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A Synthesis Report

Harmonized Local Adaptation Plans for Action (LAPA)

ANUKULAN/BRACED PROJECT

iDE नेपाल Nepal

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RUPANTARAN

RIMS-Nepal
Development through resource management

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A Synthesis Report

Harmonized Local Adaptation Plans for Action (LAPA)

ANUKULAN/BRACED PROJECT

Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)
A Synthesis Report on Harmonized Local Adaptation Plans for Action (LAPA) in Anukulan/BRACED Project.

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Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED/Anukulan), a UKAID funded project, implemented in three western Provinces of Nepal namely; Province 5 (Bardiya), Karnali Province (Surkhet) and Sudur Paschim Province (Kailali, Kanchanpur, Dadeldhura and Doti). The project aims in developing climate resilient livelihoods for 500,000 poor people in western Nepal that suffers climate extremes and disasters through public-private partnership approach.The project is led by iDE and a consortium of five international, four national and six local partner organizations. Rupantaran, as a national NGO, is leading and facilitating the implementation of climate change component including preparation of disaster risk reduction (DRR) harmonized LAPA in the Anukulan- project districts. Besides Rupantaran, Anukulan Regional Field Office in Dhangadhi, Kailali has other project staffs as experts from other national NGOs, INGOs and iDE to support the district teams. Among various components under the project, LAPA preparation and implementation is one of the most important and key activities to build resilience of vulnerable people and increase adaptive capacity to cope with impacts of climate change and disasters. In context of LAPA preparation, the project has taken an approach to harmonize Local Disaster Risk Management Plan in LAPA. So far, 41 Palika level LAPAs (17 Rural Municipalities and 24 Municipalities) have been prepared in support of Anukulan Project.

This comprehensive synthesis report is developed with an objective of wider dissemination. This report documents the process of DRR harmonized LAPA preparation including its key findings and achievements, experiences, learnings and challenges. In addition to data and information that were compiled, analyzed and consolidated during the DRR harmonized LAPA preparation process, field-level findings of activities observed and experiences of community members are also incorporated in this report.This report is expected to be beneficial for other projects, programmes and stakeholders for effective implementation ofclimate change and DRR related activities in their concerned working areas.

Our sincere thanks goes to Anukulan adaptation team of six districts for their contributions in compiling, analyzing and consolidating all data and information to produce this synthesis report. We would like to thank all iDE and Rupantaran staffs for their key role in preparing this synthesis report.

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Acronyms

AR4	Fourth Assessment Report
BRACED	Building Resilience and Adaptation for Climate Extreme and Disaster
CCA	Climate Change Adaptation
CCS	Creation of Creative Society
COP	Conference of Parties
DDC	District Development Committee
DPAC	District Programme Advisory Committee
DRMP	Disaster Risk Management Plan
DRR	Disaster Risk Reduction
EU	European Union
GHG	Green House Gas
GoN	Government of Nepal
HFA	Hyogo Framework of Action
IPCC	Intergovernmental Panel on Climate Change
LAPA	Local Adaptation Plan for Actions
LDCRC	Local Disaster and Climate Resilience Committee
LDRMP	Local Disaster Risk Management Plan
LNGO	Local Non-Government Organization
MoE	Ministry of Environment
MoFAGA	Ministry of Federal Affairs and General Administration
MoHA	Ministry of Home Affairs
MSFP	Multi Stakeholders Forestry Programme
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NCCSP	Nepal Climate Change Support Programme
NDRF	National Disaster Response Framework
PRA	Participatory Rural Appraisal
RM	Rural Municipality
SWC	Social Welfare Council
UK	United Kingdom
UN	United Nations
UNDP	United Nation Development Programme
UNFCCC	United Nation Framework Convention on Climate Change
VDC	Village Development Committee
UNDP	United Nation Development Programme
UNFCCC	United Nation Framework Convention on Climate Change
VDC	Village Development Committee

Part I: Introduction

Climate change has become one of the most global alarming issues of our time. Anthropogenic emission of greenhouse gases have accelerated increase in temperature and change in precipitation pattern resulting in changes in climate. Uncertain, extreme and unpredictable weather events have caused in decreasing agriculture productivity, drying of water sources, out-bursting of various pests and diseases and increasing incidents of floods and longer droughts.Millions of poor people, especially from the least developed countries like Nepal are exposed to the impacts of climate change. Despite negligible contribution to global greenhouse gas emissions, Nepal has been one of the most vulnerable countries due to its fragile geography, largely poor and natural resource dependent population. Therefore, Government of Nepal is taking initiations to address the detrimental effects of climatic hazards by endorsing climate change policy such as National Adaption Programme of Actions (NAPA). In order to implement NAPA priorities, the National Framework of Local Adaptation Plans for Action (LAPA) has been put into place.

The LAPA framework ensures the process of integrating climate change adaptation and resilience into local and national planning process. Following this framework, various projects and programmes working in Climate Change Adaptation (CCA) in Nepal are currently formulating and implementing LAPAs in their concerend working Palikas. In this context, Building Resilience and Adaptation to Climate Extreme and Disaster (BRACED)/Anukulan, a UKAID funded project, is also working with an aim of building resilience of 500,000 poor and vulnerable people to climate change impacts. Overall objective of the project is to improve the adaptive capacity of vulnerable people in Nepal, especially women and children, despite their exposure to climate-related shocks and stresses.The project is being implemented by a consortium of six international, four national and six local Non-Government Organizations. Anukulan Projectcovers: four district of **Sudur Paschim Province**- Kailali, Kanchanpur, Doti and Dadeldhura, one district of **Karnali Province**- Surkhet and one district of **Province 5** - Bardiya.

Figure 1. Map of the project districts.

Anukulan Project has been working in these districts since 2017. Among the various components of the project, the project has prepared 41 DRR harmonized LAPAs at Local Governments (LGs) – 17Rural municipalities and 24 municipalities. As planned by the project, a synthesis report has been prepared by combining all processes adopted in formulating the LAPAs, key findings, achievements, learning and challenges with implementation modality and monitoring mechanism for wider disseminationamong the relevant stakeholders.

Objectives of the synthesis report:
The overall objective of this report is to consolidate the process and information of the DRR harmonized LAPAs prepared under Anukulan Project. It presents relevant information on the climate induced hazards, impacts of climate change on various thematic areas and adaptive capacity in the project districts. Specifically, this report aims:

- To review literatures related to climate change adaptation and disaster risk reduction.
- To summarize information of hazards, impacts and adaptation measures identified and documented in DRR harmonized LAPAs.
- To document the processes, modality, achievements and lessons learnt in formulation and implementation of DRR harmonized LAPAs.
- To provide directions/recommendations for similar nature programmes and projects in future which will formulate and implement DRR harmonized LAPAs.

Methodology and approaches:

In order to prepare this synthesis report, following methodologies were adopted.

- Reviewed national and international literature related to climate change, climate change adaptation, disaster risk reduction, adaptation and DRR planning process.
- Reviewed, analyzed and consolidatedall DRR harmonized LAPA data and information.
- Consulted with Anukulan-XProject team to collect information, insights and learning and get feedbacks and suggestionson the consolidated report through various means of communication.
- Prepared draft report and sharedto concern staffs to receive inputs, comments and suggestions.
- Reviewed and enriched by the climate change experts to enrich the consolidated report.
- Prepared final synthesis report incorporating feedbacks, suggestions, and comments from concerned staffs and peer reviewers.

Limitations of the report:

- This report is prepared based on data available in the DRR harmonized LAPAs and other secondary sources.
- Because of time and resources constraints, field visits were not made but remote consultations were made with field staffs and community members.
- Scope of this report is only to consolidate information of DRR harmonized LAPAs and document the experiences and learning of their preparation and implementation.
- Report is focused towards consolidation of the information rather than assessment of the effectiveness of preparation and implementation of DRR harmonized LAPAs.

Structure of the report

This report includes six chapters. The first chapter explains context, objectives and limitations. The second chapter covers literature review of various national and global CCA and DRR related policies, strategies, plans and frameworks. In addition, second chapter also covers a brief description of project districts and startup and preparatory actions for DRR harmonized LAPA formulation.Third chapter is the main chapter of this report. It synthesizes DRR harmonized LAPA formulation process, its major findings, experiences, learnings and challenges. The fourth chapter explains the findings of adaptation interventions implemented in the field. The fifthchapter summarizes overall strengths, learnings and challenges, and the last chapter presents conclusion and recommendations.

Part II: National and International Climate Change Context

Global Climate Change Context

Climate change (CC) is a global concern and a natural phenomenon but it has been accelerated due to anthropogenic activities, primarily from industrialization, deforestation and increased use of fossil fuels for transportations resulting in erratic rainfall and increased temperature. Scientific evidence, as cited by the Inter-governmental Panel on Climate Change (IPCC, AR4 2007) states that the average temperature of the earth's surface has risen by 0.74 degrees centigrade since late 1800s. It is expected to increase by another 1.8°C to 4°C by the year 2100 - a rapid and profound change. These changes have direct and indirect impacts on water resources, agriculture, forests and biodiversity, health, infrastructure development, tourism, and livelihoods resulting in severe impacts to vulnerable groups of people more. In order to develop an international legal instrument to address this global problem, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992. The ultimate goal of the UNFCCC is to stabilize greenhouse gas (GHGs) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Works under the Convention have been focusing on activities relating to both mitigation and adaptation to climate change. Nepal signed this Convention on 12 June 1992 and became Party to it in 1994. Each year Conference of Parties (COP) is being held generally at the end of the year. In 2001 (COP 7), Marrakesh Accord provisioned for financial support to the least developed countries in preparation of National Adaptation Programme of Actions (NAPA).

Nepal Climate Change Context

Nepal is one of the most vulnerable country due to its physiographic characteristics. Nepal, though its contribution to global greenhouse gases emission is negligible (0.027%), is already experiencing several CC impacts on water resources, biodiversity, agriculture, and health with more adverse effects to the poor and marginalized people and communities. Government of Nepal (GoN) is keeping this concern in top priority and has formulated different CC related policies, strategies, programmes and plans in order to respond to the climate change issues. Even, new constitution of Nepal has addressed the need of ensuring clean environment that each person shall have the right to live in a healthy and clean environment. In addition, Nepal, being a Party to the UNFCCC, GoN has been fulfilling its commitments by producing and submitting various required documents and reports to the UNFCCC. Nepal is participating in Conference of Parties (COP) each year and is putting its agendas mainly on adaptation, mitigation, finance, technology transfer and capacity development including other mountainous' fragile issues.

Policy Context Climate Change and Disaster Risk Reduction

Climate Change Adaptation and Disaster Risk Reduction in Climate Change Policy

Nepal's Climate Change Policy (2011) addresses climate change adaptation and disaster risk reduction in the policy section. It refers that "implementing priority actions identified in the NAPA, and identifying and implementing medium-and long–term adaptation actions in the climate impacted and climate-induced disaster-prone areas, communities, and people; (Section: 8.1.1), Linking and implementing climate adaptation with socio-economic development and income generation activities to the extent possible; (Section: 8.1.2) and identifying the people, communities and areas impacted by climate change and implementing adaptation and impact mitigation measures based on local knowledge, skills and technologies (Section: 8.1.5)".

National Adaptation Programme of Actions

According to Marrakesh accord (2001) Nepal prepared National Adaptation Programme of Action-NAPA (MoE 2010) document and submitted to the UNFCCC. It is a strategic instrument prepared to assess vulnerability and to respond to climate change adaption issues by recommending appropriate adaptation measures. It showed that 1.9 million people are highly vulnerable to climate change whereas 10 million are increasingly at risk. NAPA has identified six thematic areas: Agriculture and food security, Forests and biodiversity, Water resources and energy, Climate induced disaster, Public health and Urban settlements and infrastructure to intervene adaptation measures. Besides these thematic sectors, there are other two cross cutting sectors: Governance and livelihoods and Gender equity and social inclusion, mentioned in NAPA. Moreover, it has identified nine (9) prioritized projects to be implemented in these thematic sectors. NAPA emphasized the preparation of Local Adaptation Plans for Action (LAPA) through country driven operational process for the effective implementation of the most urgent and immediate adaption needs, prioritized by NAPA. NAPA developed overall vulnerability map of districts based on the vulnerability index and sub-indices of exposure, sensitivity and adaption capacity and it has categorized all 75 districts into five different categories.

Local Adaptation Planning

The integration of climate change adaptation and adaptive capacity issues within development processes is now national issue for development policy and practice (Regmi and Subedi, 2010). The adaptation planning process at local and community level provides strong institutional framework and policy imperative to institutionalize climate change within development paradigm. It is also important to bridge the gap between top down and bottom up planning. Realizing this fact and to translate NAPA at local level, Ministry of Population and Environment (MoPE) formulated the National Framework of Local Adaptation Plans for Action (LAPA) to prepare and implement location specific LAPA to integrate and mainstream adaptation plans into decentralized national planning process including sector-specific planning and implementation accordingly.

LAPAs are expected to be prepared and implemented taking into consideration the sector and location, resource availability and distribution system, community access to public services and facilities, and region and areas affected by climate change. It is expected to provide the effective delivery of adaptation services to the most climate vulnerable areas and people. The process of LAPA preparation and implementation is bottom-up, inclusive, responsive and flexible. This framework has been developed with the understanding that the Village Development Committees and Municipalities are operational units and capable to consolidate and channel budgets and implement climate adaptation activities.

The LAPA Framework consists of the following seven steps for LAPA formulation and implementation. Ultimately, the LAPA framework should ensure integration and implementation of climate adaptation and resilience actions into local development and

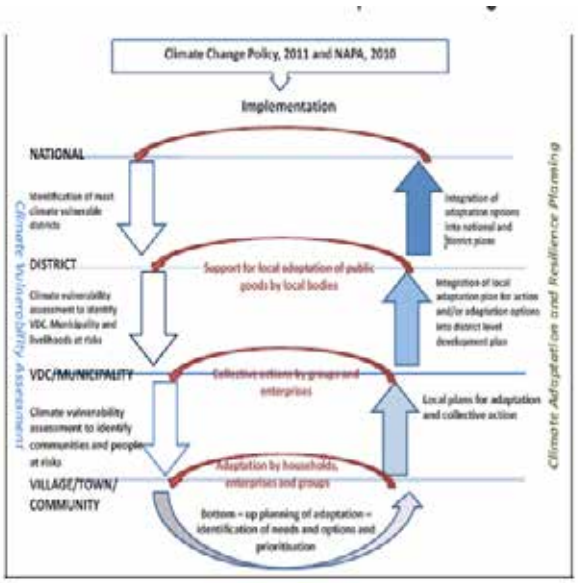

Figure 2. Integrating climate change adaptation and ressillence into local and national development planning.

sectoral planning processes, programme and project, and ensure people, community and their resources are adaptive to climate change.

1. Climate change sensitization
2. Climate vulnerability and adaptation assessment
3. Identification and prioritization of adaptation options
4. LAPA formulation
5. LAPA integration into planning processes
6. LAPA implementation
7. LAPA progress assessment

Disaster Risk Reduction and Management

Nepal is a hotspot for geophysical and climatic hazards. Nepal faces high magnitudes and intensities of a multitude of natural hazards such as flood, landslide, earthquake, fire, cyclonic winds and hailstorms, cloudburst, drought, famine, and epidemics. In addition, Climate change is leading to an increase in the probability of extreme weather events of climatic hazards. Nepal is 20th topmost disaster prone country in the world. Likewise, Nepal is ranked 4th in climate change vulnerability, 11th rank in earthquake and 30th in flood vulnerability. The April 2015 earthquake was the worst natural disaster which killed nearly 9,000 people and injured nearly 22,000. Hundreds of thousands of people became homeless with entire villages flattened across many districts of the country. In order to response these problems; GoN has been initiating various efforts by endorsing, formulating and developing guidelines.

In this line, Natural Calamity Relief Act 1982 is in place, which focuses mainly on post disaster phenomena, however the new Disaster Management Act is in progress of its finalization to be enforced according to changing context and needs. Similarly, the National Strategy for Disaster Risk Management in Nepal, 2008 (NSDRMN) endeavours to facilitate the required change in order to achieve the goal of disaster resilient Nepal by providing guidance for improving the policy and legal environment. In addition, the National Disaster Response Framework has been prepared for the effective coordination and implementation of disaster preparedness and response activities by developing a National Disaster Response Plan that clarifies the roles and responsibilities of Government and Non-Government agencies involved in disaster risk management in Nepal. This framework is relevancy to the Hyogo Framework of Action (HFA) 2005-2015, which is a consensus document adopted at the UN World Conference on Disaster Reduction, in 2005. However, the duration of this framework has been over. Sendai Disaster Risk Reduction Framework (2015-2030) is in place, Nepal needs to formulate new Disaster Risk framework based on it.

In order to response to DRR at local level, Disaster Act, 2074 and local government operation act, 2074 BS has provisioned local government (Rural Municipality and Municipality) to make them responsible for disaster preparedness and response. In this connection, Ministry of Federal and General Administration MoFAGA has drafted "Local Disaster and Climate Resilience Planning Guidelines, 2074 BS to develop and implement Local Disaster and Climate Resilience Plan (LDCRP) at local government.

Climate Change Adaptation and Disaster Risk Management Plan

Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) are inextricably linked when it comes to meteorological haz¬ards and any secondary hazards triggered by them (e.g. landslides, infrastructure failure). Climate change is lead¬ing to an increase in the probability of extreme weather events such as heat waves, extreme precipitation, and storms, which in turn is increasing the risk of disaster resulting from such hazards as drought and floods in vulnerable parts of the world. Long-term climate change adaptation processes in community can therefore support governments in reducing the risk of disaster.

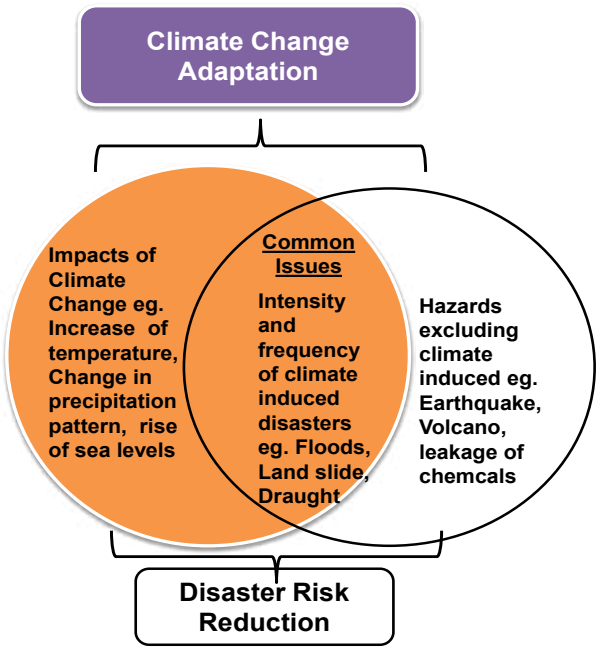

Figure 3. Inter Linakges of Climate Change Adaptation and Disaster Risk reduction.

Climate Change Adaptation can benefit from the lessons learned by DRR professionals during more than three decades of work in the field and, as such, avoid the duplication of effort and resources used on adaptation actions that have already been done as part of DRR, saving valuable time in gathering experience.

Literature Review

In initial phase of report writing, various literature were reviewed mainly national and global Climate Change Adaptation and Disaster Risk Reduction related literature. They were mainly:

Table 1. List of literature and their key focuses.

Literatures	Main focuses
Nepal's Constitution 2072	The constitution has addressed regarding clean environment that each person shall have the right to live in a healthy and clean environment.
Paris Agreement	Parties establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal by holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change

Literatures	Main focuses
National Adaptation Plan (NAP)	The NAP formulation process is undertaking to address medium and long-term adaptation. The process aims to assist Nepal to reduce its vulnerability to the impacts of climate change by building adaptive capacity and resilience, and by facilitating the integration of climate change adaptation into development planning. It has identified nine thematic areas: Agriculture and food security, Forests and biodiversity, Water resources and energy, Climate induced disaster, Public health and Urban settlements and infrastructure. Besides these there are other two cross cutting sectors: Governance and livelihoods and Gender equity and social inclusion
Climate Resilient Planning Tool, 2011.	The National Planning Commission (NPC) developed a climate resilience framework to guide the country in implementing development plans. It recommends methods, tools and approaches for guiding climate-resilient planning
Fifteenth Periodic Plan (Approach Paper)	Fifteen nation plan's approaches also emphasis and focuses to addressing climate change impact and climate ressillent & adaptation development.
Thirteenth Periodic Plan (2014-16)	The 13th periodic plan of the Government of Nepal adopts the green development approach to mitigate the impacts of climate change.
Fourteenth Plan (2016-2018)	The 14th plan has the goal of implementing development programmes by adapting to climate change. It also has a strategy to mobilize national and international sources of climate finance in the national budget and increase investment.
Disaster Act, 2074	Repeals and replaces the Natural Calamity Relief Act of 1982. Provides for the cooperation of national and local authorities in the framework of the Disaster Risk Reduction and Management Council in the case of natural disasters in Nepal. Focuses on protecting public life, public and private property, natural and cultural heritages, physical properties and minimising the disaster risk.
Local Government Operation Act, 2074	The local governance operation act, 2074 has mandated to local government for emergency preparedness, emergency responses and provision of the Disaster management fund at local level. This act also emphasizes to develop Local Disaster Risk Management Plan (LDRMP) at LG level.
Climate Change Policy, 2010	It refers that "implementing priority actions identified in the NAPA, and identifying and implementing medium-and long –term adaptation actions in the climate impacted and climate-induced disaster-prone areas, communities, and people
National Adaptation Programme of Actions (NAPA),2010	The NAPA identified nine urgent and immediate climate change adaptation priority programmes related to six thematic sectors (agriculture, forest biodiversity, water resources, health, infrastructure, and disaster).The first comprehensive government response to climate change, the NAPA also specified a coordination mechanism and implementation modality for climate change adaptation programme in Nepal. NAPA has also conducted the vulnerability assessment of the country and ranked the district based on climate change vulnerability assessment.
The National Framework of Local Adaptation Plan for Actions (LAPA), 2011	The framework was formulated to prepare and implement location specific LAPA to integrate and mainstream adaptation plans into decentralized national planning process. The process of LAPA preparation is guided by ***bottom-up, inclusive, responsive and flexible*** as the four guiding principles.

Literatures	Main focuses
Hyogo Framework of Action (HFA) 2005-2015	The Framework is a consensus document adopted at the UN World Conference on Disaster Reduction, Kobe in 2005, towards achieving the stated goals of Disaster Risk Reduction (DRR) within the stipulated time frame.
Sendai Disaster Risk Reduction Framework (2015-2030)	The Sendai Framework was adopted at the Third UN World Conference in Sendai, Japan, in March, 2015. The Framework is the successor instrument to the HFA: Building the Resilience of Nations and Communities to Disasters. The Framework has identified the most significant shifts as a strong emphasis on disaster risk management as opposed to disaster management, the definition of seven global targets, the reduction of disaster risk as an expected outcome, a goal focused on preventing new risk, reducing existing risk and strengthening resilience, as well as a set of guiding principles, including primary responsibility of states to prevent and reduce disaster risk, all-of-society and all-of-State institutions engagement.
Natural Calamity Relief Act 1982	It is expedient to make arrangement for the operation of relief work and the maintenance of people convenience with a view to protect the life and property of the people in general and public property.
National Disaster Risk Response Framework	In order to develop a clear, concise and comprehensive national disaster response framework for Nepal that can guide a more effective and coordinated national response in case of a large scale disaster. The Framework clarifies the roles and responsibilities of Government and Non-Government agencies involved in disaster risk management in Nepal.
National Strategy for Disaster Risk Management in Nepal	The National Strategy for Disaster Risk Management in Nepal (NSDRMN) endeavors to facilitate the required change in order to achieve the goal of disaster resilient Nepal by providing guidance for improving the policy and legal environment, and by prioritizing the strategic interventions.
District/Local Disaster Management Planning Guidelines, 2012	In order to assess vulnerability of climate change and disaster, risk and capacity, identify prioritized area, this guidelines helps to prepare plan to integrate for mainstreaming in periodic and development planning process for sustainable development.
Environment-friendly Local Governance Framework, 2013	The EFLG Framework has been issued to add value to the environment-friendly local development concept encouraging environmental protection through local bodies with vision to establish environmental governance and create a sustainable environment-friendly society at household, village, municipality and district levels.
IPCC, AR4	The Inter-governmental Panel on Climate Change (IPCC, AR4 2007) states that the average temperature of the earth's surface has risen by 0.74 degrees centigrade since the late 1800s. It is expected to increase by another 1.8°C to 4°C by the year 2100 -- a rapid and profound change.
IPCC TAR	The IPCC TAR defined vulnerability as: "The degree to which a system is susceptible to, or unable to cope with the adverse effects of climate change, including climate variability and extremes". Thus Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity"
Local Government Operational Act, 2074	Local Government Operational Act, 2074 providing the exclusive power for disaster management, Protection of watershed, mines and minerals, conservation of biodiversity to the local government.

Brief Description of Project Districts

The Anukulan-X Project is being implemented in the six districts of western Nepal i.e.,four districts of **Sudur Paschim Province**- Kailali, Kanchanpur, Doti and Dadeldhura, one district of **Karnali Province**- Surkhet and one district of **Province5**- Bardiya. Physiographically, three districts fall under the flatland of Terai and remaining three districts belong to mid hills region while some project implemented sites also fall under Chure-Siwalik zone. In terms of coverage of local government, the project covers 41 municipality and rural municipality of the project districts. Among which, 19 LGs falls in Terai, 11 in hill, 7 in Siwalik Chure and two/two into the Plain Chure and Hill Chure. The detail is presented in table-2

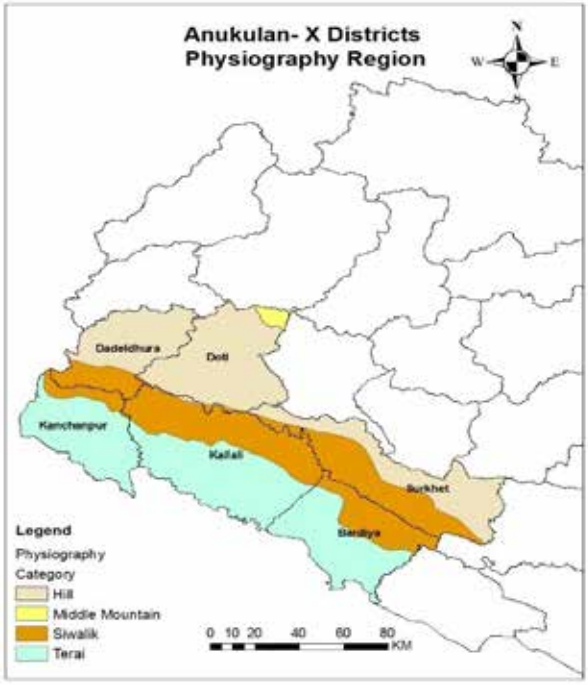

Figure 4. Physiographic location of Anukulan-X working areas.

Table 2. Physiographic location of Anukulan- X working Local Governments

District	No of LG	Plain	Hill	Siwalik Chure	Plain Chure	Chure Hill
Dadeldhura	6		4			2
Doti	7		7			
Bardiya	6	5			1	
Kailali	7	5		1	1	
Kanchanpur	9	9				
Surkhet	6			6		
Total	**41**	**19**	**11**	**7**	**2**	**2**

Similarly, NAPA vulnerability assessment shows that two project districts- Dadeldhura and Doti fall under moderately vulnerable districts while four project districts-Kailali, Kanchanpur, Surkhet and Bardiya fall under low vulnerable districts.

Figure 5. Overall Vulnerability Map of Nepal (NAPA, 2010)

Physiographic and climatic features:

The elevation of the project districts and local governments of the Anukulan-X Projects ranges from 198 - 3400 m.

Table 3. Physiographic and climatic features of project district

District	Altitude	Annual Rainfall	Annual Temp	Climate
Dedeldhura	462 m to 2639 m.	1643 mm	Max 37^{0}C and Min 13^{0}C	Tropical to Temperate
Doti	600 M to 3400 M.	1840 mm	Max 44^{0}C and Min 13^{0}C	Tropical to Alpine
Bardiya	138 M to 1279 M	1900mm.	Max 43^{0}C to Min 4^{0}C	Tropical to Sub-Tropical
Kailali	300 M to 2000 M	1840 mm	Max 43^{0}C to Min 15^{0}C	Tropical to Sub-Tropical
Kanchanpur	160 M to 1528 M	1423 mm.	Max 43°C to Min3°C	Tropical to Sub-Tropical
Surkhet	198 M to 2367 M	1609 mm	Max 41.3^{0}C to Min 0.5^{0}C	Sub tropical to temperate

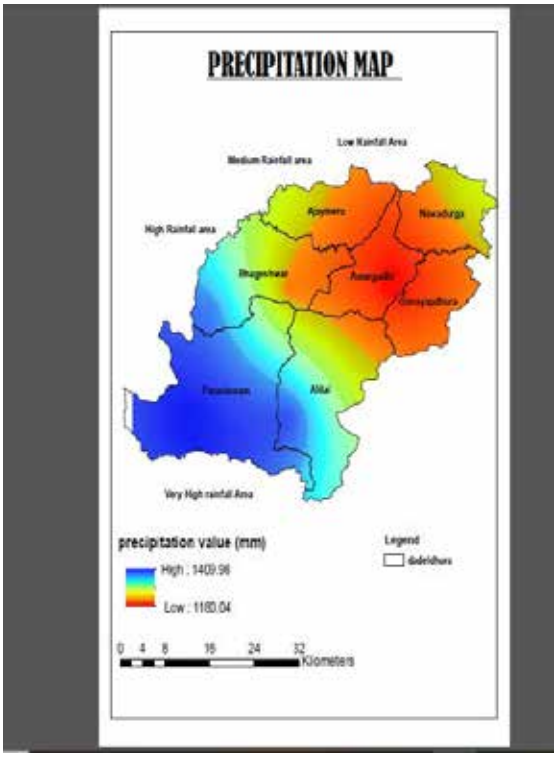

Figure 6. Precipitation map of Dadeldhura district

Population and household Profile:

According to census 2011, total population of the district is 2,216,087. Percentages of male and female are 48 % and 52% respectively which is approximately same with national average. Total number of households is 442,538 and out of which Anukulan-X Project covers the 31.04 % (124,245 HHs).

Table 4. District population, HHs and coverage of Anukulan-X

Description	Dadeldhura	Doti	Bardiya	Kailali	Kanchanpur	Surkhet	Total
Population	152,157	211750	426576	775709	451248	350804	2216087
Male (%)	51.00	45.93	48.00	48.78	48.00	48.00	48.29
Female (%)	49.00	54.07	52.00	51.22	52.00	52.00	51.72
Total HH	24507	41440	83147	142480	82134	72830	446538
HH covered by Anukulan-X	12628	10891	28929	30564	28308	12925	124245
HH Coverage in %	**51.53**	**26.28**	**34.79**	**21.45**	**34.47**	**17.75**	**31.04**

In terms of social groups, there are different caste and ethnicity living in the project districts. Three project districts of flatland -Kailali, Bardiya and Kanchanpur district are dominated by Tharus. Significant number of Dalits are living in the Mid-hill districts- Doti, Dadeldhura and Surkhet.

Land Use Pattern:

The Anukulan-XProject district covers 10858 sq.km of land area. Out of which, 65.39% of land belongs to forest, followed by 28.08% of agricultural land, 2.93% of barren land and 1.29% of water bodies. District wise land use pattern is presented in the Table below.

Table 5. Land Use Pattern.

Description	Dadeldhura	Doti	Bardiya	Kailali	Kanchanpur	Surkhet	Total
Total Area (Square KM)	1537	2025	2025	3235	1610	2451	10858.00
% of Forest Area	78.54	75.15	57.89	61.78	49.38	69.61	65.39
% of Shrub land Area	0.095	0.421	0.064	0.232	1.099	2.904	0.80
% of Grassland Area	1.040	1.861	0.905	0.896	1.897	0.877	1.25
% of Agriculture area	18.861	21.365	34.772	31.126	38.026	24.306	28.08
% of Barren area	1.272	0.748	4.204	3.816	6.899	0.622	2.93
% of Water body	0.257	0.460	2.165	1.660	2.053	1.141	1.29
% of Built-up area				0.485	0.641	0.532	0.28

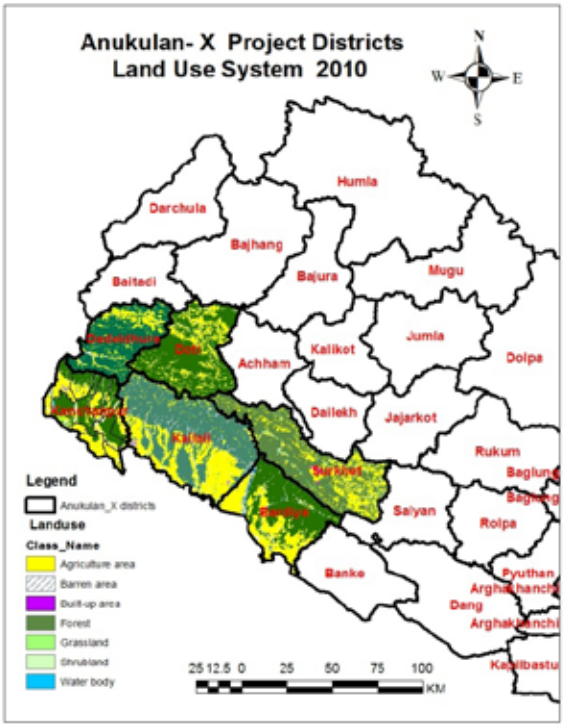

Figure 7. Land Use Map of Project districts.

Part III: Review of Process of Development and Implementation of DRR Harmonized LAPAs

The development and implementation of the DRR harmonized LAPA scan be divided into three broader steps. The first step focuses on the preparatory activities including capacity building, and Local government (LG) level climate change and DRR institutional mechanism development and strengthening. The second step focuses onpreparation of DRR harmonized LAPAs, and the third step focu ses on implementation, monitoring and review.

1. Startup and Preparatory Process of LAPA interventions

In order to initiate systematic climate change adaptation interventions in the project area, following start up activities were performed after planning and budgeting of the activities

Selection and Orientation to staffs

To prepare DRR harmonized LAPAs, LAPA facilitators were selected through competitive process. They were trained (5 days intensive training package).Major contents of the training were: climate change, adaptation and DRR related terminologies, basic science of Climate change and its impacts, local, national, international initiations undertaken on climate change issues, mitigation and adaptation, vulnerability assessment, participatory tools and techniques for harmonized LAPA preparation and their practices. In addition, contents on integration, implementation and monitoring and evaluation mechanisms, processes and funding modalities were also covered during training.Similarly, disaster risk management cycle, government provision on DRR and different institutions, measure needs to adopt for pre disaster, during disaster and post disaster was also covered. Likewise, task force committee formulation process and their mechanism, roles responsibilities of task force etc was also discussed in the training.

Ward and local government level workshops

To update the DRR harmonized LAPA, ward level and LG level workshops were designed. Prior to go the field; one day inception workshop was organized at LG level to develop common understanding on DRR harmonized LAPA process, CCA and DRR focus institutional mechanism formulation at LG level, make clear on process, tools and technique on DRR harmonized LAPA. The workshop also developed a concrete plan to collect and or share/review information at ward level. In refreshing LAPA, two approaches was adapted based on the availability of the data.One-day ward level workshops were organized in the wards with previous LAPAs while two day ward level workshops were orgnized in the ward without previous LAPAs.

In one-day workshop, facilitators presented the information of existing LAPA and validated and updated the information and data from the elected representatives. Elected bodies and others stakeholders' actively participated in the workshopsand updated, revised and added additional information in the existing ward level LAPA where needed. Inthe wards without previous LAPAs, two-day workshops were organized to collect information like major hazards, impacts, vulnerable settlement, major resources and major adaptation options to combat with adverse impact of climate change and disaster and so on.

After completion of the ward level workshop, facilitators compile ward level data and develop outline of the refreshed LAPA. After compilation of ward level information in the prescribed format, Local Disaster and Climate Resilience Committee (LDCRC) organized three-day workshop at LG. In this three-day workshop, detail discussion were undertaken to validate the field level compiled information. Likewise, additional information were collected from LG level workshop by using blendedLAPA and LDRMP tools. This three-day workshop is crucial to validate all the information received from ward level, prioritize LG level major hazards, vulnerable settlement, livelihoods and capacityassessment, major adaption options to response adverse impact of climate change and DRR, and make harmonized local adaption plan.

Formation/or Revitalizing of multi stakeholders forum

In order to lead formulation, mainstreaming (into LG planning process), and implementation, and monitoring of DRR harmonized LAPAs, institutional mechanism called Local Disaster and Climate Resilience Committee (LDCRC) was formed in those LGs where there wereno mechanism formulated to deal with climate change and disaster. Similarly, in LGs where there are mechanisms to deal with either climate change or disaster, such committees were revitalized/activated in discussion with LG to make it more functional and active. As per the decision of LG executive meeting, this committee mostly LDCRC is responsible to address both climate change and disaster related issues at LG level.

The committees are chaired by LG Mayor/Chairperson and Chief Administrative Officers.Ward chairpersons of all wards, government staffs, representatives of Nepal Red Cross Society, deprived, marginal groups and highly vulnerable settlements are included as members. Environment and DRR section head or focal persons are the member secretaries of the committees. Besides, representatives of Market planning committee (MPC), local CBOs and relevant SHs are invited as an invitee members in the meeting. In order to make these committees functional and active, executive committee's havemade decisions and developed the roles and responsibilities of LDCRC. Most of these committees are found functional and active at local governments in planning and implementing the DRR harmonized LAPAs.

Development of major contents and outline of DRR harmonized LAPA

The project team drafted contents and outline of the DRR harmonized LAPA based on past experiences and needs of the blending CCA and DRR. A discussion on contents and outline of DRR harmonized LAPA was held during orientation training to field facilitators and climate change/ DRR focused staffs and was finalized. All district teams followed the contents and outline of the DRR harmonized LAPA. While reviewing existing LAPAs, it was found that DRR harmonized LAPA documents has different chapter that include introductory part, rationale, principles, objectives and expected outputs in first chapter. The second chapter describes about location, geographical features, climatic condition, social, human, natural, economic, community development and energy status of concerned local government. Likewise, the third chapter, which is main thrust of harmonized LAPA, explains about DRR harmonized LAPA preparation process, tools adopted and their findings.

In introductory part, climate change issues and initiations undertaken at national and international levels are described. Needs to localize it to address climate change impacts are mentioned based on Government's policy, strategies and guidelines after introductory part.

Prepared DRR harmonized LAPA has envisioned a climate resilient community aiming at increasing adaptive capacity of local communities. Similarly, DRR harmonized LAPA has adopted location specificity, participatory process, inclusiveness, responsiveness, flexibility and prioritization of immediate and urgent needsas basic principles. It was emphasized that focus should be towards vulnerable groups of people and vulnerability hotspots. Mainstreaming harmonized LAPA in local government development planning, provision of local government level mechanism to lead the entire process and supports, coordination, collaboration and mobilization of local resources are other main thrust emphasized in harmonized LAPAs.

Harmonized LAPAs are expected to ensure climate friendly development, benefits to vulnerable groups of people, sensitization and awareness raising on climate change concerns, capacity builiding of community to identify best options to address climatic impacts and disasters by identifying and using new technologies and exploring resources.

Development of Facilitator Resource Book

A facilitator resource book on DRR harmonized LAPA was prepared blending the tools, process and approaches of the National Framework of LAPA and draft Local Disaster and Climate Resilience plan (LDCRP) development guideline. National Framework of LAPA principles, and its 7 stepswere considered as guiding principles and steps. Therefore, the tools were more customized and blended to bring synergy of climate change and disaster. It was observed that the resource book was very supportive to bring uniformity in process, tools and information collection for the DRR harmonized LAPA. The updated and blended participatory rural appraisal tools that wereused in the process are mentioned in Table below. .

Table 6. PRA Tools used in the DRR harmonized LAPA formulation process

Key PRA Tools	Uses and integration of DDR prospects
Seasonal Calendar	Overall assessment of climate exposure, Changes in precipitation, temperatures (Intensity, frequency and magnitude, and changes in timing of climatic hazards, major disaster and agriculture practices
Historical Timelines	Analyse trends of hazards and extreme events, analysis of the impacts on livelihood assets and climatic system and measured adaptation options.
Resources and hazards mapping	Identification of livelihoods resources and available services, extents of vulnerable hotspots (sites, settlements and peoples)
GIS-based map	Based on the mapping exercise, a GIS maps were developed with demarking the vulnerable settlement and people
Livelihoods assessment	Assessment of the existing system- nature, human, social, financial and physical, its location and quality of services for resilience enhancement
Vulnerability Ranking	Vulnerabilities ranking, vulnerabilities Vs. adaptive capacity
Institutional mapping	Identification of available service providers and analyse their roles and functions
Multi-criteria index	Identification, prioritization and selection of adaptation measures
Adaptation plan	Systematic presentation for local Adaptation plan for actions including plan based on disastercycle.

2. Harmonized LAPA Preparation Steps and Major Findings

National Framework of LAPA was considered as a guiding document in DRR harmonized LAPA development process. All steps recommended by the national framework were followed for preparation, implementation and monitoring of DRR harmonized LAPAs.Main activities carried out in all steps and their main findings are summarized below:

I. Sensitization

Stakeholders were sensitized about climate change and its impacts at international, national and local levels and means to address them. Climate change sensitizations were conducted at two levels - at ward level and at LG level.Various workshops at ward and local government levels were organized in leadership of the LDCRC with ensuring the participation of all types of stakeholders: climatevulnerable households and communities, local bodies, political parties, representatives of local level sectoral agencies, NGOs representatives, and school teachers. Sensitization workshops were supporting in identifying appropriate institutions, stakeholders and other service provider who can contribute in harmonized LAPA formulation and implementation. Mainly in these workshops, information on climate change science, causes and consequences, impacts, technologies, relevant policies, plans and strategies and programme were provided to the participants. Simple presentations, posters and pamphlets developed in simple way were also used to explain CC related subject matters clearly.

For ward level workshops, it was ensured that the most vulnerable and marginalized communities were informed and actually participated in such sensitization events and involved in all steps of harmonized LAPA preparation process. Basically, this step being a sensitization event is applied in all other following steps as well.

II. Climate vulnerability and adaptation assessment

The second step: Climate vulnerability and adaptation assessment which is more rigorous and crucial in harmonized LAPA preparation process. PRA tools and techniques were applied for collecting and analyzing information based on people's perceptions, experiences and participation as well as GIS integration was also done in the vulnerability assessment. The vulnerability assessments were done at two levels- ward level and LG level (consolidation).

Vulnerability and adaptation Capacity Assessment:

Vulnerability and adaptation assessment is a major step in harmonized LAPA preparation process. Vulnerability to climate change is defined as "the degree to which the system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes‟. Vulnerability is a function of exposure, sensitivity & adaptive capacity‟ (IPCC). “Vulnerability” emerges as a consequence of: (1) The extent to which systems are exposed to climate change; (2) The extent to which systems are sensitive to this exposure; (3) The capacity of systems to adapt to exposure and sensitivity. (LAPA Manual, MoE). Likewise, vulnerability and capacity assessment from disaster prospective also were well considered in the vulnerability assessment.

Vulnerability and Adaptation assessment was carried out during harmonized LAPA formulation at local level. This enabled to identify climate vulnerable hotspots, vulnerable communities/settlements, people within these hotspots and to identify adaptation practices and actions that are likely to reduce vulnerability to current and future climate change impacts.

At ward level, vulnerability and adaptation assessment were carried out in active engagement and leadership of the ward chairperson utilizing various participatory tools. In case of wards with former VDC or minicipal LAPAs, the existing LAPAs were reviewed and upated. While in wards without former LAPAs entire processes and tools were deployed for vulnerability and adaptation assessment.

In harmonized LAPA formulation process, various participatory tools were used to assess vulnerability and its functions such as exposure, sensitivity and adaptive capacity. Main tools and their findings are explained in following sections. To assess exposure, participatory tools like seasonal calendar and historical timeline were used and their findings are summarized below.

Seasonal calendar

This tool is used for overall assessment of exposure with key indicators such as changes in precipitation, temperatures (intensity, frequency, magnitude, and timing) of climatic hazards as exposure. Besides these, other areas such as behaviors of vegetation, changes in phenology livelihoods activities and occurrence and trend of hazards with their indicators were also identified and assessed.
Seasonal calendar was used to compare seasonal variation over a year and between past and present. Observations in these indicators were compared from current period/Now (latest 4-5 years) and past/ previous (>30 years). This tool also helped to raise awareness of climate change whilst anchoring it in local community. Major findings of this tool from the harmonized LAPAs are summarized below:

- Precipitation pattern has changed. There is erratic rainfall. Number of rainy days is decreasing resulting into longer dry periods. It was experienced that intensity and distribution of rainfall has also changed.
- In term of temperature, it was found that number of hot days is increasing. Likewise, local are experiencing extreme hot days during summer andis in increasing trend.
- Winter rainy days are decreasing. There is very less rain in winter.
- Similarly, number of foggy days and cold waves are decreasing due to increase of temperature, but intensity is high.
- Flowering and fruiting period of plants are shifting earlier.
- Locals are being forced to change their livelihoods activities such as switching to farming of wheat, mustard, etc.
- Uncertainty and frequency of hazardous events are increasing resulting into increased loss of lives and property.

Finding of Seasonal Calendar of Bardgoriya Rural Municipality as an example is presented in Annex 1.

Historical Timeline

Historical Timeline was used to gain insight into past climatic hazards, its impacts and identify trends in their nature and measures adopted by communitiesto cope with them. This tool helped to assess all variables: exposure, sensitivity and adaptive capacity of vulnerability function. This tool was applied to identify major hazards occurred and assess their impacts in different sectors (Agriculture, Forests, Infrastructure, Water Resources, Energy and Human Health) and system (Natural, Social, Physical, Human and Infrastructure). In addition, adaptive capacities by keeping consideration with all five livelihoods assets of community as measures to cope to those hazards were also assessed. Major findings of this tool from the harmonized LAPAs are summarized below:

- Frequency of the climate induced hazards is increasing.
- Floods and droughts are becoming more common and severe in the plains (Kailali, Kanchanpur and Bardiya) whereas droughts and landslides are becoming more frequent and severe in hilly and siwalik regions.
- Uncertainty and hazardous events are increasing resulting into increased loss of lives and property.
- Loss of agriculture and forest land and crops because of hailstone, landslide, riverbank cutting and longer period of inundation from floods are increasing.
- Loss of lives both human and livestock are increasing.People are compelled to migrate outside due to flooding and inundation as well as landslide.
- Loss of personal property and public infrastructures like houses, bridges, roads, irrigation canals and other infrastructure due to landslide, flood and storm is increasing

Consolidated Findings of Historical Timeline- Kailali District

Hazards: Kailali district covers both hilly and plain areas. Landslide is affecting hilly areas while lower plains are being affected areas by flood, inundation and cold waves. Other common hazards observed in both geographical areas are: diseases in agriculture, human health and livestock, drought, fire, hailstone and storm, epidemic of human disease. Human wildlife conflict is also increasing in plains, however, it might not be climate induced disaster, but this disaster is common in both Terai and Hills mainly in areas nearby forests and national parks.

Impacts of these hazards: All sectors namely, agriculture and livestock, forests, human health, water resources, energy and infrastructure are being impacted by the above mentioned hazards. While applying Historical Timeline, communities were facilitated to specify losses caused and attempts made by communities to address those losses. The major impacts are listed below:

- Loss of agriculture and forest land and crops due to riverbank cutting, and longer periods of inundation from floods.
- Loss of lives of both human and livestock, and people are compelled to migrate outside due to flooding and inundation.
- Outbreak of epidemic disease such as cholera, dysentery and diarrhea after flooding and increased cases of pneumonia among children from cold waves.
- Decrease of soil fertility resulting in decrease of productivity of agriculture crops from prolonged drought, similarly it is causing shortage of water resource for drinking and irrigation proposes.
- Increase in invasive species resulting into damage of forestry and agriculture crops.

Adaptive Measures adopted to cope with impacts: Adaptive measures adopted by communities to address the impacts of climate are very insignificant. There are only very few attempts to cope with the above impacts, which are insufficient and ineffective. Attempts were limited to coping but not to adaptation. However, the concerned line agencies are found supporting the communities by providing construction and other materials, delivering training packages, raising awareness, although they are limited.

Findings of Historical Timeline of of Amargadi Municipality is presented in Annex 2.

Participatory resource and hazard mapping and GIS integration

Participatory resource and hazard mapping was used to assess the availability of livelihoods assets and to identify hazard prone areas within the local governments. This tool helped to gain comprehensive understanding resources available, location of vulnerable households and hotspots. Key elements of livelihoods assets such as forest coverage, water sources, agriculture lands as natural asset, similarly, elements of other assets such as physical, social, human and financial are shown in the map. Open field or brown paper was used for mapping and local materials also are used for mapping. Map below shows the participatory resource and hazard map.

Based on participatory resource and hazard maps, a GIS based resource and hazard maps were prepared showing hazard porn settlements. GIS maps were validated with Google maps as well.

Figure 8. Participatory Hazard and Resource Map

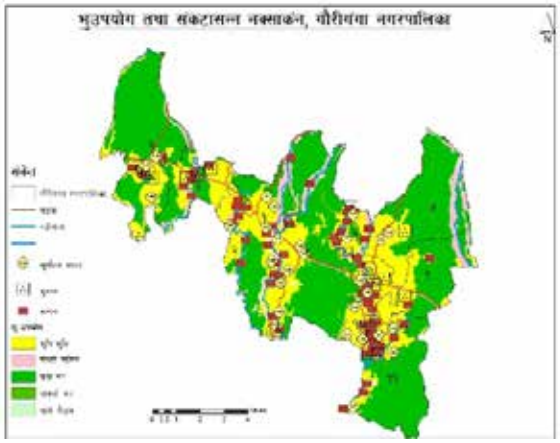

Figure 9. GIS based Resource and Hazard Map

Hazards Ranking

Pair wise ranking was used to rank hazards and other disasters identified from historical timeline in each ward of the Municipality. It is used by comparing severity of impacts and frequency of hazards observed and experienced that the communities have perceived and evaluated. The top fourth rank of the hazards of each ward has been tabulated in the harmonized LAPA. It was found that the hazard like floods and inundation is prevalent in the plains and hazard like landslide in hilly areas. The drought and weather extremes are common in both plains and hills. An example of Hazard Ranking is presented in Table below.

Table 7: Hazard Ranking of Single ward

Hazard Rank	Ward										
	1	2	3	4	5	6	7	8	9	10	11
First	Landslide	Drought	Flood	Livestocks diseeses	Drought	Landslide	Landslide	Landslide	Drought	Drought	Landslide
Second	Drought	Landslide	Landslide	Landslid	Pest in Agriculture	Drought	Pest problem in Agriculture	Drought	Landslide	Landslide	Flood
Third	Invasive and alien plant species	Pest in Agri-culture	Drought	Drought	Invasive and aliean plant species	Invasive and aliean plant species	Drought	Flood	Fire	Human wildlife conflict	Livestock diseases
Fourth	Human-wildlife conflict	Fire	Fire	Pest in Agriculture	Drought	Pest in Ag-riculture	Invasive and alien plant species	Pest in Agriculture	Invasive and alien plant species	Invasive and alien plant species	Drought

Hazards present at ward levels were consolidated and further ranked at the local government level. Pairwise ranking was used to rank the most prominent, impactful and severe hazards. The sample of the hazards ranking of Bardgoriya is presented in Annex3.

Next, based on the participatory assessment, the vulnerable settlements within wards were identified. The most vulnerable (V4) and highly vulnerable (V3) households within the vulnerable settlements

were also identified. Within the households and settlements the vulnerability of the social groups by gender, age, ethnicity, etc. were also assessed so that the adaptation needs and priority of these groups can be identified and integrated in the harmonized LAPAs. The major criteria considered are: access of community to different livelihoods assets and services, severity of impacts of climate change experienced and observed, vulnerable hot spots and people, and risk of disasters and adaptive capacity of the communities residing in the settlement. Within the project areas, 1,645 settlements were identified as most vulnerable settlements. A total of 121,270 households were identified as the most and highly vulnerable households.The districtwise vulnerable settlements and householdsis presented below.

Table 8. Districtwise vulnerable settlements and households.

District	Local Government	Vul. Settlement No	Vulnerable HHs (V3 and V4)
Kanchanpur	9	288.00	51352.00
Dadeldhura	6	355.00	12491.00
Doti	7	126.00	5318.00
Bardiya	7	349.00	28324.00
Kailali	7	411.00	22381.00
Surkhet	5	116.00	1404.00
Total	**41**	**1645**	**121270**

A sample GIS map indicating vulnerable settlements and safer places of Amargadi Municipality is presented below.

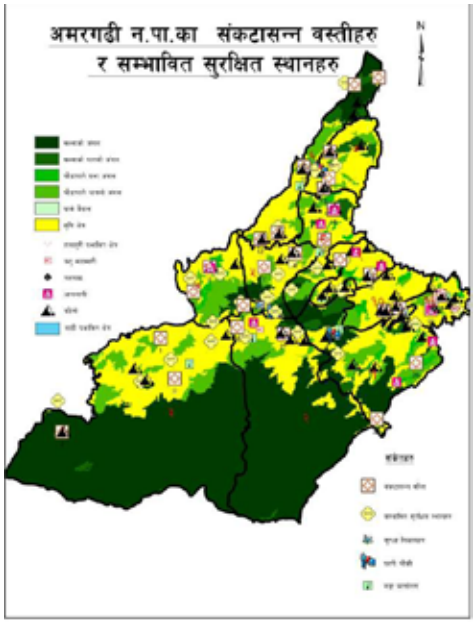

Figure 10. GIS map indicating vulnerable settlements of Amargadi Municipality.

Vulnerability of different groups of people

Assessment of vulnerability of communities by age, gender, economic and social groups showed that the poorest sections of the society such as children, elderlies, poor, women and enthnic minorities are more affected by the hazards due to their less adaptive capacities. This tool was helpful to explore adaptation options focused towards the most vulnerable groups and incorporate them in the plans to benefit the most vulnerable groups. An example of the findings of this tool is presented in Annex 4.

Vulnerability Matrix

Vulnerability matrix was used to quantify climate hazard risk and resilience capacity of local communities. Community members were encouraged to discuss on each hazards, sectors affected by hazards, and different types of adaptive capacities and resources available to enhance resilience. (Annex 5, Example from Baratal Rural Municipality)

In order to assess the effectiveness of coping and adaptation strategies against severity of climatic hazards, Force Field Analysiswas applied. It was helpful in identifying gaps in existing strategies and refocusing inputs according to priorities. Example of Baratal Rural Municipality is presented below.

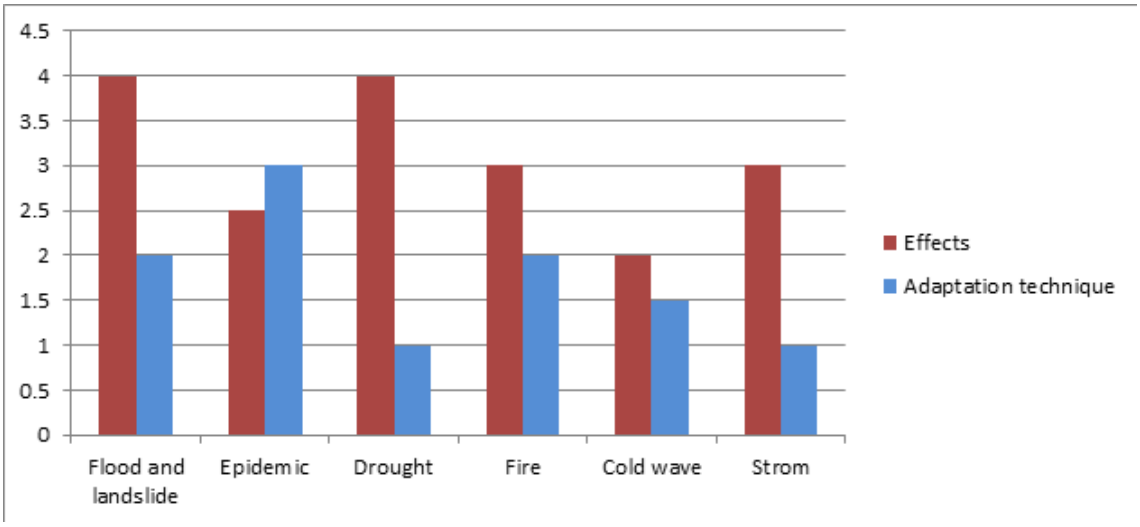

Figure 11. Force Field Analysis.

Analysis shows that severity of impacts is high whereas existing coping and adaptation strategies adopted by communities are limited.

Analysis of adaptive capacities:

Livelihoods assessment and institutional analysis were used to assess adaptive capacities of the communities.

Livelihoods assessment:

Livelihoods assessment was used to specify present and future status and quality of livelihood assets of the communities. Livelihoods assets include - Natural, Physical, Social, Economic and Human resources existing in local community. The participatory resource and hazard maps served as basis for livelihoods assessment. Livelihoods assessment of Amargadi Municipality is presented in Annex 6.

Institutional analysis of service providers

For institutional analysis of service providers, both Government and Non Governments service providers are listed and mapped according to their relation and closeness in a Venn diagram (Annex 7).Community members listed all service providers, types of supports that they provide and listed contact telephone numbers. This will allow communities to contact related service providers when they need their support.

III. Identification and prioritization of adaptation options

This step aims to identify and prioritize adaptation options that are most urgent for the most vulnerable communities. LAPA communities were facilitated to explore adaptation options against each hazards. Staffs facilitated the process by providing new options in case communities were unknown about them. The adaptation options were prioritized based on criteria like feasibility, effectiveness, cost effectiveness, sustainability, and benefits to targeted groups like women, poor and deprived groups and sensitivity to women.An example of Bardgoriya is presented in Annex8.

Adaptation options identified by community members are summarized in following table.

Table 9. Key adaptation options identified by community members by sectors.

Sectors	Adaptation Measures proposed
Agriculture and Food Security	• Training on vegetable farming (eg. seasonal and off seasonal vegetables, Mushroom, lentil crops) • Training to make organic and liquid manure • Soil test • Demonstrate and use of drought and inundation resistant species • Training on climate smart agriculture technology of farming • Livestock and crop insurance • Diversification of agricultural crops • Establishment of collection centre and cold store • Food storage and pricing monitoring and management • Crop insurance
Forests and bio-diversity	• Plantation • Choice of proper species and plantation • Fire control, training on fire fighting tools and awareness, • NTFP Training • Construction of fire line • Provision of additional fire engine • Sustainable forest mgmt training • Periodic meeting to strengthen and coordinate among CFUGs and Forester for NTFP Mgmt • Climate change awareness Training
Water Resources and Energy	• Awareness and Training for Improved cooking stoves and subsidy grant • Awareness and training for bio gas subsidy grant for its installation • Solar system as alternative energy and grant • Conservation of water sources • Provision for Pump set and pipe lines • Community based boring system • Drip irrigation • Irrigation Canal maintenance and management • Transfer drip irrigation technology to the poor and disadvantaged groups of people

Sectors	Adaptation Measures proposed
Human health and livelihoods	• Awareness in life insurance policy • Awareness and training in sanitation and hygiene • Development of women volunteers and capacity building • Vaccination campaign and family planning awareness • Motherhoods training and awareness • Establishment of vaccination centre • First Aid Training • Training to female volunteer on First Aid and Safe motherhoods • Distribution of kit box of first aid during disaster time • Purchase of stretcher for sick people and to take to hospital
Physical Infrastructure	• Construction of culvert • Training for relief, rescue from natural hazards • Maintenance of Irrigation Canals • Construction of Gabion wall, Check dam and spurs
Climate induced disaster	**Before Disaster** • In prone areas: Training on Search, Rescue and Relief, First Aid training, Establishment of early warning system. Establishment of Emergency Fund. Management of Required material, Simulation Training, Task force formation **During disaster** • Search, Rescue, Relief fund and materials distribution, Recording of damages, Mobilization of manpower, coordination and collaboration, Fund raising **After Disaster** • Rehabilitation
Capacity development and awareness Training	• CC Sensitization awareness programme • Display of hoarding board of CC messages • School awareness programme on CC sensitization • Training on DR Mgmt. • Training to LDCRMC members on CC sensitization • Livelihoods options, access, equity based distribution related training • Women Leadership Training • Orientation to LDCRMC on LAPA Implementation
Monitoring and Evaluation	• Annual review and Planning workshops • Monitoring from LDRMC • Participatory progress review, M/E

IV. Developing DRR harmonized local adaptation plan for action

This is crucial step of the harmonized LAPA preparation process. In order to formulate adaptation plan,"5 Wh and 2h" questions (what, where, whom, why, when, how much, how to monitor) were followed. Harmonized LAPAs thus prepared were shared with local government and provincial government and other appropriate stakeholders for their technical feedback/inputs and for ensuring institutional collaboration, and resource sharing in implementation of harmonized LAPAs especially through the process of mainstreaming and integration.

Adaption options were summarized in a table mentioning what activity, when and where to implement, number of beneficiaries, how much budget, financial supports and who is responsible for it implementation. The table below shows the summary of total budget of the project districts by sectors. For effectiveness, harmonized LAPAs were prepared for three years.

Table 10. Districtwise plan and budget by sectors.

District	Palika	Agriculture and Food Security	Forest and Bio-Diversity	Energy and Water Resource	Public Health	Climate Induced Disaster	Infrastructure and Urban Settlement	Capacity Building	Review and Planning	Total (NRs. '000)
Kanchanpur	9	73227	18146	36428	24917	85566	83231	0	4467	325982
Dadeldhura	6	53783	14424	53210	32548	29885	35235	1734	3690	224509
Doti	7	32146	9108	56325	4915	18619	26165	0	1720	148998
Bardiya	6	34671	56506	48765	26716	60323	358027	0	3360	588814
Kailali	7	130995	116460	135355	135560	100045	401345	18180	2115	1040055
Surkhet	5	26335	42770	74710	7002	48224	50050	0	0	249091
Total in 000	**40**	**351157**	**257414**	**404793**	**231658**	**342662**	**954053**	**19914**	**15352**	**2577449**
Percentage		**14**	**10**	**16**	**9**	**13**	**37**	**1**	**1**	**1**

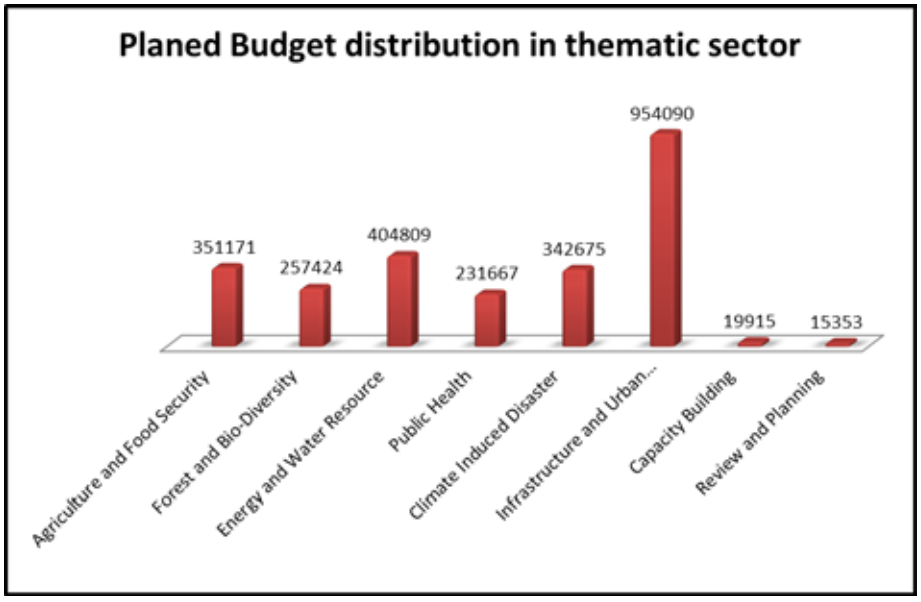

Figure 12. Planned budget distribution of the LAPA in thematic sectors.

Total planned budget is of NRS, 2,577,449,000. Out of total budget, 37% are allocated in infrastructure and urban settlements, 16 % in energy and water resources and 14% in agriculture and food security. Likewise, 13%, 10% and 9% of total budget are allocated for climate induced disaster, forest and biodiversity and public health respectively. Remaining budget (2%) is allocated for other sectors like capacity building and review and planning events. It is expected that there will be pull down of resources as leverages from local governments, provincial governments and GoN agencies of the federal government as well as other development partners and I/NGO managed programmes and projects.

V. Integrating the local adaptation plans for action into planning process

Integrating prepared LAPAs into local-to-national development planning processes will allow drawing-up resources from government, civic and private sectors for their sustainable implementation. For this, harmonized LAPAs were endorsed by Local Government Assembly. Local Government level multi-stakeholder mechanism such as LDCRC facilitated this process. Beyond the limitation of budget ceiling at assembly, request for additional budgets was forwarded to the upper levels- to provincial and federal ministry through their offices. The local governments are considering the harmonized LAPAs as bases of the local development plan formulation.

VI. Implementing the local adaptation plans for action

Thus prepared harmonized LAPAs are being implemented after endorsement from local government assembly. Funding for LAPA implementation is being sourced from Anukulan-X and from other sectors such as LGs and other projects and programmes. Due to delay in LAPA preparation process, period left for their implementation has been shortened. Detail status of LAPAs implementation is briefed in the next section.

VII. Assessing progress of local adaptation plans for action

Areas for monitoring indicators are not identified in harmonized LAPAs; however there are various mechanisms and process to monitor LAPA implementation. There are different levels of monitoring and evaluation mechanisms. Each local government has formed Sub-committee which is led by the Deputy Mayor/Vice Chairperson of the LG. Project and NGOs staffs are carrying out monitoring of the activities implemented. They are managing database and developing reports and submitingthem to the concerned authorities periodically.

District Project Advisory Committee (DPAC) as provisioned by Social Welfare Council (SWC) monitors activities implemented by local NGOs in the district. Anukulan-X Project itself from central and district levels monitors the activities periodically. Moreover, LDCRC has also planned for periodicjoint monitoring. Besides, it has been made mandatory that public auditing is carried out in the beginning, in middle and after completion of each activity.

Part IV: Implementation status of LAPAs

All harmonized LAPAs are being implemented by communities focusing on prioritized activities. Technical experts from the project are supporting the implementation process. There are two types of funds in Anukulan-X Project to support implementation of Harmonized LAPAs - Climate Change Fund and Adaptation Fund. A sum of NRs 300,000-500,000 as Climate Change Fund. Adaptation Fund is being released for each harmonized LAPA implementation. Funding is channeled from local partner to the Local Government/LDCRCand then to user committees based on decision and recommendation of LDCRC. All financial transactions are made through bank. Project staffs from Anukulan-X Project are facilitating the process of implementation of adaptation options prioritized in the DRR harmonized LAPAs.

A total of NRs34.15 millions has been spent in implementation of harmonized LAPA prioritized adaptation options. This includes elevated hand pump installation, automatic hydrological station establishment, construction of river embankment with bio-engineering, hume pipe and culvert construction for ensure easy access to market and services. Through the climate adaptation fund, a total of41 urgent and immediate adaptation options have been implemented in the project districts. Of the total NRs 34,159,000 invested, 50.65% (17,300,000) was contributed by the Anukulan-X Project and rest 49.35% was leveraged from the local governments and other projects. The leveraged amount is significant and it was possible because of the implemented activities were integrated in the local development plan. From the implementation of these activities a total of 39,504 peoples have been directly and indirectly benefited. Out of total beneficiaries, 17.38% and 51.39% were Dalits and Ethnic/ Janajatis respectively. The districtwise harmonized LAPA implementation status including investment and beneficiaries are presented in the Table below.

Table 11. Districtwise LAPA implementation status including investment and beneficiaries.

District	No of LG	Contribution in ,000 (Thousand)				Beneficiaries (Social)			
		Palika	Anuku-lan-X	Others	Total	Dalit	Jana-jati	BCN	Total
Kanchanpur	9	4700000	4100000	0	8800000	1215	2009	1077	4301
Dadeldhura	7	260000	2200000	0.00	2460000	218	0	834	1052
Doti	6	1350000	2700000	0.00	4050000	120	0	151	271
Bardiya	6	3321000	2800000	0.00	6121000	5258	18248	10133	33639
Kailali	7	1923000	2900000	700000	5523000	20	153	127	300
Surkhet	6	4605000	2600000	0.00	7205000	54	43	144	241
Total	**41**	**16159000**	**17300000**	**700000**	**34159000**	**6885**	**20453**	**12466**	**39804**
Percentage		47.31	50.65	2.05		17.29	51.38	31.31	

In addition to the CCA fund, Anukulan-X Project is also supporting financially to implement harmonized LAPAs from separate budget heading as regular budget for following components:

- Smallholder Commercial Pockets
- Integrated Pest Management (IPM)
- Conservation agriculture (CA)
- Micro Irrigation Technologies (MITs)
- Multiple Use Water Systems (MUS)
- Solar-MUS
- Biogas
- Essential Oil
- Various training on climate change adaptation technologies

Part V: Strengths, learnings and challenges

The strengths, learnings and challenges experienced during the preparation and implementation of the DRR harmonized LAPAs are summarized below.

- Harmonized LAPAs are endorsed by the concerned local government sensuring their integration and mainstreaming in local level development and sectoral planning processes. It is expected that this mechanism will be sustainable and effective. It has allowed pulling down resources from other sectors as well.
- Multi stakeholder forums at local governments comprising of representatives from all relevant stakeholders are reactivated/formed to coordinate, collaborate and link among themselves to implement harmonized LAPAs. It was found that there is active involvement of all stakeholders from the beginning in harmonized LAPA preparation, its implementation and monitoring by keeping good relation with local governments, line agencies of federal and provincial government other donor projects and programmes. In addition, it was also found that there were cases of leveraging of resources and support of technical expertise. Implementation of LAPAs through multi stakeholder forums have been an effective mechanism to create ownership and sustainability, however, there is room for its improvement.
- In order to ensure effective implementation of harmonized LAPAs, there is need of building capacity in various areas. Anukulan-X Project is organizing and delivering training events related to water resource conservation, agriculture, livelihoods, health, sanitation and nutrition and others.
- To ensure transparency and accountability, provision of monitoring from various levels are in practice. Similarly, public auditing and hearing are being carried out. Clearly defined roles and responsibilities in harmonized LAPAs have made communities and stakeholders more responsive and accountable.
- Harmonized LAPAs with disaster risk reduction activities has helped communities to address all types of hazards without duplication of both human and financial resources.
- Bottom up and inclusive approach has helped to create ownership towards harmonized LAPAs preparation and implementation from all sections of the society. In addition, harmonized LAPAs have been perceived as more need based and realistic plans resulting into direct benefits to the communities.
- The cohesive project team with diverse expertises - Agriculture, Climate Change, Disaster Risk Reduction, NTFPs/Enterprises, Nutrition, and Micro Irrigation has supported the effective implementation of the harmonized LAPAs.
- Local governments are appropriate institutional or operational units for formulation, implementation and monitoring of harmonized LAPAs. Local governments are crucial for mainstreaming and integration of the harmonized LAPAs into local development planning.
- Establishment of common and single institutional set-up LDCRC to deal with CCA and DRR has been found to be effective approach. This reduces competition in resources and duplication.

Challenges

- Budget estimated for action plans of LAPAs is ambitious resulting into difficulty in implementing and pulling down resources from other sources for their implementation.
- Communities have high expectations from the project for financial and technical support, which are beyond the capacity of the project.
- Other priorities of local goverments delayed the LAPA preparation and implementation process.

Part VI: Conclusion and Recommendations

Provision of integration and mainstreaming of harmonized LAPAs in local development planning process has created ownership and is expected to be sustainable. Harmonized LAPAs were prepared by following the national LAPA framework. Thus they are more participatory, responsive, inclusive, effective and realistic. In addition, integrating disaster risk reduction measures in harmonized LAPAs have made communities responsible to respond to disasters as well. Multi stakeholder forums at local governments have increased coordination, linkages and collaboration among themselves. However, there are some spaces for further improvement, which needs high efforts as mentioned below:

- Local governments plays pivotal role for the harmonized LAPA formulation and implementation.
- Single institution e.g. LDCRC avoids the duplication of the resources and enhances the synergy and minimizes the resource conflict and competition. Therefore, all development partners and agencies should promote and consider this approach.
- The total of 41 local government including rural municipality, municipality and sub-metropolitan city, prepared and implemented LG's level LAPA. This is an ample case of preparation of LAPA at local level. The experiences of this approach and learning can be diffused in updating and refreshing National Frameworks of LAPA.
- Harmonizing LAPAs are dynamic processes, therefore, they need regular review, sharing and assessment at all levels, and LAPAs should be revised and updated periodically as per new context such as hazard, technologies and others. In addition, monitoring is very important, though there is practice from concerned levels, still needs to increase these events and findings should be shared with communities for further improvement and revision of LAPAs in future.
- Climate Change covers all thematic sectors, so there is a need of efficient coordination, collaboration and linkages among stakeholders in implementing LAPAs to create ownership from all relevant stakeholders and to leverage resources.
- There are various new technologies for adaptation coming up, so, there is need of delivery of capacity development events to make communities and stakeholders equipped with new knowledge and skills to implement LAPAs effectively and efficiently.
- Gender perspectives in LAPAs are not adequately addressed while applying participatory tools and techniques and developing specific plans and budget. This should be considered in future.
- Sub-watershed based planning using GIS applications and meteorological data and incorporation of knowledge, skills, experiences and perceptions of communities will make LAPAs more realistic and need based.
- Plan period of three years should not discourage inclusion of medium and long term plans. Participatory scenario development approach should be used to develop future scenarios to support medium and long term planning.

Case Study: High Raise Pump

In Formal Basauti VDC, a High Water Pump is installed to access clean drinking water to the 15-20 households of Tharu communities. Communities had a problem of clean drinking water due to the area, which is prone to drought, floods and inundation causing various health problems. Anukulan-X supported it financially and technically to install it, now access clean drinking for all period including flood and inundation. Quality of water was also tested. There are also such elevated hand pumps in other parts of the former VDC. It was found very effective adaptation measure to adapt to the problems of water in prone to inundation area of the Terai.

Case Study: Sunpower Pump

Members of Sanghari Community Organization, all are women are active in vegetable framing and selling. However group members are facing challenges of irrigation in their farm land especially in winter. With both financially and technically support of Anukulan -X and PAF in joint venture, 22 Solar Pumps are installed in the village, Community members are benefitted to grow various vegetable crops and they are supporting their livelihoods of the family. They are also getting various types of training in farming, nutrition, account and record keeping etc. Now they have easy access of irrigation which also reducedwork load of women.

Success stories of the interventions: Life change of Kanchhi Chaudhary

Mrs Kanchi Chaudhary, 50 years old lady, resident of Dhangadhi-6, is a chairperson of Kushal Women Farmer Group. She has 12 family members with 6 male and 6 female. Though her village is nearby Dhangadhi city, accesses to services from Government and other projects are very limited. It is like darkness below light. Economic and social condition of the community is very poor. They are facing hand to mouth problem daily. Once Firta Rana, social mobilizer from CCS, Kailali came to that village and informed about Anukulan-X project and formed a Farmer group involving 20 female members. The group was delivered various supports such as different type of training like Account and Record keeping, IPM, off season vegetable training and also gave knowledge about making *Jhol Mal* and drip irrigation technique. They started group vegetable farming in 3.5 katha of land where they cultivated cucumber, beans and others off season vegetables and sold them to hat bazaar of Dhangadhi. Before this, Kanchhi had very little traditional knowledge about farming, now she has developed her confidence to produce various agricultural products by applying various new technologies of farming. Now she earns 7 to 8 thousands of rupees monthly. Other family members also help her. This is the case of other group members as well.

Success Story: Public Private Partnership to change life of farmer:

Harish B.K., 62 years old is a resident Chaukidanda, Attariya. He used to go to India to earn for his family's livelihoods. Due to floods, inundation and drought, he had been suffered to grow agricultural products from his limited land. When ANUKULAN-Xproject was initiated in his area, the staffs identified that area potential for essential oil cultivation and processing because essential oils crops are more resistant to both drought and floods and it has high returns. There is also no problem of pests too. Based on discussion with communities, an enterprise was thought to be established through a public private partnership approach. For this, staffs facilitated to form a group "Herbal Processing Enterprise" where there are 76 households. A distillation unit was installed there and various relevant technologies and skills were provided to the group members. Harish B.K is now the chairman of the group and Community Based Facilitator (CBF) as well. Farmers use to cultivate essential oil species in their land and processed in the DU by paying minimum costs for processing and marketing. In this season; the DU processed 39 Kg. of essential oil worth of approximately of Rs. 197,350. In the season, Harish earns Rs. 14 thousands per month. This is the same cases of other households as well. This is good example to mobilize resources of public private and community resources to improve livelihoods of smallholders.Besides these, there are many examples of success stories of the interventions in Kailali district.

Case Story from Kanchanpur: Flood Protection

A site was visited in Krishnapur Municipality, where local community is implementing LAPA activities to protect their agriculture land from river bank cutting due to flood. Total budget of this scheme is of NRs, 800,000. It was jointly supported by Municipality, DDC, CARE Nepal and Anukulan project itself. Anukulan has supported it with an amount of NRs. 200,000. Under heading of Climate Change Adaptation. Similarly, CARE Nepal has committed to provide NRs. 500,000 and remaining will be supported from VDC and DDC. This is a good example of resource pull down of resources as leverages. Mrs. Krishna Chaudhary, the chairperson of the committee said that if this scheme is completed it will be benefitted to 50 households of the community to save their agriculture land of 10 hectors. Communities are also providing their labour contribution. The chairman seemed very active and energetic, however, she is facing problems due to delay process of funding from concerned stakeholders to pay labours and to the materials borrowed from markets.

Case Story: Vegetable Farming under Plastic House

It is about vegetable farming under plastic tunnel house. Mr. Nepali, who returned from India, he was sick. After treatment, he had nothing to do for his earning. So he was advised from a project staff to grow vegetables for in his field. He took training from the project some financial support. Now, he is growing various types of vegetables under tunnel like cucumber, bitter gourd (Karela), Bottle gourd (Lauka), Lady

Finger (Bhindi) and others. He used to sell nearby market. He earns Rs.20 to 25 thousands annually. Such types of vegetable farming is being practiced in two three places of the area by the project. The project has supported financially and technically to the farmers. The project is also supporting in market of vegetables. This is a good example of earning within short period without a large investment. After observing this activity, there is high demand of such supports from the project by nearby farmers of Krishnapur Municipality.

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Annexes

Annex 1. Seasonal Calendar, Crop Calendar and Hazard Calender of Bardgoriya Rural Municipality

Areas	Indicator	Baisahak	Jestha	Ashad	Srawan	Bhadra	Ashoj	Kartik	Mansir	Paush	Magh	Falgun	Chaitra	Remarks
Rainfall														
Mansoon	Before		*	**	***	**	*							High intensity of rain in a short duration.
	After			*	***	**	*							
Winter	Before								*	**	**	*		Very rare precipitation in winter if occurs, occurring with
	After									*	*	*	*	
Temperature														
Cold Days	Before						*	*	**	**	***	*	*	Extreame cold days in a short period
	After							*	*	**	***	*		
Hot Days	Before	**	***	*	*	*							*	Extreme Hotter days come along with drought
	After	**	***	***	**	***	*					*	**	
Crop Calender														
Paddy	Before				***	*								Cultivatedtiliz with chemical fertilizers
	After	*	**	***										
Wheat	Before								**	**				Inrcease the pest problem
	After							*	**					
Hazard														
Flood	Before				**	***								Unpredictable Flood due to saprse precip-itation
	After				*	**	*							
Drought	Before	**	**										*	Decrease the agro production, Effects on aquatic habitat
	After	***	***	*									*	
Coldwave	Before									***	**			Effects on vegetable production
	After									**	**	*		

Areas	Indicator	Baisahak	Jestha	Ashad	Srawan	Bhadra	Ashoj	Kartik	Mansir	Paush	Magh	Falgun	Chaitra	Remarks
Strom	Before	**	***										*	Unpredictable strom causes the severe effect on roofing of rural houses
	After	**	***	*									*	
Crop diseases	Before					**	**			*	**	*		Plant diseases occur even in time of germination
	After	*	*	*	**	**				*	**	**	**	
Animal Diseases	Before			**	**									Some epidemic diseses widespread in domestic animal

Annex 2. Historical Timeline of hazards of one theme in sample (Amargadi Municipality).

Hazard	Year	Losses and Impacts					Affected ward and tole	Adaptation measures	Remarks
		Physical	Social	Economic	Human resources	Natural			
Landslide	2040	Swept mill, irrigation cannel, three home	Damages the pedestrian trail	Decrese in agriculture production, 25 livestock were died		200 *ropani* of 65 households agriculture land swept out, damaged the Natural source of water and drinking water pipes	Ward no. 1 Dola, Manana, Banna, Dudhkande, Malam	Improvement on tarrace farming	
	2060	One house	Problem in drinking water	Two lovestocks were died	40 HHs were reached in highly vulnerable	damaged the Natural source of water, land subduction	Banna, Manana, Molikhet		
	2069					damaged the Natural source of water	Ward no. 1 Dipal gaun		
	2073					Damaged the Natural source of water in Dharada *khola,* affects the forest ecosystem	Ward no. 1 Chichepaani	Protection net	
	2060			Decrese in agriculture production		Swept out 250 ropani agriculture land in	Ward no. 1 Dudhkande, ladbata, Malam, Daandkhola		

Annex 3. Two way Matrix for Hazard Ranking (Example from Bardgoriya Rural Municipality.

S. No.	Hazard	Flood	Drought	Coldwave	Wind strom	Fire	Epidemic	Agro diseses	Livestock Diseses	Thunder	Hailstrom	Prior-itisa-tion
1	Flood		Flood	Flood	Flood	Flood	Flood	Flood	Flood	Flood	Flood	I
2	Drought			Drought	Strom	Drought	Drought	Drought	Drought	Drought	Drought	III
3	Cold wave				Strom	Cold wave	Cold wave	Cold wave	Cold wave	Cold wave	Cold wave	IV
4	Strom					Strom	Strom	Strom	Strom	Strom	Strom	II
5	Fire						Fire	Agro diseses	Livestock diseases	Fire	Fire	VII
6	Epidemic							Agro diseses	Livestock diseases	Epidemic	Hail strom	IX
7	Agro dis-eases								Agro diseses	Agro diseses	Agro dis-eses	V
8	Animal diseases									Livestock diseases	Livestock diseases	VI
9	Thunder										Hail strom	X
10	hailstrom											VIII
	Total	10	8	7	9	4	2	6	5	1	3	

Annex 4. Vulnerable groups assessment: Affected Vulnerable and Social Groups Identification (Example of Baratal Rural Municipality).

Hazards	Effects and impacts	Age groups				Gender		Economic status				Ethnic Groups			
		Children	Youth	Adult	Old people	Female	Male	Ultra poor	Poor	Medium	Well off	Brahimin/Chhetri /Thakuri	Janjati	Dalit	Madhesi/Minority groups
Flood	Inundation on settlement, cutting of agriculture land	***	*		***	***	*	***	***	**	*	*	**	***	***
Agri / Livestock diseases	Decrease in Agriculture production	*	*		*	***	**	***	**	**	*	*	**	***	***
Drought	Effects on irrigation system, shortages of drinking water and adverse impact on biodiversity	***	*		***	***	**	***	**	**	*	*	**	***	***
Coldwaves	Decrease in Agriculture production and adverse impact on human health	***	*		***	***	**	***	**	**	*	*	**	***	***
Fire	Forest fire and fire in human settlement usually occur in dry seasons	***	*		***	***	**	***	**	**	*	*	**	***	***

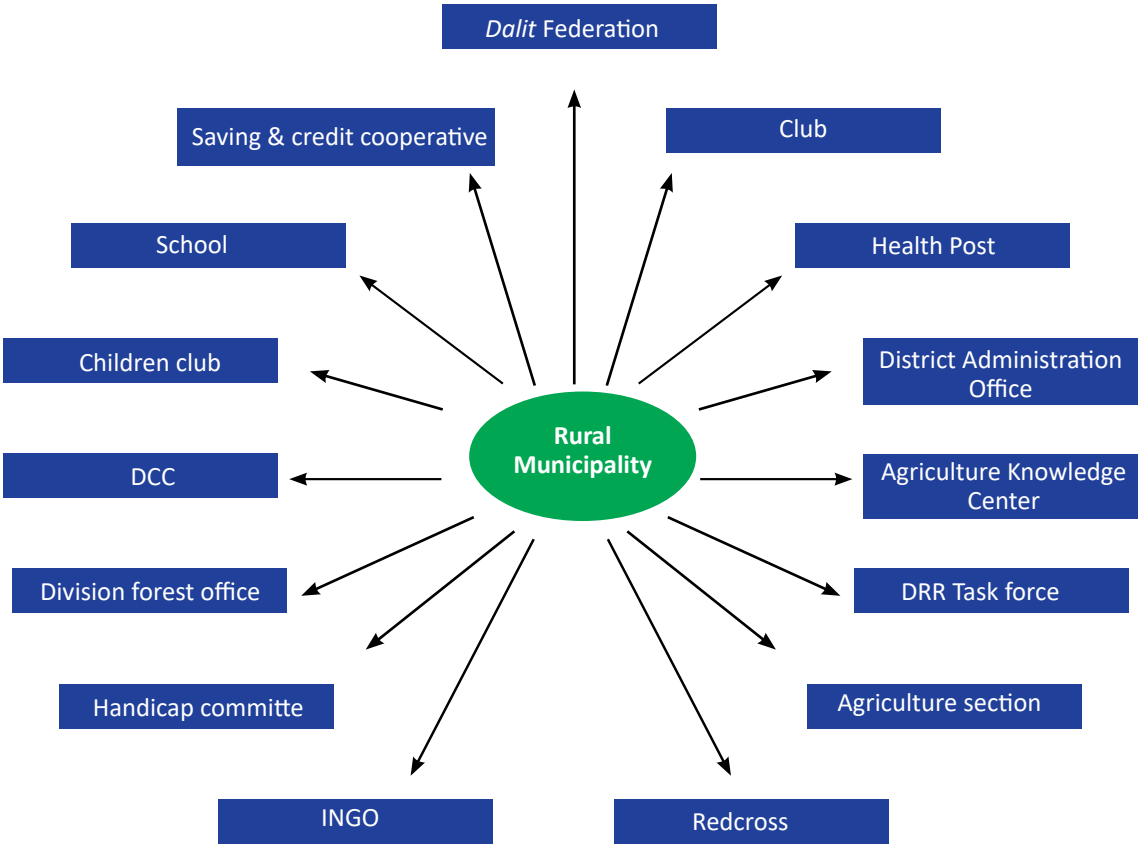
Annex 5. Vulnerability Matrix: Hazard risk and resilience capacity analysis (Baratal Rural Municipality).

SN	Hazards	Sectors	Impacts	Score	Adapation measures	Score
1	Flood/ Land-slide	Climate induced hazards, Biodiversi-ty, Infrasturucture and human settel-ment	Losses of agricultural lands ,Forest deforestation, , Damage of water source, loss of human lives	4	• Embankment • Check dam • plantation of treess	2
2	Epidemic	Human Health	Diarrohea and vector born diseases widespread due to the waste	3	• mass awareness campaign	2
3	Drought	Agriculture and Food Security, Human Health, water resource and energy	Shortage of Drinking water, effects on irrigation system, dis-appearance of wetland species	4	• Plantation • Construction water pond • Adapting Climate smart technology in agriculture • Cleaning of water tank and sources	1
4	Forest Fire	Forests and biodi-versity	Damage in natural regeneration	3	• mass awareness campaign • Fire line construction	2
5	Cold waves	Human Health and Livelihoods	Skin and new disease	2	• Simple cleaning • Treatment in health post	1.5
6	Storm/ hail strom	Climate induced hazard, Ifrastruc-ture development	Severe losses of wheat and fruits, Damages the roofing of rural residence, school and commercial buildings	3	• starting to build strong roof-ing system	1

Annex 6. Livelihoods assessment (Amargadi Municipality).

Livelihoods assets and resources	Present status		Present staus (1-4)	Trend and additional remarks
Natural	Agriculture Land	Total agriculture land is about 946.41 hectors.	3	• Income generation and conservation activitites will be applied in communities. • Additional improvement of CFs and will be registered proposed CFs • Lakes, ponds will be improved and similarly irrigation will be managed • Plantation in riverbank and construction of embankment
	Pond and lake	There is no any natural pond but a comunity managed pond for irrigation purposes, which is destructed by the earthquake occurred in 2072 B.S.		
	Natural well andtaps	Most of the wells are drying up.		
	Community forest, Leasehold forest, Religious forest and national forest.	There is 11033 hector area (65%) covered by forest. There is total 61 Community forest (1342 Ha), 25 leasehold forests (85.027 Ha), 3 religious forests and 1 private forest.		
	Rivulates and river	There is a Raduwa river and its 3 rivulets		
	Climate	This Municipality lies in Mahabharat range and altitudinal variance from 800 M to 2000 M. There is a mean temperature varies from 20-25° Celcius There is mean annual precipitation about 1343mm.		
	Land Steefness	There is less than 30° steefness area is about 45 % which is useful in agriculture purposes and remaining 55% which steefness is more than 30° is useful in forest, tourism and wild life conservation purposes. (Source: Soil fertility map of Dadeldhura 2068)		
	Others	There is a natural cave in a municipality		

Annex 7. Institutional Analysis (Venn diagram) of Baratal Rural Municipality.



Annex 8. Identification and prioritization of adaptation measures (Example from Bardgoriya Rural Municipality).

Hazards	Adaptation Measures	Effectiveness (1-5) A	Cost Effectiveness (1-5) B	Sensitive to women (1-5) C	Targeted groups friendly (1-5) D	Feasibility (1-5) E	Total	Prioritisation
Flood	Live check damp	4	3	5	5	5	22	III
	Massion dam	5	2	5	5	5	22	III
	Culvert and Hume pipe	4	3	4	5	5	21	IV
	Plantation of trees	4	5	3	2	4	18	VII
	Flood and inundation resistant varieties of paddy	5	4	5	5	4	23	II
	Identification of safe place	5	4	4	5	4	22	III
	Establishment of emergency fund	5	3	5	5	5	23	II
	Improvement of water channel	4	4	4	5	2	19	VI
	Establishment of zero grazing area	3	5	3	2	4	17	VIII
	River bed farming training	5	3	5	5	4	22	III
	Disaster management training	5	4	4	5	5	23	II
	Disaster management equipments	5	3	3	5	4	20	V
	Awareness on disaster management	4	5	5	5	5	24	I
	Strengthen the capacity of stakeholders	4	4	3	3	4	18	VII
	Strengthen the early warning system	5	4	5	5	5	24	I
	Training on search and rescue	5	4	5	5	5	24	I
	Reconstruction and rehabilitation	5	4	5	5	4	23	II
	Management disaster management expert task force	5	3	5	5	3	21	IV
	Broadcasting of EWS information	5	3	3	3	3	17	VIII
Drought	Deep bore	5	3	5	5	5	23	II
	Agriculture training	5	4	5	5	5	24	I
	Management of crop insurance	4	4	4	4	4	20	V
	Seed Bank establishment	4	4	4	4	4	20	V
	Drip irrigation	5	4	5	5	5	24	I
	IPM training	4	4	5	4	4	21	IV
	Introduce of drought tolerance varities	5	3	5	5	4	22	III
	Management of lift irrigation	5	2	5	5	4	21	IV

Annex 9. Sample of Local Adaptation Plans for Action.

SN	Activities	Unit	Quantity	Unit cost (000)	Fiscal year						Total Budget (000)	Beneficiaries					Location /Venue	Responsi-bility	Activities description	Basis for expenditure
					75/76		76/77		77/78											
					Quantity	Budget	Quantity	Budget	Quantity	Budget		V1	V2	V3	V4	Total				
1.Agriculture, Livestock and Food Security																				
1.1	Soil test Campighn	Times	1	100	0	0	1	100	0	0	100	698	1193	1378	748	4017	Municipal-ity level/ accessible place	Municipality agriculture section, Agriculture knowledge center, Anukulan/ BRACED project and community	Soil testing and farming accordingly and improvement of agriculture production	LabApparatus, chemical, Fee, and materials purchase
1.2	Seasonal and off seasonal agriculture training	Event	5	20	1	20	2	40	2	40	100	5	35	80	150	270	In all wards for the vulnerable communi-ties	Municipality agriculture section, Agriculture knowledge center, Anukulan/ BRACED project and community	Training to the vulnerable and progressive farmers for the improvement of production	Facilitator fee, demonstration, Snacks. transport and others

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