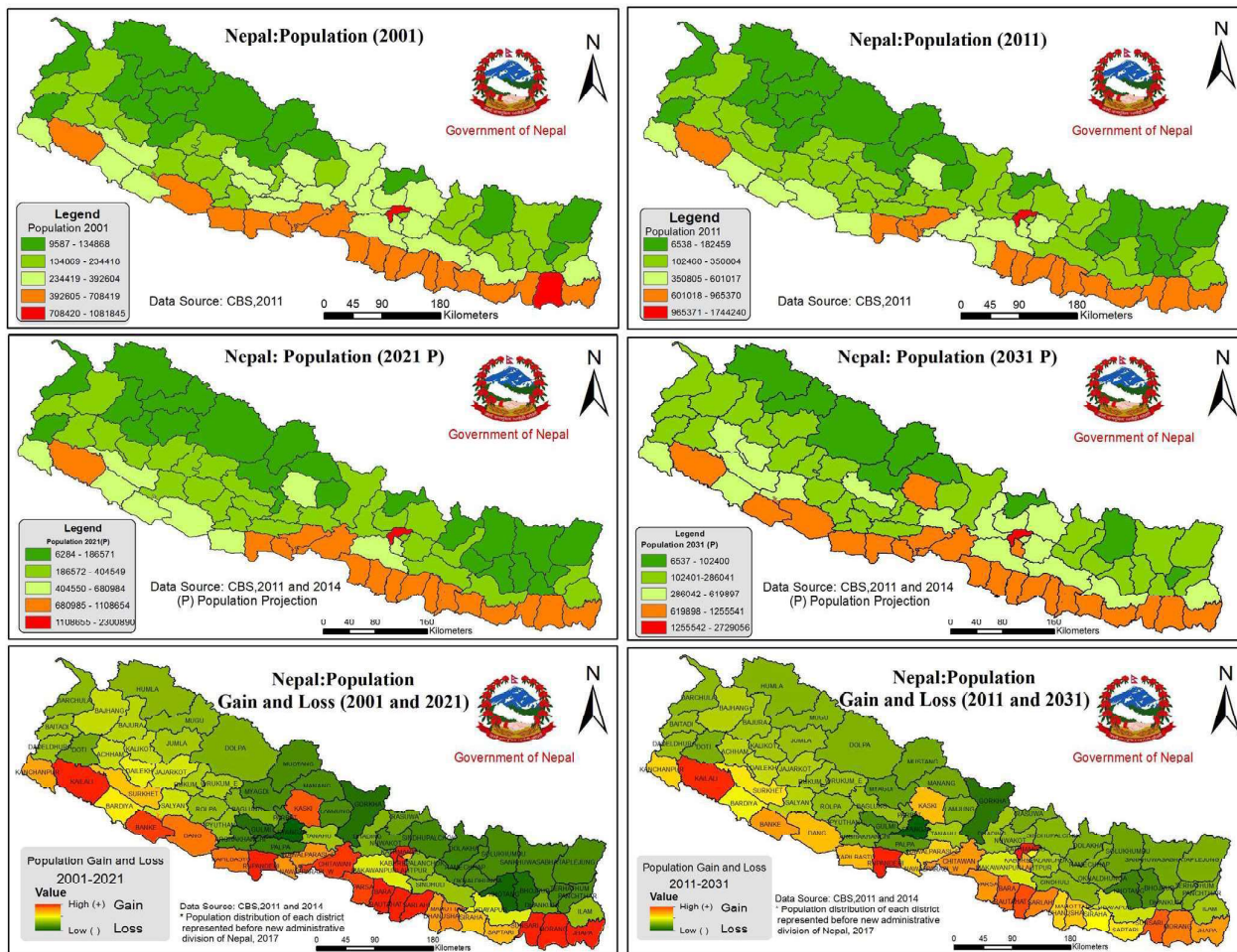


Figure 3: Population Trends and Projections in Nepal



## 3 CLIMATE CHANGE IN NEPAL

The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) on the physical basis of climate change concluded that human influence has warmed the climate and has contributed to many observed changes in weather and climate extremes (IPCC, 2021). The increase in global surface temperature is a contributor to changing precipitation patterns, and climate warming is associated with declines in snow and ice cover, and cryosphere changes in high mountain regions due to climate change include declines in low-elevation snow cover, glaciers, and permafrost (Hock et al., 2019). The Himalaya will have no ice by the year 2300 or even sooner. The intense impact of climate change on glaciers in the Nepal Himalaya has resulted in retreat of glaciers, elimination of small glaciers and formation of new glacial lakes and enlarged existing glacial lakes and Glacial Lake Outburst Floods (GLOFs) that result from the breaching of natural dams that hold back the glacial lakes (Rai et al., 2017).

### 3.1 OBSERVED CLIMATE CHANGE

Nepal's climate has warmed, and temperature has increased in all climate zones from the Tarai region in the south to the high Himalayas region in the north (Figure 4). Data from the Berkeley Earth Dataset estimated historical warming in Nepal at between 1.0°C and 1.3°C between the periods 1900–1917 and 2000–2017 (World Bank Group & ADB, 2021).

Temperatures in Nepal increased at the rate of 0.056°C per year for the base period 1971 to 2014 (DHM, 2017). Warming occurred in all regions of Nepal, with the highest rate of increase taking place at higher altitudes in the high mountain and Himalaya regions. Precipitation decreased in all seasons from 1971 to 2014, with the trends of decreasing precipitation observed mainly in the high mountains and high Himalayas in all seasons. Precipitation extremes are increasing (Karki et al., 2017).

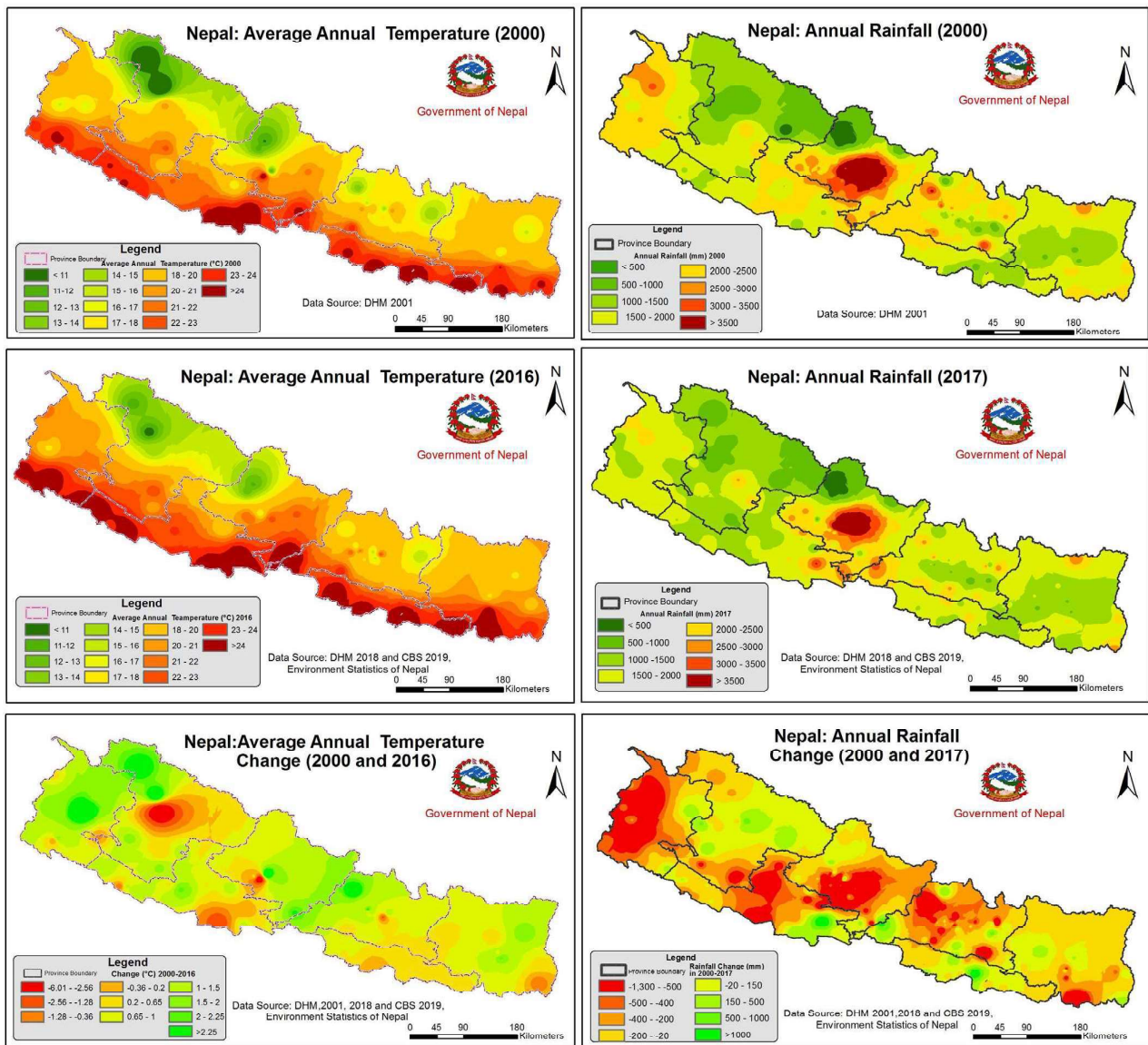


Figure 4: Trend of Average Annual Mean Temperature (2000-2016) and Annual Rainfall (2000-2017)

## 3.2 PROJECTED CLIMATE CHANGE

Nepal's climate will warm further, with increases in temperature projected for all seasons. Future climate change scenarios for the medium-term (2016–2045), long-term (2036–2065), and end of century with respect to the reference period (1981–2010) suggested that the climate in Nepal will be significantly warmer and wetter in the future, but for a decrease in precipitation during the pre-monsoon season (Tables 1

and 2). The scenario modelling for RCP 4.5 and 8.5 for period (2010–2014) and (2050–2080) also shows the warming and erratic rainfall (Figure 5). Extreme climate events are likely to be more frequent and severe in the future (MoFE, 2019); and snow depth or mass at lower elevations of mountain regions is projected to decline by 25% by 2050 and by 50% to 80% by the end of the century (Hock et al., 2019).

**Table 1.** Projected range of mean change in temperature (°C) compared to the reference period 1981–2010 in the five physiographic regions of Nepal

Physiographic regions	Medium-term (2016–2045)		Long-term (2036–2065)		End of the century (2071–2100)	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
High mountains	0.95	1.09	1.36	1.86	1.79	3.61
Middle mountains	0.89	1.04	1.27	1.76	1.66	3.44
Hill	0.90	1.06	1.26	1.80	1.69	3.56
Siwalik	0.94	1.10	1.29	1.87	1.72	3.66
Tarai	0.93	1.11	1.29	1.87	1.73	3.69

Source: MoFE (2019).

**Table 2.** Projected range of mean change in precipitation (%) for different seasons compared to the reference period 1981–2010

Seasons	Medium-term (2016–2045)		Long-term (2036–2065)		End of the century (2071–2100)	
	RCP - 4.5	RCP - 8.5	RCP - 4.5	RCP - 8.5	RCP - 4.5	RCP - 8.5
Winter	-5.8	7.2	13.6	5.0	24.4	20.9
Pre-monsoon	-5.0	-4.0	-7.4	4.2	-7.8	-3.1
Monsoon	2.7	7.8	9.4	13.6	12.4	27.1
Post-monsoon	18.6	6.0	20.3	19.0	16.5	22.9
Annual	2.1	6.4	7.9	12.1	10.7	23.0

Source: MoFE (2019).

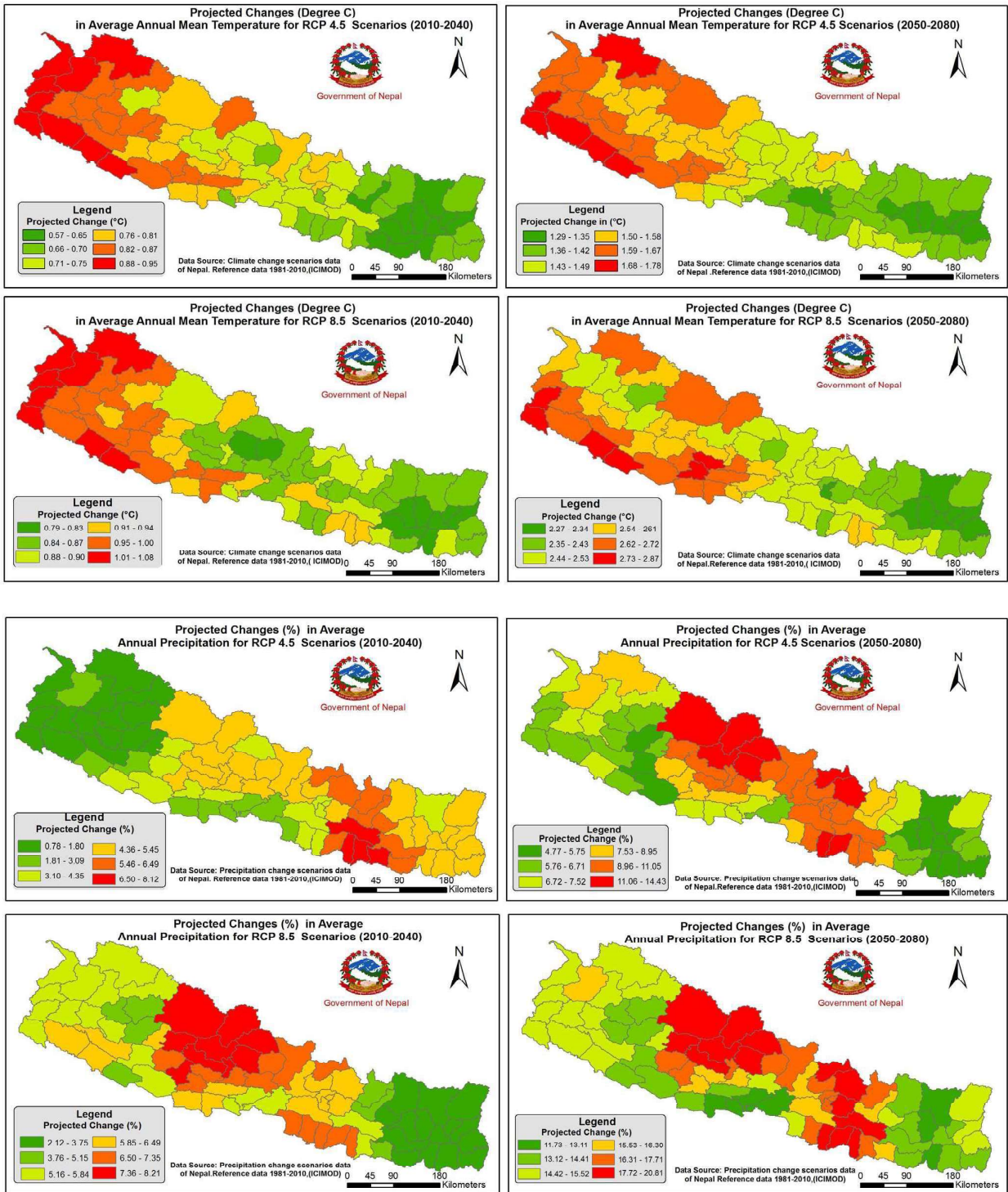


Figure 5: Projected Average Annual Mean Temperature and Annual Rainfall

### 3.3 CLIMATE HAZARDS AND VULNERABILITIES

About 80% of the population live in rural remote areas and are exposed to the risk of natural hazards such as earthquakes, droughts, floods, landslides, extreme temperature, and GLOFs (MoHA, 2017). Floods, landslides and drought are principal climate hazards in the country. More than 80% of property loss due to disasters is attributable to climate hazards, particularly water-related events such as floods, landslides, and GLOFs that displace people, and destroy homes, farmland, and other essential infrastructure (MoFE, 2018). The 2021 Nepal vulnerability and risk assessment (VRA) report (2021) stated that on average Nepal loses 647 lives and sustains economic losses of over NPR 2,778 million each year due to climate-induced disasters (MoFE, 2021). The report asserted that forest fires are another common hazard in the country that occur more frequently in the low-lying south-west regions and cause severe harm to ecosystems and livelihoods (Figure 6).

As temperatures rise in Nepal, acute climate hazards such as extreme weather events (including heavy rainfall, snowstorms, high winds, hailstorms, and increased lightning), heat waves, cold waves, floods, landslides, and forest fires are expected to increase in frequency and severity; and chronic or slow onset hazards such as drought, changes in precipitation patterns, snow cover changes, glacier retreat, and GLOFs, are expected to intensify. Multiple

events may occur simultaneously across regions, which could be catastrophic (MoFE, 2021). Multi-hazard mapping with the data period 2011–2021 shows that the low-lying south-east districts are highly impacted by multiple climate-induced hazards (Figure 7).

These climate hazards will trigger biophysical and socio-economic impacts including loss of life and harm to human health; reductions in food production; damage to livelihoods and well-being; loss of biodiversity; changes in ecosystems and availability of natural resources; damage to and destruction of property and infrastructure; and reduction in services. The future economic costs of climate change in Nepal could be very large, equivalent to an additional 2% to 3% of current GDP per year by 2050 (MoSTE, 2014). The climate hazards will interact with and cause harm to vulnerable systems and vulnerable communities living mountainous and low land Tarai districts.

In Nepal, specific regions (such as high mountain), populations (poor, marginalized communities, women, landless, indigenous people, vulnerable and disabled people, and people residing in climate-vulnerable geographical areas), and systems (such as food production systems) are vulnerable to current and projected climate hazards (Table 3).

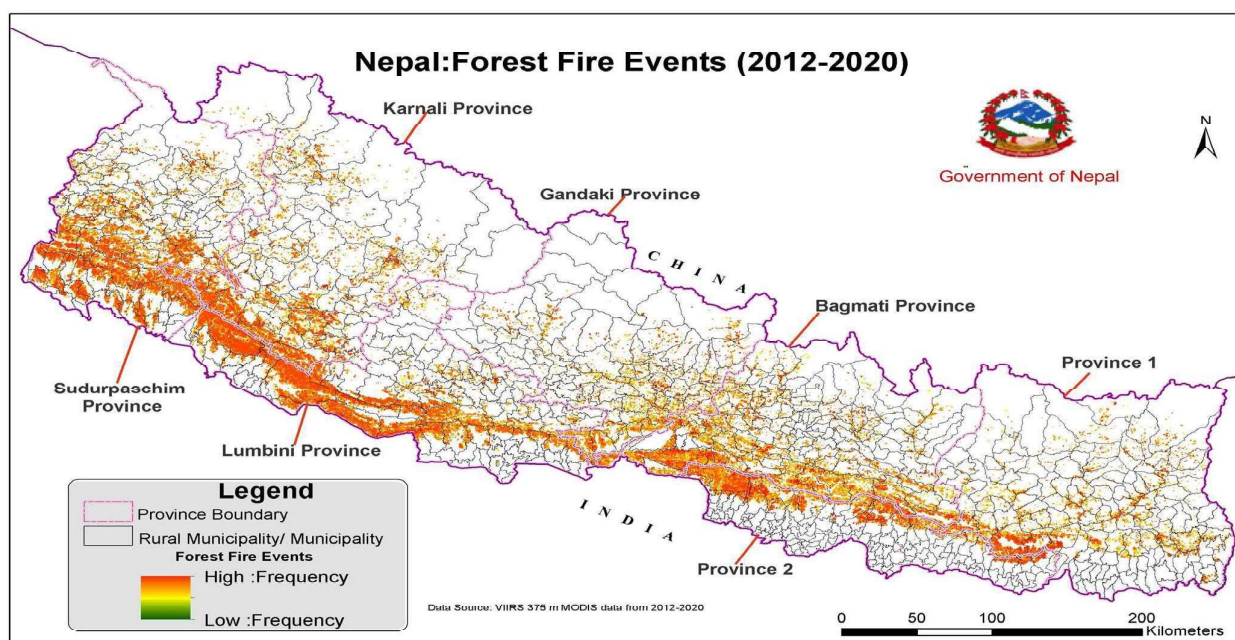
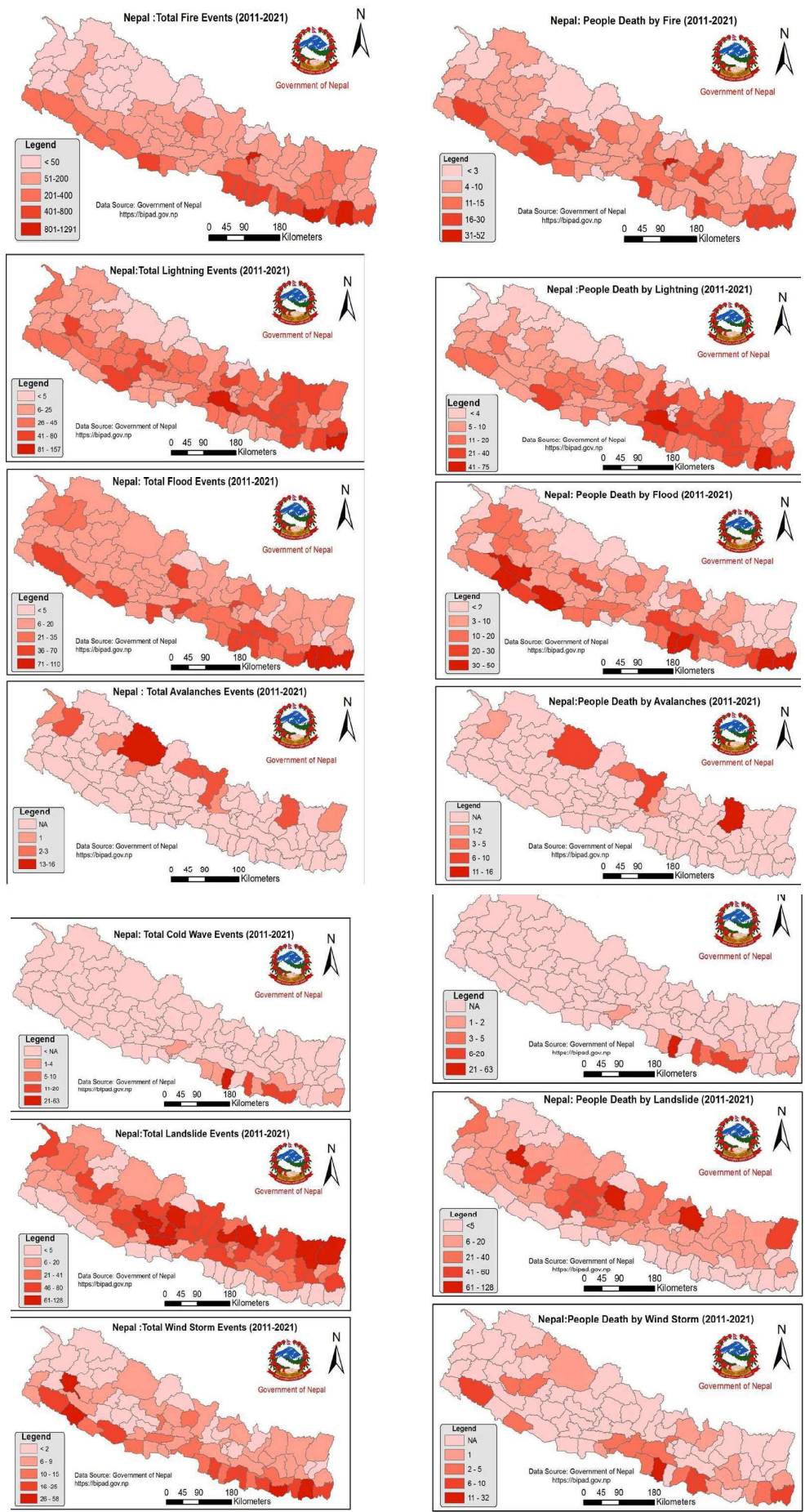


Figure 6: Total forest fire events at municipal level observed between 2012 and 2020



**Figure 7:** Total number of events and human death caused by climate hazards between 2011 and 2021

**Table 3.** Summary of climate hazards and the key factors of vulnerability in Nepal

CLIMATE HAZARDS	KEY FACTORS OF VULNERABILITY
<p><b>Acute</b> Increased frequency and severity of:</p> <ul style="list-style-type: none"> <li>• Extreme weather events</li> <li>• Heat waves</li> <li>• Floods</li> <li>• Landslides</li> <li>• Avalanches</li> <li>• Forest fires</li> </ul> <p><b>Chronic / Slow onset</b></p> <ul style="list-style-type: none"> <li>• Drought</li> <li>• Changes in precipitation pattern</li> <li>• Snow cover changes</li> <li>• Glacier retreat</li> <li>• GLOFs</li> </ul>	<ul style="list-style-type: none"> <li>• 28.6% of the population is multidimensional poor; 18.7% live in absolute poverty</li> <li>• Significant disparities between rural and urban areas</li> <li>• Significant disparities along lines of caste and ethnicity</li> <li>• Low levels of gender equality</li> <li>• Reliance on ecosystem services for subsistence livelihoods</li> <li>• Largely natural resource-dependant agrarian economy</li> <li>• High reliance on natural rainfall and insufficient irrigation systems</li> <li>• Small, fragmented landholdings in rural areas</li> <li>• Poor urban and land use planning - rapid and haphazard urbanization</li> <li>• Large number of informal settlements due to rural-urban migration</li> <li>• Poor health infrastructure</li> <li>• Inadequate access to improved technologies</li> <li>• Inadequate evidence and knowledge base</li> <li>• Illiteracy (in 2018, 32% of the population was not literate)</li> <li>• Inadequate, but improving, governance structures</li> <li>• High dependence on international finance to address adaptation priorities</li> </ul> <p><b>Particularly vulnerable regions</b></p> <ul style="list-style-type: none"> <li>• High mountain landscapes and ecosystems</li> </ul> <p><b>Particularly vulnerable groups</b></p> <ul style="list-style-type: none"> <li>• Women, indigenous people, Madheshi, Tharu, Muslim, oppressed groups, backward class, minorities, landless, marginalized farmers, labourers, youth, children, senior citizens, persons with all forms of disability, pregnant women, incapacitated and disadvantaged persons or groups</li> <li>• People in remote communities with small landholdings and/or livelihoods dependent on natural resources</li> <li>• Communities in the mid and far western hills and mountain communities that have attracted the least climate investment and experience the highest levels of poverty</li> </ul>

*Source: Patra & Terton (2017); World Bank Group & Asian ADB (2021); Karki et al., (2017); GoN (2021, 2020b); MoFE (2021).*

## 4 THE NEPAL NAP PROCESS

The NAP process emerged as an outcome of the Cancun Adaptation Framework put forward at the 16th Conference of the Parties (CoP16) of the UNFCCC held in 2010 (UNFCCC, 2010). Numerous bodies and programmes under the UNFCCC provide assistance to developing countries on adaptation, including the LDC Expert Group (LEG) that provides guidance for and support to the NAP process, and the Adaptation Committee that promotes the implementation of enhanced action on adaptation. The LEG prepared and continues to update technical guidelines for the NAP process (UNFCCC, 2012); and the

LEG's LDC work programme was updated in 2018 to support "the process to formulate and implement NAPs and related relevant adaptation strategies, including national adaptation programmes of action" (UNFCCC, 2018). The guidance provided through the UNFCCC, the LEG, Adaptation Committee, and other bodies and programmes has been instrumental in assisting Nepal to initiate and implement its NAP process (for an overview of UNFCCC bodies that provide support to the NAP process, see UNFCCC, 2012).

### 4.1 NEPAL NAP PROCESS MILESTONES

Since 2010, Nepal has been engaged in systematic and evidence-based adaptation planning, including the development of the National Adaptation Programme of Action (NAPA) in 2010 and the preparation of Local Adaptation Plans for Action (LAPAs) that guide implementation of adaptation

programmes. The learning from NAPA preparation and implementation, and LAPA formulation and execution at the local level have given the government more confidence and experience in systematic planning for climate-resilient socio-economic growth.

**Table 4:** Working Groups, Thematic Sectors and Coordinating Ministries

Working Groups	Thematic Sector	Coordinating Ministry
Thematic Groups	Agriculture and Food Security	Agriculture and Livestock Development
	Disaster Risk Reduction and Management	Home Affairs/Federal Affairs and General Administration
	Rural & Urban Settlements	Urban Development
	Health, Drinking Water and Sanitation	Health and Population/Water Supply
	Forests, Biodiversity and Watershed Conservation	Forests and Environment
	Water Resource and Energy	Energy, Water Resources, and Irrigation
	Tourism, Natural and Cultural Heritage	Culture, Tourism and Civil Aviation
	Industry, Transport and Physical Infrastructure	Physical Infrastructure and Transport/Industry, Commerce and Supplies
	Gender, Equality and Social Inclusion, Livelihoods and Good Governance	Women, Children, and Social Welfare
Cross-cutting Groups	Awareness Raising and Capacity Development	Education, Science, and Technology
	Research, Technology Development and Expansion	Forests and Environment
	Climate Finance Management	Finance



Nepal started its NAP process in 2015, guided by the Cancun Adaptation Framework and the guidance of the LEG; and in response to the national urgency to address climate change through adaptation planning for the medium- and long-terms. The process follows a country-driven, multi-stakeholder, gender responsive, inclusive and integrated approach fundamentally guided by the Leave-No-One-Behind (LNOB) principle. Nepal's NAP is also a response to the National Climate Change Policy (2019) that identified eight thematic areas and four cross-cutting areas (Table 4), based on the experience and good practice of the NAPA process for priority adaptation interventions, and the Fifteenth Plan (Fiscal Year 2019/20 – 2023/24) that included climate change as a crosscutting issue.

The NAP process is aligned with Nepal's Nationally Determined Contribution (NDC), Nepal's climate change adaptation priorities and actions will be communicated through the country's NAP. Nepal's first and second NDCs were submitted in 2016 and 2020 under the Paris Agreement of the UNFCCC. Nepal, as a Party to the UNFCCC, has engaged in global dialogues and negotiations, including ratification of the Paris Agreement in 2016 (signature on 22 April 2016, and ratification on 05 October 2016).

## 4.2 PROCEDURE OF NEPAL NAP PREPARATION AND IMPLEMENTATION

On September 23, 2018 the Government of Nepal and the UN Environment Programme (UNEP) launched the National Adaptation Plan (NAP) Project – “Building Capacity to Advance the NAP Process in Nepal” – to build institutional capacity to deal with the adverse impacts of climate change. This was Asia's first Green Climate Fund (GCF)-financed NAP project to support multi-sectoral, medium- to long-term adaptation planning and budgeting across sectors in order to advance the country's adaptation planning process. The formulation of Nepal's NAP was supported through this project.

The NAP process was redefined, contextualized, and advanced through the project. Building on foundational work and research, the process re-established the thematic

Nepal's NDC includes an adaptation section that sets out how the country will contribute to the Paris Agreement's adaptation goal of “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development” (UNFCCC, 2015). Nepal's adaptation contribution includes the development of this NAP; the implementation of priority adaptation programmes in eight sectors through its NAP process; and reporting on this action to the UNFCCC through the submission of Adaptation Communications.

Nepal's NAP process aligns with the key principles of the 2030 Agenda, including the commitment to leave no one behind; and the priority thematic areas identified in this NAP directly maps to the Sustainable Development Goals (SDGs). In addition, the actions programmes in this NAP contribute to the goals and objectives of other international agreements, including the United Nations Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD), and the Sendai Framework for Disaster Risk Reduction.

and cross-cutting working groups as guided by the NCCP, set up institutional mechanisms at federal (Inter-ministerial Climate Change Coordination Committee), and provincial levels (Provincial Climate Change Coordination Committee). The methodology to identify and prioritize climate change adaptation actions, projects, and programmes built on the values and criteria contained within the climate adaptation and VRA framework using a participatory and inclusive multi-criteria analysis. Consideration was given to identifying specific needs, options, and priorities on a country-driven basis; utilizing the services of national, provincial, local, and community-based entities, where appropriate; and promoting the principles of ecosystem integrity, participatory processes, gender-responsive and socially

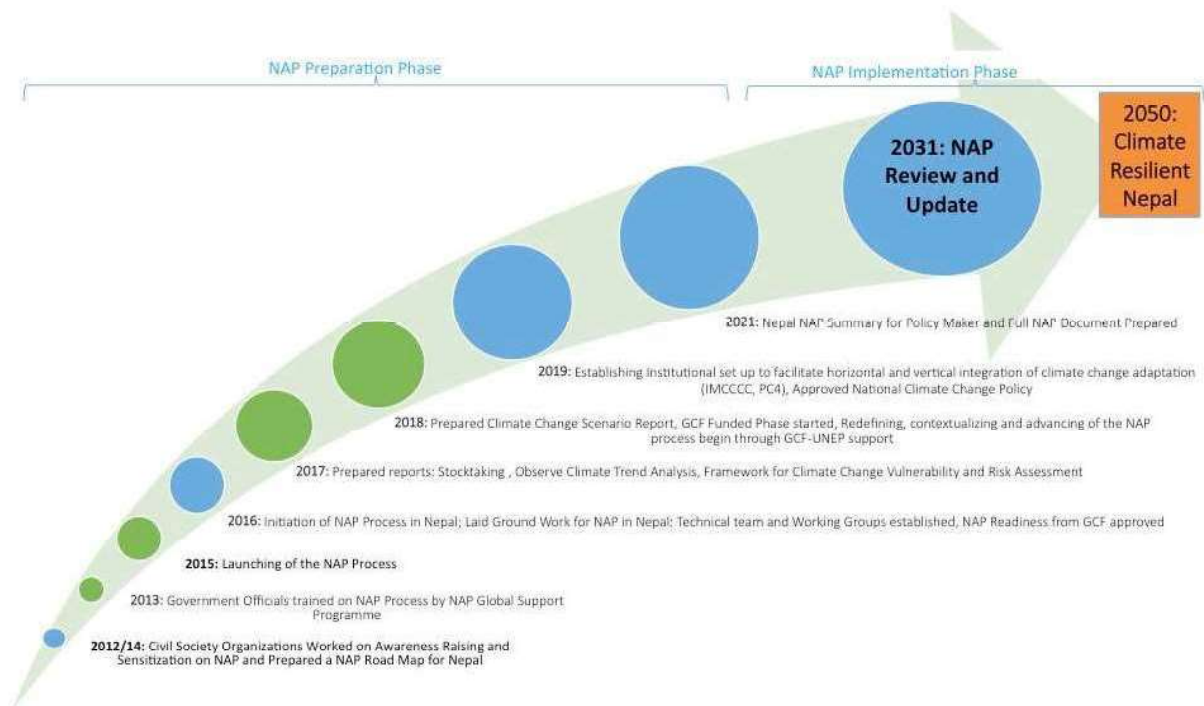


Figure 8: Nepal NAP milestones (2012–2050)

inclusive processes, and policy coherence. The methodology promoted eco-friendly and nature-based solutions that align with sustainable development objectives and programmes.

The methodology to develop the Nepal NAP followed UNFCCC LEG guidelines and followed steps A) Laying the groundwork and addressing gaps; and B) Identifying specific needs, options, and priorities (UNFCCC, LEG, 2012). With the completion of this NAP document, Nepal enters into steps C) Developing implementation strategies for the actions; and D) Reporting, monitoring and review. The process to formulate the NAP included eight steps:

1. Desk mining and review of all literature and documents pertaining to climate change adaptation,
2. Multi-stakeholder consultations in each province,
3. Collection and synthesizing the long list of adaptation actions,
4. Thematic Working Group coordinators conclave and write-shop with thematic leaders,
5. Round-Table discussion with thematic experts,
6. Sharing the draft NAP at a province-level stakeholders' forum and collecting

7. Sharing the penultimate draft of the NAP with central level stakeholders for feedback and review, and
8. NAP finalization and submission.

An adaptation appraisal tool that applied multi-criteria analysis was used to prioritize adaptation actions during the Coordinators' conclave and write-shop. The approach built on the experiences of NAPA formulation, and the comparative strength of multi-criteria analysis over other tools. A long list of adaptation actions collected from the provinces was scored and ranked to identify priority adaptation actions and programmes (Kunwar, 2021; Paudel and Adhikari, 2021).

A total of 64 priority programmes that were identified through this appraisal process are included in the Nepal NAP. The Nepal NAP will be reviewed and updated in 2031, at which time the long-term programmes will be restructured to reflect changes in the country's economy, development, policy framework, international commitments, and climate change risks.

# 5 NEPAL'S NATIONAL ADAPTATION PLAN (NAP): VISION, GOALS, PRINCIPLES AND OUTCOMES

The Nepal NAP aims to help the country achieve the objectives of the NAP process that have been agreed under the UNFCCC. These objectives are:

- To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience.
- To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate (UNFCCC, 2012, decision 5/CP.17, paragraph 1).

This NAP has been formulated to help the country adapt to the effects of climate change over the short-term (until 2025), medium-term (until 2030), and long-term (until 2050); and will:

- Inform the planning, coordination, and implementation of adaptation actions needed at all levels of government and across society and ecosystems.
- Provide guidance on integrating adaptation considerations into policies, programmes, and activities.

## VISION

To contribute to the socio-economic prosperity of the nation by building a climate-resilient society and reducing the risk of climate change impacts on people and ecosystems through the integration of adaptation across sectors and levels of government.

## GOALS

The over-arching goals are informed by the National Climate Change Policy (2019), and the Nepal NAP aims to:

- Build the adaptive capacity and resilience of key natural, social, and economic sectors vulnerable to and at risk of climate change, and service providers.
- Integrate climate change issues

into policies, strategies, plans, and programmes of all sectors and at local, provincial, and federal levels emphasizing Gender Equality, Social Inclusion, Livelihoods and Governance (GESILG) concerns.

- Ensure equitable resource mobilization and distribution of resources for climate change adaptation through national and international financing, research, technology, and extension services related to climate change adaptation.

## PRINCIPLES

The Nepal NAP is guided by the following principles that will help the country achieve adaptation action that simultaneously advances economic and sustainable development objectives

- **Responsiveness** to the actual adaptation needs through the identification of actions that reduce the adverse impacts of climate change and maximize resilience, informed by a robust body of research and analysis undertaken through the NAP process.
- **Policy coherence** with:
  - National policies, strategies, plans, development goals, and priorities; and
  - International commitments under the UN conventions including the UNFCCC, Paris Agreement, SDGs, Sendai Framework for Disaster Risk Reduction, UNCCD, and UNCBD.
- **Integration** of climate change adaptation in the planning, budgeting, and implementation of actions at the three levels of government - federal, provincial, and local.
- **Gender responsive and social inclusive** actions to ensure that people of all genders are engaged in all stages of climate adaptation planning, budgeting, implementation, and monitoring and evaluation.
- **Multistakeholder engagement, coordination, and cooperation** to promote transparency, better decision

- making, and enhanced implementation of adaptation.
- **Ecosystem integrity** to maintain naturally biodiverse, healthy, and resilient ecosystems.
- **'Leave-No-One-Behind'** through commitment to an inclusive NAP process that prioritizes planning and implementation of adaptation actions by identifying who is left behind, identifying measures to meet their needs, and generating evidence and data to monitor progress.

### IMPLEMENTATION OUTCOMES

NAP is an overarching adaptation strategic instrument that specifies prioritised adaptation programmes in eight thematic and four cross-cutting sectors outlined in the National Climate Change Policy 2019 for 2025 (short), 2030 (medium) and 2050 (long). Implementation of these priority programmes will support in achieving the goal of building a climate-resilient society.

The damage and losses from climate change impacts in key natural, social and economic sectors reduced by 2025 through enhanced adaptation planning capacity of the concerned agencies and service providers, and implementation of urgent and immediate adaptation actions enabled by the establishment and operationalization of real time early warning, climate change data management, monitoring and review mechanism at federal, provincial and local levels. Additionally, policy ground for furthering the resilience to climate change vulnerability and risks laid, and climate foresighted planning system initiated that supports graduation of the country from Least Developed Countries by 2026. These actions support in achieving 2030 Sustainable Development Goals and Sendai Framework for Disaster Risk Reduction.

Building on the outcomes of the short-term adaptation actions, by 2030, resilient agro-ecosystem developed for sustainable production, food sufficiency and nutrition; ecosystem health and functionality maintained, critical habitats and protected areas networks restored; and nature-based solutions, and green and circular economy

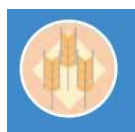
promoted. The resilience of health, drinking water and sanitation system and services enhanced for continuous functionality and water supply. Additionally, the resilience of energy systems enhanced for uninterrupted supply of power that supports continuous operation of industries. Likewise, robust physical infrastructures developed to withstand the climate change induced disasters, shocks and stresses, and maintain functionality of key economic sectors including tourism, transport, industry, and agriculture. Increased adaptive capacity of the settlements to deal with climate disasters through risk sensitive land-use planning and implementation. Furthermore, livelihood of the marginalized and vulnerable people and communities diversified and enhanced through GESI responsive adaptation programmes.

The 2025 adaptation actions laid the foundation, and 2030 adaptation strategic interventions further the resilience through implementation that undergoes review in 2031 which will form the basis for long-term adaptation programmes that contribute to achieve the national goal of *"Prosperous Nepal, Happy Nepali-2043"* through building a climate-resilient society and reducing the risk of climate change impacts on people and ecosystems by integrating adaptation across sectors and at all level of government.

## 6 PRIORITY ADAPTATION PROGRAMMES

The NAP sets out priority programmes in the eight thematic and four cross-cutting sectors as outlined in the National Climate Change Policy (2019). The programmes include adaptation actions that are best able to address climate vulnerabilities and risks in the short (to 2025), medium (to 2035), and long-term (to 2050); as well as adaptation actions that contribute to the achievement of national economic and development priorities. This section sets out the 64 strategic priority adaptation programmes/interventions, their estimated cost, duration, their alignment with the national policy documents, and the climate vulnerabilities and risk addressed by these measures.

The programmes were identified through rigorous consultation, adopting a bottom-up, multi-stakeholder approach engaging the three levels of government. The adaptation programmes were developed through desk research, provincial level consultations, expert review, write-shops, and round-table discussions with thematic experts. The full Nepal NAP documents the methodology to identify and prioritize adaptation actions, projects and programmes; and includes additional information about the proposed programmes, accommodating a summary of the adaptation programmes, expected outcomes and impacts, implementing institutions, geographic coverage, and target beneficiaries.



### 6.1 AGRICULTURE AND FOOD SECURITY

The agriculture sector – including crops, livestock, and fisheries – is a major economic sector in Nepal, being a main source of incomes and livelihoods in rural areas and providing important revenues through agricultural exports. The sector contributed about 27.65% of Nepal’s GDP in 2019/20 (Nepal Rastra Bank, 2020), and about 66% of the country’s population worked in the agricultural sector in that same year (GoN, 2021).

Climate change has the potential to prevent the achievement of national goals by negatively impacting agricultural production and nutrition security. Rising temperatures, changes in precipitation, and increases in the occurrence of extreme weather events have negatively impacted productivity in the agriculture sector. The sector is vulnerable to climate impacts because of a high reliance on small-scale, rain-fed agriculture and dry land farming (Paudel, 2016). Climate change impacts livestock production including increased incidence of diseases and pests, depleted grass and feed, heat stress, appetite loss and reduced milk production, and death of animals (Shrestha & Baral, 2018). Temperature increase has reduced the productivity of freshwater aquaculture, with negative impacts for fishing communities

(Wagle et al., 2011). The direct economic cost of climate vulnerability in the agriculture sector in 2020 was equivalent to 1.5% to 2% of the country’s GDP (MoSTE, 2014).

Future climate change is expected to continue to impact agricultural productivity. The Ministry of Agriculture and Livestock Development (MoALD, 2019a) identified that the most severe climate impacts on agriculture and food security will be “the loss of already limited arable land from flash floods and landslides, accelerated soil degradation and loss of soil fertility, outbreaks of new pests and diseases, shortages of water for crop production and uncertainty of precipitation that will directly affect rain-fed agriculture, particularly in the mountains.” Increasing agricultural productivity in a changing climate is critical to achieving national agriculture and food security goals, including modernizing the sector, increasing smallholder productivity, and ensuring adequate and affordable food. Climate vulnerability in the sector results from a high reliance on rain-fed agriculture; fragmentation of arable lands; limited access to agricultural extension services; high levels of poverty among farmers; limited resources and lack of access to markets, loans, insurance, and technology;

and out-migration, mainly of males leading to a trend of “feminization of the agricultural sector” (IUCN, 2020).

A total of nine priority adaptation programmes with a budget of USD 11.2 billion to 2050 are included in the Agriculture and Food Security sector. Implementation of these programmes will help transform the agriculture sector by building the resilience of agroecological systems through the

enhancement of agricultural productivity, preserving genetic resources, building national capacities and information systems, adopting clean energy, and introducing peasant-friendly climate induced risk-sharing models.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Programme on Sustainable Agriculture, Food and Nutrition Security, and Climate Resilient Health and Hygiene	<ul style="list-style-type: none"> <li>Promotion of nutrition security for healthier livelihoods.</li> <li>Increase crop production through identification and adoption of good, climate resilient, and sustainable agriculture practices.</li> <li>Develop energy efficient agriculture technology.</li> </ul>	2025, 2030, 2050	2,000
Commercial Animal Husbandry for Climate Resilient Rural Livelihoods (753 Model Demonstration Projects)	<ul style="list-style-type: none"> <li>Explore, assess, and introduce climate-resilient land species crossed with local breeds.</li> <li>Diversify rural livelihoods and increase incomes through commercial and integrated livestock programmes.</li> <li>Promote the circular economy for resilient rural livelihoods.</li> </ul>	2025, 2030	2,000
Development of Insurance, and Community and Peasant Friendly Climate Induced Risk Sharing Model and Expansion in both Agriculture and Livestock	<ul style="list-style-type: none"> <li>Build the capacity of local peasants and local governments to cope with climate risks.</li> <li>Create an enabling environment that promotes private sector engagement in the provision of insurance products in the agricultural sector that help farmers and communities cope with climate risks.</li> </ul>	2025, 2030	500
Genetic Resource Conservation Programme for Climate Resilient Agriculture in Nepal	<ul style="list-style-type: none"> <li>Strengthen the National Gene Bank to conserve local land species.</li> <li>Strengthen biotechnology laboratories to develop climate resilient crop varieties and animal breeds</li> </ul>	2030	500
Enhancing Agriculture Productivity through Building Climate Resilient Water Management Systems	<ul style="list-style-type: none"> <li>Improve climate resilient irrigation facilities for agriculture production.</li> <li>Increase the coverage of irrigated area through water use efficient technology.</li> <li>Improve irrigation facility to increase productivity.</li> </ul>	2050	1,500
Climate Smart Transformative Collective Agriculture Promotion in the Hills and Mountains	<ul style="list-style-type: none"> <li>Explore, assess and promote climate-smart agriculture technology.</li> <li>Increase crop production and benefits to farmers through collective farming.</li> </ul>	2030, 2050	2,000

Integrated Soil and Nutrient Management for Resilient Agriculture	<ul style="list-style-type: none"> <li>• Increase productivity by improving soil fertility through adaptive agriculture interventions.</li> <li>• Improve the soil nutrients that support the growth of all forests and agricultural plants including carbon sinks and stress tolerant varieties.</li> </ul>	2025, 2030	1,200
Strengthening Climate Services and Agriculture Information System	<ul style="list-style-type: none"> <li>• Establish and operationalize early warning systems and localized weather stations for precise climate services.</li> <li>• Provide a package of climate services (such as weather information, soil moisture conditions, and incidence of extreme events) directly to the farming communities.</li> <li>• Provide timely and accurate information regarding agriculture inputs and output prices.</li> </ul>	2030	1,000
National Capacity Building of Agriculture Institutions and Professionals (including Livestock) on Climate Change Adaptation Research, Planning and Implementation	<ul style="list-style-type: none"> <li>• Enhance the capacity of agriculture technicians to understand climate- and climate change-associated risks and vulnerabilities.</li> <li>• Strengthen the adaptive capacities of agriculture-based local institutions to address climate risks.</li> </ul>	2025, 2030	500
<b>Total programmes 9</b>	<b>Total objectives 22</b>		<b>USD 11.2 B</b>

Alignment with/Contribution to:

15th Periodic Plan 2019/20-2023/24, Nationally Determined Contribution 2020, National Climate Change Policy 2019, Third National Communications to UNFCCC 2021, Sustainable Development Goals, Status and Road Map: 2016-2030, Agriculture Development Strategy 2015-2035, National Agriculture Policy 2005, National Agroforestry Policy 2019, National Seed Vision 2013-2025, National Forest Policy 2019, Agrobiodiversity Policy 2007, National Food Safety Policy 2018.

Climate Risks and Vulnerabilities Addressed by the Actions:

- Loss of production, productivity, and nutrients due to moisture loss induced by increasing temperatures and extremes such as prolonged dry spells, hailstorms, and windstorms.
- Loss of agricultural land due to increased severity and frequency of climate change-related droughts, floods, and landslides.
- Infestation of pest and diseases in the agriculture and livestock sector leading to reduction of agriculture and livestock production and productivity.



## 6.2 FORESTS, BIODIVERSITY AND WATERSHED CONSERVATION

Forests underpin the livelihoods of rural people in Nepal, with about 80% of rural householders deriving some or their entire livelihoods from the forestry sector (MoFSC, 2015). About 64% of Nepali households use fuelwood as their main source of energy (CBS, 2014). The forestry sector provided average annual revenues of about NPR 550 million (USD 5.4 million) to the national economy in 2013 (Subedi, 2014). Climate change has impacted forests and ecosystems not only in the Himalayas, mountains, and hills but also in the lowland Tarai and fragile Chure-Siwalik (MoFE, 2021c). Local livelihoods have

been negatively impacted by changes in the availability and regeneration pattern of forests and non-timber forest products, which has contributed to a decline in the productivity of some economically viable forest products such as medicinal plants, herbal fruits, mushrooms, rattan, and bamboo (GoN, 2021). The government's Forest Monitoring and Detection System recorded 5,626 forest fires incidents across the country from November 2020 to April 2021 (Mandel, 2021b). Climate change has intensified dryness, which has contributed to an increase in the number of forest fires and

the area burned, with 2020–2021 being the worst fire season since Nepal began keeping records in 2012 (Aljazeera, 2021).

Future climate change will continue to degrade, damage, and transform forest areas in Nepal, including a large span of mountainous and hilly physiography that is vulnerable to climate change (Chitale et al., 2018). The Fourth Assessment Report (AR4) confirmed that a large proportion of forest species are at increased risk of extinction (IPCC, 2014). These changes in forest distribution and composition will adversely affect ecosystem services, biodiversity, and watersheds. The negative impacts can include reduced access to forest products that include food, household energy (fuelwood), and water. A decrease in the availability of non-timber forest products will impact the communities that are dependent on these resources for their livelihoods (MoPE, 2017b).

Women are particularly vulnerable to the impacts of climate change in the forestry sector because they play a major role in the collection of various forest products and are considered the primary users of forests in

Nepal (IUCN, 2020). Poor Dalits, because of poverty and caste-based discrimination are more vulnerable (MoFSC, 2015). Forests under community-based management made up 42.7% of the forest areas in Nepal in 2019 (NPC, 2020b) meaning that these groups have an important role to play in mainstreaming adaptation in forest management plans.

Total 11 priority adaptation programmes in the forests, biodiversity and watershed conservation sector contribute to the development of climate-resilient ecosystems; the sustainable management and conservation of forests, eco-systems and watersheds; enhanced food and water security; enhanced hydrological ecosystem services such as regulation of rain and storm water; improved livelihoods of forest communities; healthy wildlife populations and viable tourism operations; and improved opportunities for non-timber forest products. The estimated budget for the 11 priority programmes is USD 8.7 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Forests Fire Preparedness, Prevention and Control (In Multi-Stakeholder Partnerships)	<ul style="list-style-type: none"> <li>Prevent and manage forest fires through enabling policy implementation.</li> <li>Capacitate forest-based institutions through technology development and transfer.</li> <li>Build the resilience of forest ecosystems, biodiversity, and rural livelihoods.</li> </ul>	2025, 2030	1,000
Karnali Watershed Management Programme for Reducing Climate Risks and Vulnerabilities and Promoting Irrigation Facilities in the Downstream	<ul style="list-style-type: none"> <li>Build resilience to climate vulnerabilities and risks of the Karnali watershed community and people.</li> <li>Secure river- and forest-based watershed resources.</li> <li>Enhance adaptive capacity of Indigenous people and local communities and engage them in participatory watershed conservation.</li> <li>Promote upstream-downstream linkages to reduce downstream climate risk.</li> </ul>	2025, 2030	500
Integrated Sub-Watershed Management for Climate Resilience and Increased Water Availability and Agricultural Productivity	<ul style="list-style-type: none"> <li>Promote watershed management for conservation of soil fertility and enhanced productivity.</li> <li>Support local livelihoods through watershed management.</li> </ul>	2030, 2050	1,000



Improvement of Forest Health and Restoration of Rare, Endangered, Endemic, and Threatened Species for Building Resilient Forest	<ul style="list-style-type: none"> <li>Control invasive species of forest, wetlands, and rangelands.</li> <li>Promote and restore Rare, Endangered, Endemic, and Threatened (REET) species.</li> </ul>	2030, 2050	1,000
Restoration of Habitats and Strengthening Ecological Connectivity for Wildlife and Biodiversity	<ul style="list-style-type: none"> <li>Safeguard wild fauna from climate extreme events.</li> <li>Establish climate resilient safe wildlife passage in selected corridors and connectivity between protected areas.</li> <li>Manage and restore ecological connectivity.</li> </ul>	2025, 2030	200
Promotion of Multiple Uses of Protected Areas and Natural Heritage and Generation of Climate Adaptation Services by Maximizing the Utility of Protected Areas	<ul style="list-style-type: none"> <li>Assess the commercial feasibility of the protected areas.</li> <li>Increase the adaptation services from the Protected area resources.</li> <li>Develop partnership between PA and local community for generating adaptation services.</li> </ul>	2030, 2050	500
Control of Climate Induced Disasters and Extension of the Network of Protected Areas for Resilient Ecosystems	<ul style="list-style-type: none"> <li>Strengthen landscape/arc level connectivity and increase buffer zones to build capacity to respond to climate-induced disasters.</li> <li>Explore, assess and implement physical and biological means of disaster management in Protected Areas.</li> </ul>	2030, 2050	1,000
Development and Strengthening of Ponds/Lakes in Community Forests for Resilient Biodiversity (One Community Forest - One Wetland)	<ul style="list-style-type: none"> <li>Maintain water availability both above and under the ground.</li> <li>Enhance climate resilient forest growth.</li> </ul>	2015, 2030	500
Wetlands Development, Conservation and Management at the Foothills of Chure	<ul style="list-style-type: none"> <li>Maintain healthy wetlands and conserve biodiversity by building small earthen dams, connecting water bodies, and restoring forests.</li> <li>Sustain ground recharge in the Bhawar and dune areas through retaining streams, gorges, estuaries, waterholes, ponds, and lakes.</li> </ul>	2030, 2050	1,000
Integrated Green Economy and Green Job Promotion Programme through Sustainable Forest Management and Circular Economy in the Hills and Mountains	<ul style="list-style-type: none"> <li>Explore, assess, and promote green jobs that support maintaining healthy ecosystem.</li> <li>Enhance livelihoods of forest dependent communities through diversifying income sources and promoting the circular economy in the forest sector.</li> </ul>	2025, 2030, 2050	1,000
Upland Conservation and Climate Resilient Livelihoods Programme in High Mountains	<ul style="list-style-type: none"> <li>Conserve, promote, and increase uses of highland high value forest products for climate resilient livelihoods</li> <li>Conserve pastures and meadows for high value forest products through community led control of grazing and animal husbandry.</li> </ul>	2025, 2030	1,000
<b>Total programmes 11</b>	<b>Total objectives 27</b>		<b>USD 8.7 B</b>

**Alignment with/Contribution to:**

Nationally Determined Contribution 2020, 15th Periodic Plan 2019/20–2023/24, National Climate Change Policy 2019, Third National Communication 2021, Forest Act 2019, National Forest Policy 2019, Land Use Policy 2015

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Degradation of forest health due to increasing incidence of forest fire, invasion of alien species, pests, and diseases.
- Loss of biodiversity due to increased severity and frequency of extreme events such as extreme temperatures, pro-longed dry spells and drought, forest fires, incessant precipitation, and flooding.



## 6.3 WATER RESOURCES AND ENERGY

The proper management of water resources is essential to maintain adequate access to water for drinking, irrigation, and hydropower generation. Nepal's annual renewable water availability is 7,173 m<sup>3</sup> capita<sup>-1</sup> yr<sup>-1</sup> (2014 value) (FAO– AQUASTAT, 2019), which is well above the global average. However, a large section of the population and potentially irrigable lands lack adequate access to water, and only about 7% of Nepal's total water potential has been utilized for socio-economic purposes (WECS, 2011). Ensuring adequate water resources for hydro-electricity generation is a priority for Nepal where over 90% of total electrical power generated in Nepal in 2019/20 was from hydroelectricity (MoF, 2020).

The 2019 Irrigation Master Plan reported that water availability, its spatio-temporal distribution, and the hydrological cycle had been altered by climate change and variability (DWRI, 2019). Climate change has accelerated the melting of glaciers, led to the formation of glacial lakes in the mountain valleys, and expanded existing glacial lakes (Salerno et al., 2012). This retreat of glaciers and associated changes in hydrology affects availability of water resources and has subsequent impacts on energy generation. Substantial areas of different land use and land cover have been reported to be exposed to potential GLOFs. Electricity generated by the Nepal Electricity Authority declined by 6.9% in 2020/21 compared to 2019/20 because of reductions in rainfall that affected river discharge.

Future climate change is expected to increase annual water availability parameters in most districts, while decreasing in others in the medium term (the 2030s) and long term (2050s); reflecting spatial imbalances and temporal variations in water availability (DWRI,

2019). Future temperature change scenarios and population projections for 2100 indicate that the annual renewable water availability in Nepal will be above the critical line of water stress (Chaulagain, 2015). Some river flows in the dry season will be insufficient to operate run-of-river hydropower plants, and this situation will worsen as a result of climate change. In addition, floods, landslides, snowstorms, and other hazards damage the electricity grids, transmission lines, and powerhouses. The economic costs of the impacts of climate change on hydroelectricity production could be equivalent to 0.1% of GDP per year on average, and 0.3% in extremely dry years (MoSTE, 2014). The main climate risks in the sector are water stress and lower water availability during the winter season; damage to energy infrastructure including dams, hydropower generating stations, and transmission lines; water shortages in rural and urban areas; and GLOFs.

Total eight priority adaptation programmes in the WRE sector will lower the risk of GLOFs, improve water availability, promote a clean energy mix system that emphasizes hydroelectricity, and build capacity to improve the enabling environment. These adaptation programmes have an estimated cost of USD 5.35 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
National Capacity Building on Policy Reform, Bridging Climate Information Gaps, Promoting Climate-Informed Decision Making, and Developing Climate-Smart Design and Guidelines for Water Resources Infrastructure	<ul style="list-style-type: none"> <li>• Build the climate resilience of vulnerable communities in rural and urban sectors.</li> <li>• Develop climate-smart designs and guidelines for water resources infrastructure.</li> <li>• Formulate meteorological and hydrological acts, regulations, and other policy protocols to address climate risks.</li> <li>• Capacitate the National Meteorological and Hydrological Services to provide downscaled weather, climate, and hydrological prediction and services.</li> <li>• Develop a national framework for climate information services to enhance access to climate information.</li> <li>• Promote multiple water use systems.</li> <li>• Establish water recharge, retention, and re-use technologies through the spring-shed mappings.</li> </ul>	2030	50
Promoting Energy Mix System for Industrial Sustainability and Climate Resilient Livelihoods	<ul style="list-style-type: none"> <li>• Identify, assess and develop diverse energy sources for energy resilience</li> <li>• Increase energy mix in the national energy system</li> </ul>	2030	2,000
Establishing GLOF Risk Reduction and Early Warning Systems (EWS) in Glaciated River Basins (Gandaki, Koshi, Karnali)	<ul style="list-style-type: none"> <li>• Prevent and control life losses and minimize damage to infrastructure due to climate change-induced GLOFs.</li> <li>• Establish infrastructure for glacier lake water lowering.</li> <li>• Establish and operate EWS with collaboration and cooperation in emergency response.</li> <li>• Build capacity of the federal, provincial and local level public emergency operations centres.</li> <li>• Quantify the fresh water storage in and the impact of climate change on glaciers and snow coverage.</li> <li>• Reduce the risk of GLOFs to save infrastructure, lives and property of the peoples/communities living downstream.</li> </ul>	2030	1,000
Promoting Water Pumping Technology in Water Scarce Areas (To Address Water Stress for Food Security in Hilly Areas)	<ul style="list-style-type: none"> <li>• Enhance climate resilience capacity of rural vulnerable people living in water scarce areas.</li> <li>• Promote solar water pumps to improve access to drinking water and irrigation water.</li> <li>• Promote use of hydroelectricity for water pumping to improve access to drinking water and irrigation water.</li> <li>• Reduce the unit price of hydroelectricity that is used for water pumping.</li> </ul>	2030	1,000

Promoting Climate Resilient Renewable Energy in Rural Vulnerable Settlements and Institutions	<ul style="list-style-type: none"> <li>Promote renewable energy and energy efficiency.</li> <li>Equip and enable rural institutions to meet basic needs (health care and education) as the climate changes and during extreme weather events.</li> <li>Promote non-conventional energy (biogas, solar energy, wind energy and hydropower), and fuel-efficient technologies to reduce firewood demand and enhance energy resilience.</li> </ul>	2050	500
Constructing Climate Resilient Check Dams on the Rivers of Nepal to Sustain Life	<ul style="list-style-type: none"> <li>Build check dams for rainwater harvesting, gully erosion control, and protection of river valley settlements and assets.</li> </ul>	2050	200
Programme on Sustainability of Run-of-River Systems and Backing by Reservoir Systems at Feasible Locations Together with Climate Change Awareness Raising and Capacity Building of Hydropower Developers and Stakeholders	<ul style="list-style-type: none"> <li>Assess climate risk of the hydro projects through mapping of climate hazards, vulnerability, and exposure.</li> <li>Undertake policy reform for climate proof hydroelectricity management.</li> </ul>	2030, 2050	100
Efficient Energy and Clean Technology Development and Retrofitting to Build Resilient Systems and Infrastructure	<ul style="list-style-type: none"> <li>Identify, assess and develop inventory of climate-resilient energy efficient technology.</li> <li>Build resilience of energy systems and infrastructures.</li> </ul>	2030	500

<b>Total programmes 8</b>	<b>Total objectives 27</b>		<b>USD 5.35 B</b>
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**Alignment with/Contribution to:**

Nationally Determined Contribution 2020, 15th Periodic Plan 2019/20-2023/24, National Climate Change Policy 2019, Third National Communication 2021, National Energy Crisis Reduction and Electricity Development Decade 2015, White Paper 2018, Water Resource Policy 2020, Sustainable Development Goals Status and Road Map 2016-2030

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Drying up of water resources, and decreasing surface water flow and ground water recharge affecting water availability and access.
- Reduced hydropower generation potential due to drying up of water resources and increased siltation in the rivers.
- Reduced water discharge in rivers thus affecting irrigation and energy production.
- Damage to hydropower plants, solar plants, and their transmission lines, due to water induced disaster events such as floods and landslides.
- Increased snow retreat, formation of new glacial lakes and probability of GLOFs.



## 6.4 RURAL AND URBAN SETTLEMENTS

The Fifteenth Plan calls for cities and human settlements to be inclusive, safe, sustainable and resilient; and highlights that losses to disasters need to be reduced. Nepal's urban population has grown rapidly over the past two decades (MoFALD, 2017); and for the period 2014 to 2050, Nepal is expected to be among the top ten fastest urbanising countries in the world (UN DESA, 2014). Urbanization in Nepal is primarily fuelled by rural-to-urban migration. Cities offer diverse

economic opportunities, which attract rural migrants including the poor. Cities have been hailed as drivers of economic growth, but urbanization in Nepal has been mostly haphazard (Rimal et al., 2017). There are wide deficits and geographical disparities in the availability of basic urban infrastructure (MoUD, 2017).

Rural and urban settlements are primarily impacted by floods, landslides, droughts,

epidemics, heat waves, cold waves, and fire events. Many settlements in Nepal are built in areas, such as steep slopes and riverbanks, that are prone to climate risks such as landslides and flooding. The increased occurrence of heavy rainfall has increased the risks of landslides in the high mountains, landslides and floods in the middle mountains, and floods and debris flow in the Tarai. The consequences of climate change include loss of lives; damage to property, physical and social infrastructure, and cultural heritage; impacts on markets; and increased economic burdens. The observed impacts on physical infrastructure include damage to and destruction of buildings, transport systems, communication systems, among others. In urban areas, the urban heat island effect has increased electricity use for cooling purposes and increased heat-related health impacts (MoPE, 2016). Impacts on social infrastructure include disruption to and lack of access to health and education services. These social impacts tend to be higher for children, women, the elderly, expectant mothers, people with chronic health problems, and disadvantaged

population groups.

Climate risks and vulnerabilities in the sector include inadequate infrastructure and services for increasing rates of urbanization, including insufficient drainage that contributes to urban flooding; and a failure to integrate climate change in municipal policies and plans, and to adopt sustainable land-use planning. An increase in informal settlements, often located in risk-prone areas, and inadequate and non-compliance with standards, regulations, and building codes during infrastructure construction increases vulnerability to climate hazards.

The priority adaptation programmes in the Rural and Urban Settlements sector will mainstream adaptation in land use planning, integrated settlement planning, and urban and rural development planning; improve the enabling environment to promote climate resilient building design and construction; and assist vulnerable settlements to cope with climate impacts. The three adaptation programmes for RUS sector have an estimated cost of USD 2.85 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Promoting the Circular Economy for Sustainable Urban Development (Piloting, Integration, Capacity Building, and Implementation)	<ul style="list-style-type: none"> <li>Pilot climate resilient city planning.</li> <li>Build national capacity on adaptive urban development.</li> </ul>	2025, 2030	350
Developing Integrated Settlement and Urbanization Models for Climate Risk Reduction and Supplying Climate Adaptation Services through Nature-based Solutions and Policy Reform	<ul style="list-style-type: none"> <li>Resettle / relocate climate and disaster vulnerable populations in safer and serviced areas.</li> <li>Study and identify vulnerable settlements in three ecological zones.</li> <li>Identify safer locations for resettlement and relocation as part of rural municipal-level strategic spatial plans.</li> <li>Introduce integrated settlement planning concepts for disaster resilient community development.</li> </ul>	2030, 2050	2,000

Updating and Promoting Climate Resilient Building Designs, Codes, Practices and Construction Technologies and National Capacity Building to further Implementation	<ul style="list-style-type: none"> <li>• Prepare/revise climate risk-informed urban and rural development plans.</li> <li>• Design, pilot, and demonstrate climate and disaster-resilient construction technology.</li> <li>• Promote climate resilient building practices. Prepare/revise climate risk-informed urban and rural development plans.</li> <li>• Design, pilot, and demonstrate climate and disaster-resilient construction technology.</li> <li>• Promote climate resilient building practices.</li> <li>• Explore and identify environmentally friendly building materials and construction technologies.</li> <li>• Disseminate information about and raise awareness of climate-resilient building practices.</li> </ul>	2025, 2030	500
<b>Total programmes 3</b>	<b>Total objectives 11</b>		<b>USD 2.85 B</b>

**Alignment with/Contribution to:**

NDC 2020, 15th Plan 2019/20–2023/24, National Climate Change Policy 2019, Third National Communication 2021, Land Use Policy 2015, Land Use Act 2019, National Urban Policy, National Urban Development Strategy 2017, Habitat III National Report, Sustainable Development Goals Status and Road Map: 2016–2030

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Damage to rural and urban buildings, mostly in the rural areas as the buildings are comparatively less resilient than urban buildings; damage to public infrastructure and human settlements; disturbance in social harmony; increased risk of injury or death and displacement of population; imbalanced migration leading to low population in rural settings and dense population in urban areas with increased urban sprawl.
- Disturbance in rural-urban linkages and nexus due to climate extreme events,
- Acute disturbance in lives and livelihoods of rural and urban populations due to shortage of water supply due to drought, increasing temperatures, and extreme precipitation.



## 6.5 INDUSTRY, TRANSPORT AND PHYSICAL INFRASTRUCTURE

A total of 8,212 industries were registered in Nepal in 2020, including 1,162 large industries, 1,846 medium industries, and 5,204 small industries (MoF, 2020). The industries, however, were unevenly distributed across physiographic zones and the country’s seven provinces. Industry and transport together consumed over 1,500 kton of energy, and the largest energy supply was biomass in 2016 (ADB, 2017b).

The observed climate change impacts on industry, transport and physical infrastructure vary widely across geography and location. Floods, landslides, mass wasting, debris flow, rock falls, mudflows, sedimentation, erratic rainfall, windstorms, glacial floods, and rise in groundwater levels, are found to damage infrastructure. These climate hazards lead to the collapse

of industrial buildings and properties, impact the integrity of infrastructure, increase the instability of land through the weakening of riverbanks and hill toes and land subsidence, damage road drainage structures, breach road embankments, scour bridge foundations, block the flow of traffic, and create washouts and inundation that can submerge infrastructure (UNECE, 2019). In general, the main impacts on infrastructure observed in Nepal’s rural and urban areas are damage to houses, buildings, communication systems, bridges and roads, transmission lines, and water. Flooding has damaged water and sewer systems; overwhelmed drainage systems, caused traffic congestion, and polluted water. Drought has contributed to the failure of water and irrigation schemes in rural areas (MoFE, 2021).

Transport systems are critical for effective disaster response and access to health, education, and agricultural extension services. Heavy monsoon rains in 2019 demonstrated that transport infrastructure is highly vulnerable to flooding and landslides, with major highways blocked or destroyed, including the Koshi-Kamala section of the East-West Highway (WB, 2020). Out of the 488 landslides reported in 2020, 59 occurred along roadsides and 62 occurred on roads and obstructed vehicular flow (GoN, 2020). Disruptions to road and aviation systems can have negative economic impacts for the industrial sector. The ITPI sector is vulnerable to the impacts of climate change because of development practices such as rampant construction of buildings, expansion of unplanned settlements, and the rapid development of physical infrastructure and social infrastructure in disaster risk prone

municipal areas. Sensitivity to climatic hazards is further increased by fragile and feeble road networks, and maladaptive water schemes (MoFE, 2021). Only 46 municipalities have implemented building codes, and these codes were not necessarily developed in a manner that mainstreamed climate risks.

The five priority adaptation programmes in the Industry, Transport and Physical Infrastructure sector will improve the enabling environment to encourage infrastructure and industrial development that accounts for climate risks, diversity the energy supply mix to scale up clean energy to meet industrial demand, and encourage electric modes of transport. The five programmes have an estimated cost of USD 3.05 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Developing and Strengthening Capacity, Awareness, Resources (Databases), Institutions, Technologies and Policies for Building Climate Resilient and Environment Friendly Industries, Transport Systems and Physical Infrastructure	<ul style="list-style-type: none"> <li>Develop, update, and provide accessible and early information to all (prioritization to people living in climate vulnerable areas).</li> <li>Build awareness and develop capacities and resources in the maintenance and operation of climate resilient industry, transport and infrastructure.</li> <li>Conduct periodic monitoring and review activities as necessitated by standards.</li> <li>Develop and amend climate resilient infrastructure design, climate friendly guidelines (Environment Impact Assessment-EIA, Strategic Environmental Assessment, and Climate Impact Assessment), land use planning, construction and building codes, relocation strategies, international standards, green certificates (LEED), and provision of insurance and subsidy mechanism.</li> </ul>	2030, 2050	200
Diversifying the Energy Supply for Industrial Districts	<ul style="list-style-type: none"> <li>Promote diverse energy sources for energy security and resilience.</li> <li>Develop and implement energy mix approach in special economic zones and industrial districts</li> </ul>	2030, 2050	1,000
Developing and Promoting Clean Energy-based Transportation Systems through National Capacity Building and Policy Reform	<ul style="list-style-type: none"> <li>Reform policies to promote electric transportation modalities.</li> <li>Establish infrastructure that can promote electric mobility.</li> </ul>	2025, 2030	500

Developing Climate Resilient Infrastructure Systems for Climate Risks, Hazards and Pandemics	<ul style="list-style-type: none"> <li>Develop guidelines on building climate resilient infrastructure systems</li> <li>Develop a pool of climate resilient technologies that helps to build robust infrastructures</li> <li>Establish open spaces, helipads, community shelters and buildings, in each municipality, and province,</li> </ul>	2030, 2050	350
Upgrading, Maintaining, and Relocating Vulnerable Industries, Physical Infrastructure, and Transport Sector to Increase Resilience to Climate Risks	<ul style="list-style-type: none"> <li>Build resilience of climate risks vulnerable ITPI through inventory, assessment and mapping.</li> <li>Maintain and relocate Industry, Transport, Physical Infrastructure to address climate related vulnerabilities following the standards and assessment reports.</li> <li>Strengthen, promote, construct climate smart (resilient) and eco-friendly infrastructure and industries.</li> </ul>	2050	1,000
<b>Total programmes 5</b>	<b>Total objectives 14</b>		<b>USD 3.05 B</b>

**Alignment with/Contribution to:**

NDC 2020, 15th Plan 2019/20–2023/24, National Climate Change Policy 2019, Third National Communication 2021, Land Use Policy 2015, Land Use Act 2019, Foreign Investment and Technology Transfer Act, Industry Policy, Supplies Policy, National Mineral Policy, Commerce Policy, Sustainable Development Goals Status and Road Map: 2016–2030

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Due to increased climate induced hazards and extreme events increased risk of;
- Damage to industries and its physical infrastructures
- Damage to water and energy supply systems for the industry
- Reduced availability of water for industrial purposes due to increase in dry spell and drought



## 6.6 TOURISM, NATURAL AND CULTURAL HERITAGE

Tourism represents a small but expanding industry in Nepal. While the number of tourists dropped dramatically in 2020 and 2021 because of COVID-19, the sector has the potential for significant growth and could be a driver of economic and sustainable human development (UNDP, 2020). Tourism accounted for 7.5% of national GDP in 2017 (MoF, 2017a) when 940,218 international tourists visited Nepal, an increase of 25% over the previous year (MoCTCA, 2018). The tourism sector is a key contributor to the national economy as it is one of the sources of foreign exchange in Nepal.

Nepal's tourism industry is primarily focused on nature; and most of the nature-based tourism activities are climate sensitive. Trekking and mountaineering in Nepal are concentrated in Protected Areas that are at high risk of floods, landslides, glacier melt, avalanches, and GLOFs (ICIMOD,

2011). Changing monsoon patterns have impacted tourism activities, such as trekking, mountaineering, and safari (Nyaupane and Chhetri, 2009). The abrupt changes in climatic variables and extreme events are a major threat to the health and safety of tourists and people directly involved in tourism activities. Climate change and inclement weather have put the lives of trekkers, mountaineers, and associated human resources at threat. Between 2005 and 2014, a total of 235 tourists lost their lives due to inclement weather in the country, including avalanches and snowstorms (MoHA & DPNet-Nepal, 2015).

Other climate impacts on the tourism sector include loss of biodiversity, reduced landscape aesthetics, and infrastructure damage including cultural heritage sites. Many cultural heritage sites are located near rivers and could be destroyed or heavily damaged by rising river waters, flash floods and landslides (MoSTE, 2014).



Flash floods are particularly dangerous for museums and archives, especially when parts of collections are stored underground (WB, 2017). In Mustang, the decrease of snow in winter and the increase in rainfall after the winter months have affected the traditional construction of mud and stone flat-roofed houses (MoEF, 2021). The main climate risks in the sector are socio-economic losses due to disruptions to tourism businesses; and damage to and destruction of physical property and tourism infrastructure due to landslides, floods, fires and extreme weather.

The reliance on nature-based tourism means that the sector is highly vulnerable to climate change and its impacts. Women are the de facto managers of many

hospitality businesses, including homestays, restaurants, hotels, and teashops; and may experience declines in income or increases in workload (e.g., water scarcity in tourism areas) (Tenzin et al., 2019).

The 8 priority adaptation programmes in the Tourism, Cultural and Natural Heritage sector will identify climate sensitive areas, establish emergency preparedness and rescue teams for immediate action in climate-related disasters, establish a digital information centre, strengthen sustainable climate-resilient tourism practices, and promote the diversification of tourist products and destinations. The eight adaptation programmes have an estimated cost of USD 1.13 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Climate Resilient Tourism for Ecological Sustainability and Economic Prosperity	<ul style="list-style-type: none"> <li>Diversify and promote tourism destinations and products for sustainable tourism.</li> <li>Promote agro and eco-tourism value chains that consider the polluter pay principles and climate resilient practices.</li> <li>Facilitate private as well as foreign direct investments to improve the climate resilience of tourism infrastructure.</li> </ul>	2030	50
Climate Risk and Tourism Information System for Resilient Safe and Sustainable Tourism	<ul style="list-style-type: none"> <li>Develop and install hi-tech digital forecast information systems.</li> <li>Provide accurate, timely, and geo-specific meteorological information.</li> <li>Develop disaster preparedness plans for the high-altitude area destinations by 2030.</li> </ul>	2030	20
Establishment and Operation of Emergency Relief and Rescue Services in Adventure Tourism	<ul style="list-style-type: none"> <li>Identify tourism hotspots from climate change perspective</li> <li>Develop emergency emergency rescue centers at appropriate locations</li> <li>Promote insurance in tourism sector covering climate risks.</li> </ul>	2030	500
Regulatory Framework Development, Awareness Raising and Capacity Building on Climate Proofing, Protection, Retrofitting and Use of Natural and Cultural Heritage	<ul style="list-style-type: none"> <li>Develop technology for retrofitting and rebuilding the cultural heritage.</li> <li>Build national capacity on developing and ensuring compliance with a regulatory framework.</li> </ul>	2030	200
Develop Climate Resilient Infrastructure and Explore and Enhance Knowledge and Capacities for Resilient Mountain Tourism	<ul style="list-style-type: none"> <li>Identify, conserve, and restore cultural, historical, and archaeological sites that are at risk of damage because of climate impacts.</li> <li>Promote archaeo- and heritage tourism.</li> <li>Develop climate resilient infrastructure at specific tourist destinations.</li> <li>Catalogue and preserve indigenous and traditional knowledge to contribute to a climate resilient tourism sector.</li> </ul>	2030, 2050	60

Community-Based Adaptation through Eco- and Cultural Tourism	<ul style="list-style-type: none"> <li>• Upgrade existing and build 500 new climate-resilient homestays (nationwide)</li> <li>• Develop and operationalize 'One Province- One Home Stay' circuit.</li> <li>• Increase gender equality and social inclusion (GESI) inclusive tourism employment at the local level and develop women leadership in the sector.</li> <li>• Capacitate homestays to serve climate, gender and indigenous knowledge-based tourism products.</li> </ul>	2025, 2030	100
Promotion of 'One Local Level One Tourism Destination' and Planning for Functional Climate Resilient Tourism Destinations (Piloting, Demonstration and Replication. One Project in each Province)	<ul style="list-style-type: none"> <li>• Promote local tourism for livelihoods promotion.</li> <li>• Make the tourism destinations climate resilient.</li> </ul>	2030	100
Diversifying and Promoting Alternative Destinations and Products for Climate Resilient Tourism Business	<ul style="list-style-type: none"> <li>• Develop climate smart and diversified tourism products to adapt to a changing climate.</li> <li>• Promote climate smart and eco-friendly tourist circuits, routes and sites. Promote climate smart and environmentally friendly tourism destinations including resorts through collaborative approaches.</li> </ul>	2030, 2050	100
<b>Total programmes 8</b>	<b>Total objectives 23</b>		<b>USD 1.13 B</b>

**Alignment with/Contribution to:**

NDC 2020, 15th Periodic Plan 2019/20-2023/24, National Climate Change Policy 2019, Third National Communication 2021, Tourism Policy 2008, National Tourism Strategic Plan 2016-2025, National Forests Policy 2019, National Land Use Policy 2015 Sustainable Development Goals Status and Road Map: 2016-2030

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Damage of and destruction to cultural heritage and archaeological sites due to climate extreme events such as blizzards, landslides, avalanches, GLOF, extreme precipitation, hailstorms, windstorms, extreme temperatures
- Reduced number of trekkers and mountaineers due to extreme weather-related events such as windstorms, hailstorms, excessive rain, excessive heat, blizzards, and snowstorms.
- Damage to tourist infrastructure and destinations due to climate extreme events
- Loss of traditional knowledge, practices and languages due to climate-induced migration and shifting of locations
- Loss in national GDP induced by decreased tourism activity due to extreme events



## 6.7 HEALTH, DRINKING WATER AND SANITATION

Health, drinking water sanitation are critical elements of balanced development and the promotion of healthy lifestyles. The Fifteenth Plan highlights the importance of mainstreaming climate change impacts in the design and construction of drinking water and sanitation facilities.

Water availability and quality are impacted by climate change in Nepal. Springs are the primary source of drinking water in the mid-hill region, and spring discharge

has declined by 30% over the last 30 years. The increase in temperature also causes melting and thawing of glaciers, snow, and frozen ground leading to changes in the seasonality of river flows and a reduction in water availability in summer (MoFE, 2021). An increase in precipitation and severe weather has caused flooding, pollution of wells, inaccessibility of water sources, flooding of latrines, damage to infrastructure, landslides around water sources, sedimentation and turbidity, challenges to the sustainability

of sanitation and hygiene behaviours, and water-borne diseases (MoFE, 2021). Floods and landslides over a six-year period caused damage to WASH systems that amounted to almost USD 196 million (MoWS/DWSS, 2019). Rising temperatures, fluctuating precipitation, and extreme weather events have significant impacts on the seasonal and temporal trends of vector-borne diseases, water-borne diseases, respiratory diseases, cardiovascular disease, food-borne diseases, nutrition-related diseases, injuries, and mental illnesses (NPC, 2020).

Nepal's national adaptation plan in the health sector indicated that vulnerability in the health sector is linked to the availability of local resources, institutional good governance, quality of public health infrastructure, and the access to relevant local information regarding extreme weather threats. The spatial distribution of these factors is not uniform, with vulnerable populations being impacted by varying degrees. For example, the mid and far western districts were found to be more exposed to climate risks that increase the incidence of diarrhoea, respiratory disease, and malaria. Climate change can significantly worsen health conditions of poor people and communities that are living below the poverty line (MoH, 2017). The Tarai region of Nepal is particularly vulnerable because it is prone to flooding

and experiences health and hygiene issues during disasters. Floods and landslides damage and disrupt water and sanitation infrastructure and services, resulting in poorer sanitation conditions, contamination of water sources, and limited access to water for hygienic practices that could lead to health impacts and potential outbreaks. Many health facilities are located near rivers or on steep slopes and are vulnerable to damage during floods and landslides. For example, 30 out of 51 (59%) of health facilities in Ramechhap have suffered damage from landslides (MoFE, 2021).

The seven priority adaptation programmes for the HDWS sector will enhance the public health system to address critical climate vulnerabilities and risks through improved research and surveillance of diseases linked to climate change; and the establishment of early warning systems, emergency preparedness, and prompt responses to epidemics and pandemics. The actions will improve the enabling environment for the sector, work to integrate climate risks in all infrastructure projects, and improve the conservation of water sources along with watershed management to ensure sustainable water supply. The proposed programmes have an estimated cost of USD 4.75 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Capacity Building of Health and Hygiene Service Providers (Institution and Personnel) on Climate Resilient Health and Hygiene Service Planning and Implementation	<ul style="list-style-type: none"> <li>Empower and inform health care providers to respond to climate risk and vulnerabilities.</li> <li>Ensure sustainable and safe management of water, sanitation, and health care waste services.</li> <li>Ensure use of sustainable energy (renewable) in health care facilities and services.</li> <li>Develop and promote climate resilient infrastructure, to enable efficient functioning of health care facilities during extreme weather events.</li> </ul>	2025, 2030	50

<p>Climate Change Resilience Development through Capacity Building, Innovation, Improvement and Construction of WASH Services and Facilities</p>	<ul style="list-style-type: none"> <li>• Capacitate and aware stakeholders on climate-resilient WASH interventions.</li> <li>• Explore and pilot technologies to implement climate-resilient water supply, systems and sanitation services.</li> <li>• Develop climate-resilient water supply system, and sanitation services and facilities focusing on Gender, Children, Youth and overall social inclusion</li> <li>• Design and implementation of climate proofing of WASH services.</li> <li>• Promote adaptive water, sanitation and hygiene practices to reduce the impact on environment and climate.</li> <li>• Support local government to establish and operationalize water-quality monitoring mechanism through various local and national initiatives.</li> </ul>	<p>2030, 2050</p>	<p>2,000</p>
<p>Strengthening of Climate Sensitive Disease Surveillance System with Emergency Preparedness and Response</p>	<ul style="list-style-type: none"> <li>• Operationalize a disease surveillance system through adoption of appropriate technology and tools.</li> <li>• Generate evidence and support in evidence-based decision making in regard to climate sensitive diseases.</li> <li>• Integrate climate change and health issues in academic curriculum.</li> <li>• Strengthen and equip public health laboratories to better assess climate sensitive diseases.</li> <li>• Prevent and control life losses and disabilities to due to emergency situations created by climate-induced extreme events.</li> <li>• Enhance capacity of health services and responders to act swiftly in the case of climate emergencies.</li> <li>• Strengthen the rapid and emergency response system.</li> <li>• Build capacity of the federal, provincial, and local level public health emergency operations centres.</li> </ul>	<p>2030</p>	<p>500</p>
<p>Health Promoting Cities: Health, Environment and Life (HEAL)</p>	<ul style="list-style-type: none"> <li>• Improve health and quality of life of all urban and rural dwellers.</li> <li>• Ensure adequate open spaces and parks for healthy behaviours.</li> <li>• Improve environmental health services (water supply, sanitation, solid waste management, food safety, and air pollution monitoring and control).</li> <li>• Increase urban forests coverage and conserve ecosystem that is stable and sustainable.</li> <li>• Promote clean, safe physical environment of high-quality including housing quality.</li> </ul>	<p>2030, 2050</p>	<p>500</p>
<p>Promotion and Conservation of Water Sources along with Watershed Management for Sustainable Water Supply Service</p>	<ul style="list-style-type: none"> <li>• Support local governments in the conservation of water sources (surface and ground).</li> <li>• Promote and support watershed management for sustainable water supply service delivery.</li> <li>• Promote and support water recharge and retention activities.</li> </ul>	<p>2030</p>	<p>1,000</p>

Policy Reform, Strategy Development and National Level Awareness Raising on Climate Resilient Health and WASH Programme, Planning, Operationalization and Sustainability	<ul style="list-style-type: none"> <li>• Policy reform and/or formulation to make climate-sensitive WASH, Health plans and programme.</li> <li>• Support local government on integration and implementation of climate change adaptation in local level WASH and health plans and programmes.</li> <li>• Develop national guidelines and strategies to support local government to integrate multiple uses of water, water quality improvement system, insurances and hybrid technologies.</li> <li>• Operationalize National Health and WASH Management Information System integrating with hydro-meteorological, land-use data for climate sensitive planning, implementation and monitoring.</li> </ul>	2030	200
Research, Innovation and Development of Climate Resilient Measures/ Technologies for Water Supply, Sanitation and Health Systems	<ul style="list-style-type: none"> <li>• Explore climate-resilient technologies for water and sanitation that are suitable for the local context.</li> <li>• Explore resources and partnerships for scaling up identified climate resilient WASH technologies and businesses (Supply to Service) through engagement of the private sector and industries.</li> <li>• Build the capacities of service providers, WASH practitioners, and local governments to adopt innovative technologies.</li> <li>• Develop early warning systems for water source (surface and ground) yield, demand, and quality.</li> </ul>	2030	500
<b>Total programmes 7</b>	<b>Total objectives 34</b>		<b>USD 4.75 B</b>

**Alignment with/Contribution to:**

NDC 2020, 15th Periodic Plan 2019/20-2023/24, National Climate Change Policy 2019, Technology Needs Assessment 2021, Third National Communication 2021, National Health Sector Support Programme (NHSSP), Long-term (Water Supply and Sanitation) Sectoral Development Plan 2017-2030, National Health Policy 2019, National Health Infrastructure Development Standards 2017, National Disaster Risk Reduction and Management Strategy and Action Plan 2017, Sustainable Development Goals Status and Road Map: 2016-2030

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Damage to and destruction of health sector infrastructure and water supply and sanitation systems due to extreme events such as floods, landslides, forest fires, prolonged dry spells, and incidences of drought.
- Compromised health care facility systems due to extreme events and emergence of new diseases.
- Compromised access to safe water and sanitation leading to diseases and long-term impacts among the most vulnerable groups, including children, women, disabled persons and elderly people.
- Greater risk of injury, disease, and death, owing to more intense heat waves, cold waves and forest fires.
- Increased risk of vector-borne, water-borne and foodborne diseases, especially in mountain areas, and leading to perennial occurrence in the lowlands.
- Increase in morbidity and mortality related to extreme cold waves as well as heat waves in the southern Tarai lowlands. Increased prevalence of vector-borne, water-borne and foodborne diseases in the mountainous areas.



## 6.8 DISASTER RISK REDUCTION AND MANAGEMENT

Owing to a diverse topography, complex geology and highly varying climate, Nepal is exposed to many natural and human-induced hazards that are impacted by climate change. The hilly areas of Nepal are prone to landslides and Tarai plains are prone to floods, while higher Himalaya and middle-mountains experience debris flow

and GLOFs. The middle-mountains and Tarai are affected by forest fires, and the higher mountains by landslides and avalanches.

On average, 647 people die from climate-induced disasters in Nepal each year which is about 65% of the total deaths from all disaster events except road accidents

(MoHA, 2018). Floods, landslides, epidemics, and fires are the most devastating climate-induced disasters in Nepal in regard to deaths, affected population, and economic losses (MoFE, 2021). Floods are most damaging, causing over 50% of deaths and 30% of economic losses (UNISDR, 2015). An example is the 2017 flooding that affected 80% of the Tarai region and some surrounding districts and caused USD 584.7 million in damages (NPC, 2017b). In the future, it is expected that flooding will cause 82.93% of the Average Annual Loss (UNISDR, 2015). The impacts of climate-related disasters are felt at the household level through food insecurity, damage to property, and increased prices of food and fuel; and at the national level, where scarce government resources are re-allocated to address the impacts of disasters at the expense of other programmes. Demographic factors such as rapid population growth, human encroachment into the vulnerable lands, poverty, and limited awareness about the sustainable use of natural resources increase vulnerability to the impacts of climate-induced disasters and increase the risk of increased damages.

Disaster Risk Reduction and Management (DRRM) is a concurrent function of the federal, provincial, and local governments. The DRRM Act (2017) addresses disaster risk management with a comprehensive approach, focusing on the different stages of the disaster management cycle from preparedness, to mitigation response, to

rehabilitation. However, collecting and managing disaster and climate-related data remains inadequate, and it is not accessible to many local level planners and the private sector. Given that local actors are usually the first responders, the success of immediate rescue often correlates with available equipment and their capacity to instigate operations. The priority adaptation actions promote a proactive, rather than reactive, approach to climate-related disasters; and aim to reduce risks to communities and infrastructure resulting from climate-related disasters such as droughts and floods. The programmes work to ensure that disasters are curtailed, do not result in emergencies, and build the capacity of people to cope with the impacts of climate change.

Six priority adaptation programmes in the DRRM sector will help to empower provincial and local governments to assume effective and efficient roles in leading DRRM activities in their respective localities. The enabling environment will be improved through actions to harmonize DRRM and climate adaptation plans, policies, and guidelines; to develop climate risk sensitive land use planning, and to develop actions plans to address climate-induced disasters. The programmes will improve and strengthen early warning systems and multi-hazards monitoring, and integrate adaptation considerations into social protection systems. The adaptation programmes have an estimated cost of USD 8.05 billion to 2050.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Building Climate Resilience by Developing and Harmonizing DRRM and CCA at Federal to Local Levels through Policy Reforms (Integration of DRR in Local Adaptation Plans)	<ul style="list-style-type: none"> <li>Formulate Integrated Guidelines on Disaster Risk Management and Climate Change Adaptation at Local Level.</li> <li>Harmonize DRR and CCA plans, policies and guidelines at federal, provincial, and local level and mainstream into sectoral periodic and annual plans and budgets.</li> <li>Develop and implement GESI responsive Local Disaster and Climate Resilience Plans (LDCRP).</li> <li>Increase participation and involvement of vulnerable groups in climate and disaster risk governance.</li> <li>Foster the enabling environment for inclusive climate and disaster risk governance.</li> </ul>	2030, 2050	1,000

Strengthening Adaptive Social Protection/ Shock Responsive Practices Initiatives for Transferring Climate Risk	<ul style="list-style-type: none"> <li>Develop and operationalize adaptive social protection/shock responsive social protection frameworks, guidelines, mechanisms, and institutional arrangements at all levels of the government.</li> <li>Provide adaptive social protection through insurance companies that support government plans and policies.</li> </ul>	2050	2,000
Maintenance, Upgradation and Strengthening Early Warning Systems and Multi-Hazard Monitoring to Facilitate Climate Adaptive Function of Key Economic and Service Sectors	<ul style="list-style-type: none"> <li>Establish timely, effective, appropriate, people-centred and GESI sensitive early warning systems that easily outreach hazard-affected communities of Nepal, including the most vulnerable.</li> <li>Provide lead time to prepare and respond to disasters</li> </ul>	2030, 2050	1,500
Development of Federal and Provincial Strategy and Action Plans on Control of Climate Induced (Primarily Water Borne) Disasters in the Forest Areas of Nepal and Phase-Wise Implementation Under the Leadership of Forest Authorities	<ul style="list-style-type: none"> <li>Map climatic disasters in forest areas</li> <li>Implement DRRM schemes phase wise to control disasters.</li> <li>Build resilience of forest sector to climate induced disaster.</li> </ul>	2025, 2030, 2050	2,500
Develop Regulatory Framework for Domestic and Industrial Fire Control and Mitigation, and Implementation Strategy and Build National Capacities with Supply of Technology and Equipment	<ul style="list-style-type: none"> <li>Reduce and control the magnitude and frequency of domestic fires.</li> <li>Build capacity of relevant authorities and stakeholders on the use of domestic fire control tools and techniques</li> </ul>	2030	1,000
Promote Culture of Safety and Build Climate Resilience through Climate Risk Sensitive Land Use Plan (RSLUP) Guideline and Standards	<ul style="list-style-type: none"> <li>Formulate Climate Risks and Sensitive Land Use Plan.</li> <li>Develop and implement Risk Sensitive Land Use (RSLUP) Guidelines and Standards at the federal, provincial, and local level covering all the ecological zones.</li> </ul>	2050	50
<b>Total programmes 6</b>	<b>Total objectives 15</b>		<b>USD 8.5 B</b>

**Alignment with/Contribution to:**

NDC 2020, 15th Periodic Plan 2019/20–2023/24, National Climate Change Policy 2019, Third National Communication 2021, National Disaster Risk Reduction and Management Act 2017, National Disaster Risk Reduction and Management Policy 2018, National Disaster Risk Reduction and Management Strategy and Action Plan 2018–2030, National Land Use Policy 2015, Sustainable Development Goals Status and Road Map: 2016–2030, Local Government Operationalization Act 2017.

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Displacement caused by climate-induced hazards.
- Loss of lives, property and assets, physical infrastructure, livelihoods, shelter, education, water, sanitation, medicine, food, recovery and protection caused by climate-induced hazards (landslides and flooding due to extreme precipitation, and domestic, industrial and forest fire incidences due to extreme temperature and drought incidences.
- Landslide dam outburst and GLOF risks.



## 6.9 GENDER EQUALITY AND SOCIAL INCLUSION, LIVELIHOODS AND GOVERNANCE

Nepal, being a signatory to various international conventions, is legally committed to gender, equality, and social inclusion (GESI). GESILG is a guiding principle of this NWWAP, which takes a dual approach of both mainstreaming GESI considerations into policies, and programmes; and by targeting excluded and vulnerable groups, where needed, through GESI-specific actions and projects. The NAP formulation process included GESILG analysis across the key sectors, which guided the identification and design of priority adaptation actions that are participatory, transparent, and gender and socially inclusive. This approach provides a solid basis for addressing GESILG in an informed and practical way that supports inclusive economic development and livelihood opportunities.

Children, girls/women, pregnant women, the elderly, and people with disabilities have higher levels of mortality and morbidity due to climate change impacts (MoFE, 2018). Marginalized or indigenous groups, particularly Majhi, Raute, Chepang, Satar, are more vulnerable to food insecurity and are more likely to suffer from disasters like floods, landslides, and fire. Heat and cold waves impact those working outside, including the poor, women, children, and the elderly. Extreme climatic events such as droughts and floods increase the prevalence of water-borne diseases like typhoid, cholera, and other diarrhoeal diseases, which mostly impact children below the age of 5 (Eriksson et al., 2008). Flood-related fatalities are higher for girls and women than boys and men (Bartlett et al., 2008).

Women are particularly vulnerable to climate change because of lack of income, limited ownership of land and property, limited access to credit and markets, and lack of capacity for diversification of livelihoods. Women in Nepal make up about 73% of the agricultural work force and the country is experiencing a trend of “feminization of the agricultural sector” because of male out-migration. This climate vulnerability is exacerbated because women farmers do not have the same access to land, water, seeds, agricultural extension, training, and credit as men. Only 10% of the farms of

Nepal are owned by women or jointly owned by men and women (IUCN, 2020), and female-headed households are more vulnerable to climate shocks because they grow fewer crop types (MoFE, 2021).

Women are particularly vulnerable to the impacts of climate change in the forestry sector because they play a major role in the collection of various forest products and are considered the primary users of forests in Nepal (IUCN, 2020). Poor Dalits, because of poverty and caste-based discrimination are more vulnerable. Nepal’s REDD+ Strategy reported that decisions and resources are controlled by male elites, hindering the poor, Dalits, and women from exercising leadership (MoFSC, 2015).

There is a strong correlation showing households with fewer years of schooling and lower wealth are considerably more likely to be affected, experience higher casualties, and incur livelihood losses because of floods and landslides (Shrestha et al., 2016). Climate impacts tend to have a disproportionate effect on the poorest and most vulnerable communities who have limited options or resources to diversify their livelihoods (Goodrich et al., 2017).

Addressing these vulnerabilities requires increased access to training and capacity building for women and marginalised groups, the collection of sex-disaggregated climate change data, and the implementation of specific actions to improve the livelihoods of women. Similar to gender equality, a more robust approach to collecting and analysing data on social exclusion is required to better understand and identify actions (MoEF, 2020b).

The four priority adaptation programmes in the GESILG Sector enhance resilience to climate change through GESI-responsive livelihood programmes; integrate GESI and climate foresight in social protection and development interventions; and establish and functionalize climate change aware gender focal desks in all state and non-state institutions. The proposed programmes have an estimated cost of USD 700 million to 2050.



Programme Title	Objectives	Timeframe	Budget (Million USD)
Strategy and Action Plan on Restrengthening, Establishing and Functionalizing Climate Change Aware Gender Focal Desks in all State and Non-State Institutions (Including Private Organizations)	<ul style="list-style-type: none"> <li>Increase qualitative and quantitative research on GESI and climate change impacts, risks, and adaptation for evidence-based planning and implementation of climate change adaptation projects.</li> <li>Capacitate and raise awareness of government institutions, communities, policymakers, and private sector entities on the importance of GESI integration in climate change adaptation to achieve sectoral goals through an informed process.</li> <li>Identify, recognize, and promote GESI responsive and climate resilient indigenous knowledge for socio-economic empowerment.</li> </ul>	2030	100
Building Human Capital for an Inclusive Climate and Disaster Resilient Society through Promoting Safe and Equitable Access to Disaster Reduction Response Services	<ul style="list-style-type: none"> <li>Establish and strengthen GESI responsive multi-hazard early warning systems.</li> <li>Provide GESI responsive and sensitive emergency support.</li> <li>Minimize risks of discrimination, gender-based violence, and violence against children by providing immediate services and referrals during and following climate induced emergency situations.</li> <li>Capacitate the frontline service providers and community networks in providing GESI responsive support during emergency situations.</li> </ul>	2050	500
Integrating GESI and Climate Foresight in Social Protection and Development Interventions (Piloting and Replication)	<ul style="list-style-type: none"> <li>Promote participation and involvement of vulnerable groups to reduce the risks of disasters.</li> <li>Identify social safety nets for building resilience to disaster.</li> </ul>	2030	50
Enhancing Resilience to Climate Change through GESI Responsive Livelihood Programmes	<ul style="list-style-type: none"> <li>Develop, implement, and operationalize a GESI responsive budgetary system at all tiers of government.</li> <li>Promote community level financial safety nets for vulnerable groups to adapt to climate change impacts.</li> <li>Identify and promote climate resilient alternative businesses for livelihood enhancement especially for vulnerable people.</li> </ul>	2050	50
<b>Total programmes 4</b>	<b>Total objectives 12</b>		<b>USD 0.7 B</b>

**Alignment with/Contribution to:**

NDC 2020, 15th Periodic Plan 2019/20-2023/24, National Climate Change Policy 2019, Third National Communication 2021, Climate Change and Gender Strategy and Action Plan 2021, Sustainable Development Goals Status and Road Map: 2016-2030, Local Government Operationalization Act 2017

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Impacts of climate-induced hazards on vulnerable groups including children.
- Damage to and destruction of infrastructure, assets, and livelihoods; and exacerbated poverty
- Food and nutrition insecurity; loss of shelter, and increased displacement, forceful migration, discrimination, and violence; loss of access to vital services, such as education, health facilities, medicine, water, sanitation, and hygiene.
- Health implications, especially for pregnant women, children, lactating mothers, and the elderly; Enhanced risk of disease spread; Mental and psychosocial health problems caused by disasters.

## 7 ENABLING ACTIONS

The implementation of the adaptation actions will be supported by enabling actions that cut across all the sectors. These actions aim to equip government and stakeholders with the knowledge, skills, technologies, and financing needed to deliver and report on adaptation actions.

Enabling actions include establishing the policy, legal and regulatory framework for adaptation programmes. A priority is the continued emphasis on integrating climate change in planning and budgeting at the three levels of government. Work is needed to ensure that adaptation is viewed as a core business in the new structures and systems that are being established at the provincial and local levels. LAPAs are a key mechanism to identify local adaptation priorities and integrate them into development planning. Climate resilient livelihoods will be facilitated by mainstreaming adaptation into the formulation of policies and institutional frameworks, implementation of programmes and budgets at the three levels of government.

Awareness raising and capacity building is required at the national, provincial, and local levels to better understand the impacts of climate change and how to integrate adaptation in planning, budgeting, and implementation. In addition, awareness raising is required for the private sectors, communities, and households (MoFE, 2020). Knowledge and capacities are required to support the implementation of the NAP process and the development of future NAPs and sectoral programmes. Work is needed to increase the level of awareness and capacities of different government agencies and stakeholders, including improving their overall understanding of climate change discourse, increasing access to information on climate change variables, and improving cooperation and coordination amongst different stakeholders on the implementation of different climate change adaptation interventions.

The Nepal NAP sets out three programmes related to awareness raising and capacity building to address the gaps. The programmes also aim to build the national, provincial, and local capacities to implement the proposed

strategies. The three key programmes are listed below:

- Continue to implement the NAP process.
- Strengthen capacities of federal thematic ministries and provincial governments on developing and implementing the NAP integration process.
- Establish and operationalize a climate change data management system and programme monitoring centre at federal and provincial level.

Increasing adaptive capacity requires **research and technology development** in each sector. Nepal lacks technological innovations to ensure sustainability of initiated interventions. Scientific climatic information is limited to only few institutions and is often inadequate, resulting in high uncertainty about climatic events, and limited information on scenarios of different levels of temperature increase and its implications. The lack of hydro-met stations in high altitude locations means that trends of climate change and predictions of future climatic conditions cannot be produced.

In addition to limited technology, proper dissemination mechanisms are not in place for climate information. Extensive research, sharing of traditional knowledge, building on existing adaptation actions, information dissemination, and science-policy interface are necessary for effective climate adaptation in Nepal (KC, 2018). Priority research and technology development needs in four critical sectors are:

- Forests, Biodiversity and Watershed Conservation sector – climate change projections, modelling, and emissions scenarios to help visualise climate impacts in the long-term.
- Agriculture and Food Security – Improved extension services for agriculture, nutrition, and health to help support small farmers, communities, and households adapt to climate change.
- DRRM – Early warning systems and forecast systems are required in each province.
- Health – Research and study to better understand the effects and impacts of climate change on people's health.

Nepal has taken steps to improve **climate finance management**, including establishing the Climate Finance Unit in the Ministry of Finance to strengthen national capacity to absorb and manage climate financing. The Government of Nepal has pursued a policy of integrating climate finance into national planning and budgeting processes by adopting the Climate Change Financing Framework (MoF, 2017a). In addition, since 2013–14, the government has included the climate change code in budget and expenditure tracking. The “highly relevant” climate budget has accounted for about 5% of the total national budget (MoF, 2017b).

Furthering the aim of the National Climate Change Policy (2019) that 80% of mobilized resources will be used to support the implementation of programmes at the local level requires the identification of national resources for the implementation of adaptation actions, the establishment of a national Climate Fund, the preparation of a strategy to finance adaptation, and the establishment of an improved system to track climate finance.

The adaptation monitoring, review and reporting (MR&R) system will be developed and implemented to generate information for national and international reporting requirements. MR&R needs to demonstrate how adaptation actions improve the ability of people, communities, and systems to cope with climate change. The MR&R system can help the government track the participation of women and vulnerable groups in the NAP process, and identify opportunities to enhance their equitable access to resources and benefits from adaptation interventions. This will require a robust approach to collect gender-disaggregated data and data on social inclusion, and to use this data to demonstrate the different needs and priorities of men, women, and vulnerable groups.

The priority action in this sector is the establishment of an MR&R system for adaptation, which will be developed in a phased approach up to 2030. Initial actions will include the development of sectoral MR&R frameworks, including the development of indicators and the collection of baseline information.

Programme Title	Objectives	Timeframe	Budget (Million USD)
Continue to Implement the NAP Process, including Research on Climate Risks and Vulnerabilities, and Capacity Building of Actors and Stakeholders on Climate Change Matters	<ul style="list-style-type: none"> <li>Improve oversight and coordination of the NAP process.</li> <li>Enhance reporting to the national and global communities on adaptation action in Nepal.</li> <li>Build capacity to implement the NAP process at all levels of government.</li> <li>Build the awareness and capacity of stakeholders on adaptation issues</li> </ul>	2025, 2030, 2050	100
Strengthen Capacities of Federal Thematic Ministries and Provincial Governments on Developing and Implementing the NAP process	<ul style="list-style-type: none"> <li>Develop capacities to mainstream the adaptation in policies, plans and budgets at both the provincial and federal level (thematic ministries).</li> <li>Build capacity to implement the NAP process.</li> </ul>	2025, 2030	50
Establish and operationalize Climate Change Data Management System and Programme Monitoring Center at Federal and Provincial Levels	<ul style="list-style-type: none"> <li>Establish a climate change data management and monitoring system at MoFE.</li> <li>Build the capacity of sectoral and provincial ministries on the adaptation data management and monitoring system.</li> <li>Monitor, review and report on NAP implementation.</li> </ul>	2030	10
<b>Total programmes 3</b>	<b>Total objectives 9</b>		<b>USD 0.16 B</b>

**Alignment with/Contribution to:**

National Climate Change Policy, 2019, 15th Periodic Plan 2019/20–2023/24, Third National Communication 2021, Climate Change and Gender Strategy and Action Plan 2021, Sustainable Development Goals Status and Road Map: 2016–2030

**Climate Risks and Vulnerabilities Addressed by the Actions:**

- Overall risks posed by climate change in development gains of the country including in the sectors (mentioned above) where capacity gaps have hindered effective response to climate change impacts

## 8 IMPLEMENTATION OF THE NAP

The NAP is designed to be a complement to existing plans. It presents a strategic approach that will help the government achieve national development goals and the SDGs, including poverty alleviation, gender equality, transformation of the agricultural sector, and climate-resilient infrastructure. The short-term actions to 2025 are aligned with the national development priorities set out in the Fifteenth Plan and the Government of Nepal's Covid-19 recovery plan. The medium-term actions to 2030 are aligned with the priority actions in Nepal's NDC and informed by the priorities set out in the SDG roadmap. The strategic vision guiding

action to 2050 is aligned with the goals of the National Climate Change Policy 2019. This NAP promotes actions to mainstream adaptation in the planning and budgeting processes at the Province and Local levels; and in the policies, plans and budgets of the sectoral ministries at the federal level. The NAP has drawn on and can be an input to strategies on the SDGs, biological diversity, combatting desertification, and DRR. The identification of common adaptation actions across these strategies helps provide consistent messaging to stakeholders and potential funders of adaptation priorities.

### 8.1 INSTITUTIONAL ARRANGEMENT

The effectiveness of Nepal NAP involves a mix of institutional and behavioural responses, the use of technologies, and the design of climate-resilient plans and climate smart practices, which balances development, economic, social, and environmental sustainability and disaster risk reduction. The main institutions involved in the implementation of the NAP process range from the Environmental Protection and Climate Change Management National Council (EPCCMNC), chaired by the Rt. Hon. Prime Minister to the Inter-Ministerial Climate Change Coordination Committee (IMCCCC) to the Thematic and Cross-cutting Working Groups (T/CWGs) and Ministry of Forests and Environment at the federal level.

At the provincial level, the institutions responsible for the NAP roll out and its effective implementation range from Provincial Environmental Protection and Climate Change Management Council (PEPCCMC), to Provincial Climate Change Coordination Committee (PCCCC) to Provincial Policy and Planning Commission, to the ministry related to forests, environment and climate change and other sectoral ministries at the province. The District Climate Change Coordination Committee provisioned under the chair of District Coordination Committee chief and the Local-level Executive Board are crucial to implement the strategic adaptation

interventions outlined in the NAP document. Their detail information and roles is given in Figure 9.

The **EPCCMNC** chaired by the Rt. Hon. Prime Minister provides strategic guidance in mainstreaming of the NAP actions into policies, plans and programmes at all levels of government. The **IMCCCC**, is proposed to lead by the Forests and Environment Minister for the overall coordination and technical aspect of the NAP implementation with sectoral ministries, government and non-governmental institutions along with the communication of NAP priorities to the three levels of government.

The **MoFE** is responsible for the overall NAP process, and for policies, laws, and strategies for climate adaptation. MoFE provides guidance and technical support to provincial and local governments; monitoring, reporting and review of adaptation actions; reporting on adaptation actions on an annual basis; and approval of adaptation projects funded through international sources. The **CCMD**, MoFE, is responsible for the development, coordination, and implementation of the NAP. As the convening agency on adaptation, CCMD engages with sector ministries at the federal level, and provincial and local governments. It is responsible for coordinating the NAP process within MoFE; mainstreaming adaptation

## Institutional Arrangement for NAP Implementation

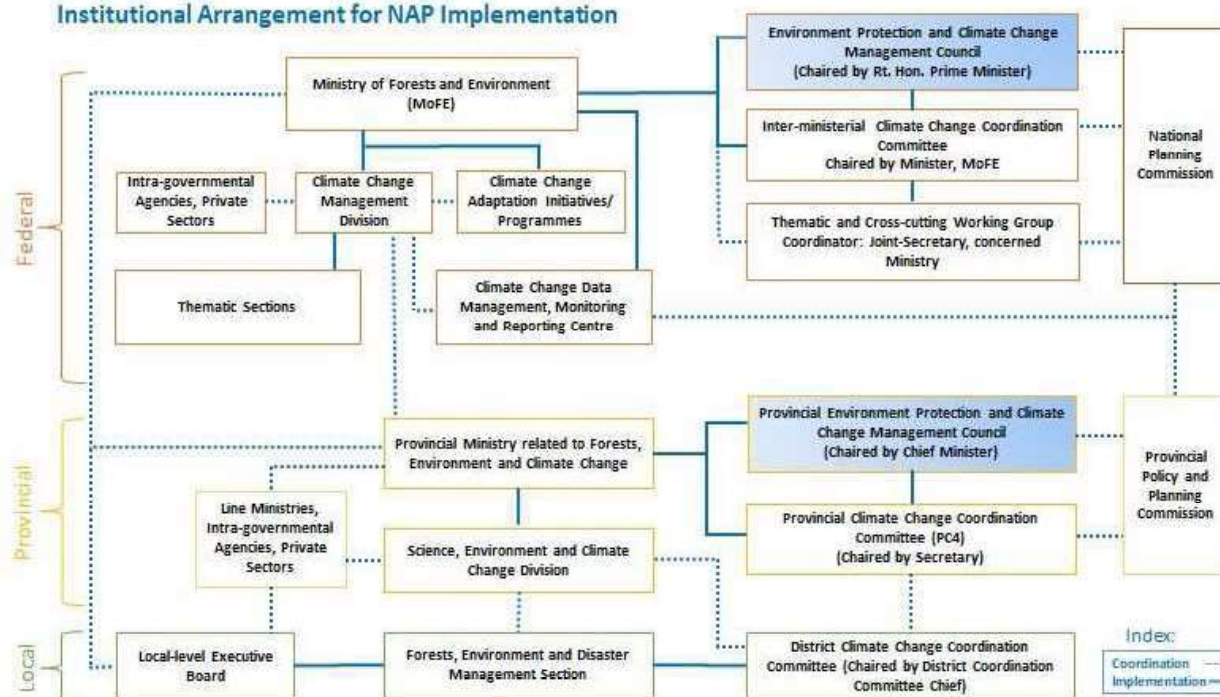


Figure 9: Institutional framework for Nepal's NAP process

in sectoral, provincial, and local policies, plans, and programmes; leading studies and research on adaptation; reporting annually on adaptation; serving as the focal point for the UNFCCC; coordinating all adaptation-related projects; and supporting coordination across working groups.

The **sectoral ministries** at the federal level are responsible for establishing climate change units to mainstream the NAP in sectoral policies, planning and activities. Relevant ministries are responsible for coordinating **Thematic Working Groups** and **Cross-cutting Working Groups**, and lead the mainstreaming of adaptation into sectoral policies and plans.

The **Ministry of Finance**, as the focal point to the Green Climate Fund and Global Environmental Facility, works to increase access to domestic and international financial resources related to adaptation and helps to coordinate climate finance through a dedicated climate finance unit within the ministry.

The **National Planning Commission** leads the federal government's planning process, coordinates efforts to achieve the SDGs,

assists with the mainstreaming of climate change adaptation in planning processes, ensures that plans and programmes are climate-resilient, and assists MoFE in the monitoring and evaluation of the NAP.

**Provincial Climate Change Coordination Committees (PCCCC)** have been established in each of the seven provinces with responsibility to integrate and mainstream climate adaptation into policies, plans, strategies, programmes, and projects. This includes vertical linkages with the federal government, integrated approaches across provinces, and coordination of capacity building for provincial governments. The ministry related to forest, environment and climate change is the focal ministry for climate change affairs at the provincial level and is responsible for implementing and coordinating climate adaptation actions; sharing of adaptation information with sector ministries and local governments; and monitoring the implementation of adaptation planning and budgeting.

**District Climate Change Coordination Committees (DCCCC)** chaired by the DCC chief are to be established at the district level that helps to facilitate climate change

adaptation and resilience work at the district level where the mayor/chairperson remains the member to roll out NAP implementation.

**The Executive Board** at the local level oversees and provides strategic guidance to coordinate implementation of climate change adaptation actions outlined in the NAP document at the local level. A **Forest, Environment and Disaster Management Section** at the local is responsible for facilitating climate adaptation activities; monitoring and review of adaptation action; raising public awareness on adaptation; implementing adaptation projects in areas under local jurisdiction (such as environmental conservation, biodiversity, agriculture and livestock, watershed management, and wildlife) and integrating adaptation into local level services (such as health, sanitation, agricultural extension, and drinking water).

**Climate Change Data Management, Monitoring and Reporting Centre (CCDMMRC)** at the federal level is envisioned under the MoFE to facilitate regular

monitoring of the NAP implementation that is guided by the NPC, EPCCMNC, IMCCCC, PEPCCMC, PPPC, DCCCC, for its effectiveness. This centre will collect and compile all the data related to climate change adaptation implementation from sectoral ministries, intra-governmental agencies, development partners, non-governmental organizations, private sector working at the all tiers of government through a dedicated system of online portal and or platform for data sharing mechanism. Periodic adaptation status report, monitoring report will be prepared by this centre so as to understand the overall implementation of the NAP.

The role of the development partners and agencies, international and national non-governmental organizations, private sector, academia, networks and associations is crucial in NAP implementation in Nepal. A cross-sectoral learning and experience sharing among all the stakeholders of the NAP led by the MoFE will be periodically organized utilizing the existing and or new coordination mechanisms and through cooperation with different sectors.

## 8.2 FINANCIAL REQUIREMENTS

Nepal will mobilize both national and international finance to implement its NAP. The total indicative cost of Nepal's NAP is USD 47.4 billion to implement priority programmes up to 2050. Nepal will contribute USD 1.5 billion until 2050; and external support totalling USD 45.9 billion is required to implement the NAP to 2050. The government requires USD 2.1 billion per year for the delivery of adaptation services through the implementation of NAP for medium term.

The cost breakdown for each sector reveals that the highest cost (USD 11.2 billion to 2050) is required to implement the adaptation programmes in the Agriculture and Food Security sector, followed by the Forest, Biodiversity and Watershed Conservation

sector (USD 8.7 billion to 2050) and the Disaster Risk Reduction and Management sector (USD 8.05 billion to 2050). The Tourism, Natural and Cultural Heritage sector is a smaller programme with a budget of USD 1.13 billion to 2050. GESILG and the enabling actions have adaptation programmes with an indicative cost of USD 0.23 billion to 2050.

*Table 5: Source of Funding for medium and long-term adaptation programmes of Nepal NAP*

Contributions	Medium-Term (2030)	Long -Term (2050)	Total Costs
External Support	USD 20.5 billion	USD 25.4 billion	USD 45.9 billion
National Contributions	USD 0.5 billion	USD 1 billion	USD 1.5 billion

## 8.3 MONITORING, REVIEW AND REPORTING

The structure and functions around climate change has been shifted across provincial and local governmentWs. National Climate Change Policy (2019, Section 10) proposed

the role of federal, provincial and local levels as shown in the Box 2. Local Government Operation Act (2017) provisions power of local government on environment,

forest, biodiversity, land and watershed management. In its 11.2 section, it provisions disaster management related 12 types of explicit powers; watershed, wildlife, and conservation of mines related 8 types of explicit power; in 11.4, it provisions forest, wildlife, water use, environment, and biodiversity related 26 types of concurrent powers and in its 11.6 section, it provisions land management related 3 types of concurrent powers.

MoFE, in its capacity as climate change focal point, is responsible for reviewing and reporting on the implementation of the NAP. A review of the implementation of the NAP will take place every five years; and the NAP will be updated every 10 years. The review will utilize reports from sector ministries, province governments, and local governments, as well as inputs from stakeholders. The review of the NAP will include reporting on progress indicators, but the emphasis will be on measuring the impacts of the adaptation actions – showing how taking action on adaptation leads to development benefits that are linked to the government’s national priorities, including poverty alleviation. This will provide the evidence base for planning and implementing future adaptation programmes, for reporting on adaptation at the national and international levels, and for seeking financial support for adaptation programmes. The reporting and review of the NAP will be part of Nepal’s adaptation MR&R system, and will be linked to the NPC’s national monitoring and evaluation system and SDG reporting, as well as the system established for tracking of climate finance.

As shown in the Figure 10, at the local level; it is proposed that Forest, Environment and Disaster Management Section will be responsible for monitoring of adaptation activities implemented at the local level by the government, forest user’s groups, CBOs, private sector, I/NGOs, UN, bilateral and multilateral agencies. A Local level Climate Change Coordination Committee (chaired by Mayor/Chairperson) will provide policy guidance to local government. The DCCCC chaired by District Coordination Committee Chief will compile all data at local level activities and forward the report to the “Science, Environment and Climate Change Division” of the Ministry of forests,

#### a. Province governments

- Formulate provincial policy, directives, standards and plans in conformity with this policy and implement or cause to be implemented them.
- Carry out or cause to be carried out M&E of climate change mitigation and adaptation programs conducted within the Province.
- Coordinate with federal and local levels to formulate and implement programs and projects related to climate change.

#### b. Local governments

- Formulate policies, directives, standards and plans at local level in conformity with this policy and implement or cause to be implemented them.
- Conduct climate change mitigation and adaptation programs in coordination and collaboration with the concerned agencies under the federal and provincial governments, NGOs, private sector, educational institutions and other stakeholders.
- Carry out M&E and documentation of programs and projects conducted at local level.
- Raise public awareness on climate change.
- Form and mobilize ‘Youth Volunteer Committees’ for climate induced disaster management.

*Box 1: Role of province and local levels*

environment and climate change at the provincial level through the specified online platform.

At Provincial level, the Ministries of Environment and climate change will be responsible for monitoring and reporting on all adaptation activities implemented at the provincial level. The Science, Environment and Climate Change Division of these Ministries will compile all data and information of this ministry itself, adaptation projects/ programs, other sectoral ministries, I/NGOs, private sector, UN, bilateral and multilateral agencies including local governments and forward the report to the CCDMMRC at the federal level through the specified online platform.

MoFE and the technical working groups will be responsible for monitoring and reporting

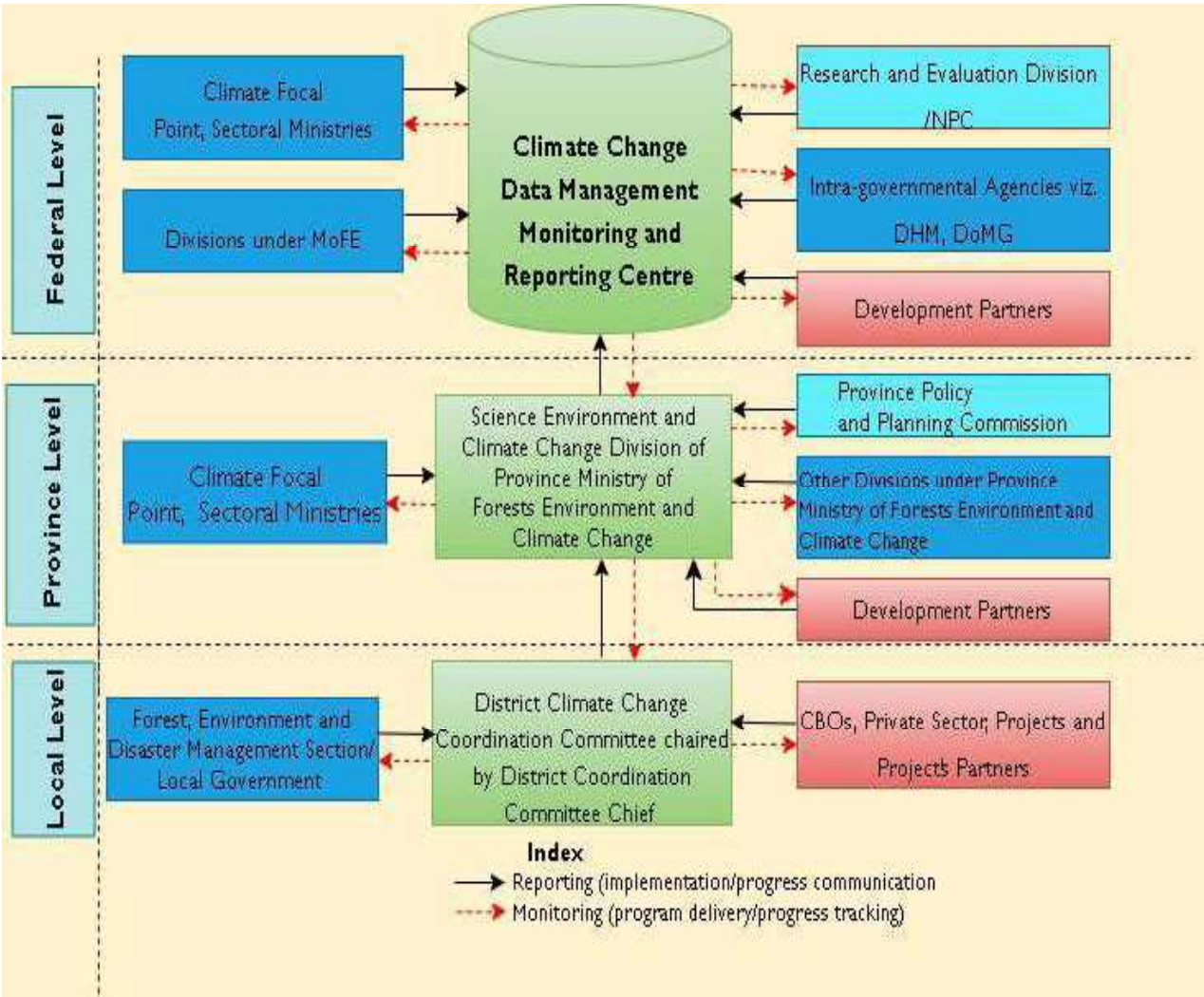


Figure 10: A Framework for Monitoring Nepal NAP Process

on adaptation activities implemented at the federal level, and forwarding the monitoring reports to the CCDMMRC through the specified online platform. CCMD/MoFE, sectoral ministries, intra-government agencies, Department of Hydrology and Meteorology (DHM), and Department of Mines and Geology (DoMG) and so forth will be expected to report on adaptation activities.

CCDMMRC will be responsible for compiling the monitoring reports submitted by the provincial ministries and technical working groups at the national level. In addition, development partners will be encouraged to report on financial flows for adaptation, and the private sector will be encouraged

to report on their adaptation actions. CCDMMRC will collect and manage climate change-related data and information, and ensure the data is publicly accessible.

1. For convenience, forest ministry at the provincial level is denoted by "MoITFE" (Ministry of Industry, Tourism, Forest and Environment) in the chart. However, the exact name of the ministry varies with province. This applies for all provincial ministries.



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