Rural Village Water Resources Management Project Phase III

'Climate Change Adaptation and Disaster Risk Reduction' Component

CONCEPT PAPER

Contents

GOVERNMENT OF NEPAL EUROPEAN UNION

1. Background

1.1. CCA-DRR policy context

Finland's Development Policy (MFA, 2016a) states that all development activities supported by Finland are geared to climate change adaptation (CCA), mitigation and preparedness. Strengthening the capacity of societies to be better prepared for natural disasters and survive crises is mainstreamed into Finland's development cooperation.

As per the Nepal Country Strategy by the Ministry for Foreign Affairs of Finland (MFA, 2016b), disaster risk reduction (DRR) is mainstreamed in all the programmes and activities supported by the Government of Finland in Nepal. The Strategy underlines that DRR and CCA are important in the construction and operation of water supply schemes, and that every water supply scheme should have a water safety plan (WSP) in use. Furthermore DRR and CCA are mainstreamed in agriculture and environment related activities including forestry and renewable energy.

Climate Change Adaptation plays an important role in the realization of the Sustainable Development Goals (SDGs; UN, 2019). SDG 13 calls for urgent action to combat climate change and its impacts. GoN has recently endorsed a Climate Change Financing Framework in 2017 (CCFF; GoN, 2017), and prepared a roadmap to guide mainstreaming climate actions into development plans and budgets. The roadmap provides guidance to the sectoral ministries in SDG implementation and climate actions.

The Government of Nepal has recently developed a set of policies in that regard. The Climate Change Policy (GoN, 2011) serves as a national framework to address climate change and increase the resilience of farmers to climate-related shocks. Alongside the Climate Change Policy, the National Planning Commission (NPC) developed its framework for Climate-Resilient Planning (NPC, 2011). In the livelihoods sector, the long-term Agriculture Development Strategy (Ministry of Agricultural Development, 2017) outlines measures and approaches for promoting: i) efficient and sustainable use of natural resources (land, water, soils, and forests); and ii) increased resilience to climate change and disasters.

The National Adaptation Plan (NAP; MoFE, 2018) process is a mechanism for integrating climate change adaptation objectives in sector strategies. Nepal's NAP process builds on past experience with adaptation planning, including through the National Adaptation Programme of Action (NAPA), developed in 2010, and the Framework on Local Adaptation Plans for Action (LAPA), developed in 2011. NAP emphasizes gender and social equity in the face of the climate change impacts, named 'leave no-one behind' philosophy. The framework emphasises resilience and adaptation capacity development, sectoral integration, stakeholder engagement, information-based management, and constant learning and development of the approach.

1.2. RVWRMP stance and scope of work in CCA-DRR

Project stance

This Concept Paper explores the ways in which RVWRMP III addresses the CCA and DRR objectives in relation to the policy context, and the Project's scope of work as outlined in the Project Document and the project indicators. The project is aligned with the government structures and follows the national policies and guidelines in its work. The National Adaptation Plan and related policies emphasise local level

actions, participation, and inclusion, and the actions are focused on the grassroots level. The NAP approach integrates the water, health, and rural livelihoods to disaster risk reduction likewise the Project. These key features make them well aligned with the Project implementation modalities and efforts at local levels. The Climate-Resilient Planning framework (NPC, 2011), emphases the adaptation and risk reduction aspects of the planning, in line with the RVWRMP approach.

Scope of work

RVWRMP is a water use management project working locally, which broadly defines the scope of the Project's CCA-DRR activities. The project implements water supply, health and sanitation (WASH) activities at its core, while rural livelihoods development activities are closely integrated to all the water management operations. The project also considers renewable energy, integrated to the WASH and livelihoods activities. The development efforts mostly occur at community level, backed by capacity building and governance support at local government level.

The core working sectors and the local nature of the project define the scope of the Project's CCA-DRR. The CCA-DRR activities are regarded as a cross-cutting theme that is integrated to the core working areas. The CCA-DRR component exemplifies itself in various ways in the different result areas, and this document describes the ways in which CCA-DRR aligns itself within these areas (Figure below).

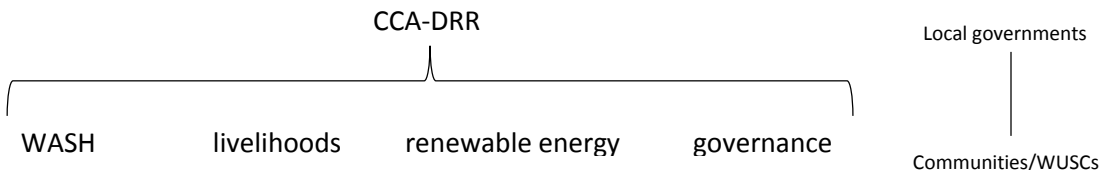


Figure 1: RVWRMP scope of work in CCA-DRR.

The RVWRMP Project Document (PD) and Project Implementation Guidelines (PIG) directs the focus of the project activities. The Project Document (PD; available at rvwrmp.org.np) prioritizes CCA-DRR as an integrated part of WASH: "The resilience of the local communities towards disasters as well as the local authorities' capabilities to respond in the disaster situations will be addressed by training measures. Specific measures will be taken to ensure the resilience of the constructed infrastructure towards disasters and climate change adaptation. Designs and technical solutions of all infrastructure are modified to endure major natural disasters (earthquakes, landslides and floods)." The PD and PIG thus give the main focus of CCA-DRR under WASH.

This document describes the specific ways in which CCA-DRR is accounted for in the other project result areas, as well. PD and PIG hardly mention CCA-DRR in relation to livelihoods, but the project has integrated CCA-DRR whenever possible in the livelihoods implementation. Livelihoods Implementation Plans and home garden and income generation implementation follow the principles of Climate-Resilient Planning (NPC, 2011), emphasizing efficient and sustainable use of natural resources and increased resilience to climate change and disasters in agriculture, aligning with Agriculture Development Strategy.

PD only loosely mentions CCA-DRR in relation to other project activities, such as renewable energy development. The PIG elaborates the renewable energy a little more in relation to CCA-DRR (p. 60-61),

especially ICS and IWM technologies, listing 13 CCA-DRR related capacity building activities in the ICM implementation, and the benefits of the renewable energy for climate.

Governance and CCA-DRR is mentioned in terms of trainings to be given at community and RM level. In practice, the project implements numerous CCA-DRR related trainings at community level, and almost all the training events has a linkage to CCA-DRR. At RM level, Project conducts CCA-DRR Policy Workshops for RM representatives and leaders, which has a concrete policy and budget outcomes.

2. Climate trends and disaster risks

2.1. Climatic patterns and trends, and hazard vulnerability

Nepal's geography makes the country's climate particularly complex. Because of the extreme variations in elevation within short distances, Nepal's climate varies significantly across the country, ranging from alpine and arctic in the north to tropical in the south (Figure 1).

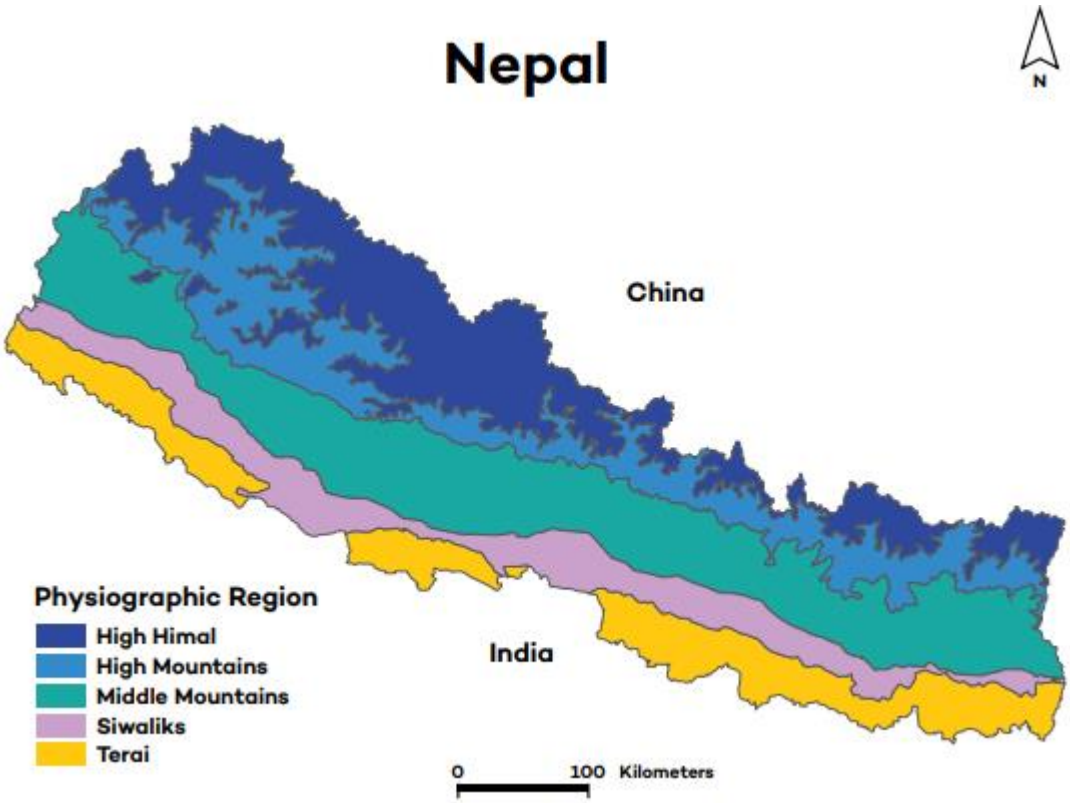


Figure 1: Physiography of Nepal. Apopted from NAP (MoFE 2018).

Precipitation

Nepal's precipitation is affected by two major air movements. The highest rain occurs when monsoon comes from the Bay of Bengal. The western disturbances during the winter season affects mostly the western parts of the country and results in snowfall in the high mountains and the Himalayas. The interaction of the complex topography with monsoon and westerly weather systems results into high variation in spatial distribution of precipitation. The windward side of the mountains receives more precipitation while the leeward side receives less.

The precipitation mainly occurs during the summer monsoon (Figure 2).

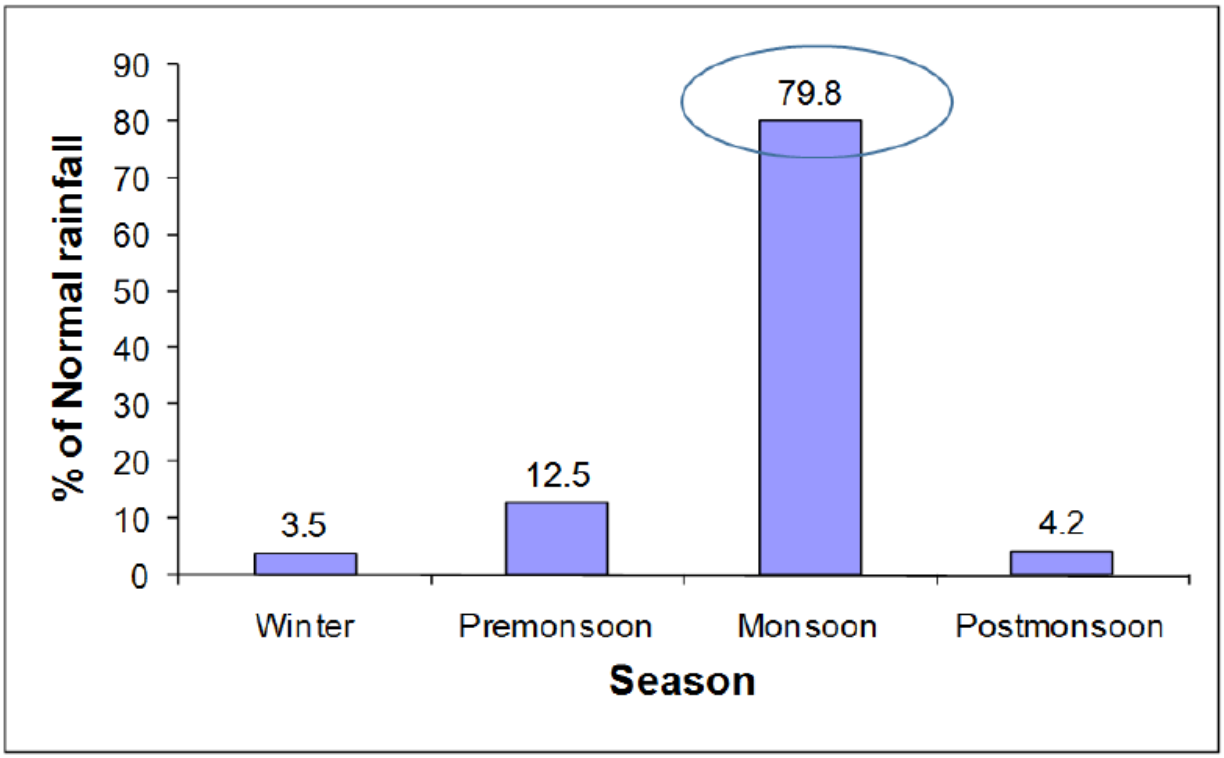


Figure 2: Rainfall distribution over seasons in Nepal. Source: DHM, 2017.

In the project area, the Chure mid-hills and Humla are drier areas, whereas Darchula corridor is slightly wetter than the average (DHM, 2017). The winter precipitation in the west is relatively high compared to the east due the western disturbances, and the precipitation trends were found slightly increasing during winter. West Nepal has a relatively dry pre-monsoon, compared to the east. In the monsoon, the western half is generally drier compared to the eastern half. In the project area, Chure mid-hills and Humla stay relatively dry, whereas Darchula corridor receives relatively high precipitation. The spatial distribution of precipitation in the post monsoon is similar to the pre monsoon, with low precipitation ranging from less than 25 mm in the western half of the country and to over 230 mm in the eastern half of the country.

The annual precipitation patterns are predicted to increase especially in Terai and Chure region. Most of the increase would occur in monsoon season. Recently-developed scenarios suggest that precipitation will increase by 2–6 per cent by 2030 and by up to 8-16 per cent by 2050 (CIAT, 2017; Figure 3). From a

seasonal perspective, precipitation is likely to increase in all seasons except the pre-monsoon, when decreases are projected (DHM, 2017). In the west, this means a very dry pre-monsoon, and wetter the rest of the year. Overall, however, the range of uncertainty in the projections is large, so adaptation planning must build in flexibility (ICIMOD, 2018).

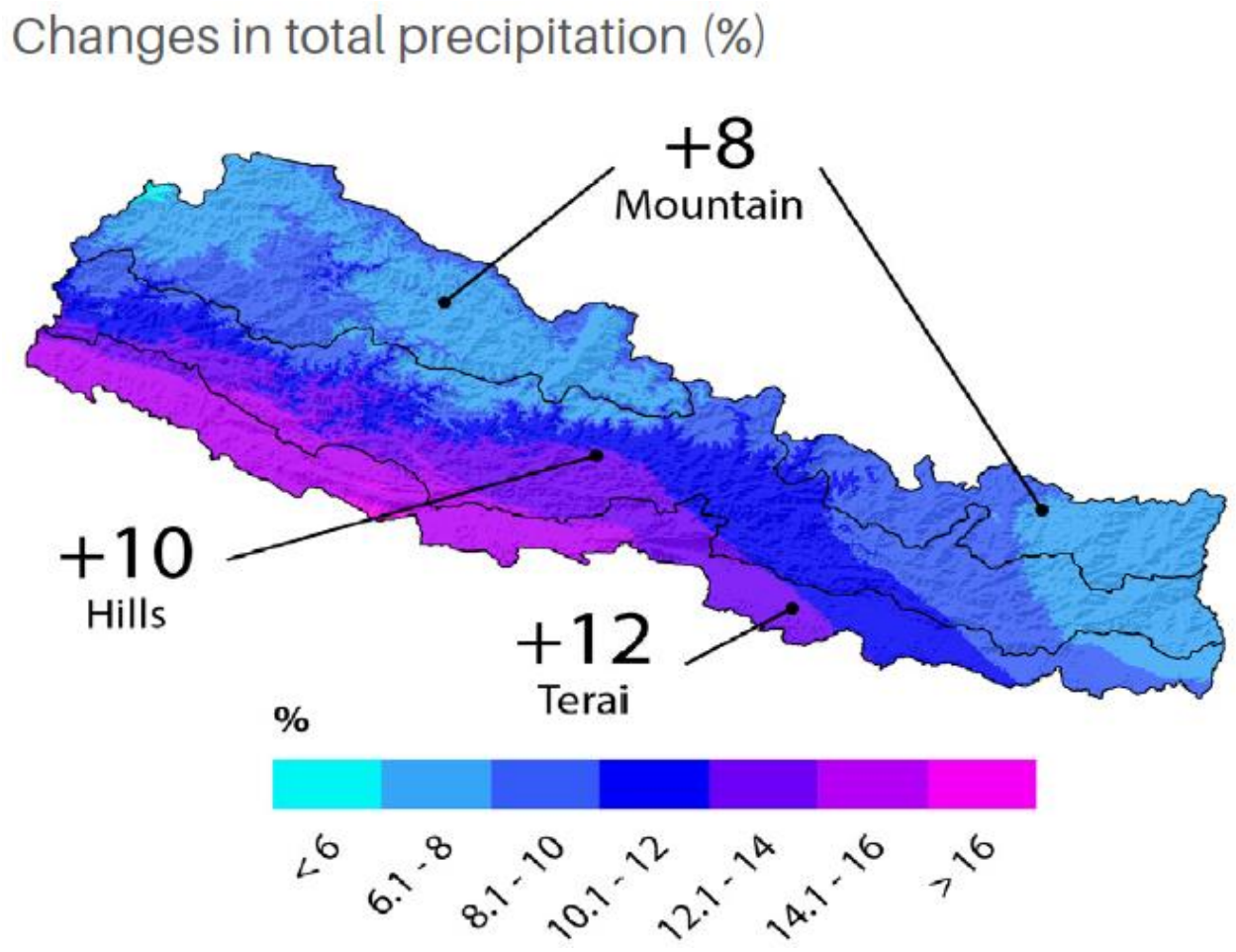


Figure 3: Changes in precipitation in Nepal by 2050. Source: CIAT, 2017.

Temparature trends

The relatively short length of the meteorological record in Nepal limits analyses of observed climate trends, including for temperatures and precipitation. A recent analysis of trends from 1971 to 2014 by the Department of Hydrology and Meteorology (DHM, 2017) exposes weak but significant increasing temperature patterns evident in the country, whereas CIAT's (2017) figures are slightly more intense (Figure 4). The mean annual temperature is expected to continue to increase in Nepal over the remainder of the century. Recent projections indicate that mean annual temperatures could increase by 1.3–1.8°C (DHM, 2017) or 1.8-2.4°C (CIAT, 2017) by the 2050s, with the highest increases in the mountain regions.

In the project area, the trend in the most evident in high mountains. Increasing temperature indicates the likelihood of increasing heat waves and extreme droughts in these areas.

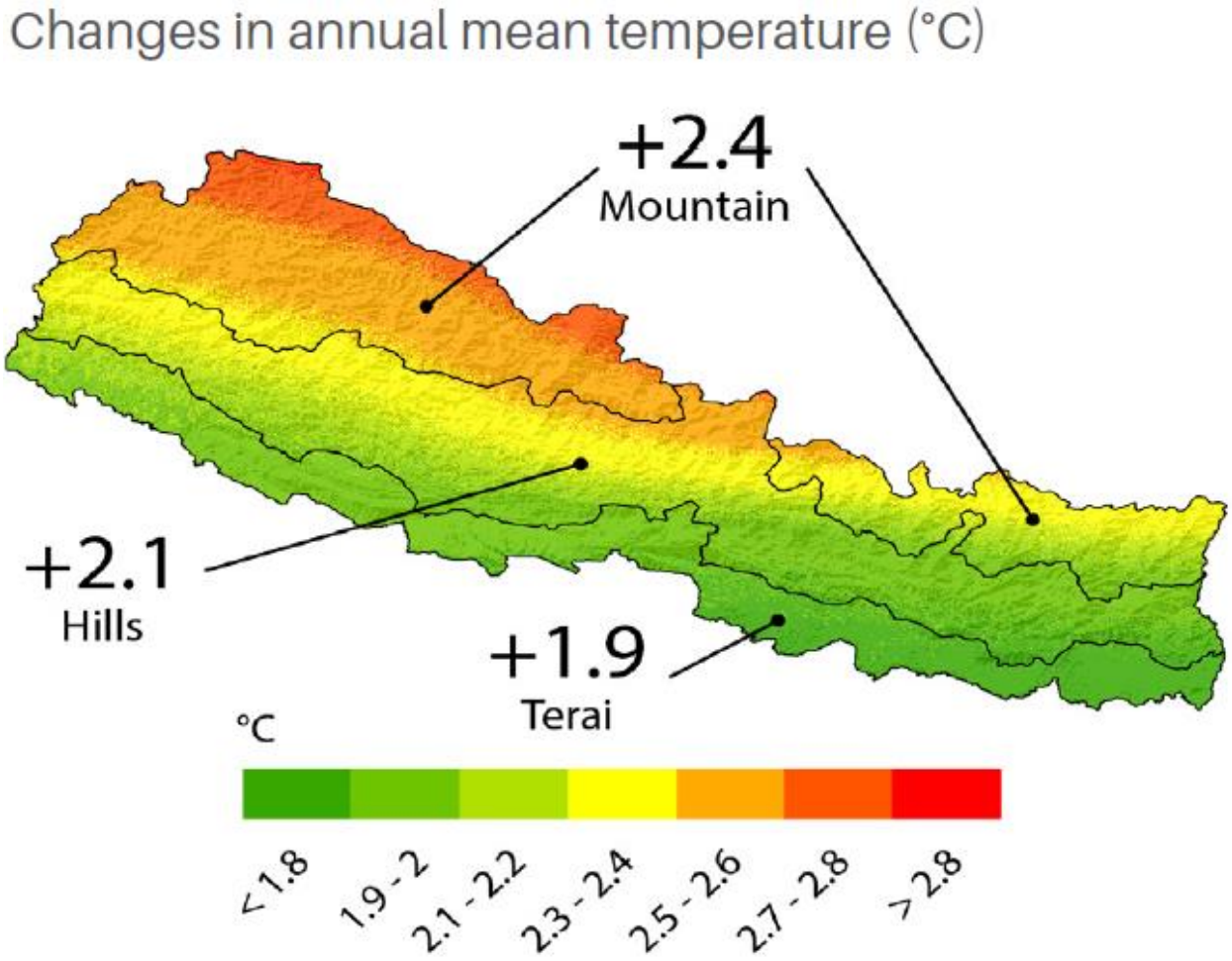


Figure 4: Changes in temperature trend in Nepal by 2050. Source: CIAT, 2017.

2.2. Disaster risks in the project area

Vulnerability to natural hazards

For its fragile geology and steep topography, Nepal is prone to various natural hazards. Nepal is ranked among the 20 most disaster-prone countries in the five countries most vulnerable to the impacts of the climate change (Liski, 2015). Multiple hazards take place frequently such as floods, landslides, fires, epidemics, avalanches and earthquakes. (Asian Disaster Reduction Center, 2014). More than 80 per cent of property loss due to disasters is attributable to climate hazards, particularly water-related events such as floods, landslides and glacial lake outburst floods (GLOFs).

Nepal also ranks high in vulnerability to water-related disasters being the 7th country in the world with most deaths resulting from floods, landslides and avalanches combined and the 8th country for the flood-related deaths alone between 1988 and 2007 (Asian Disaster Reduction Center, 2014; Liski, 2015).

Comprehensive data of the impacts of natural hazards in Nepal is difficult to find and the severity of different hazards is thus arguable. According to Desinventar database (2019), between 1971 and 2007 in Nepal, most deaths due to natural hazards were caused by epidemics (60 %), followed by landslides (15%), floods (11%) and fires (4%), (Figure 5). It is good to acknowledge that between 1971 and 2007 Nepal did not face any major earthquakes and the year 2015, would change the figures considerably. Water-related disasters claim more than 300 lives a year, displace people and destroy homes, farmland and other essential infrastructure (Bishokarma, 2017).

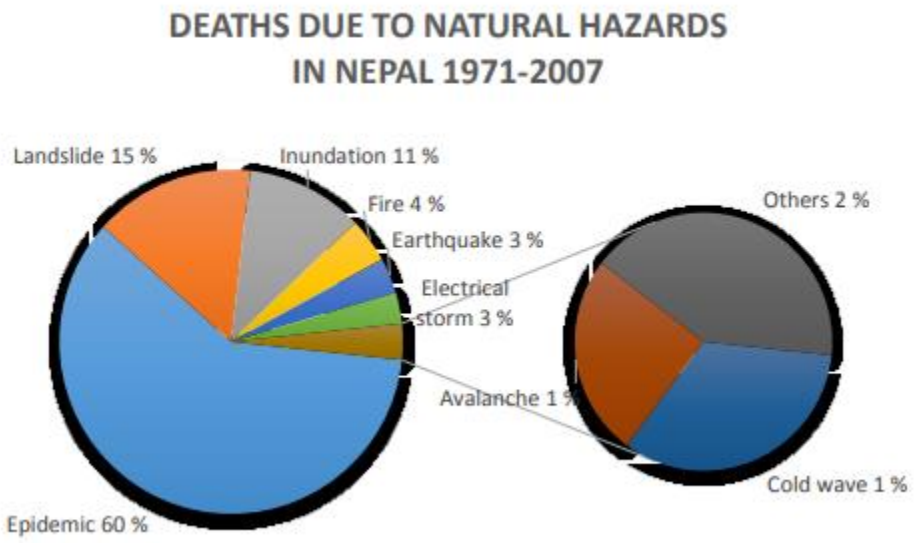


Figure 5: Deaths due natural hazards 1971-2007. Adopted from Liski, 2015, based on Desinventar Database.

Landslides

Landslide hazard is frequent phenomenon is Nepal due to several reasons including tectonic activities, uncontrolled and unsafe development, heavy precipitation and environmental degradation. However it is observed that rainfall induced landslides is most prevalent in the hills and mountainous districts.

The analysis by Asian Disaster Preparedness Center shows that much of the project area is vulnerable to earthquake induced landslides, the risk being the highest in Darchula, Bajhang, and Bajura (Figure 6). The whole project area is considered having a medium risk of an earthquake in 50 years return period, but the land slide risk concentrates on the high mountain belt that has the greatest earthquake risk.

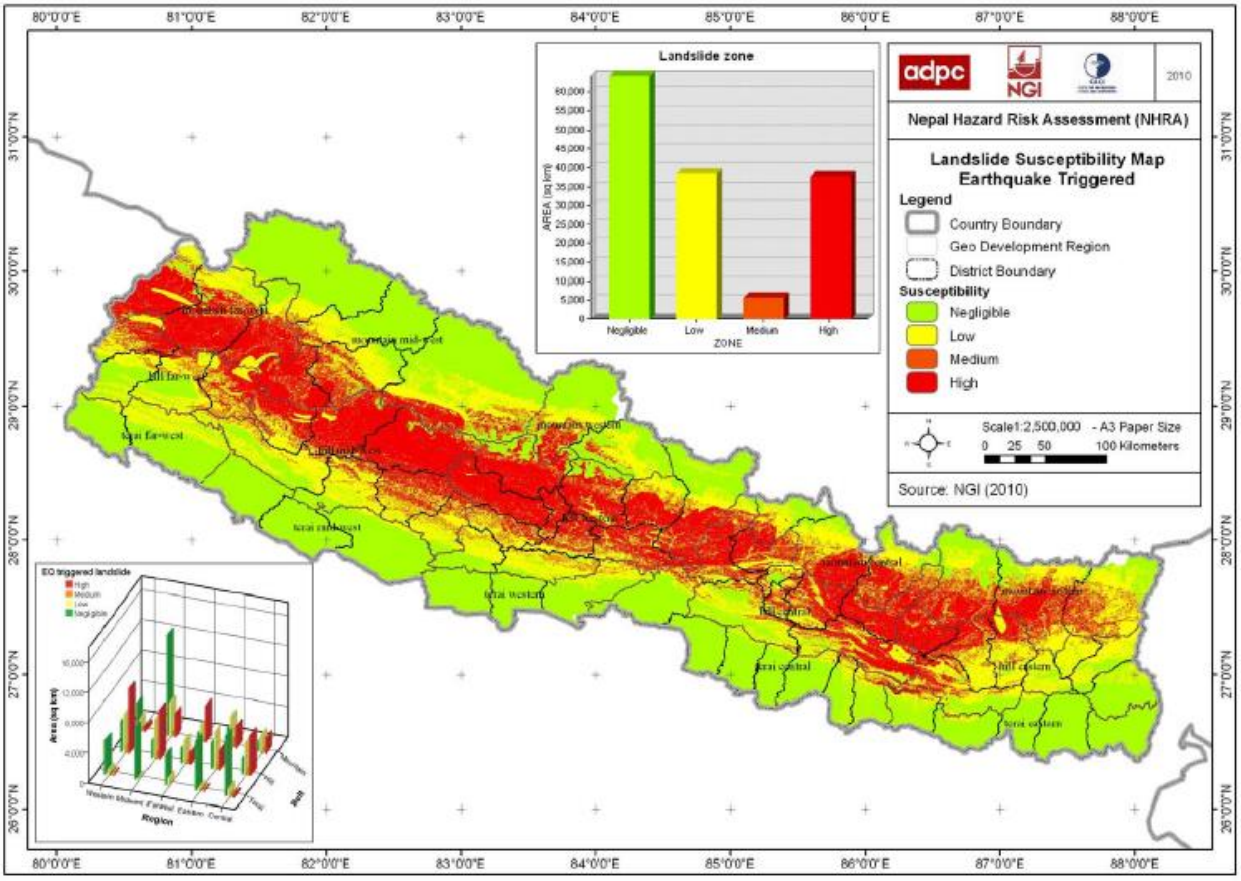


Figure 6: Earthquake induced land slide hazard risks in Nepal. Source: Asian Disaster Preparedness Center, 2010.

Precipitation induced landslide risk is evident basically everywhere in the project working area. For the project area, the map (Figure 7) shows that the precipitation induced landslide risk is higher in Darchula, Baitadi, Bajhang, Bajura, Achham, Dailekh and Humla compared to Dadeldhura and Doti. The risk is, however, very localized and must be addressed by local risk analyses.

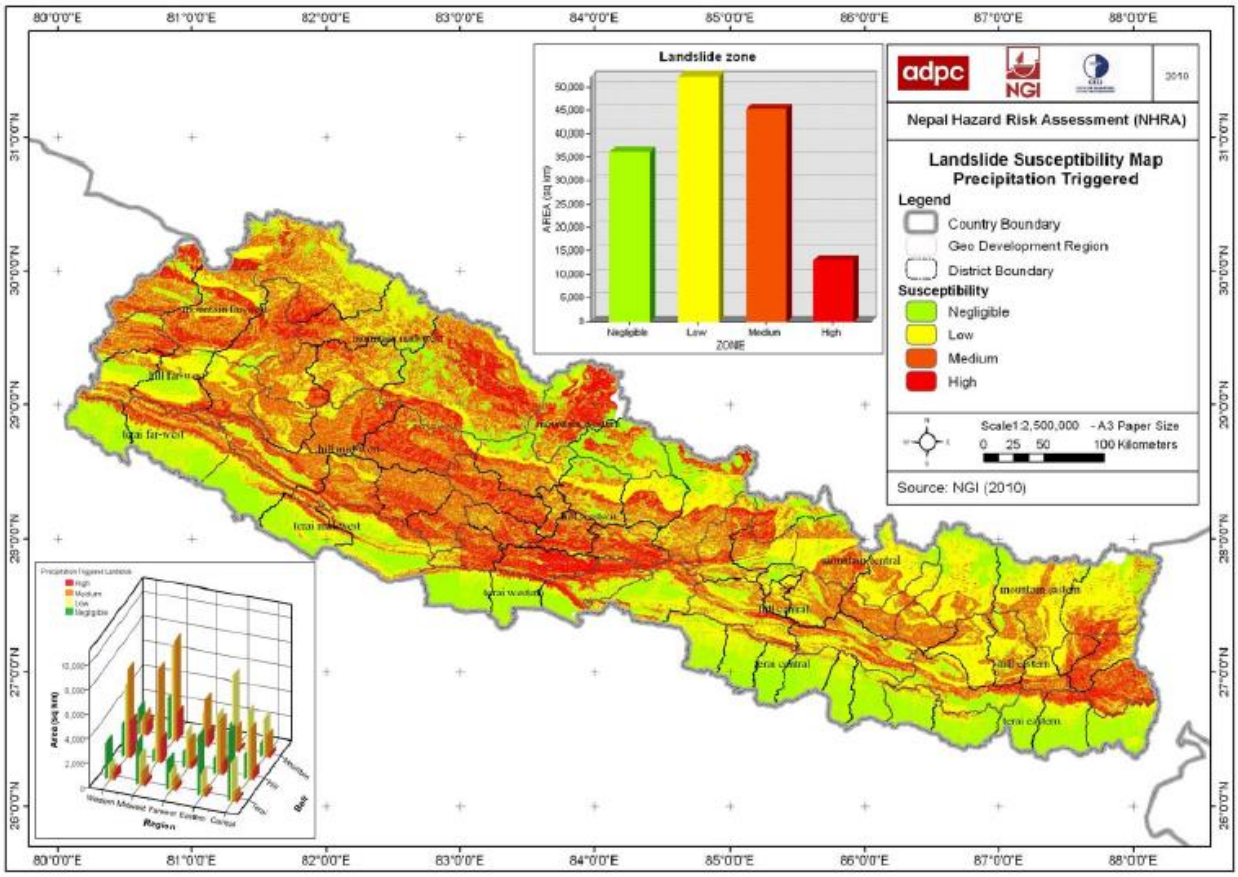


Figure 7: Precipitation induced land slide hazard map of Nepal. Source: Asian Disaster Preparedness Center, 2010.

Droughts and floods

The analysis (Figure 8) shows that the likelihood for winter droughts is most evident in the western tip of the country. Monsoon droughts are more probable in the high mountains rather than in the mid hills where most of the people life. Recent projections indicate that mean annual temperatures could increase by 1.3–1.8°C by the 2050s, with the highest increases in the mountain regions. In the project area, the trend in the most evident in Dadeldhura and Bajhang. Increasing temperature may indicate increasing likelihood of droughts in these areas.

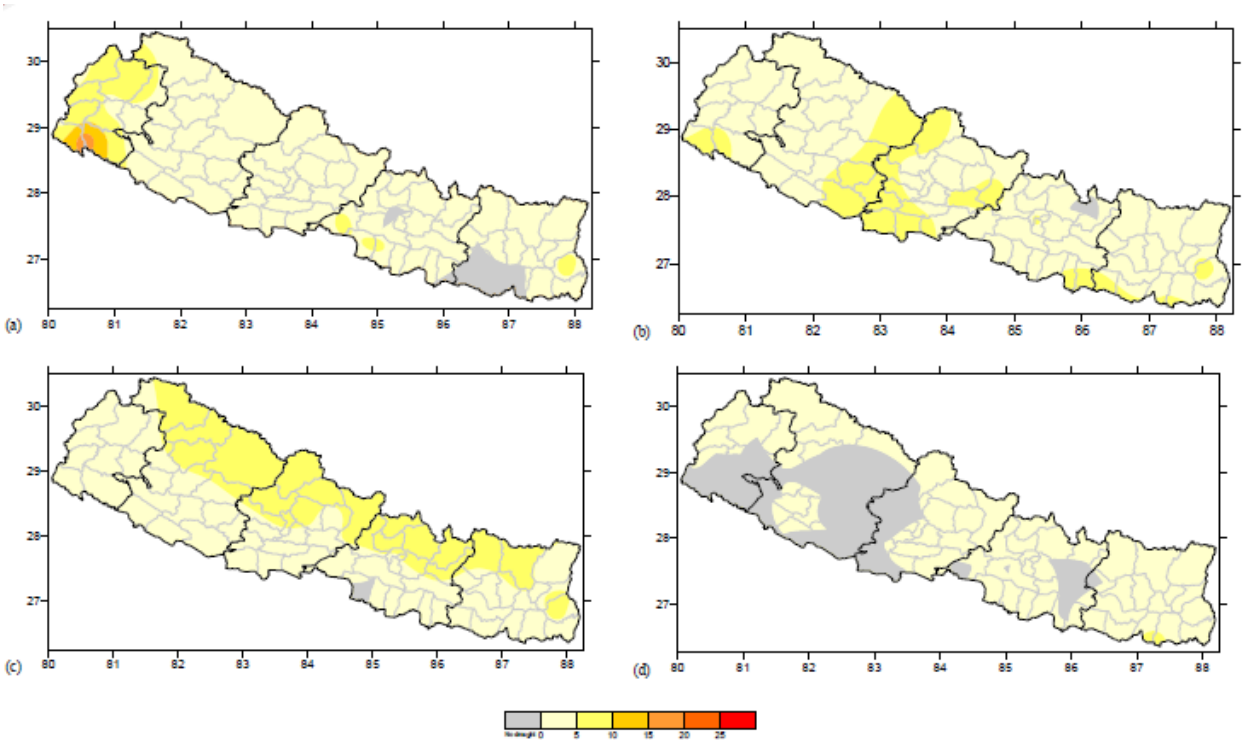


Figure 8: Severe drought susceptibility in a) winter b) pre-monsoon c) monsoon d) post-monsoon period. Source: Asian Disaster Preparedness Center, 2010.

Precipitation extremes are also expected to occur more frequently, with an increase in very wet and extremely wet days (Karki et al., 2017). In the project area, the extreme precipitation events seem to concentrate on the southern belt of the area, whereas in the high hills of the project area the distribution of extreme rains remain small (Figure 9).

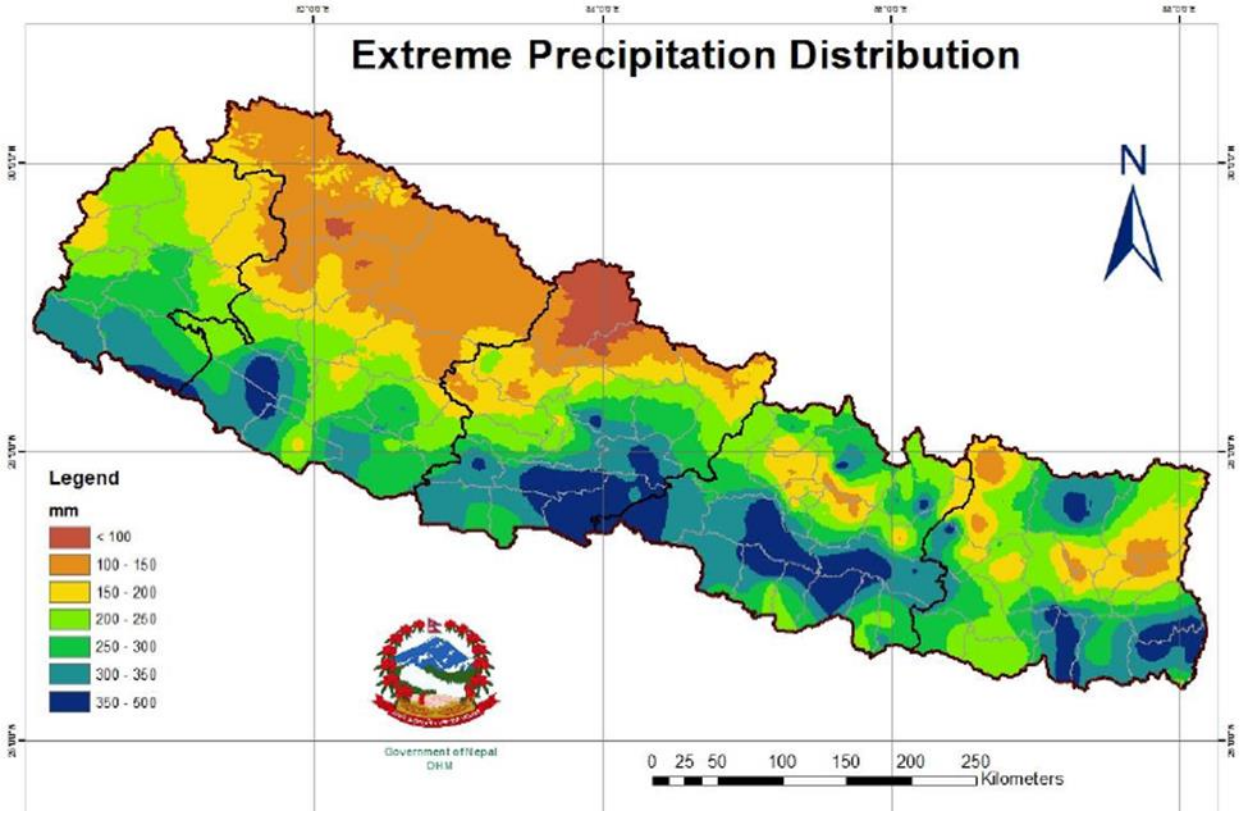


Figure 9: Extreme precipitation likelihood. Source: DHM, 2017.

Of particular concern is the potential for changes to the flow and quality of water derived from glaciers, snowmelt and rainfall, leading to excess water at certain times of the year and prolonged dry periods and extreme drought in others. Floods are a very localized phenomena, and all streams and rivers have their own seasonal flow patterns and different likelihoods for flooding based on the local topography. Therefore, flooding risks must be assessed locally.

Water-born epidemics

Nepal is prone to wide range of diseases and epidemics. The reasons for epidemics are linked to several socio-economic factors, demographic profile, geographical locations and health infrastructure. Acute water shortages may trigger outbreaks of epidemics. Crowded accommodation, poor hygiene, contaminated drinking water and food are few factors for outbreaks and diseases in the country.

The map below shows the susceptibility of diarrhea incidents in Nepal. The analysis shows that the project area is relatively vulnerable to diarrhea, Bajura, Accham, Humla, Dailekh, and Doti being even more pronounced that the other areas (Figure 10). This gives a good reason for the project to continue carrying on activities on health and sanitation improvement in the area.

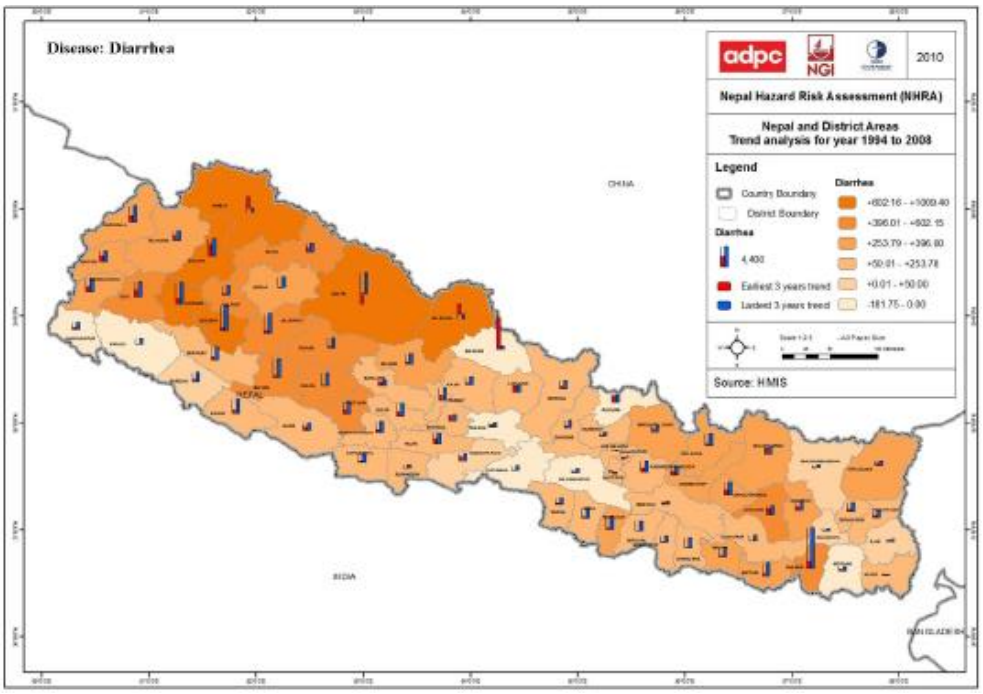


Figure 10: Susceptibility of diarrhea in Nepal. Source: Asian Disaster Preparedness Center, 2010.

2.3. Rapid multi-criteria CCA-DRR assessment of RVWRMP working Districts

Concluding from the data analysis section above, the Project working Districts have slightly different risk profiles and climatic tendencies. The information can be summed as follows, reflecting more the relative differences between the areas rather than absolute risk profile differences:

Table 1: CCA-DRR risk assessment of RVWRMP working Districts. Map of working area shown below.

District	Precip. induced landslides	Severe winter droughts	Extreme rains	Pronounced water scarcity	Increasing temp.	Pronounced earthquake risk	Epidemic risk (diarrhea)	TOTAL SCORE
Kailali (hills)	x	x	x	x				4
Dadedhura		x	x	x				3
Baitadi	x	x		x		x		4
Doti		x	x	x				3
Achham	x			x		x	x	4
Dailekh	x					x	x	3
Darchula	x	x	x		x	x		5
Bajhang	x	x	x		x	x		5
Bajura	x	x			x	x	x	5
Humla	x			x	x		x	4

The quick analysis exposes in overall that all except Doti and Dadeldhura have a pronounced landslide risk. The western part of the working area has more risk for winter droughts. The extreme precipitation likelihood is increasing most in Kailali, Dadeldhura, and Doti, whereas the biggest amount of precipitation occurs in Darchula and Bajhang. The Chure range (lower mid hills), including Kailali, Dadeldhura, Baitadi, Doti, and Achham, suffers more from water scarcity compared to the other areas. Continuous reports from the field can ensure this estimate. Maximum temperature is expected to rise from the current levels most in the most mountainous areas, which is in Darchula, Bajhang, Bajura and Humla. The earthquake risk is most pronounced in the front side of the first high mountain ranges, which are especially located in Baitadi, Achham, Dailekh, Bajhang and Bajura.

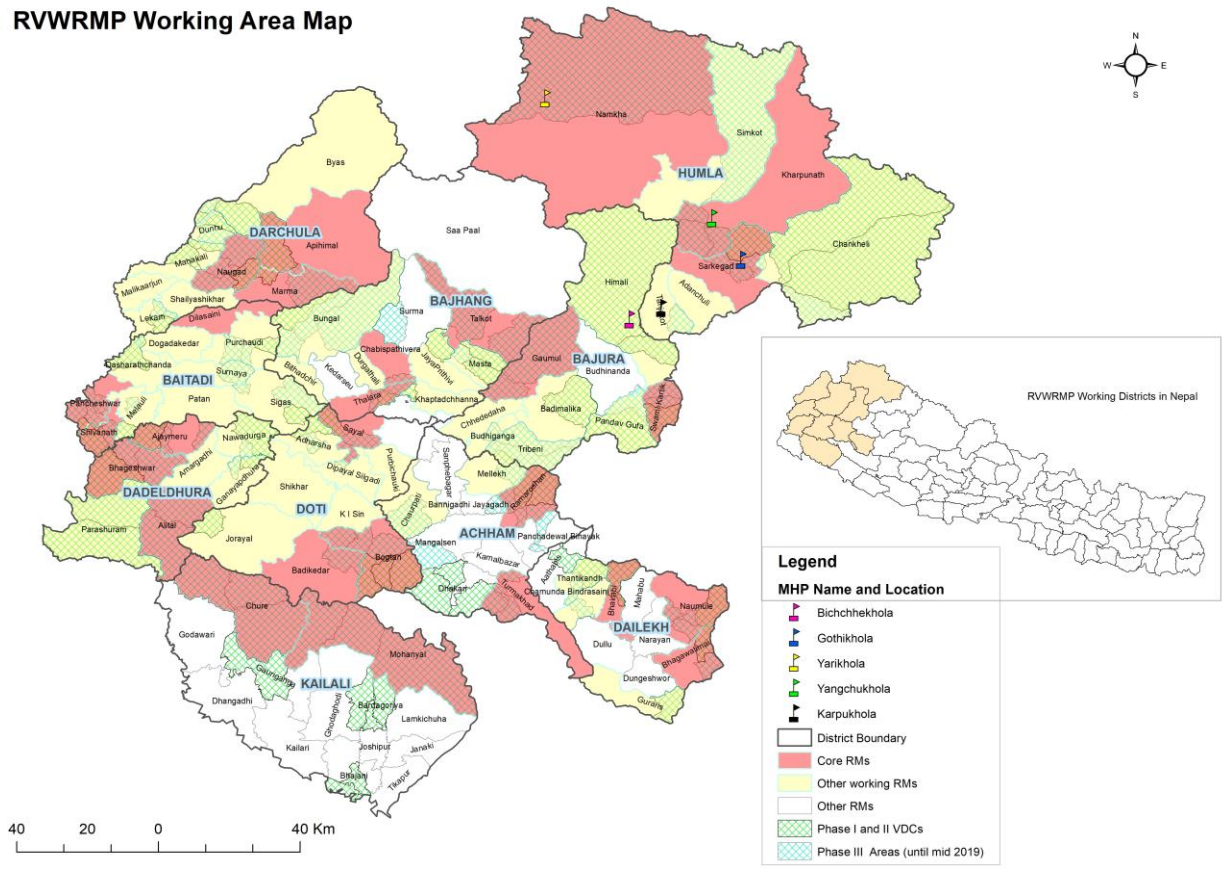


Figure 11: RVWRMP working area.

Overall in the working area, Darchula, Bajura, Bajhang, might have pronounced hazard risk profiles, though the profiles are somewhat different. Dadeldhura, Doti, and Dailekh get lesser risk profiles in this rapid multi-criteria analysis. It is notable that the Project implementation activities do not occur at District but community level, and the risk profile can be very localized and differing from the District profile. However, the District profile gives a good background for the more local risk assessments locally and especially at the Municipality level.

3. RVWRMP approach

3.1. CCA-DRR theory of change

The logic of the intervention is described in PIG (p. 54), and the reflection is extended here:

Risks that may occur: Based on the analysis in Section 2, there are multiple environmental risks that may occur, causing concerns to water services and uses, and people's lives and livelihoods.

- **Climate Change Risks**: changes in temperature (heat- and cold-waves), likelihood and intensity of extreme weather events increase, change in the duration and reliability of rainy season, changes in temperature and humidity, which may trigger outbreaks of diseases and pests; increased likelihood of forest fires.
- **Hazardous Events**: Landslides, water contamination, forest fires, droughts, floods, epidemics.
- **Man-made environmental risks:** erosion of forests and catchment areas due to poor land-use management; overutilization of water resources; pollution of water resources; mismanagement of natural resources, e.g. sand and gravel extraction, road construction leading to changes and depletion of water sources.
- **Other risks:** earthquake risk; vandalism; fires.

Results: All the above lead to the increased insecurity of water supply for households and livelihoods, mainly in the agriculture sector. The impacts are seen as direct and indirect losses through economy, social and environment affected. Direct losses may be physical damages to constructed structures rendering service level deterioration to closure. The indirect losses may be complicate with human suffering as loss of capital and labour force, loss of livelihood and migration affecting economy:

- Degrading levels of water services and water quality
- Source depletion (drinking water and irrigation)
- Damaged infrastructures
- Loss of productive land
- Disputes in water use
- Crop losses
- Changes in land use pattern
- Decrease in agriculture production
- Loss of forest coverage

Impacts:

- Worsening of hygiene and health situation and decrease in the quality of life
- Increased drudgery and amount of hard work
- Changed water consumption and use patterns
- Decrease of agriculture production and income
- Increased out-migration
- Long-term environmental damage

Response - Project Intervention: The project intervenes with the risk trajectories under the scope of the project. The following subsections present the activities under the respective Result Areas of the Projects.

3.2. CCA-DRR in WASH Result Area

The Project Document and PIG put a big emphasis on CCA-DRR especially in relation to WASH, directing the project activities on CCA-DRR to emphasize the WASH result area as a most important segment in that regard. The project has one target indicator explicitly related to CCA-DRR: '90% of the water supply schemes supported by the Project fund in phase III apply a Water Safety Plan (WSP) with CCA/DRR component'. The following table lists the main CCA-DRR activities in WASH:

CCA-DRR activities in WASH Result Area	
Planning Phase:	• Pre-feasibility Study: Separate questions in terms of CCA/DRR. • Pre-feasibility Study: Flow measurement and water quality testing. • Detailed Study: source monitoring from CCA/DRR aspect (similar to IEE). • Detailed Study: While choosing structures, adapted CCA/DRR friendly structures or modification to suit the local environment and reduce the hazardous agent. • Prioritize Multiple-Water Use Systems (MUS) schemes. • System design: Appropriate, Affordable and Renewable → climate change resilient • Protection of the immediate watershed above the spring or stream, and many activities from recharge pits and plantations and water saving smart technological options. Source recharge, conservation, protection and storage options. • General orientation on CCA/DRR to users • Risks such as land slide prone areas or areas of increased risk of contamination, are accounted for in the design of the scheme. • construction of hazard-resistant infrastructure
Implementation Phase	• Implementation of schemes coping CCA/DRR perspective in structures. • Operation and maintenance (O&M) and Water Safety Plan as part of the WUSC Preparatory Workshop. • CCA-DRR orientation to users • VMW training • Other interventions: Grazing restricted area, Water recharge activities (e.g. Recharge pit / trench / pond, plantation, etc.), Climate Resilience activities (e.g. Conservation, run off diversion structures, Gabion works, masonry works, plantation, Prayer flags at source, culturally protection, etc.) • Structure chlorination • Construction of animal drinking troughs (MUS)
Post Construction	• Water safety plans in all Water supply (and MUS with WS) schemes. • Local level financing maintenance: O&M fund and cooperatives. • O&M Regulation serves as a policy that considers both short and long-term maintenance needs. • Linkages to umbrella organizations and RM technical units
Public auditing	• 3 compulsory monitoring visits and public audits: CCA and DRR issues are discussed in every monitoring visit: first monitoring pays special attention to the

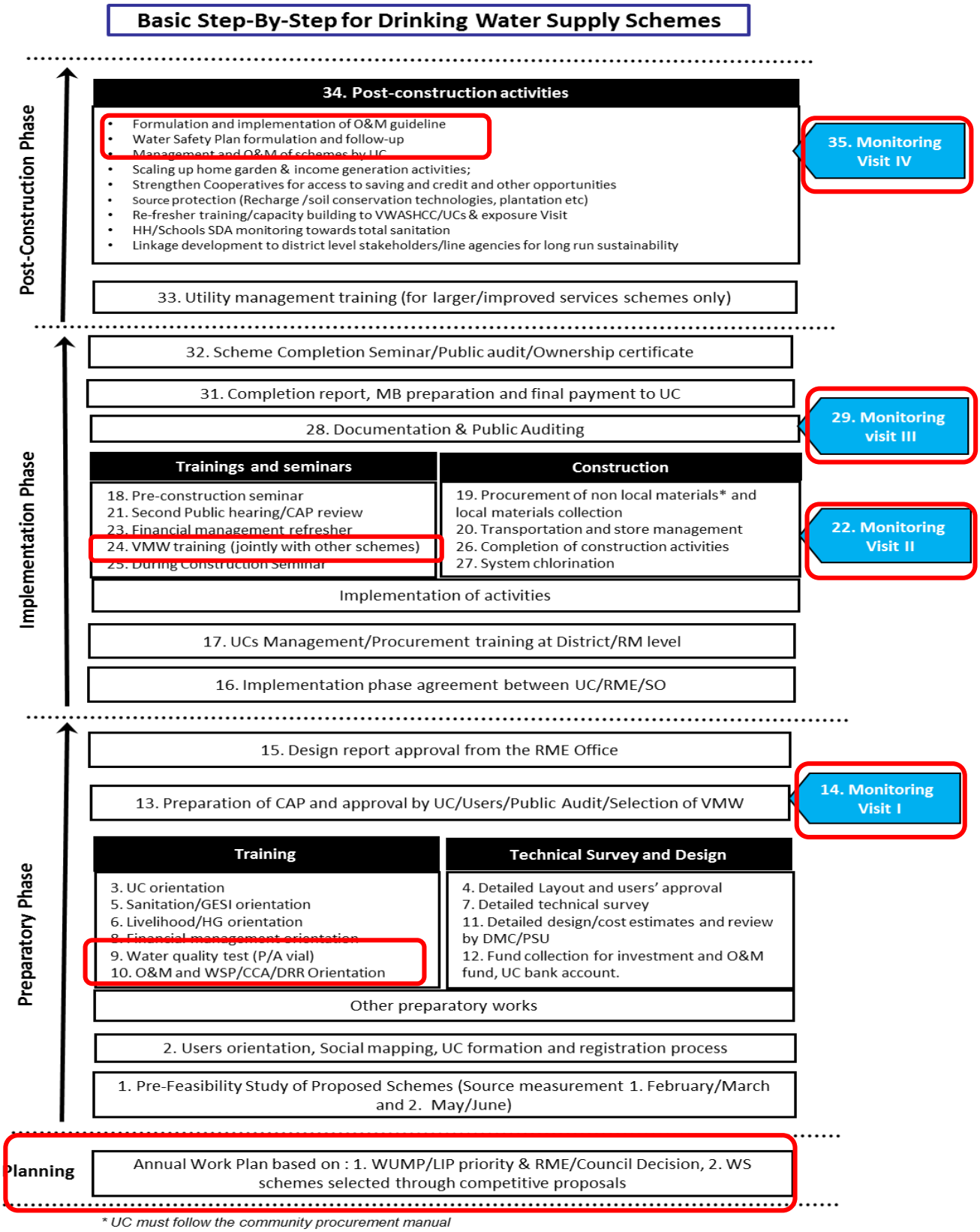
	water source including water quantity, availability and quality as well as source protection needs. The monitoring team investigates whether there are risk factors that require further attention in the scheme technical design. The second monitoring ensures that the scheme is constructed as per design and gives advice for improvements. The third monitoring ensures that all the required works have been completed as per design, VMW has been trained, O&M Regulation has been prepared and the scheme is financially cleared.
Sanitation and Hygiene	• Awareness raising in health issues and behavior change in sanitation (ODF/TS) contribute to control water-borne / water-washed diseases through hygiene through safe hygiene behavior (small doable actions) • Household level Water Treatment and Storage (HWTS) or PoU.

DESIGNS: Accounting for CCA-DRR is a part of good scheme design process – the risks such as land slide prone areas or areas of increased risk of contamination, are accounted for in the design of the scheme. RVWRMP has a tool box of water source protection activities to secure the discharge of safe water at the source. The tools involve protection of the immediate watershed above the spring or stream, and many activities from recharge pits and plantations and water saving smart technological options. The project investments in infrastructure development are physical risk reduction measures that contribute to reducing structural vulnerability, hence the design and construction of hazard-resistant infrastructure is a priority work. Similarly impact from climate uncertainty is targeted through source recharge, conservation, protection and storage options and application of appropriate climate smart cropping and irrigation systems. Project also invests in training users on appropriate disaster risk and climate change resilient measures in all project activities.

STEP-BY-STEP: In RVWRMP, CCA-DRR are integrated to scheme implementation process: The scheme implementation follows a Step-by-Step approach. Step-By-Step guides the Water Users and Sanitation Committees (WUSC) through the scheme planning, implementation and post-construction phases. It ensures feasibility of scheme design and participation of all the scheme users throughout the process. WUSC is the centre of Step-by-Step: WUSC members' capacity is developed through gradual learning-by-doing backed up by training events and scheduled monitoring visits.

→ More details about CCA-DRR in WASH implementation on RVWRMP's Step-by-Step Manual – rvwrmp.org.np.

CCA and DRR are embedded in Step-by-Step. Figure below shows the steps that explicitly incorporate a CCA-DRR component.


Basic Step-By-Step for Drinking Water Supply Schemes
Post-Construction Phase
34. Post-construction activities
Formulation and implementation of O&M guideline
Water Safety Plan formulation and follow-up
Management and O&M of schemes by UC
Scaling up home garden & income generation activities;
Strengthen Cooperatives for access to saving and credit and other opportunities
Source protection (Recharge /soil conservation technologies, plantation etc)
Re-fresher training/capacity building to VWASHCC/UCs & exposure Visit
HH/Schools SDA monitoring towards total sanitation
Linkage development to district level stakeholders/line agencies for long run sustainability
35. Monitoring Visit IV
33. Utility management training (for larger/improved services schemes only)
Implementation Phase
32. Scheme Completion Seminar/Public audit/Ownership certificate
31. Completion report, MB preparation and final payment to UC
28. Documentation & Public Auditing
29. Monitoring visit III
Trainings and seminars
18. Pre-construction seminar
21. Second Public hearing/CAP review
23. Financial management refresher
24. VMW training (jointly with other schemes)
25. During Construction Seminar
Construction
19. Procurement of non local materials* and local materials collection
20. Transportation and store management
26. Completion of construction activities
27. System chlorination
22. Monitoring Visit II
Implementation of activities
17. UCs Management/Procurement training at District/RM level
16. Implementation phase agreement between UC/RME/SO
Preparatory Phase
15. Design report approval from the RME Office
13. Preparation of CAP and approval by UC/Users/Public Audit/Selection of VMW
14. Monitoring Visit I
Training
3. UC orientation
5. Sanitation/GESI orientation
6. Livelihood/HG orientation
8. Financial management orientation
9. Water quality test (P/A vial)
10. O&M and WSP/CCA/DRR Orientation
Technical Survey and Design
4. Detailed Layout and users' approval
7. Detailed technical survey
11. Detailed design/cost estimates and review by DMC/PSU
12. Fund collection for investment and O&M fund, UC bank account.
Other preparatory works
2. Users orientation, Social mapping, UC formation and registration process
1. Pre-Feasibility Study of Proposed Schemes (Source measurement 1. February/March and 2. May/June)
Planning
Annual Work Plan based on : 1. WUMP/LIP priority & RME/Council Decision, 2. WS schemes selected through competitive proposals
* UC must follow the community procurement manual

PLANNING PHASE: Prefeasibility and Feasibility Studies investigate if the potential water source delivers enough water throughout the year, if the water is free from contaminants, if source protection is needed, and if any hazards risk the scheme functionality. These are examples of factors that define whether the scheme is considered feasible and can enter the Preparatory Phase.

IMPLEMENTATION PHASE: If the scheme is considered feasible, next step is the WUSC formation after which WUSCs receive orientation to operation and maintenance (O&M) and Water Safety Plan as part of the WUSC Preparatory Workshop. In this one-day orientation, WUSCs familiarize with themes such as climate change, natural hazards, water safety and spring shed management in a practical way. This helps WUSCs to identify potential risks and come up with solutions. The project trains Village Maintenance Workers (VMWs) that are able to technically maintain and operate the scheme. The VMWs get CCA-DRR orientation as part of their training. Water quality is being tested and respective actions taken during the implementation phase.

POST-CONSTRUCTION PHASE: WUSCs prepare two interlinked plans: O&M Regulation and WSP. O&M regulation serves as O&M policy that considers both short and long-term maintenance needs. It describes scheme institutional arrangements such as WUSC composition and frequency of meetings, water tariff collection and maintenance worker responsibilities. The users receive WSP training. In the two-days training, the whole scheme and catchment area are carefully investigated to identify any risks to be addressed. Based on the system analysis, the WUSC prepares a WSP - a comprehensive maintenance plan including immediate control measures, short term plan for regular O&M works and a long-term plan for bigger upgrading works. After the training, the WSP team has the responsibility to continuously implement, review and update the Plan.

MONITORING AND AUDITING: Scheme monitoring and public auditing play an important role in the Step-by-Step modality. Each gravity and lift scheme go through at least three monitoring events and public audits. In the half-day public audit meeting, the community can discuss any challenges and find solutions together with the Municipality and Project staff. CCA and DRR issues are discussed in every monitoring visit: first monitoring pays special attention to the water source including water quantity, availability and quality as well as source protection needs. The monitoring team investigates whether there are risk factors that require further attention in the scheme technical design. The second monitoring ensures that the scheme is constructed as per design and gives advice for improvements. The third monitoring ensures that all the required works have been completed as per design, VMW has been trained, O&M Regulation has been prepared and the scheme is financially cleared. The fourth monitoring is optional and depends upon the need as the scheme is formally phased out and the WUSC runs it independently. The last monitoring focuses on the Post-construction activities, including the WSP and O&M policy, and scheme sustainability.

3.3. CCA-DRR in Livelihoods Result Area

Besides the Climate Change and Disaster Risks mentioned in previous chapters, the main factors influencing livelihoods are the expected increase in precipitation and annual mean temperatures. The following maps show the predicted changes in precipitation and temperatures by 2050 (Figure 11).

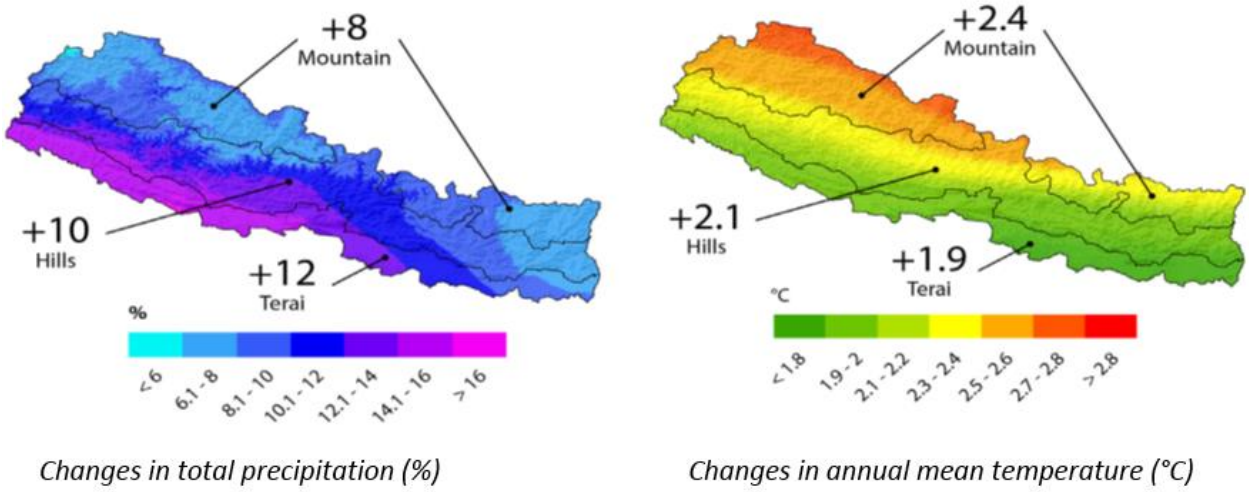


Figure 12: Changes in precipitation and temperature in Nepal. Adopted from CIAT, 2017.

Some general effects can be predicted on the cropping and land-use pattern in Nepal such as:

- Increase in production areas for rice, vegetables and sugar cane
- Decrease in production areas for maize, wheat, lentils and potato
- Increase in yield levels for wheat and decreases for maize, potato, lentil and sugar cane

However, micro-climate effects of climate change are extremely hard to assess in hill and mountain areas, depending on the geography.

Effects of climate change can lead to:

- Loss of productive land through floods, landslides and droughts
- Crop losses due to floods, diseases and pests
- Changes in land use pattern
- Decrease in agriculture production due to floods, droughts, diseases and pests
- Loss of forest coverage due to droughts, forest fires and increased logging
- Land degredation

The project has integrated CCA-DRR issues in the livelihoods implementation. Livelihoods Implementation Plans (LIPs) and home garden and income generation implementation follow the principles of Climate-Resilient Planning (NPC, 2011), emphasizing efficient and sustainable use of natural resources and increased resilience to climate change and disasters in agriculture, aligning with Agriculture Development Strategy, 2015-2035.

→ More details about CCA-DRR in livelihoods implementation on RVWRMP's Livelihoods Concept Paper – rvwrmp.org.np.

The table below presents the main activities and practices under the Livelihoods Result Area in relation to CCA-DRR:

CCA-DRR activities in Livelihoods Result Area	
Livelihood Implementation Plan (LIP):	• Identification of potential crops and areas, taking into account available agriculture land, water availability, access to services and market access • Identification of communities in terms of GESI and vulnerability
Implementation activities	• Conservation agriculture (zero- and minimum tillage, mulching, crop diversification) • Establish multi-purpose nurseries for supply of saplings of fruit, fodder, bamboo, grasses and other multi-purpose species • Promotion of drought- and flood tolerant crops and varieties. • Application of appropriate climate smart cropping and irrigation systems. • Utilization of waste water • Rain water harvesting • Use of drip irrigation and sprinklers (micro-irrigation), poly-house, plastic tunnel • Use of compost (FYM) and mulch • Use of bio-pesticides and liquid manure • Mixed- and inter-cropping • Stall-feeding and improved sheds for livestock • Select and capacitate Leader Farmers and Local Resource Persons for sustainability.

Livelihood Implementation Plan (LIP)

Livelihood Implementation Plan (LIP) identifies all livelihoods and CCA-DRR related aspects of the RM, including land-use-pattern, soil fertility, water availability, existing commercial agriculture coverage, established MEs, government institutions, cooperatives, irrigation facilities, market facilities, existing collection centres, access to local markets, transport possibilities etc.

Based upon this existing situation a detailed livelihoods sector analysis takes place with all relevant stakeholders to identify potential and feasible activities based upon the available resources, skills and market potential. The final LIP prioritizes activities and ensure that investments made will be sustainable, inclusive, and have a maximum impact on the livelihood situation in the RM, while being climate change resilient.

Implementation activities

The project implements concrete actions and practices in the agriculture activities promoted at field level, both in the basic livelihoods such as home gardens as well as in the advanced livelihoods such as (semi-) commercial farming and agriculture Value Chain development.

Most practices follow the Climate-Smart Agriculture (CSA) approach as developed by FAO "as a way to increase food production while adapting to **climate** change and reducing and removing greenhouse gas emissions."

The project promotes and trains, farmers, Leader Farmers and Local Resource Persons, but also agriculture staff of the RMs in a variety of CSA practices in order to mitigate the risk and climate change and other natural disasters.

Some of these practices are:

- Utilization of waste water from the drinking water supply schemes.
- Practice rain water harvesting for home garden use or collected in small ponds.
- Promote Conservation Agriculture: zero- and minimum tillage to minimize soil disturbances, provide soil cover through mulching and cover crops (legumes) and crop diversification.
- Establish multi-purpose nurseries for the supply of saplings of fruit trees, fodder trees, bamboo, grasses and other multi-purpose species. Also planted to protect water sources.
- Promotion of drought- and flood tolerant crops and varieties where needed, this may lead to a change in cropping patterns such as from rice to maize or cereals to ginger.
- Organic agriculture: Farm-Yard-Manure (FYM) management for soil fertility improvement, use of bio-pesticides, managing all home gardens as organic.
- Micro-irrigation such as use of drip-irrigation systems and sprinklers.
- Practices mixed cropping, intercropping and crop diversification such maize and beans intercropping.
- Practice crop rotation to minimize pest- and disease outbreaks and minimize risks for the farmers.
- Use of poly-houses and plastic tunnels to block out the negative impacts of extreme weather events.
- Promote stall feeding and improved sheds for livestock, fodder management.
- Promote beekeeping (for those RMs that specifically plan for this).
- Promote biogas (for those RMs that specifically plan for this).

All livelihoods trainings incorporate CCA-DRR relevant material. Leader Farmers Trainings promote CCA-DRR and capacitate Leader Farmers and Local Resource Persons for sustainability.

3.4. CCA-DRR in Renewable Energy Result Area

RVWRMP support various types of renewable energy, the main components being micro-hydropower (MHP); Improved Water Mills (IWMs) and Improved Cooking Stoves (ICSs). They all produce carbon-free energy of some form, having a positive climatic impact.

→ More details about CCA-DRR in renewable energy implementation on RVWRMP's Project Implementation Guidelines – rvwrmp.org.np

Micro-hydropower (MHP)

MHP provides green electrification option to remote villages, having a considerable climatic contribution. The implementation follows the SBS and scheme design criteria for ensuring proper CCA-DRR integration that is presented above in relation to WASH implementation. MHP has a separate implementation manual (rvwrmp.org.np), and the MHP component is considered more in detail in there.

Improved Water Mills (IWMs)

IWMs have a CCA-DRR objective, but also other rationales for the implementation:

- Reduction of drudgery of specially women to improve the living standard
- Creation of employment opportunities for rural poor people and increase the productivity.
- Reduction of CO2 emissions from grinding, contributing to climate change adaptation and mitigation

Project will support IWM installation. IWM will be owned by beneficiary community or individual. Each IWM is encouraged to be integrated into WASH or irrigation schemes instead of being a standalone facility. Affiliation with cooperatives and sector organizations are encouraged.

Improved Cooking Stoves (ICSs).

Biomass energy occupies a very importance place in energy consumption of the country. As fuel wood is crucial to rural populace of the country for meeting their cooking as well as heating needs, the rate of exploitation of forest resources for fuel wood has gone beyond a sustainable level and is one of the causes of deforestation in the country.

ICS is a device that is designed to improve combustion efficiency of biomass, consume less fuel, save cooking time, convenient in cooking process and creates smokeless environment in the kitchen or reduction in the volume of smoke produced during cooking against the traditional stove. The improved cooking solutions improve not only the adverse health condition of the people but also the environmental situation with reducing the deforestation rate. The improved cooking stoves improves fuel saving via improved fuel efficiency as well as lowers emissions through improved combustion efficiency.

ICS will be implemented as separate schemes and will be implemented by WUSC or Cooperative, and integrated to the project schemes as much as possible. ICS plan will be synchronized with total sanitation strategy. ICS technology is selected based on the community demand and appropriate technology suitable for the particular location. The set of related possible CCA-DRR activities supported by the project are listed below:

1. Green House emission reduction/calculation training to RM/Project staffs
2. ICS promoter training and incentives
3. IWM Installation Training
4. Training on Energy Efficient Technology to RM/Project staffs

5. CCA/DRR ToT to GP staff, GPO and RM/Project staffs
6. Training on Bio-Engineering Technology to RM/Project staffs
7. Training on Land Slide Treatment Technology specially for MHP
8. Awareness programme to community regarding CCA/DRR
9. Training on 3R Technology
10. Learning visit regarding CCA/DRR to Project Staffs and RM Engineer
11. Workshop/Studies/Exposure Visit
12. Climate smart irrigation/cropping technology training
13. Institutional support to local level DRRCC

3.5. CCA-DRR in Governance Result Area

RVWRMP III strengthens the institutional capacity of government bodies to plan, coordinate, support and monitor WUSC and other community groups in the implementation, operation and maintenance of domestic water, sanitation and hygiene programmes in a self-sustainable manner. Since the state restructuring process of Nepal, municipalities have the responsibility to plan, coordinate and manage water supply in their corresponding areas.

→ More details about CCA-DRR in Governance on RVWRMP's Project Document and Implementation Guidelines – rvwrmp.org.np.

Table below presents the main activities under Governance Result Area in relation to CCA-DRR:

CCA-DRR activities in Governance Result Area	
WUMP	• Identification of water sources, its inventory • Identification of current uses and potential uses of water sources • Assessment of existing water infrastructures in terms of CCA/DRR • Identification of vulnerability of all water sources • Social resource mapping and identifying disaster prone areas (landslides, water depletion, flow, river scouring, etc.) and • Planning for source protection, conservation, river-training works, landslide and other dry debris flow protection, etc. • Planning of schemes even in temporary settlements. • Prioritize schemes according to the vulnerability condition of community.
Capacity building	• Capacity building for RM officials • CCA-DRR policy formulation workshops conducted for RM representatives in all core RMs, having concrete policy and budget outputs.

Water Use Master Plan (WUMP)

Water Use Master Plan (WUMP) is a holistic plan for the long-term management, utilization and protection of the water resources in the Rural Municipality area. The plan is prepared following a

participatory and inclusive planning process. There are a few guiding principles in the WUMP preparation process that are all at least indirectly related to CCA-DRR:

- Equitable water use between different stakeholder groups
- Sustainable utilization of water resources
- Prioritization of different water uses in situation of scarcity
- Inclusive and participatory planning process, empowering the marginalized groups. The WUMP process is led by the local level and local level also adopts the WUMP after its completion.

The WUMP will be promoted as a main tool for the Local Government Councils as a framework for annual planning and resources mobilization. Local Level Government is the leading agency to coordinate and implement the schemes planned in the WUMP. Due lack of data, WUMPs do not have statistical RM level analysis on the pass hazards or probable future weather changes.

Municipality level capacity building

Municipality staff must have adequate knowledge of CCA and DRR so that they can support others. Therefore, the Project trains municipality staff and arranges a three-day CCA-DRR policy formulation workshop for all core municipalities.

3.6. CCA-DRR in GESI

Gender equity and social inclusion (GESI), local ownership, transparency, and accountability are core values of the project, integrated to all project modalities, activities, and implementation efforts. These aspects have a close linkage to CCA-DRR, and especially to the 'leave no-one behind' philosophy. The project wants to ensure this principle by enabling the broadest possible participation, accountability, and proportional inclusion of women and disadvantaged groups in water and livelihoods related planning and implementation activities. The principle of the project is to cover all households in the whole scheme service area, leaving nobody behind. The design of the project emphasizes the possibilities for water-smart solutions, and Multiple Use Water Services (MUS) to ensure the broadest possible impacts on the quality of lives in the area for all.

→ More details about CCA-DRR and GESI on
RVWRMP's and RWSSP-WN's mutual GESI Strategy and Action Plan – rvwrmp.org.np.

In the software part, the GESI trainings facilitated by the Project, such as Women as Decision-makers', often lead to actions such as river bank control, agricultural improvements towards resilience, and other CCA-DRR related enhancements, as required by the local women. Transparency and local ownership support the sustainability of the scheme, also in difficult and unexpected occurrences. The numerous behavior change activities are to improve environmental awareness that has positive influence to resilience towards environmental changes and hazards.

4. Donors working on CCA-DRR in Far West:

- **Nepal Climate Change Support Programme (NCCSP)**
  - Duration: Phase I: 2013-2017; Phase I Transition Extension: 2018- Oct 2019
  - Geographic coverage: **Humla**, Mugu, Dolpa**, Bajura**, Jumla, Achham, Kalikot, **Dailekh**, Jajarkot, Rolpa, Rukkum, Dang, Bardiya, Kailali
  - Focus area: Energy, Environment, Climate and Disaster Risk Management
  - Implemented by: Central: Ministry of Forest and Environment (MoFE),
  - Collaborating partners: Ministry of Federal Affairs and Local Development (MoFALD), Alternative Energy Promotion Centre (AEPC)
  - Funded by: DFID, EU and Government of Cyprus, UNDP
  - One coordinator and one administrative officer in their priority RMs. http://www.np.undp.org/content/nepal/en/home/projects/nccsp.html
- **USAID Paani Program**
  - Duration: 2016-2020.
  - Working at Basin level: **Mahakali**, Karnali, Rapti
  - The USAID Paani Program (Paani) works to enhance Nepal's ability to manage water resources for multiple uses and users through an integrated, whole-of-basin approach focused on **climate change adaptation** and the conservation of freshwater biodiversity. Through activities at the watershed, basin and national scales, **Paani aims to reduce threats to freshwater biodiversity and strengthen the resilience of targeted communities to adapt to the adverse impacts of climate change through improved water resource management.** https://www.usaid.gov/nepal/fact-sheets/paani-program
  - Paani works to raise the profile of freshwater issues through policy engagement, academic research, curriculum development, and sponsorship of international forums. The project emphasizes user-centered design to analyze how various stakeholders, including fishermen, government officials, and hydropower developers, use water resources to better incentivize their engagement in water conservation and management activities. https://www.dai.com/our-work/projects/Nepal-Program-for-Aquatic-Natural-Resources-Improvement-PANI
- **PAHAL (phasing out)**
  - Duration: 2014-2019
  - Seeks to strengthen livelihoods, improve nutritional status, and **increase the capacity of vulnerable households to mitigate, adapt to, and recover from shocks and stresses in rural communities.** The program is focused in the far-western and mid-western districts of **Achham, Baitadi, Bajhang, Bajura, Dadeldhura, Darchula, Dailekh, Doti**, Jajarkot, Pyuthan, Rolpa, Rukum, Salyan, and Surkhet.
  - Objectives: 1) **Mitigating risk of socio-ecological stressors and shocks** that reduce local food security; 2) Strengthening and diversifying livelihoods for food-insecure populations

http://nepal.mercycorps.org/projects/eco-development/pahal.php

- **Building Climate Resilience of Watersheds in Mountain Ecoregions (BCRWME) (Phased out)**
  - January 2015 — July 2019
  - The project aims to improve access to and **enhance the reliability of water supply and irrigation for communities living in the watersheds of Nepal river systems which are significantly vulnerable to climate change.**
    https://www.ndf.fi/project/building-climate-resilience-watersheds-mountain-eco-regions-bcrwme-ndf-c56
    http://armp.aviyaan.com/bcrwme/

Cooperation and coordination:

As CCA-DRR is integrated to all project Result Areas, differentiating CCA-DRR related cooperation and activities from the other project activities is normally not possible. RVWRMP is closely aligned with GoN structures, the local governments being the main partners of the project. Cooperation with GoN in WASH and governance and sector planning support is daily (see Project Document and Project Implementation Guidelines). Furthermore, RVWRMP cooperates with multiple partners in the livelihoods result area – see Livelihoods Concept Paper for more (rvwrmp.org.np).

The other donors in the area conduct different activities that are not replicated by RVWRMP. RVWRMP works at RM level, where the coordination between the donors is organized by the RM, and GWROs (RMSUs) from the Project's side. RVWRMP coordinates RM level CCA-DRR with the other stakeholders through RMSUs. RMSU collaborate in capacity building with other stakeholders. The staff working in RMSUs provide a cooperation opportunity with RVWRMP to all organizations working at the same core RMs.

RVWRMP has a collaboration arrangement with Finnish Meteorological Institute (FMI; Ilmatieteenlaitos), supporting the FMIs Project on weather radars. The project has a community level CCA-DRR capacity building component, planned in an RM in Sudurpaschim. RVWRMP has promised to support the facilitation of the capacity building event.

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