CLIMATE CHANGE ADAPTATION AND DISASTER RISK MANAGEMENT IN AGRICULTURE

PRIORITY FRAMEWORK FOR ACTION 2011 – 2020



Government of Nepal
Ministry of Agriculture and Cooperatives (MOAC)

April 2011

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Climate Change Adaptation and Disaster Risk Management in Agriculture

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Kathmandu, Nepal

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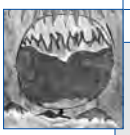


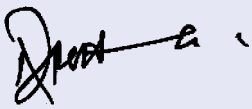
FOREWORD

Food production systems in Nepal are highly vulnerable to increasing climate variability and change. Agriculture production is constrained by altered frequency, timing and magnitude of climate variables such as precipitation and temperature. High rates of snow and glacial melting, frequent floods and droughts, heat waves, and increased incidence of pests and diseases are already causing widespread damage and loss to agricultural sector in Nepal.

Systematic efforts are needed to improve sustainability of the food production systems and ecosystem resilience under changing climatic conditions. Addressing climate related risks and uncertainties in agriculture and food security require development of an integrated framework for the sector, and identification of priorities in line with other national programs and strategies.

The Priority Framework for Action (PFA) is a beginning of a long journey to address the impacts of climate change and extreme climate events in various sub sectors of agriculture in Nepal. This document explicitly integrates the priorities of NAPA and the National Strategy for Disaster Risk Management, which opens a multiple avenues for technical cooperation to implement the immediate actions of climate change adaptation and disaster risk management.

The Framework considers integration of climate change adaptation and disaster preparedness into Nepal's agricultural policy, programs and plans as one of the priorities. The Ministry of Agriculture and Cooperatives is seriously considering these priorities and committed to implement disaster preparedness and adaptation actions to address the needs of the country.



Nandan Kumar Datta
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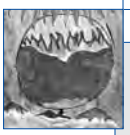
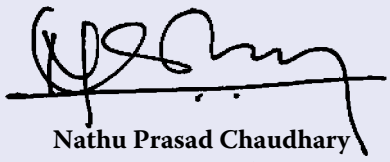


PREFACE

Nepal has been frequently hit by climate variability and natural disasters of hydro-meteorological origin. Floods, landslides, intense rains, hailstorms, droughts, cold and heat waves, pest and diseases are regular phenomenon in the country. Such climate-related events have put fragile agricultural eco-systems at risk. Impacts of climate change and related extreme events on agriculture often lead to a situation of food insecurity affecting most the poor and marginalized peoples, including women and children, with its ultimate repercussion on the nation's economic growth. The impacts are therefore a question of primary concern, as they directly impinge upon the objectives of sustainable development. The Government of Nepal, in particular the Ministry of Agriculture and Cooperatives (MOAC), is dedicating the strong efforts to counterbalance the impacts.

Recent studies relate increasing frequency and intensity of climate related disasters to global warming and climate change. Projections and future scenarios of climate seem to be harboring a worsening of climatic conditions in the Himalayan region, which may imply an even more frequent occurrence of climate related extremes and detrimental impacts on food production. However, by adopting right measures and changing the type of interventions, it is possible to adapt effectively to the challenges posed by climate change. This warrants a comprehensive strategy and priority actions for the Ministry of Agriculture and Cooperatives (MOAC) to devise the access to resources and to deliver need-based services to farming communities. The needs and solutions proposed in this priority framework are clearly in line with the national level programs and strategies such as National Adaptation Program of Action (NAPA) and the National Strategy for Disaster Risk Management (NSDRM). In the framework, important lessons learnt in the field works are considered suggesting core activities to support farming communities in climate change and disaster risks management. Also suggested is a fundamental shift in approach from reactive emergency response to pro-active climate risk management and disaster preparedness approach. Such shift in approach requires technical, logistic, analytical and institutional strengthening as major areas of the sector's interventions. The framework will be instrumental in enhancing coordination and collaboration among the Government Departments, non-governmental organizations and development partners. Strengthening climate change and disaster risk management units in the Ministry of Agriculture and Cooperatives (MOAC), Department of Agriculture (DOA), Department of Livestock Services (DLS) and Nepal Agriculture Research Council are some of the notable priorities.

On behalf of the Project Steering Committee, I would like to express my appreciation to Food and Agriculture Organization of the United Nations (FAO) for technical assistance through the Technical Cooperation Program (TCP) and United Nation Development Program (UNDP) for their contribution through a FAO-UNDP joint program. My appreciations are also due to Dr. Hari Dahal in the Gender Equity and Environment Division of the Ministry of Agriculture and Cooperative having the project(s) coordinated effectively.



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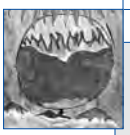

ACKNOWLEDGEMENT

The Priority Framework for Action (PFA) to strengthen capacities for climate change adaptation and disaster risk management in agriculture sector was prepared through wider consultations among stakeholders and development partners. Formulation of the framework was coordinated by Gender Equity and Environment Division in the Ministry of Agriculture and Cooperatives with active participation by DOA, DOLS, NARC, FAO, UNDP, Practical Action and other partners. The FAO office in Nepal administered its development under the project 'Strengthening capacities for disaster preparedness and climate risk management in the agriculture sector" (TCP/NEP/3201 (D). UNDP under UN Joint Program sponsored the project's extension to two additional districts.

In fact, several components and activities outlined in the document have been built on the community-level pilot activities. Therefore, contributions of district level officials and community representatives from the pilot districts are highly creditable in the prioritization. At the national level, the staffs from the Ministry of Agriculture and Cooperatives and its departments and representatives from the ministry of Environment, Department of Hydrology and Meteorology, Nepal Agriculture Research Council, Practical Action, UNDP and FAO provided valuable feedback during the initial consultation as well as validation meetings making consolidation of the PFA in its present form possible. The stakeholders' cooperation and contributions were indispensable and fundamental to ensure the quality of the product.

My special thanks are due to Mr. Bishnu Aryal and Lilaram Poudel (the then DDGs, Planning of DOA) who as the Project Manager(s) implemented the project smoothly in their tenure. Dr. D. M. Pokhrel and Bidya Pandey, Senior Horticulturist in the Gender Equity and Environment Division of MOAC and Mr. Kanchan Raj Pandey in the Department of Agriculture are acknowledged for their contribution in the preparation of the framework. Also acknowledged are Dr. Stephen Bass, Dr. J. D. Nayava and Dr. Krishna Raj Regmi, National Experts in FAO (N) for their facilitations in steering committee meetings, brain storming/ consultative meetings and workshops. Messer Shrawan Adhikay and Arjun Thapa, Program Officers in FAO (N) deserve due appreciation for their logistic supports.

My sincere thanks go to Dr. Selvaraju Ramasamy in Climate, Energy and Tenure Division of FAO (Rome) for overall technical guidance and supervision to the project and final compilation of the framework.

Dr. Hari Dahal
Joint Secretary and National Project Director
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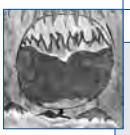


EXECUTIVE SUMMARY

Agriculture remains Nepal's principal economic activity, employing over 65 percent of the population and contributing to 33% of the GDP. The agricultural sector is extremely exposed and highly vulnerable to natural disasters and impacts of climate change. Nepal is prone to a variety of recurring climate related natural disasters such as floods, landslides, snow avalanches, Glacial Lake Outburst Floods (GLOF), hailstorms, thunderstorms, cold waves, hot waves, drought and epidemics. In particular floods, landslides, hailstorms and drought spells are almost regular phenomena.

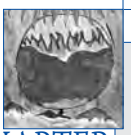
In response to the request from the Government of Nepal, FAO assisted the Ministry of Agriculture and Cooperatives (MOAC) to "strengthen the capacities for climate risk management and disaster preparedness in the agricultural sector" through a Technical Cooperation Project (TCP/NEP/3201 (D)) and a FAO/UNDP Joint programme (UNJP/NEP/005/UNJ. The project facilitated several national consultations and provided technical support to identify the priorities and prepare a 10 year Priority Framework for Action (PFA). The Priority Framework for Action (PFA) draws the actions from the National Adaptation Programme of Action (NAPA) and National Strategy for Disaster Risk Management (NSDRM). The field experiences through the district and community level interventions, outcomes from the project components (data base management, vulnerability and risk mapping, farmers support services as well as climate/weather and early warning information provision) contributed heavily to formulate this PFA. The Priority Framework for Action builds on the strengths and comparative advantage of the Ministry of Agriculture and Cooperatives (MOAC) and, at the same time, specific actions are proposed considering the existing gaps and weaknesses. Moreover, the Priority Framework of Action lays out activities for achieving the Hyogo Framework for Action (HFA) and several other climate change related priorities outlined in the first national communication to UNFCCC and NAPA. The PFA considers an integrated approach by considering short-term (disaster response), short to medium-term (Disaster Risk Reduction) and medium to long-term (climate change adaptation) priorities.

The first chapter is an introduction, which describes the background information on climate and natural disaster impacts in Nepal, climate trends and future projections, and implications of climate change for agriculture and food security. The second chapter describes the priority setting, which included gaps identified through the consultations and several existing plans and strategies and outlines the underlying principles of the framework. The third chapter describes the framework for action, key areas of focus under each of the priority areas. Chapter 4 provides guidelines on the institutional mechanisms for the implementation of the plan. There are several annexes within the PFA: provide basic terminologies, priority areas of HFA, a list of identified actions relevant to climate change adaptation, NAPA and national strategy for disaster risk management.

The Priority Framework for Action outlines 5 priority action areas: (i) Institutional and technical capacity for climate change adaptation and disaster risk management in agriculture; (ii) Assessment and monitoring of climate risks, vulnerabilities as well as enhancing early warning systems; (iii) Improving knowledge management, awareness raising and education on climate change, adaptation and disaster risk management; (iv) Reducing climate related risks and the underlying vulnerabilities by implementing technical options in agriculture and livestock; (v) Strengthening capacities and procedures for effective disaster preparedness, response and rehabilitation at all levels and integration of climate change adaptation interventions.

ACRONYMS

ABPSD	Agricultural Business Promotion and Statistics Division
APP	Agriculture Perspective Plan
ARS	Agriculture Research Stations
ASC	Agriculture Service Centers
CBO	Community Based Organization
CBA	Community Based Adaptation
CBDRM	Community Based Disaster Risk Management
CCA	Climate Change Adaptation
DADO	District Agriculture Development Office
DDC	District Development Committee
DDRC	District Disaster Relief Committee
DHM	Department of Hydrology and Meteorology
DOA	Department of Agriculture
DOI	Department of Irrigation
DLS	Department of Livestock Services
DLSO	District Livestock Service Office
DSCWM	Department of Soil Conservation and Water Management
DRC	Disaster Relief Committee
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DWIDP	Department of Water Induced Disaster Prevention
EWS	Early Warning Systems
FASWG	Food and Agriculture Sector Working Group
GCM	General Circulation Models
GEED	Gender Equity and Environment Division
GLOF	Glacial Lake Outburst Floods
HFA	Hyogo Framework for Action
IDM/IPM	Integrated Disease/Pest Management
ISDR	International Strategy for Disaster Reduction
INGO	International Non-Governmental Organization
LDC	Least Developed Country
MOAC	Ministry of Agriculture and Cooperatives
MOE	Ministry of Environment
MOHA	Ministry of Home Affairs
MOLR	Ministry of Land Resources
MOFSC	Ministry of Forest and Soil Conservation
MOICS	Ministry of Industry, Commerce and Supplies
NADRM	National Authority for Disaster Risk Management
NAPA	National adaptation Programme of Action
NARC	Nepal Agriculture Research Council
NARDEF	National Agriculture and Research Development Fund
NEOC	National Emergency Operations Centre
NFC	Nepal Food Corporation
NGO	Non-Governmental Organization
NPC	National Planning Commission
NSDRM	National Strategy for Disaster Risk Management
NDMA	National Disaster Management Agency
PFA	Priority Framework for Action
RAD	Regional Agriculture Directorate
RLSD	Regional Livestock Services Directorate
SALT	Slope Agriculture Land Technology
TAG	Technical Advisory Group
TCP	Technical cooperation Programme
TWG	Technical Working Group
UN/ISDR	United Nations International Strategy for Disaster Reduction
UNDP	United Nations Development Programme
UNDAC	United Nations Disaster Assessment and Coordination
UNFCCC	United Nations Framework Convention on Climate Change
VDC	Village Development Committee
WCDR	World Conference on Disaster Reduction
WFP	World Food Programme



CHAPTER 1

INTRODUCTION

Climate of Nepal

The climate of Nepal varies greatly from South to North due to the vast altitudinal variation. The altitudinal variation within a short span of about 193 km, ranging from 60 meters to 8848 meters above mean sea level, makes the country with diverse agro-climatic zones. The regional climate variations are largely a function of elevation. The variable geo-climatic conditions, unplanned settlements, degradation of natural resources and increasing population makes the country vulnerable to a variety of climate related extreme events.

The national average mean temperature is around 15° C, and increases from north to south with the exception of mountain valleys. The onset of the monsoon in early June checks the increase of the daily temperature over the country. Therefore, the maximum temperature of the year occurs in May or early June. Temperature starts decreasing rapidly from October and reaches the minimum of the year in December or January. Although the temperature normally decreases with height, there are also spatial variations in temperature influenced by topography. The Terai belt is the hottest part of the country, where the extreme maximum temperature reaches more than 45° C and causes heat waves during summer.

Average rainfall is 1 800 mm, with rainfall increasing from west to east. The North West corner receives the least rainfall, as it is the rain shadow of the Himalayas. Rainfall also varies with altitude. About 80% of the annual precipitation in the country falls between June and September under the influence of summer monsoon. The winter months, from December to February, are relatively dry with few spells of rain. The winter rain decreases in amount from northwest both southward and eastward. From April to May, the country experiences pre-monsoon thundershower activities. The pre-monsoon rainfall activities are more frequent in the hilly regions than in the southern plains. The period of October and November is considered as a post monsoon season and a transition from summer to winter.

Extreme climate events

Nepal is prone to a variety of recurring natural disasters such as floods, landslides, snow avalanches, Glacial Lake Outburst Floods (GLOF), hailstorms, thunderstorms, cold waves, hot waves, drought, epidemics and earthquake. Out of the 75 districts in the country, 49 are prone to floods and/or landslides, 23 to wildfires, and one to windstorms. A total of 64 out of 75 districts are prone to disasters of some type (MOHA, 2009).

High intensity rainfall events during the monsoon season leave the country highly susceptible to water induced natural disasters such as floods, landslides, flash floods, debris flows and slope failures. Flooding is frequent in the monsoon season during summer, while droughts are not uncommon in certain regions at other times of the year. Prolonged breaks in the summer monsoon cause severe drought.

The vulnerability to climate- related extremes and natural hazards are often attributed to insufficient public awareness, lack or inadequacy in preparedness, lack of coordination among inter-government agencies, inadequate financial resources, low level of technical know-how and skills in mitigation of natural disasters, and a strong concentration of knowledge and skills in academic centers alone, without appropriate information dissemination among the vulnerable population groups. The development of settlements in hazardous areas and marginal land are caused by the lack of proper land use planning. Women are often among the most marginalized people and have limited access to land property and other resources. The poor, marginalized and disadvantaged groups of people are hardest hit by climate extremes in the country.

TABLE 1 • Loss of agricultural land and crop by climate related extreme events in Nepal (1971–2007)[1]

Event	Loss of agricultural land and crops (in Ha)
Drought	329 332
Flood	196 977
Hail storm	117 518
Rains	54 895
Strong wind	23 239
Cold waves	21 794
Others (Forest epidemic, snow storm, fire, storm, thunderstorm, avalanche, plague etc.,)	83 336
Total	847 648

Trends in climate

Temperature observations in Nepal show a consistent and continuous warming trend. According to available data, average annual mean temperatures have been increasing in Nepal by 0.04 - 0.06°C and these increases are more pronounced at higher altitudes and in winter. There is a general increase in temperature extremes with hotter days becoming more frequent and cooler nights less frequent. The temperature differences are most pronounced during the dry winter season, and least during the monsoon. There is also significantly greater warming at higher elevations than at lower elevations in the Terai region. Glacier melt as well as expansion of glacial lakes have been recorded in recent decades, with a high likelihood that such impacts are linked to rising temperatures.

The precipitation data for Nepal does not reveal any significant trends. However, the analysis based on data from 166 stations across Nepal from 1976 to 2005 reveal a positive annual rainfall trend in Eastern, Central, Western and Far-western Nepal. The monsoon precipitation shows general declining trends in the mid-western and southern parts of western Nepal, with few pockets of declining rainfall in the central and eastern Nepal. In the rest of the country, the monsoon precipitation displays an increasing trend.

Post monsoon precipitation shows increasing trend in most of the mid-western and the southern parts of eastern and central/western Nepal. A general declining precipitation trend is observed in most of the far-western and northern part of western, central and eastern Nepal. The winter precipitation trends show overall increasing trends excepting the northern part of mid-western, western and eastern Nepal. However, a detailed analysis is required to understand the significance of these trends.

Future climate change projections[3]

The climate model projections show that there will be a rise in the average annual temperature over Nepal and that it will vary both spatially and temporally. In the OECD study, General Circulation Models (GCM) run with the SRES B2 scenario show an annual mean temperature increase by an average of 1.2°C by 2030, 1.7° C by 2050 and 3° C by 2100 compared to pre-2000 baseline. In general, several studies show higher temperature increment projections for winter as compared to the monsoon season. In terms of spatial distribution, a higher temperature increment over western and central Nepal is projected as compared to eastern Nepal.[4]

For precipitation, the trends are less certain, but there is evidence of increasing occurrence of intense rainfall events, and an increase in flood days and generally more variable river flows. Importantly, the above changes, which are consistent with a range of climate change models, are predicted to continue into the 21st Century. The summer monsoon is likely to become more intense with increasing occurrence of heavy rainfall events. In terms of winter precipitation, the models project almost no change in western Nepal and up to 5 – 10% increase in precipitation in eastern Nepal. During the summer months, the projections show an increase in precipitation for the whole country in the range of 15 to 20%. In terms of spatial distribution, studies show an increase in monsoon rainfall in Eastern and Central Nepal as compared to Western Nepal.

1 Global assessment of risks, Nepal Country Report, ISDR Global Assessment Report on Poverty and Disaster Risk 2009.
2 National Adaptation Programme of Action (NAPA), September 2010, Ministry of Environment, Government of Nepal.
3 Projected Climate Change, National Adaptation Programme of Action (NAPA), September 2010, Ministry of Environment, Government of Nepal.
4 NCVST (2009) Vulnerability Through the Eyes of Vulnerable: Climate Change Induced Uncertainties and Nepal's Development Predicaments, Institute for Social and Environmental Transition-Nepal (ISET-N), Nepal Climate Vulnerability Study Team, (NCVST) Kathmandu

Vulnerability of the agriculture sector to climate variability and change

Agriculture remains Nepal's principal economic activity, employing over 65 percent of the population. Only 20 percent of the total area is cultivable; another 29 percent is forest. Rice, wheat and maize are the main cereal crops mostly produced in the Terai region. The Terai plains constitute 43 percent of the total cultivated land. The majority of the farmers are reliant on rainwater for irrigation, as the country lacks major facilities for artificial irrigation. On average, about 65 percent of the total cultivated land is rainfed. Recurring climate related natural hazards undermine agricultural productivity causing poverty and food insecurity. The crop and livestock productivity are constrained by variations in farm level water resources, changes in seasonal rainfall characteristics, extreme climate events such as droughts, floods, heat and cold waves as well as pest and diseases.

The most vulnerable to climate variability and change are the poor and marginalized, who generally are the least able to cope with disasters, live in most hazard prone areas and generally have the least information, knowledge and resources to reduce their risk. The predicted impacts of climate change will intensify existing vulnerabilities, inequalities and exposure to hazards and will therefore impact most on those least able to cope with climate risks.

Smallholder farmers will be the most vulnerable to the predicted impacts of climate change. These vulnerable groups tend to own fewer livelihood assets, including land and livestock, receive lower income, and have low levels of education and less access to community and government services. They tend to be reliant on rain-fed agriculture and occupy land that is prone to floods, drought and landslides. Many of Nepal's poor farmers occupy small parcels of land that can barely produce enough for the family. They are more reliant on local natural resources such as forests and water and would therefore suffer the most from the drying up of local water sources and changes in the vegetation cover.

Women and children are most vulnerable to climate change. As the men undertake seasonal migration to nearby towns to seek work, the women, boys and girls are left to cope with variable climate and management of farm. They need to travel long distances to collect firewood and water for both household use and livestock. Highly variable and unpredictable climatic conditions would lead to food shortages at the household level and thus children and elderly are most likely affected by under nourishment.

Some farming communities are already undertaking several local coping strategies. These include changing crops such as growing vegetables instead of grain crops, planning for short duration and low water requiring crops, diversification of farm enterprises, rain water harvesting and erosion control measures. The poor farmers and women in particular are least able to cope due to lack of resources to undertake coping strategies. Even if these coping practices are implemented, these are not enough to match the impacts of climate extremes and creeping changes in climatic conditions.

Impacts of climate variability and change on agriculture and food security

The Himalayan environment faces additional threats derived from global warming and the resulting repercussions of climate change on the Himalayan environment. These are bound to further increase the number of hazardous events and their social, economic and environmental impacts. It is likely that a variety of different climate induced threats will further increase the impacts of hazards in new areas. Rapid population growth, shrinking farm size in the Terai region, continued unplanned agriculture in hazard-prone areas are expected to further increase the damage and losses, if no countermeasures are put in place. The cropping intensity in vulnerable areas is increasing due to demand for food.

The future impacts of climate change on agricultural production, as calculated by Cline (2007)[5], suggest an initial increase until 2050 due to carbon fertilization, but a decrease by 2080 by 4.8 percent. This is based on the assumption of a positive carbon fertilization effect up to 2.5 °C temperature increase, and a decrease of 17.3 percent or without that effect thereafter. These figures do not reflect the most likely

5 Cline WR (2007) Global warming and agriculture: impact estimates by country. Washington DC. Centre for Global Development, 250p.

negative impacts of natural disasters on agricultural production, which are likely to increase in frequency and intensity during that time span.

In the Terai region people report more frequent and less predictable monsoon flooding, making it more difficult to prepare for and to cope with. They also face more extremes, including severe 'cold waves' that destroy winter vegetable crops. Winter droughts are also increasingly evident causing widespread damage to agriculture in Terai and mid-hills. These events are likely to become more frequent due to prolonged dry spells in future irrespective of change in total annual precipitation.

Much of the population is reliant on rain fed agriculture that is vulnerable to localized drought and more variable precipitation in terms of form, timing and intensity. With increased intensity of summer monsoon rain events, the risk of flash flooding, erosion and landslides will be increased. With warmer winters, particularly at higher altitudes, less precipitation may fall as snow, further accelerating glacial retreat but also reducing soil moisture and accelerating erosion, and therefore impacting on winter crops. However, due to Nepal's diverse topography and range of ecological zones, the overall impact of climate change on agriculture and ecosystems is likely to be highly variable depending on location.

More than 3.4 million people in Nepal are estimated to require food assistance, due to a combination of natural disasters, including 2008/09 winter drought – one of the worst in the past several decades. In Nepal, the highest incidence of poverty is found in the Mountain and Hill areas, particularly in remote areas of the Mid and Far Western Development Regions, and among the most marginalized sectors of society as defined by gender, caste and ethnicity. These zones are also considered the most food insecure and also have a proportionately higher population of dalits and ethnic minorities.

In the past few decades (1983–2005), over 28 billion Nepalese rupees (USD 288 million) were lost due to natural disasters, an average of nearly 1 208 million Nepalese rupees per year. The accompanied indirect losses, in terms of lost time and opportunities, and the lack of services and the repercussions thereof, may be several times more than the above figure. Limited information is available on the differential impact of these disasters on women, the youth, the elderly and people with disabilities.

Changing hydrological flows due to both glacial retreat and increased and more variable precipitation will impact on the many irrigation systems, water-powered grain mills, hydropower plants and drinking water supply systems throughout the country. This will affect agricultural production, water and sanitation, leading to increasing levels of malnutrition and incidence of water-borne disease.

Excessive water due to projected increased precipitation would impact human settlements, infrastructure and agriculture land. Changes in river flow will have direct implications for micro-hydro projects in the hill and mountain ecological zones; an increase in the number of cloudy days and changes in the form of precipitation (from snowfall to hailstones) has resulted in adverse impacts on solar power potential in the mountain ecological zone; and increases in the incidence of forest fires has adversely impacted on the already scarce fuel-wood sources.

Box 1: Climate risks and agriculture

Floods: There are more than 6000 rivers and streams in Nepal. As the topography of the country is very steep and rugged, intense rainfall during the monsoon season causes flood, and debris flow and moderate or light rainfall for long hours cause extensive landslides. In July 1993, Nepal experienced a devastating flood in the Terai region and affected 487 534 people. On 18 August 2008, a massive flood on the Koshi River breached about 1.7 km of its embankment, which resulted in inundation of many village development committees with major damage to agriculture land and standing crops. Excessive rainfall of 240 to 300 mm per day between the 19th and the 20th September 2008, with frequency of 50 year record, caused floods in Kailali and Kanchanpur districts that damaged irrigation facilities and related infrastructure. The estimated cost of damaged irrigation facilities in 11 542 ha was $12.7 million. The total loss of agriculture income owing to lack of irrigation was estimated to be about $16.6 million.

Drought: In 2009, the summer monsoon was delayed and weak - therefore the transplanting of paddy was delayed in most parts of the country, and in the same year, flood occurred in western Nepal during the harvesting period causing a damage of 20 to 25% on paddy production. The table 2 highlights some major losses in the agricultural sector by natural disasters in recent years.

TABLE 2 • Area (ha) of crops affected by climate related extreme events in Nepal

Description	Year							
	2002	2003	2004	2005	2006	2007	2008	2009
Paddy (ha)	115000	6967	116506	3585	120000	88800	30873	92000
Maize (ha)	4435	954	1293	20	47	4271	549	1700
Millet (ha)			500	419	0	1451	3	0
Others	2067	611					324	
Total	211502	8532	118299	4024	120047	94522	31749	93700

Source: Bimonthly Bulletin of Crop and Livestock Situation in various years, ABPSD, MOAC

CHAPTER 2

PRIORITIES IN EXISTING PLANS AND STRATEGIES AND FUTURE DIRECTIONS

Priorities in the existing plans and strategies

National Agricultural Policy, 2004: The Government of Nepal had brought into force the National Agricultural Policy (2004), which takes into consideration aspects that are related to Climate Change Adaptation and Disaster Risk Management. The extracts relevant to climate related extremes and natural hazards are:

- Survey/surveillance system should be established and activated to assess the impact of heavy rainfall, droughts, diseases, insects and other natural calamities as well as to mobilize agriculture relief schemes.
- Special facilities should be provided to the targeted groups to construct and install small irrigation infrastructures such as pedal pumps, rower pumps, sprinklers, drips and water harvest ponds.
- In times of climatic hazard and/or natural disaster, safety nets (food and nutrition) should be gradually developed for farmers with less than half a hectare of un-irrigated land, as well as landless and marginal farmers lacking alternative employment opportunities.
- Production of food grains at the local level should be encouraged by launching a special program
- Mechanisms should be established to purchase food grains produced near by the hilly areas for supplying food to the food deficit areas.
- The livestock insurance program should be extended; besides poultry/chicks, seeds of selected crops and high-value agricultural products need to be gradually introduced for insurance.
- The negative impacts and other environmental problems resulting through the use of agricultural chemicals on soil and water bodies should be minimized.

National Development Plan: Three-Year Interim Plan (2007 – 2010) of Nepal recognizes disasters as one of the major impediments of national development process. The plan recognizes priorities to DRM issues pertaining to various development sectors.

The plan distinguishes the importance of disaster risk reduction and mitigation, emphasizes the need to introduce changes into the prevailing national policies for the required shift of focus from disaster response to prevention, mitigation and preparedness, identifies challenges such as the need to foster coordination among the institutions, and seeks to promote better understanding of hazards and the related disaster risks.

The plan recognizes existing gaps such as the lack of institutional capacities at various levels, and emphasizes the need for systematic hazard and vulnerability mapping, enhancing public awareness and capacities for disaster risk assessment and building code implementation. The need to establish proper institutional mechanisms at the highest level for establishing a comprehensive DRM system is also taken into account[6].

National Adaptation Programme of Action (NAPA): Nepal has recently completed the preparation of the National Adaptation Programme of Action (NAPA), which is a requirement under the United Nations Framework Convention on Climate Change (UNFCCC) for all Least Developed Countries (LDC's), which are parties to the convention. Of the six major sectors identified for NAPA, "Agriculture and Food Security" is one of them. The Ministry of Agriculture and Cooperatives (MOAC) is leading the thematic area and FAO has provided technical support to prioritize the activities (Annex 2). The priorities identified by the "Agriculture and Food Security" committee for NAPA was considered for preparation of this priority framework for action.

6 UNDP., 2008. National strategy for Disaster Risk Management in Nepal, Final Draft., UNDP, March 2008

National Strategy for Disaster Risk Management (NSDRM): Nepal developed a policy and a legal framework for disaster management by promulgating the Natural Calamity (Relief) Act 2039 in 1982. It constituted the Central Disaster Relief Committee (CDRC) with the Minister of Home Affairs as the Chair and, for the first time, allocated the district level management of rescue and relief activities to the Chief District Officer (CDO), who is the ex-officio chairperson of the District Disaster Relief Committee (DDRC). Very progressive when promulgated, this act, although amended twice, has however failed to integrate actions focusing on a paradigm shift to disaster risk management from a reactive intervention in the form of relief.

The recent NSDRM is closely oriented along the lines of the Hyogo Framework for Action (HFA)[7] and it implies a major shift in government policies away from an emergency response driven way of working toward a disaster risk management perspective, which puts equal emphasis on prevention, mitigation and preparedness, highlights the links between disaster management and development, as well as the cross sectoral nature of DRM and the responsibilities of a variety of actors in DRM. The strategies relevant to agriculture and food security are presented in the Annex VI.

The increasing commitment to move towards more risk management action offers enormous opportunities to shift the focus from emergency response to risk management in the agricultural sector. Experiences from FAOs' assistance (TCP/NEP/3201 (D)) to "strengthen capacities for disaster preparedness and climate risk management" especially field level actions offer guidelines to align the agriculture sector plan with the National Strategy for Disaster Risk Management. The preventive and preparedness actions in agriculture includes the adoption of crop varieties, cropping patterns, hedge row intercropping, as well as the adaptation of farming systems, seeds systems, risk reducing water management on farmers fields, or livestock management. These practices clearly contribute to climate change adaptation interventions in the agricultural sector.

In addition, FAO is supporting preparation of DRM plan in four districts of Nepal and recently expanded to two additional districts with the support of UNDP. These DRM plans recently facilitated by FAO explicitly target the agricultural sector related aspects. Nevertheless, they provide a basis to build upon and integrate agriculture and food security perspectives. The Priority Framework for Action takes into account the roles and responsibilities of the agriculture support services at the district level.

Future directions of the Priority Framework for Action (PFA)

The Priority Framework for Action (PFA) builds on an integrated approach of linking Climate Change Adaptation and Disaster Risk Management[8] as both share common goals and objectives. Both fields aim to reduce the vulnerability and risks faced by the communities and achieve sustainable development. Considering the convergence of actions, the priority framework for action promotes an integrated approach to address the climate risks both in short-term (DRM) and long-term (CCA). The Ministry of Agriculture and Cooperatives (MOAC) recognizes the importance of a coordinated approach and integration of climate change adaptation and disaster risk management priorities in its plans and programmes.

The NAPA priorities and DRM strategy, creates a strong momentum for climate change adaptation and disaster risk management in Nepal, but also a strong demand for integrating related actions into agriculture sectoral priorities. This enables donor agencies and development partners to assist the country, particularly in agriculture and natural resource management, in building the institutional capacities and technical skills needed for moving towards the implementation of the NAPA priorities and DRM strategies, in an integrated manner. With regard to the agricultural sector, there is an urgent demand by the MOAC to flesh out a sector specific PFA for DRM, in line with the NSDRM strategy and for CCA in line with NAPA priorities.

The institutional and technical capacity building of the MOAC at national and district levels is needed,

7 UN/ISDR., 2005. Hyogo Frame for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters: World conference on Disaster Risk reduction (18-22 January, 2005), www.unisdr.org, Kobe, Japan

8 The Disaster Risk Management under the Priority Framework for Action (HFA) considers mainly hazards of meteorological, climatological and hydrological (including mass movements wet) origin and associated events and some related phenomenon.

in particular within its line agencies (DOA and DLS) to address climate change adaptation and disaster prevention/preparedness related issues in a proactive way from an agricultural perspective. This will catalyze a process to better position the DOA and DLS as key partners and actors in the implementation of the new strategy for disaster risk management in Nepal as well as to introduce DRM into the main stream of MOAC's sustainable agricultural and rural development planning. For the first time in Nepal, the strategy for DRM provides an institutional framework, which recognizes the important role of agriculture in DRM. Until recently, agriculture did not have any formal mandate related to disaster risk prevention or preparedness and climate change adaptation. Building institutional and technical capacity within MOAC related to climate change impacts, vulnerability and adaptation will also provide a comparative advantage to better represent the agricultural sector in national level adaptation initiatives facilitated by the Ministry of Environment.

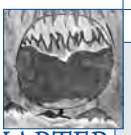
FAO's technical assistance from 2008 includes facilitation of processes related to prioritization of agriculture and food security perspectives into NAPA. The NAPA food and agriculture committee incorporated several priorities based on the field level experiences from the FAO's assistance. All these interventions need to be strengthened and up-scaled by institutionalizing and integrating the experiences into government programs and projects in the future. This PFA is timely and provides a strong basis to support MOAC to replicate good practices tested from the project and documented from elsewhere.

The data requirements, information about climate change impacts and vulnerabilities need to be systematically assessed and managed to prepare adaptation strategies in agriculture. The existing approaches focus on the current risks and employ a livelihood perspective to assess the location specific risks and vulnerabilities. As climate change scenarios are increasingly made available, model based impact assessments in line with the NAPA priorities need to be carried out to provide objective information on impact, risk and vulnerability to plan and implement location specific adaptation priorities.

Use of currently available weather and climate information and early warning systems offers significant opportunities for managing climate risks pro-actively. The risk management approach focusing on farm management strategies can eventually enhance the adaptive capacity and resilience of the farmers to the future anticipated impacts due to climate change. Therefore, building on the existing Early Warning System (EWS), innovative forecast products tailored to the local needs of farmers, to increase lead times for flood and drought warnings to facilitate farmer's decision making can improve farmer's choice of crops and other management practices. Efforts have already started enhancing the capacity of the agricultural support services and local organizations to understand the climate change impacts, vulnerabilities and adaptation. However, further research is needed to improve the current 24 hours forecasts into long lead forecasts, which would help to expand the scope of early warning from its current focus on life saving towards a better safeguarding of peoples' livelihoods.

Climate change adaptation interventions should focus on community needs. As the climate change impacts and adaptation are location specific, interventions at the local level require introduction and demonstration of innovative adaptation options through a guided learning by doing process at district and community levels. The community based adaptation approach has already been tested through the FAO-TCP project and further efforts are needed in all the risk prone districts to disseminate locally adapted, innovative and gender-sensitive technologies for climate change adaptation within the agricultural sector. This process will enhance: local awareness about adaptation to climate variability and change; the resilience of local communities against the impacts and unpredictability of current climatic extremes, which are expected to further increase in intensity and frequency according to climate change projections; livelihood assets, on-farm employment and household food security; and active participation of the most vulnerable men and women. As MOAC is actively participating in the ongoing community based adaptation, its agencies are well placed to upscale climate change adaptation and disaster risk management initiatives in all the risk prone districts irrespective of development regions.

Within the framework of the NAPA and NSDRM, the overall objective of the PFA is to provide a road map to the MOAC with operationalizing the process of shifting from a reactive emergency response focused intervention approach towards a pro-active natural hazard risk prevention/ preparedness in short term and climate change adaptation in long-term.



CHAPTER 3

THE PRIORITY FRAMEWORK FOR ACTION (PFA)

The 10 years (2011 – 2020) Priority Framework for Action (PFA) is an endeavour to devise ways and means to manage the impacts of climate change and natural disasters in agriculture. The PFA is prepared based on a brain storming session and two stakeholder workshops (Annex VIII) and a number of meetings with staff of MOAC at national and at district levels. The sectoral PFA for agriculture applies the structure of main areas of action outlined in the HFA, but systematically brings in issues related impacts of climate change and adaptation.

The PFA is built in line with the NAPA and NSDRM as a road map for responding to the impacts of climate change and natural disasters (climate related) collectively. The 10 years (2011 – 2020) priority framework for action systematically targets to cover all the hazard prone districts in Nepal. These actions seek to ensure that climate change adaptation and disaster risk reduction are a national and local priority with a strong institutional basis for implementation. The priority action areas are:

- Strengthening institutional and technical capacity for climate change adaptation and disaster risk management in agriculture
- Assessing and monitoring climate risks (current and future) and vulnerabilities and enhance early warning systems
- Improving knowledge management, awareness raising and education on climate change impacts, adaptation and disaster risk management
- Reducing climate related risks and the underlying vulnerabilities by implementing technical options in agriculture and livestock sectors
- Strengthening capacities and procedures for effective disaster preparedness, response and rehabilitation at all levels and integration of climate change adaptation initiatives

The Priority Framework for Action (PFA) promotes to: (i) Strengthen climate change adaptation, disaster prevention, impact mitigation, preparedness and response as well as rehabilitation within the agricultural sector; (ii) Articulate MOAC, DOA and DLS contributions to the NAPA and National DRM Strategy, linked to national climate change policies and strategies; (iii) Provide MOAC, DOA and DLS with a road map to strengthen institutional and technical capacities to effectively provide climate change adaptation and DRM related technologies and services to farmers and (iv) Strengthen coordination among the key stakeholders on matters related to CCA and DRM at national, district and local level.

Priority Area I: Strengthen institutional and technical capacity for climate change adaptation and disaster risk management in agriculture and enhance policy frameworks and coordination mechanisms at all levels

Objectives: Ensure efficient institutional mechanisms within MOAC, while covering all aspects of climate change and disaster risk management activities related to the agricultural sector and enhancing coordination with other agencies.

Gaps to be addressed: At present there is no specific entity mandated within line departments under MOAC to be responsible for climate change adaptation and DRM in agriculture. The new challenges require a re-definition of CCA and DRM related tasks and responsibilities in MOAC and DOA/DLS, including partnerships and networks with other stakeholders.

Strategy: Strengthening institutional and technical capacities and mainstreaming climate change adaptation and disaster risk management within agriculture and food security policies, strategies and plans.

Key areas	Description of main activities	Main responsibility	In co-ordination with	Indicators of monitoring
Strengthen institutional mechanisms within MOAC for effective coordination of climate change and DRM related tasks	▪ Strengthen the Gender Equity and Environment Division (climate change) and Agribusiness and Statistics Division (Disaster Risk Management) of MOAC with additional trained staff and ensure logistic support for the climate change unit in MOAC. A secretariat/focal unit to oversee CCA and DRM activities are proposed.	MOAC (GEED, ASD)	MOACDOA,DLS, NARC	Additional staff with specific ToR and required logistic support
	▪ Develop an information platform and resource center within MOAC for providing need based information on climate change, DRM and land degradation related aspects and technologies	MOAC	MOACDOA, DLS, NARC	Information centre established with equipments and staff
	▪ Establish a mechanism for information exchange, collaboration, coordination between Ministry of Agriculture and Cooperatives, Ministry of Environment, Ministry of Home Affairs with regard to climate change and DRM, respectively	MOAC	MOE, MOHA	Necessary orders issued from respective Ministries and Departments
Mainstream climate change and disaster risk management into agriculture and food security policies, strategies and plans	▪ Establish a committee to draft or integrate the climate change adaptation and disaster risk management and sustainable land management (controlling and preventing land degradation) priorities in to agriculture and food security policies, strategies and plans (including special programmes on food security)	MOAC	DOA, DLS, NARC	Committee established with Terms of Reference and updated policies, strategies and plans endorsed by the Government and available
	▪ Promote to prepare district adaptation and disaster risk management plans and ensure that climate change issues (including adaptation and mitigation, land degradation) and food security priorities are integrated into district level plans	DOA and DLS	DADO and DLSO	Number of districts having new plans or updated existing plans
	▪ Update agriculture land utilization plans and integrated natural resources management plans (focusing on control and prevention of land degradation) in view of climate related risks building on outcomes of land resources mapping project	MOAC	Dept. of Land Reform	New guidelines and updated plans available
	▪ Update and integrate agriculture perspectives into national level documents such as NAPA, National Communication, National Strategy for Disaster Risk Management, strategies for preventing and arresting land degradation etc.,	MOAC	MOE MOHA	Updated documents have food and agriculture perspectives
	▪ Institutionalization of agricultural insurance (for crops and livestock) mechanisms through new guidelines and pilot in selected districts	MOAC	DOA and DLS	New guidelines available and piloted in selected districts
	▪ Prepare guidelines for national redistribution of surplus agricultural produce (rather than international trade) as a mechanism for exchange within the country during extreme climate and non-climate risks	MOAC	NFC and Ministry of Supply and Trade	New guidelines available and endorsed by the Government

Key areas	Description of main activities	Main responsibility	In co-ordination with	Indicators of monitoring
Strengthen the technical units and mandate them for climate change adaptation, disaster risk management and integrated natural resources management in DOA and DLS at national and district levels	▪ Enhance operational and technical capacities of agriculture offices operating at district and area level on climate change adaptation, disaster risk management and integrated management of natural resources	DOA and DLS	DADO and DLSO	Training programs conducted in risk prone districts
	▪ Institutional set up (technical units) with DOA and DLS at the national level for climate change adaptation, disaster risk management and management of degraded lands	DOA and DLS	DADO and DLSO	Technical units within DOA, DLS established with Terms of reference
	▪ Mandate the agricultural departments and offices at decentralized levels to participate as key partners in DRM committees at all levels	MOAC	DOA/ DLS	New guidelines and informed to all the vulnerable districts
	▪ Establish data management unit in DADO to cover livelihood vulnerabilities, DRM related data and baselines, information on degraded lands and formulise data collection, data management and dissemination system	DOA/DLS	DADO/DLSO	A database management facility established in 10 most vulnerable districts
	▪ Prepare guidelines for formulation of district and community level DRM plans and promote a participatory dialogue with all stakeholders at district level for preparation of district disaster preparedness plans incorporating priorities of natural resources management and management of degraded lands	DOA/DLS	DADO/DLSO/DDC/ NGOs	Additional district DRM plans prepared or updated incorporating agriculture perspectives
	▪ Develop curriculum for DRM training and integrate into regular DOA/DLS training programs (3 days, 7 days)	DOA/DLS	DADO/DLSO	Training manuals prepared and trainings offered for at least 200 DOA/DLS staff
Strengthen agricultural research institutions and facilitate to prioritize immediate issues and conduct applied research on climate change impacts and adaptation/mitigation and develop technologies for sustainable land management	▪ Strengthen research and development linkages (research – extension) on climate change adaptation and disaster risk management and land management between NARC and DOA/DLS	NARC and DOA/DLS	DADO/DLSO/ARS	New research projects on crop improvement and management prepared and implemented by NARC as a lead coordinating agency
	▪ Promote joint (NARC/DOA/DLS) demonstration of recent drought, flood, cold and heat tolerant varieties and technologies of integrated natural resources management and rehabilitation of degraded lands at the regional centers and local research stations	NARC and DOA/DLS	DADO/DLSO/ARS	Guidelines for field demonstration of adaptation practices established and at least 20 large scale demonstrations conducted

Priority Area II: Assess and monitor climate risks (current and future) and vulnerabilities and enhance early warning systems for proactive climate risk management and adaptation to climate change

Objective: Improve climate risk and vulnerability assessment tools and methods, climate information products and early warning systems customized to the needs of farmers and other agriculture dependent communities.

Gaps to be addressed: Access to latest tools and methods; translating climate information products into impact outlooks and alternative management strategies relevant to farmers and establishing a strategy for communication.

Strategy: Use of best available methodologies for more systematic monitoring of current and future climate related risks for agriculture and food security. Improve sector specific early warning systems with dissemination down to local level.

Key area of support	Description of main activities	Main responsibility	In co-ordination with	Indicators of monitoring
Improve climate impact, risk and vulnerability assessment methodologies and transferred to MOAC and relevant departments	▪ Conduct hazard risk, vulnerability and impact assessment studies specific for the agricultural sectors, and share relevant information for adaptation planning	MOAC	FAO/NARC/INGO/ NGO	Results of the analysis available for decision making at different levels
	▪ Prepare detailed climate impacts, hazard risk (including land degradation) and vulnerability maps for agriculture	MOAC	FAO/INGO/NGO	Spatial information products available with national focal organizations
	▪ Consolidate and use results from in-depth studies on current and future climate risks and impacts on natural resources and agricultural sectors to design policy priorities, adaptation and DRM strategies	MOAC	FAO/DOA/DLS	Results of the impact analysis considered for formulation of policies, plans and adaptation strategies
Strengthen the institutional and technical capacity of DHM to be able to provide necessary forecast products and early warning systems for agriculture application	▪ Enhance human resources, logistics and facilitate need based training programs for the agrometeorological division of DHM	DHM	MOAC MOE	Number of staff trained and engaged on sustainable basis to feed information products relevant to agriculture
	▪ Evaluate and communicate available early warning systems, five days and seasonal forecast products from international and regional institutions for agriculture applications	DHM	MOAC MOE	New forecast products made available and farmers in at least 10 most vulnerable districts have access to the new products
	▪ Assess existing agroclimatic/ climate monitoring for agriculture applications and strengthen climate monitoring infrastructure and equipments for DOA and NARC research stations	DHM	MOAC/DOA/ NARC	At least 30% of the agroclimatic observatories upgraded
Strengthen technical capacity to apply need based climate and weather information products and early warning systems in agriculture	▪ Support to MOAC translate weather and climate forecast products from Department of Hydrology and Meteorology (DHM) into agricultural impact outlooks using decision support tools	DHM	MOAC/DOA/ DLS	The technical core group in MOAC, DOA, DLS trained to interpret weather and climate information and to prepare impact outlooks
	▪ Enhance climate database in DOA/DLS and train to interpret historical climatic data for agriculture application	DHM	DOA/ DLS	Updated historical climate data (30 years) for a minimum of 50 stations available at DOA and DLS for use
	▪ Analyze current flood and drought early warning system as basis to assess the needs and strengthen with new systems for application in agriculture	DHM	MOAC/DOA/ DLS	A report with recommendations for improvement; new flood and drought early warning systems piloted
	▪ Establish community based early warning system for flood at local level in collaboration with MOAC and Department of Water Induced Disaster Prevention	DHM MOAC	MOAC MOAC/DWIDP	Localized flood early warning systems established and tested in major river basins
	▪ Establish communication strategy and mechanisms for timely dissemination of EW messages to local level /farmers	DHM	DADO/DLS	A prototype strategy tested by involving farmer groups and replication strategy finalized.

Develop and test livelihood based damage and loss assessments procedures and baseline database formats in agriculture sector	▪ Consolidate existing data on damage and loss due to climate related extreme events (including natural disasters) in collaboration with other relevant ministries and organizations and strengthen the database in MOAC/DOA/DLS	MOAC/DOA/ DLS	MOHA	A time series data for at least 25 years available
	▪ Strengthen livelihood oriented baseline data collection methodologies and formats and facilitate implementation in risk prone districts of Nepal	MOAC	DOA/DOLS	New integrated livelihood based approach introduced in place of existing methods
	▪ Strengthen the crop and livestock monitoring and forecasting system and data base in high risk areas to establish a basis for better risk reduction, emergency needs assessment and response	MOAC	DOA/DOLS/NARC	Improved crop and livestock monitoring and forecasting system established building on existing ones

Priority Area III: Improved knowledge management, database and awareness raising on climate change impacts, adaptation and disaster risk management

Objective: Use knowledge to build a culture of innovation, and resilience, and institutionalize training on climate change adaptation and disaster risk management in agriculture.

Gaps to be addressed: The operational skills are needed at the institutional level to implement climate change adaptation and disaster prevention and preparedness activities. Therefore, awareness creation and knowledge building are considered very important. There is also a lack of knowledge and awareness about the climate related impacts at the community level. Department of Agriculture (DOA) and Department of Livestock Services (DLS) have a comparative advantage to receive trainings because of their local level presence.

Strategy: Awareness raising, knowledge management and information dissemination on climate change adaptation and disaster risk management in agriculture

Key areas of support	Description of activities	Main responsibility	In coordination with	Indicators of monitoring
Design and apply awareness creation strategy for climate change adaptation and disaster risk management in agriculture at the local level	▪ Identify the information needs of farmers and agriculture dependent communities relevant to disaster risk management (short term) and climate change adaptation (long-term)	MOAC/DOA/ DLS	DADO/ DLSO	Information needs of local communities in different agro-eco regions available and integrated into routine agriculture support services
	▪ Local level awareness raising campaigns and training programs for farmers on lessons learned and best practices of DRM, sustainable land management and climate change adaptation	DADO/ DLSO	ASC/ASSC	Number of training programmes organized for the farmer groups in each district
	▪ Conduct field days, orientation meetings, demonstration rally, exchange visits for farmers and farmer groups to create awareness on climate change adaptation and disaster risk management	DADO/ DLSO	ASC/ASSC	At least one event per year conducted in each of the VDCs involving most vulnerable farmer group representatives
	▪ Train local farmer organizations, community based local institutions and promote access to information on risks and vulnerabilities for community based disaster risk management, integrated natural resources management and climate change adaptation	DADO/ DLSO/ DDC	ASC/ASSC	At least one training programme conducted for the representatives of local institutions at the VDC level

Key areas of support	Description of activities	Main responsibility	In coordination with	Indicators of monitoring
Enhance knowledge, innovations and good practices for climate change adaptation and disaster risk management in agriculture.	▪ Develop information centers for documentation of gender sensitive local knowledge, risks and vulnerabilities at village development committees and district level	DOA/DLS	DDC/DADO/ DLSO	Information centers within DDC/DDRC established in close coordination with DADO/DLSO
	▪ Good practice database (includes indigenous and local practices) relevant to agriculture and livestock for climate change adaptation and DRM established at national level and dissemination at local level	MOAC/ FAO	DOA/DLS	A good practice database developed in the proposed secretariat in MOAC and linked to FAO database
	▪ Integrate climate change, DRM and sustainable land management into farmer field school approach and promote agricultural extension system to demonstrate and disseminate good practices	DOA/DLS	DADO/DLSO	Revised farmer field school curriculum available and at least two demonstrations conducted in each district
	▪ Include CCA and DRM issues into the curricula of agricultural colleges and vocational agriculture schools	MOAC. NARC	Ministry of Education	New curriculum includes climate change and DRM related subjects and implemented in agricultural colleges and vocational agriculture subjects
Mobilizing local communities and local institutions for climate change adaptation and disaster risk management interventions	▪ Promote establishment of model demonstrations at regional research centers by involving local communities to showcase relevant good practice examples on climate change adaptation and disaster risk management	NARC	DOA/ DLS	One model demonstration centre in each of the regional research centers established in next 5 years
	▪ Organize periodical capacity development and knowledge sharing sessions with DOA/DLS staff and local institutions and farmers on relevant aspects of climate change adaptation and disaster risk management	DOA/ DLS/	DADO/ DLSO	Annual training events organized involving participants from local institutions and farmer representatives at the regional research centers
Knowledge sharing and strategic dissemination of key reports and information material related to climate change adaptation and disaster risk management	▪ Dissemination of information on climate change impacts on agriculture and livestock through mass media, news papers, printed bulletins	DOA/ DLS	DADO/ DLSO	Routine information sharing mechanism established through the mass media
	▪ Dissemination of tested good practice examples of climate change adaptation and disaster risk management	DOA/ DLS	DADO/ DLSO	Printed leaflets, information briefs developed and disseminated at the district level.

Priority Area IV: Reducing climate related risks and underlying vulnerabilities by implementing technical options by integrating approaches of Community Based Adaptation (CBA) and Community Based Disaster Risk Management (CBDRM) in agriculture and livestock sectors

Objective: Increased capacity of extension staff, research institutes and farmers to implement and disseminate a range of tested good practices for increasing resilience against climate change impacts and natural hazards.

Gaps to be addressed: Technical options to assist farmers in increasing livelihood adaptation and resilience against climate change impacts and natural hazards are known and available at regional and national levels. However, the available options are often not known or easily accessible at community level. Climate change adaptation and disaster risk reduction measures are not systematically assessed,

documented and shared. To make climate change adaptation and disaster risk management more effective, it is of utmost significance that available options are systematically documented, shared and adapted to location specific needs in a participatory way with farmers.

Strategy: Facilitate long-term community based adaptation processes and related technology development and transfer for enhancing climate resilience and sustainable agriculture in the most vulnerable districts.

Key areas of support	Description of main activities	Main responsibility	In coordination with	Indicators of monitoring
Promote integrated production systems and economic diversification to build resilience of agriculture communities to climate change impacts	▪ Encourage the use of crops and livestock species and of integrated production systems more resistant to climate related risks	DOA/ DLS/NARC	DADO/ DLSO	New models of integrated production systems introduced in agroecological zones and adopted.
	▪ Strengthen highland-lowland linkages to improve community access to goods and services	DOA/DLS/ NARC	DADO/ DLSO	Guidelines prepared for highland-lowland linkages and adopted at watershed scale
	▪ Enabling climate vulnerable communities to sustain their livelihoods by improving access to basic agricultural services, technology and practices (on-farm agro-biodiversity management, integrated pest management, home garden promotion, farmers field school)	DOA/DLS/ NARC	DADO/DLSO	Over 50% of the communities in vulnerable districts have improved access to basic agriculture services
Promote post harvest practices to proactively manage climate related risks	▪ Promote improvement of strategic seed banks and seeds storage systems at community/district levels and enhance seed buffer stock at regional levels	DOA	DADO	Improved seed storage systems at community and district level established
	▪ Strengthen existing resource centers for seeds and saplings	DOA/ NARC	DADO/ARS	Number of existing resource centers for seeds and saplings improved.
	▪ Improve local storage practice (farm level food, animal feed and local seeds storage systems)	DOA/ DLS	DADO/ DLSO	New seed storage technologies introduced and adopted in selected districts of Terai and mid-hills
Promote risk sharing and transfer mechanisms	▪ Inventory and review of available insurance mechanisms for crops, and livestock and saving and credit schemes in participation of relevant stakeholders and outline recommendations	MOAC/ FAO	DOA/DLS	A report available with recommendations and subsequent implementation at the national level
	▪ Assess scope and feasibility for risk transfer mechanisms in agricultural sector and develop strategy tailored to the needs of medium and small farmers	MOAC/ FAO	DOA/DLS	Small farmer risk transfer mechanisms devised and guidelines available.
Reducing land slide and erosion risks through community level interventions	▪ Encourage practices for reducing landslide risks, soil erosion control and nutrient loss	MOAC/DOA/ DLS	DADO/ DLSO	Innovative, indigenous and improved practices of land slide treatment and erosion control available
	▪ Discourage settlements in flood prone areas and invest on river training especially to reduce flood risks.	DDC	Dept. of Water-induced Disaster	New guidelines on settlements in hazard prone areas
	▪ Promote terrace management in hills to reduce the risk of landslides and Slope Agriculture Land Technology (SALT)	DOA	DADO	Improved models of SALT introduced in mid-hills and mountains and adopted

Key areas of support	Description of main activities	Main responsibility	In coordination with	Indicators of monitoring
Promote sustainable biodiversity, land and soil management practices	▪ Promote natural and social heritage conservation relevant to agriculture and community level bio-diversity conservation practices through community mobilization.	DOA		New guidelines on heritage conservation and bio-diversity conservation introduced.
	▪ Mitigation of river cutting and promotion of sustainable livelihood activities on the river embankments in selected pilot districts	Dept. of Water-induced Disaster Prevention	DDC	River embankment strengthening activities are carried out with other relevant agencies
	▪ Sustainable land and soil management (organic farming, community biodiversity management, integrated nutrient management etc.,)	DOADLS		At least 20 districts have introduced sustainable land and soil management practices
	▪ Integrate climate change adaptation and mitigation priorities into activities of the forest user groups and leasehold forestry in pilot scale and promote sustainable forest resource management (community fire control, non-timber forest products management etc.,)	MOFSC/DOF	DFO	Practices contributing to adaptation and mitigation introduced through forest user groups in mid-hill districts as part of the first phase.
Sustainable water management and conservation practices on farmers fields	▪ On-farm water conservation and management practices for supporting vulnerable communities (water harvesting schemes, multi use water system and technologies e.g. drip irrigation)	DOA	DADO	New water conservation practices introduced, demonstrated and adopted.
	▪ Increase irrigation coverage where water resources are available without negative impacts on ground water	DOI	DIO	Number of hectares of additional area under irrigation
	▪ Improve water harvesting techniques, water productivity and drought management in selected Terai and mid-hills	DOA/NARC	DADO /ARS	Number of new techniques introduced and adopted
Improve construction of animal shelters and hen pens including guidelines and promote proactive animal/livestock management initiatives	▪ Develop standards for animal shelter	DLS/NARC	DLSO	New standards followed for constructing animal shelters
	▪ Vaccination of animals before start of the rainy season in vulnerable districts	DLS	DLSO	Coverage of existing vaccination programmes to additional VDCs
	▪ Promote fodder and forage grass cultivation in the bunds and community lands	DLS	DLSO	New species identified and technology introduced and adopted by the farmers
	▪ Supply of improved fodder seeds and fodder storage methods	DLS	DLSO	Improved practices introduced and adopted by the farmers
	▪ Link local dairy and milk production to urban markets	DLS/NDC	DLSO	Mechanisms established to improve value chain linkages
	▪ Promote improved manure management and support to implement biogas plants at community level and animal waste recycling as manure	DLS/BSP-Nepal	DLSO	Number of biogas plans established through DLS in close collaboration with BSP.
Promote community action plans for climate change adaptation and disaster risk management and package lessons learned	▪ Mobilize and develop community action plans with the involvement of local stakeholders and integrate with technological options proposed as part of food security programmes and district disaster risk management plans	DDC/DOA/DLS and others	DDC, DADO, DLSO	Number of VDCs having community action plans
	▪ Promote community based organizations and local communities to implement local adaptation and disaster risk management plans	DDC/DOA/DLS and others	DDC/DADO/DLSO	Number of VDCs implemented community action plans
	▪ Package lessons learned from CBA and CBDRM interventions as a background to promote enabling policy provisions to support CBA and CBDRM in agriculture.	DDC/DOA/DLS and others	DDC/DADO/DLSO	Number of agriculture and food security policies/plans considered CBA/CBDRM actions.

Priority Area V: Strengthen capacities and procedures for effective disaster preparedness, response and rehabilitation at all levels and integration of climate change adaptation into response, recovery and rehabilitation initiatives

Objective: Enhance the national and local capacities for disaster preparedness, response and rehabilitation and ensure that climate change adaptation actions are considered in all relevant interventions

Gaps to be addressed: A significant resources are being allocated for response and rehabilitation after natural disasters. Mostly all these efforts are ad hoc in nature focusing on the immediate needs. These interventions can be utilized as an opportunity to integrate climate change adaptation priorities considering long-term perspectives.

Strategy: Facilitate long-term sustainable risk reduction and adaptation measures as part of response and rehabilitation interventions.

Key areas of focus	Description of activities	Main responsibility	In coordination with	Indicators of monitoring
Promote regular contingency planning at all levels	▪ Conduct a contingency planning exercise in hazard exposed districts and identify the practices to facilitate preparedness, response	DOA/ DLS/ DDC	DADO/DLSO	All the most vulnerable districts are having contingency plans
Enhance adequate response measures to improve effectiveness of emergency response actions	▪ Formulate definitions and protocols for emergency situations in agriculture and food security and phasing of emergency response	MOAC/ FAO	DOA/DLS	Improved protocols and guidelines available for phasing of emergency response and recovery
	▪ Strengthen mechanisms to provide timely early warning systems for timely response	DHM/ MOAC MOAC	DOA/DLS DOADLS	Improved capacity to interpret and response to timely warnings exists.
	▪ Preserve seeds/saplings at community/district/ regional levels	MOAC	DOA/DLS	Quality seeds and saplings maintained at the district and community levels as preparedness for emergency response.
	▪ Motivate to maintain emergency fund to contribute to support to farmers	MOAC	DOA/DLS	Emergency funds promoted at the community level through existing cooperatives and farmer groups
	▪ Promote establishment of strategic emergency buffer stocks of seeds, and key agricultural inputs in district agricultural development offices or at regional level	MOAC	DOA/DLS	The district level offices maintain specified quantity of inputs allocated for emergency response
Standardize the content/ format of information collection on disaster impacts	▪ Standardize procedures and promote institutional cooperation to faster damage and needs assessment in agriculture	MOAC/ DDC	DOA/DLS	The MOAC and its departments participate in the national mechanisms to be able to provide damage and needs in agriculture sector
	▪ Apply a livelihood based integrated damage, loss and needs assessment methodology including pre-disaster baseline data in all hazard exposed districts and VDCs (linked to risk reduction and preparedness)	DOA/DLS/DDC	DADO/DLSO	A new guidelines available integrating livelihood based approaches.
Build capacity to know the risks at all levels to plan for better preparedness and response	▪ Promoting localized information dissemination mechanisms including posting of pertinent information at public places in remote villages (met info/warnings/ vulnerability maps etc)	DOA/DLS/DHM	DADO/ DLSO/DDC	Printed materials available and accessible to communities

Key areas of focus	Description of activities	Main responsibility	In coordination with	Indicators of monitoring
Strengthen capacities to integrate CCA, DRM and sustainable natural resources management into response and rehabilitation projects	▪ Use response, recovery and rehabilitation projects as entry point to initiate better disaster risk reduction (short-term) and climate change adaptation (long-term) applying the principle of building back better.	MOAC/MOHA	DOA/DLS/DDC	The response, recovery and rehabilitation projects implemented with a long term perspective rather than ad-hoc emergency supports

Cross-Cutting Priorities

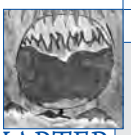
The Priority Framework for Action (PFA) considers four cross cutting elements that should be part of all the priority actions outlined in this chapter.

Capacity development: Strengthening institutional and technical capacities is necessary for effective implementation of the priorities. Though capacity development is specifically addressed under the Priority Action Area I, this applies to all the priority action areas based on the need. The core areas of capacity development includes research and development, technology transfer, tools and methods for assessment, agriculture and livestock support services, policy advocacy, awareness raising and mainstreaming.

Knowledge and communication: There is a lack of knowledge and awareness about the climate related impacts and adaptation measures at all levels. Communication between the research and development in general and to the extension system in particular are the key to transfer new innovations to the farmers. Generation, documentation, sharing and application of information directly contribute to meeting priority action III.

Partnerships: Strategic partnership promotes an interdisciplinary approach in implementing the priority actions. The priority Framework for Action (PFA) foresees partnership at all levels and among the agencies and ministries. Specific collaboration and coordination arrangements at various levels are described in Chapter 4.

Gender Equity: The gender dimension is crucial in the agriculture sector, where gender inequalities in access to and control over resources are persistent, undermining a sustainable and inclusive development of the sector. The gender roles and relations affect food security and household welfare, critical indicators of agriculture development. Integration and mainstreaming of gender priorities in all the activities is the key for successful implementation of the priority framework for action.



CHAPTER 4

INSTITUTIONAL AND COORDINATION MECHANISM FOR IMPLEMENTING THE PRIORITY FRAMEWORK FOR ACTION (PFA)

Existing institutional mechanisms

The Ministry of Agriculture and Cooperatives (MOAC) is the main body responsible for implementing the priority framework of action. The implementing agencies shall be the two Departments, namely, DOA and DLS of MOAC. The Ministry is the central apex body of the Government of Nepal to look after the agriculture and allied fields in the country. The MOAC consists of five divisions, two Councils, four Departments, one Autonomous Body, one Research Council, three Corporations and a Development Committee and Board. Agriculture development programs are run in all 75 districts. Several agricultural services centers and thousands of pocket areas at the grass root levels are in operation. The supervision and technical backstopping at the regional level are carried out through five Regional Directorates each for agriculture and livestock departments.

The Department of Agriculture (DOA) is headed by the Director General (DG), there are three Deputy Director Generals (DDGs): (1) DDG-Planning and Human Resources; (2) DDG-Monitoring Evaluation and Management; and (3) DDG-Technology Transfer and Coordination. There are twelve Program Directorates, five National Programs, five Regional Directorates, five Regional Training Centers, Farms/Centers, Labs, Quarantine check Post and other offices under DOA. There are seventy five District Agriculture Development Offices, and three hundred seventy eight Agriculture Service Centers in Nepal.

At present, the CCA and DRM activities are under the DDG-planning and human resources. The DDG is also Project Manager of the first CCA/DRM project implemented through the FAO-TCP (TCP/NEP/3201 (D)) to "strengthen capacities for disaster preparedness and climate risk management in the agricultural sector". To make the CCA and DRM and their related activities effective, a team of seven to nine existing staff of Planning and Human Resources Section can be utilized. It is proposed to form a technical and coordination group for CCA and DRM under Director General, Department of Agriculture. The existing committee formed under the TCP project can serve this role.

As the CCA and DRM actions are location specific and in order to cater the needs of the vulnerable districts, a team of regular staff who is responsible to supervise, coordinate, and facilitate the planning and implementation of the prioritized activities is needed. Periodic monitoring of CCA and DRM activities should be carried out by existing human resources and as per the regular procedures of the Department.

The Department of Livestock Services (DLS) has four Program Directorates: (1) Animal Health; 2) Livestock Production; 3) Livestock and Training Extension; and 4) Livestock Marketing and Promotion. For the CCA and DRM activities, Planning Section does have overall responsibility. Under the Director General, Department of Livestock Services, a core working group need to be formed to look after both technical and coordination aspect of CCA and DRM. The technical staff trained under the TCP project may be part of the technical and coordination group within the Department of Livestock Services.

Proposed implementation arrangements MOAC

The MOAC is supported by five divisions, namely the Planning Division, Monitoring and Evaluation Division, Gender Equity and Environment Division, Agribusiness Promotion and Statistics Division and Administration Division. The Gender Equity and Environment Division performs activities on environmental, plant genetic resources and agro-biodiversity, pesticides, organic agriculture and climate change issues through the Agricultural Environment and Biodiversity Section. The division worked as a

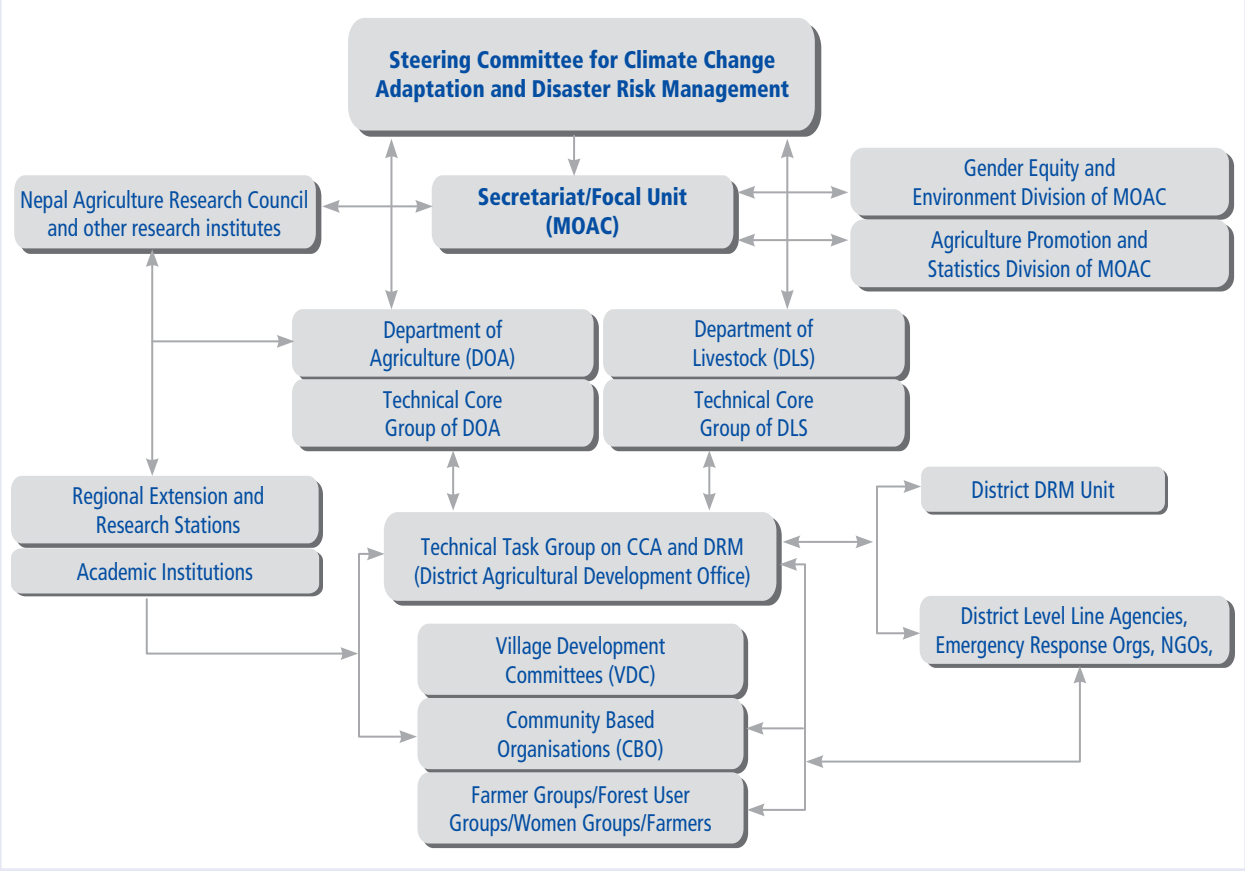
desk office in the Ministry to coordinate the activities of FAO supported climate change adaptation and disaster risk management project.

The Gender Equity and Environment Division can be an official coordinating unit for climate change related aspects. At present, the Gender Equity and Environment Division (GEED) is also acting as a coordination unit with the thematic Committee (Agriculture and Food Security) of the NAPA. One of the Under Secretaries from the Agricultural Environment and Biodiversity Section is appointed as a member in the thematic committee. However, the Agriculture Environment and Biodiversity Section do not have adequate manpower to coordinate all the activities proposed as part of the Priority Framework for Action. This unit needs to be strengthened with additional manpower and technical expertise to address issues related to climate change adaptation.

Currently, the statistics section of the Agribusiness Promotion and Statistic Division (ABPSD) is working as a focal point for all the disaster related activities (pre, during and post disaster rehabilitation). The ABPSD is responsible for the collection and processing of agricultural statistics. At present, the crop data are being collected mostly by subjective method. This unit needs to have close collaboration with the GEED in future in order to have a comprehensive and integrated approach of addressing the climate risks both in short term (extreme climate events) and long term (climate change).

At the department level (DOA and DLS), there is currently no unit established to carry out the climate change and disaster risk management related aspects. There are focal points nominated to implement the FAO assisted project combining CCA and DRM. This needs to be upgraded as a technical core group with dedicated staff responsible for coordinating and implementing the activities relevant to climate change adaptation and disaster risk management.

On the research part, the Environment unit in Nepal Agriculture Research Council (NARC) is undertaking studies on climate change impact assessment on cereals and vegetables. In the present context, the environment unit of NARC needs to be upgraded to



a Division under the present Directorate of Planning and Coordination of NARC to enable future activities and coordination with other partners.

The present steering committee chaired by the Secretary (Agriculture) in MOAC can be made a permanent body. The steering committee can be responsible for approving the annual work plans related to CCA and DRM in close linkages to its secretariat within the Ministry of Agriculture and Cooperatives.

As the CCA and DRM are the priorities to be integrated into the overall work of the DOA and DLS, it is important to strengthen their technical capacities. The trained man power (technical core group) from these departments can look after the technical issues related to CCA and DRM. The technical core group with dedicated staff can be created to undertake the work related to climate change adaptation and disaster risk management. This technical core group may be converted into a unit with dedicated staff based on the need. The proposed technical capacity development for the DOA and DLS is very important to effectively implement all the five major result areas described in the priority framework for action. The two departments DOA and DLS are responsible for the implementing the CCA and DRM activities in all 75 districts and service centers on priority basis. The concerned units of both departments will directly coordinate with the Secretariat/Focal Unit in the Ministry of Agriculture and Cooperatives.

The responsibility of field level work is under the District Agricultural Development Office (DADO) at the district level. Creating awareness among the farmers and the local community, training program on the impact of climate change and disaster risk management in agriculture, update of district risk management plans, demonstration of CCA and DRM good practice examples, regular update of field school curriculum and other extension activities should be held at the district and community level. To develop the capacity, training programs and periodic field trips need to be arranged for the district level offices.

At the district level, at present, the Technical Task Group for CCA and DRM is chaired by DADO and this also includes DLS staff. Under the technical support of DADO and DLSO, the farmer field school curriculum should be revised and incorporated with resource materials relevant to climate change adaptation and disaster risk management. The district level technical task group can conduct vulnerability and risk assessment on a regular basis to identify vulnerable areas in a phased manner. These resources can be used to develop new district disaster management plan or update existing plans.

Coordination mechanism

At present, the GEED and ABPSD in the MOAC are looking after the CCA and DRM related activities respectively. At the district level, the DADO in collaboration with DLSO, DDC, and development agencies and farmers groups are responsible to implement the programmes as per the guidelines of the MOAC. There are number of other players from different Ministries, International Organizations, Ministerial Divisions and Departments are engaged in climate change and disaster risk management. For enhance the effectiveness of local actions proposed in the Priority Framework for Action, coordination mechanism is central. The suggested coordination mechanisms are:

- Inter-sectoral/inter-agencies mechanism: There are number of agencies at the national and decentralized levels are active in CCA and DRM activities. At the national level the proposed focal unit at the Ministry of Agriculture and Cooperatives and the focal points in the DOA and DLS may liaise with the Ministry of Environment (MOE), Ministry of Home Affairs (MOHA), Ministry Forest and Soil Conservation (MOFSC) and international and UN agencies such as FAO, UNDP, WFP and other relevant INGOs and NGOs. The secretariat/focal unit will also liaise with all the members of the steering committee drawn from Ministries, organizations and departments at the national level.

- Intra-sectoral mechanism: The proposed focal unit for CCA and DRM in the MOAC can liaise with the focal points and the technical core group members through the respective heads of the departments in DOA and DLS to channel programmes and projects related to climate change and disaster risk management with the approval of the steering committee.

Monitoring and evaluation

A central level monitoring and evaluation system will be developed by MOAC in order to track per-

formance on implementation of activities specified in the PFA. The system will also identify success and failures of implementation and key lessons learned from various components of the framework. The matrices of indicators outlined in chapter will be elaborated during the implementation phase. Each project will develop specific baselines prior to implementation of the actions. The cross cutting elements such as gender integration, capacity development, policy advocacy and awareness rising will also be considered as key indicators.

The monitoring and evaluation system will be administered by the secretariat/focal unit proposed to be established within the MOAC. The unit will develop common guidelines and will be made available to all stakeholders and development partners. The unit will bring all the projects into the central monitoring and evaluation system. The unit will also collate all the outputs of the projects and will be made available through the central database to be maintained at the secretariat. The reports and outputs will be reviewed to find the suitability of good practice examples to replicate in similar areas of the country.

Institutional MOAC collaboration to strengthen CCA and DRM in agriculture

Climate Change Adaptation

The Ministry of Environment (MOE) is the focal ministry for climate change and environmental matters. The ministry formulates and implements policies, plans programs related to the environment; carries out research on environment and technology and promotes alternative energy. The Ministry of Environment has a full mandate in climate change related activities in Nepal. The Ministry has undertaken a lead role to prepare the National Adaptation Programme of Action (NAPA).

Agriculture and Food Security Thematic Working Group (TWG) of the NAPA is coordinated by the Gender Equity and Environment Division (GEED) of the Ministry of Agriculture and Cooperatives. The division may continue to coordinate all climate change related aspects with the Ministry of Environment, other development partners and research institutes. The coordination and collaboration with the proposed climate change programme coordination and monitoring unit within MOE is essential to draw resources for agriculture sector and to avoid duplication of efforts.

Disaster Risk Management

The Ministry of Home Affairs (MOHA) is the apex body in relation to disaster management in Nepal. The Ministry formulates and implements national policies, plans and programs on disaster risk management. The Ministry is responsible for providing rescue and relief to the disaster victims. Data collection and dissemination, collection and distribution of funds and resources are also vital functions of the Ministry of Home Affairs. A Central Disaster Relief Committee (CDRC) under the chairmanship of the Home Minister provides policy guidelines and directives to the operating agencies for rescue and relief works. Being the focal point, the Ministry of Home Affairs has the responsibilities to coordinate the activities relating to disaster preparedness, mitigation and reconstruction as well as rehabilitation with other agencies.

The Ministry of Home Affairs is also responsible for local administration and the maintenance of law and order. It has 4 divisions – Management, Personal Administration, Law and Order, and Planning and Special Services, 5 regional administration offices, and 75 district administration offices. The Disaster Management Section is under the planning and special service division of the ministry. The National Emergency Operations Center (NEOC) operates under this division. The main objective of the center is to act as a coordination and communication point for disaster information across Nepal, including government agencies and other response and recovery stakeholders such as Nepal Red Cross Society, UN agencies, INGOS and NGOs.

The Central Disaster Relief Committee (CDRC) provides necessary funds, resources and relief materials to the natural disaster victims through the District Natural Disaster Relief Committees (DDRCs). Central Natural Disaster Aid Fund under the control of the Central Disaster Relief Committee and the District Natural Disaster Aid Fund under the control of the District Disaster Relief Committee are in operation. The Central Fund is released to the District Disaster Aid Funds according to need and justification for immediate rescue and relief assistance to the victims of natural disasters.

The disaster management section carries out various types of public awareness training programs on disaster risk management and conducts risk assessment through projects in close collaboration with international and national organizations. The section sends messages through mass media so as to make people aware of the natural disasters. The section has a central database system and it publishes annual reports, risk maps, booklets and pamphlets for information dissemination. The proposed secretariat and focal unit for climate change adaptation and disaster risk management with the Ministry of Agriculture and Cooperatives (MOAC) can be a focal point to coordinate activities together with the Ministry of Home Affairs in all activities related to agriculture.

Promoting decentralized DRM planning

The National Strategy for Disaster Risk Management in Nepal links the International Hyogo Framework of Action (HFA) to Nepal's specific context, and sets an agenda for priority action to mainstream disaster risk management into Nepal's development. This also promotes development of District Disaster Risk Management Plans to support the district level hazard risk and vulnerability assessment and identification and implementation of the priorities with a multi-sectoral context. By analyzing the impacts of the climate risks (short and long term) and the fundamental vulnerabilities, and by identifying the key institutions at the district and local level, the plan sets strategic priority activities for the district. As several agencies are involved and closely connected to the communities, participation at the district level institutional mechanisms for DADO/DLSO to articulate importance of agriculture and livestock sector is essential.

Sustainable Natural Resources Management

Sustainable natural resources management is one of the major elements of the priority action areas in the framework. Strengthening collaboration with relevant ministries and departments is the key for successful implementation of the local actions. The Ministry of Irrigation (MOI)'s two major departments: Department of Irrigation (DOI) and Department of Water Induced Disaster Prevention (DWIDP) are responsible for managing water resources in the country. Department of Irrigation is mandated to plan, develop, maintain, operate, manage and monitor different modes of environmentally sustainable and socially acceptable irrigation and drainage systems. Its ultimate aim is to provide year round irrigation facilities and increase the irrigable area of the country. Apart from this, the DOI also has to carry out river- training activities to protect the floodways, floodplains and agricultural lands in the form of river bank protection such that the loss of properties caused by flooding is reduced.

The Department of Water Induced Disaster Prevention (DWIDP) has a mandate to assist the Ministry in formulating river management policy, carrying out emergency disaster prevention and rehabilitation works including river-training and inundation mitigation, conduct research, training and workshops and create public awareness, develop and transfer of conservation technology, develop disaster information systems and prepare hazard and risk maps. As many activities of CCA and DRM within the PFA are inter-related, collaboration with these departments will enhance the efficiency and sustainability of the local interventions.

Similarly, the Department of Soil Conservation and Watershed Management (DSCWM) within the Ministry of Forestry and Soil Conservation (MFSC) is responsible for planning, implementation, and monitoring soil conservation and watershed management programs/activities based on the principles of integrated watershed management. Its activities include land use development planning, community integrated watershed management focusing on land productivity conservation, development infrastructure protection, natural hazard prevention, community soil conservation and extension, community mobilization and empowerment, nursery establishment and seedling production, technology development, study and mapping, and monitoring and evaluation. The whole system of DSCWM is in itself highly relevant to CCA and DRM and some of them are directly related to agriculture and thus coordination is necessary between the line agencies.

Weather and climate information

The Department of Hydrology and Meteorology (DHM) is responsible for collection, analysis and dissemination of hydro-meteorological data including snow and ice. It focuses on five program areas – hydrology, climatology, weather forecasting, flood forecasting, and glacier and snow hydrology. The weather forecasting is provided for international

aviation as well as general 24 hrs weather forecast is provided to the public. The DHM's role is expected to broaden and development of new forecast products will be useful to enhance the information use in agriculture for disaster risk management and climate change adaptation. In this regard, the MOAC, DOA and DHM need to collaborate to facilitate smooth transfer of data and information products for agricultural applications. Training programmes were organized to the MOAC, DOA and DLS staff on climate change impacts, vulnerabilities and application of weather and climate information in agriculture as part of the FAO project. The activities could be continued by strengthening the collaboration with the Department of Hydrology and Meteorology.

Strengthening of existing committees in MOAC

Food and Agriculture Sector Working Group

There are several Committees and Working Groups under the MOAC. The key committees relevant to CCA and DRM activities proposed in the PFA are presented here. The major working groups and committees are: the Food and Agriculture Sector Working Group (FASWG), Steering Committee for Strengthening Capacities for Climate Change Adaptation and Disaster Risk Management in Agriculture and the Technical Advisory Group (TAG).

After the 1993 natural disaster in Nepal, three groups, namely, food and agriculture; health; and logistic were formed with the objectives (a) to establish a channel of communication between the GoN and the international community in order to provide technical and financial support following a disaster, (b) to assist the GoN in performing assessment, analyzing and interpreting the data and formulating an appropriate intervening strategy, (c) to work closely with the GoN in identifying various needs following a disaster, (d) to provide a conduit for information exchange between disaster management actors, and (e) to provide guidance and as an information resource to the international community on the current process and procedures of the GoN for disaster response.

In MOAC, the Food and Agriculture Sector Working Group (FASWG) was established in 2004. The FASWG is composed of representatives from different institutions working in the realm of food and agriculture. The core group consists of representatives from the following agencies:

- Ministry of Agriculture and Cooperatives (MOAC)
- Ministry on Industry, Commerce and Supplies (MOICS)
- Ministry of Home affairs (MOHA)
- Ministry of Health (MOH)
- Nepal Food Corporation (NFC)
- Disaster Management Unit of UNDP
- World Food Programme (WFP)
- Food and Agricultural Organization (FAO)
- NGO Federation, Nepal
- Other NGOs and Private sectors

Considering the constant transfer of employees in these institutions; the FASWG considered appropriate to have two representatives per institutions in the FASWG to ensure representation of all institutions in the working group. However, if necessary, other institutions will be invited to participate in the meetings.

Objectives

- The overall objective of the FASWG is to ensure that human survival and well-being particularly in the realm of food and agriculture – are assured in case of any emergency. This goal will be reached through the coordination of preparedness and relief activities, among the FASWG members and the GoN. The main objectives of this working group are:
- Facilitate communications among the members by providing financial and technical support;
- Formulate an appropriate strategy for assessing losses and needs in the areas of food and agriculture;
- Identify the priorities for maintaining a minimum food security reserve;
- Address the disaster situation and assist the GoN timely and effectively in case of disaster;
- Monitor on a continuous basis the disaster situation and signs of floods, landslides, drought, crop diseases, insect infestation, food-borne, and farm animal diseases;
- Provide a conduit for information exchange between Nepal and international crop monitoring facilities;

The nature of support activities undertaken by the FASWG are as follows:

Immediate Support

- Act as a liaison among concerned national and international agencies;
- Collect and analyze information related to the disaster situation;
- Identify donors and INGO interests, resources, capabilities and processes;
- Assist the GoN to present and appeal to donors for support;
- Assist the GoN and the LSWG in the development of systems for distributing relief supplies;
- Coordinate a system among donors to ensure that adequate and timely food and other agricultural relief is provided to the disaster victims at the country level;
- Ensure that the aid is appropriate to Nepal's dietary and agricultural practices; and
- Assist in preparing detailed status maps outlining where both the GoN and NGO support activities are taking place.

Long-Term Support

- Assist the GoN in developing a long-term food and agriculture support plan for the rehabilitation stage of a disaster;
- Assist the MOAC and MOICS in assessing the impact of disaster on the country food security;
- Assist in carrying out an assessment of food, seed and fertilizer stocks available within the country;
- Assist in formulating a food and agricultural intervention strategy that would minimize short and long-term price distortions on the food and agriculture sector; and
- Assist in the preparation of projects for agricultural rehabilitation and emergency food stock.

The type of activities coordinated by the FASWG will depend upon the scale (magnitude) and characteristics of the disaster. The working modality may differ in terms of a rapid-onset disaster (floods, landslides, earthquake, insect infestation and animal epidemic) or a slow – onset disaster (drought and starvation). The Terms of Reference of the working group need to be revised incorporating the elements necessary to implement the PFA described in this document.

Steering Committee for CCA and DRM in Agriculture Sector

The FAO assisted TCP\NEP\2301 (D) has started in October 2008 to strengthen capacities for climate change adaptation and disaster risk management in the agriculture sector. The Steering Committee for DRM and CCA in MOAC is chaired by Secretary. The members of the steering committee are as follows:

- Joint Secretary, Planning Division, MOAC
- Joint secretary, Monitoring and Evaluation Division, MOAC
- Joint Secretary, Agri-business and Statistics Division, MOAC
- Director General, Department of Agriculture
- Director General, Department of Livestock Services
- Director General, Department of Hydrology and Meteorology
- The Representative, Ministry of Environment
- The Representative, Ministry of Local Development
- The Representative, Ministry of Home Affairs
- The Representative, Ministry of Energy
- The Representative, Department of Water Induced Disaster Prevention
- The Representative, UNDP

Technical Advisory Group (TAG)

The Technical Advisory group was also established on July 2009 for DRM and CCA in MOAC. These are the following members.

- The Representative from Gender Equity and Environment Division, MOAC
- The Representatives from Agri-business and Statistics Division, MOAC
- The Representatives from GIS Section, MOAC
- The Economist and Agronomist from Department of Agriculture
- The Representatives from Department of Livestock Services
- The Representatives from Department of Water Induced Disaster Prevention
- The Representatives from Department of Hydrology and Meteorology
- The Representative, Ministry of Home Affairs
- The Representative, Ministry of Local Development
- The Representative, Ministry of Environment
- The Representative, Ministry of Energy

In case of need, the Steering Committee can nominate the representatives from other Government and non- Government Organization. The Steering Committee would nominate the focal person from the above organizations.

ANNEX I

BASIC DEFINITIONS OF TERMINOLOGY

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Adaptive Capacity: The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Capacity Building: In the context of climate change, capacity building is developing the technical skills and institutional capabilities in developing countries and economies in transition to enable their participation in all aspects of adaptation to, mitigation of, and research on climate change, and in the implementation of the Kyoto Mechanisms, etc.

Climate Change: Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. The United Nations Framework Convention on Climate Change (UNFCCC) defines 'climate change' as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.

Climate Variability: Climate variability refers to variations in the mean state and other statistics (such as standard deviations, statistics of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability). See also climate change.

Climate Change Impact Assessment: The practice of identifying and evaluating, in monetary and/or non-monetary terms, the effects of climate change on natural and human systems.

Climate Change Impacts: The effects of climate change on natural and human systems. Depending on the consideration of adaptation, one can distinguish between potential impacts and residual impacts: Potential impacts: all impacts that may occur given a projected change in climate, without considering adaptation. Residual impacts: the impacts of climate change that would occur after adaptation.

Disaster: A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster Risk Reduction (DRR) refers to the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

Disaster Risk Management (DRM) consists of a management perspective that combines prevention, mitigation and preparedness with response.

Drought: The phenomenon that exists when precipitation is significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems.

Hazard: A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Natural hazards can be classified according to their geological (earthquake, tsunamis, volcanic activity), hydrometeorological (floods, tropical storms, drought) or biological (epidemic diseases) origin. Hazards can be induced by human processes (climate change, fire, mining of non-renewable resources, environmental degradation, and technological hazards.) Hazards can be single, sequential or combined in their origin and effects.

Risk: The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

Resilience: The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Risk Assessment: Diagnostic process to identify new risks that communities may face again.

Livelihood: A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain its capabilities and assets both now and in the future, while not undermining the natural resource base.

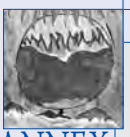
Rehabilitation: A post disaster activity performed to restore (partially or in full) the losses occurred as a result of the disaster.

Relief: a short-term support to the surviving disaster victims (food, shelter, medicines, expenses for cremation of the dead, etc.) immediately after a disaster.

Rescue: A successful effort to save lives/properties during a disaster. This may also include some of the successful efforts for the same purpose.

Sensitivity: Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea-level rise).

Vulnerability: The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.



ANNEX II

HYOGO FRAMEWORK FOR ACTION (HFA) 2005-2015

Hyogo Framework of Action 2005-2015 (HFA) is the consensus strategy adopted by 168 member countries in the UN World Conference on Disaster Reduction in January 2005 in Kobe in order to spearhead the task of disaster risk reduction globally. The HFA 2005-2015 was developed based on the gap analysis in the national and global efforts in DRR in the preceding decade from 1994-2004.

The goals set by the HFA 2005-2015 are: a) Integration of disaster risk reduction into sustainable development policies and planning, b) Development and strengthening of institutions, mechanisms and capacities to build resilience to hazards, and c) Systematic incorporation of risk reduction approaches into the implementation of emergency preparedness, response and recovery program. It recommends five priorities for Action, namely,

- Priority Action 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.
- HFA Priority Action 2: Identify, assess and monitor disaster risks and enhance early warning.
- HFA Priority Action 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
- HFA Priority Action 4: Reduce the underlying risk factors.
- HFA Priority Action 5: Strengthen Disaster preparedness for effective response.

The HFA Framework provides logical steps for achieving DRR; knowledge of the risk faced, especially from a participatory process with the participation of the people and communities at risk, is the starting point. Once the risk is known and there is a conviction on the possibility and commitment for reducing the risk, one needs the knowledge, skills, and methodologies for reducing the risk. The next priority action stresses on knowledge management for DRR aiming at propagating the knowledge and empowering communities with the skills. The next step suggested is to home into action for risk reduction targeting the causative factors; thus, it focuses on risk assessment as the starting point for DRR.

However, risk reduction is a long-term process, and there is always some residual risk at any point in time, hence the Framework suggests also disaster preparedness for effective response. All the steps mentioned above are possible only if there is a firm commitment by the nation to make disaster risk reduction as its priority and if it creates suitable legal, policy and institutional arrangements for implementing the DRR initiative, which forms the first priority action of the HFA. Nepal has expressed its commitment to DRR by signing the HFA 2005-2015. Nepal has already prepared the NSDRM and outlined the strategy for the food and agricultural sector.

III ANNEX

PRIORITIES OF CLIMATE CHANGE ADAPTATION

First national communication to UNFCCC

Nepal first National Communication (2004) to United Nation Framework Convention on Climate Change (UNFCCC) has suggested the following priorities on climate change and agriculture.

- Develop drought tolerant crop varieties and study the use of traditional varieties;
- Estimate the change in production rates with Carbon dioxide fertilization and temperature increase on different crops - rice, field crops, and vegetables;
- Study the role of agro-silviculture systems in Nepal- which are regarded as carbon dioxide sinks;
- Undertake studies of economic models that determine the ability to mitigate climate change through emission reduction vs. the ability to adapt to such changes through adjustments in production functions;
- Study the aspects of soil organic matter and nutrient cycling (rates of accumulations, decomposition, etc.) in relation to climate change and agricultural sustainability;
- Study the effect of different traditional practices such as green manuring, continuous cropping with fertilizer, multiple cropping, modified alley-farming, etc., on mitigating climate change impacts;
- Study the effect of climate change impact on weed, pest and disease occurrence of cultivated crops and develop forecasting systems;
- Identify agro-ecological zones particularly sensitive to climate change impacts and potential vulnerable areas;
- Undertake studies to determine the probability of drought in different agricultural seasons and in different areas;
- Examine factors affecting methane production in rice grown under different agro-ecological zones and farming practices;
- Study of the impact of climate change on water availability and crop water requirements;
- Promote rain-fed farming and efficient utilization/conservation of water; and
- Develop integrated farming systems

National Adaptation Programme of Action (NAPA)

The NAPA provides a process for the LDC to identify, communicate and prioritize the most "urgent and immediate" adaptation needs, and respond to those needs. The priority activities identified through the NAPA process will be made available to the entity that will operate the LDC fund, and also other sources of funding, for the provision of financial resources to implement these activities. Based on the FAO/ TCP workshop (February 23, 2010 to support NAPA) findings, five main projects with 40 corresponding activities on Agriculture have been prepared. These five proposed projects and forty linking activities are as follows:

Five Proposed Projects

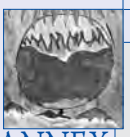
- On–farm soil and water conservation initiatives for supporting communities vulnerable to climate change impacts;
- Enabling climate vulnerable communities by improving local access to agricultural services;
- Strengthening highland-lowland linkages to improve community access to agricultural services;
- Linking local diary and meat production to urban markets to enable community fight against climate change impacts; and
- Building adaptive capacity to enhance community resilience to climatic hazards.

ANNEX IV

PRIORITIZED ACTIVITIES FROM THE NAPA WORKSHOP ON AGRICULTURE AND FOOD SECURITY

Key areas	Priority activities
Irrigation and water management	■ Increase irrigation facilities through the promotion of shallow tube well, water collection/recycling and rain water harvesting; ■ Promotion of low cost non-conventional irrigation technology including drip/sprinkle irrigation, Thai-Jar and overhead water tank;
Resource conservation	■ Promotion of resource conservation technologies including minimum tillage, seed priming, crop mixtures, double transplanting of rice and low nutrient requiring widely adapted crop species; ■ Promotion of organic agriculture practices with special focus on bio-pesticides, organic fertilizers, crop nutrients and pest management; ■ Promotion of organic agriculture practices with special focus on bio-pesticides, organic fertilizers, crop nutrients and pest management and multiple cropping; ■ Improved collection and utilization of rain water in pasture and rangeland areas;
Strengthening agriculture service systems	■ Distribution of crop seeds, seedlings, saplings and fingerlings adaptable to local conditions; ■ Promotion of a community seed bank for cereals, vegetable, forage, fodder and agro-forestry species; ■ Promotion of crop varieties for vulnerable areas, adaptable to climatic stresses and suitable to supply a high quantity of food;
Infrastructure development for risk reduction and effective response	■ Infrastructure (such as plastic/ green house for off season vegetable) and marketing development for agro-based micro-enterprises development; ■ Stockpile agricultural inputs and emergency food supplies through establishment of stores (cold stores and zero energy storage) and decentralized food buffer stocks; ■ Embankment and plantation on river bank areas; ■ Sloping agricultural land management for soil conservation.
Policy development, mainstreaming	■ Agriculture development policy review in terms of agricultural finance and inputs, small scale irrigation, seed banks, food storage and buffer stock and market from climate change adaptation perspectives; ■ Promotion of resource efficient technologies (ensuring high income) regarding vegetables, fruits and flower production; ■ Promotion of pocket area production to back up seed banks and food buffer stocks; ■ Diversify food dishes of nutritionally rich cultivated and wild food crop species of local origin; ■ Strengthening marketing institutions and network at strategic centers in different ecological regions (Koshi, Gandak and Karnali river basin); ■ Enacting pro-farmer land use policy and programs; ■ Protect local community rights on its natural resources and indigenous knowledge, practice, skill and innovations;
Livestock and animal husbandry	■ Improve performance of piggeries with emphasis on housing, mortality and ration management; ■ Promote community approach of innovative pasture and rangeland management using locally adapted fodder and forage species; ■ Improve animal housing, nutrition (based on local feed, fodder and forage supply/ production), disease and parasite management; ■ Improvement of indigenous breeds of pigs, poultry, goat and sheep; ■ Studies of climate change impacts on farm animals with particular reference to reproductive cycle, heat period, infertility, diseases/parasites incidences and declining productivity; ■ Promotion of poultry, dairy, goat and piggery based enterprise linking with urban markets; ■ Integrate eco-tourism and sport fishing in sustainable community development;

Key areas	Priority activities
Fishery and aquaculture	■ Fish species conservation especially in rivers used for hydropower and irrigation (improve fish migration); ■ Public-private partnership in fishery development especially fingerling supply in pond culture; ■ Improve carrying capacity of natural water bodies (rivers, lakes, reservoirs and other wetlands) for sustainable community fish production and marketing; ■ Promote poly-culture and integrated pond culture with low-cost and high productivity technology; ■ Studies on climate change impacts on fishery; ■ Strengthening livelihoods of ethnic minority dependant on fishing;
Awareness raising and local capacity building	■ Awareness raising campaign on climate change adaptation; ■ Exposure visits, vocational training and farmers' field school to enhance adaptive capacity of local organizations and communities;
Research and Development	■ Strengthen climate change adaptation research and education; ■ Promote development of new crop varieties, livestock breeds capable of withstanding emerging climate stresses;
Impact assessment and early warning systems	■ Establish/strengthen agro-meteorological stations representing various agricultural systems; ■ Establish early warning system based on science, local knowledge and practices;
Biodiversity conservation and management	■ Improvement on climate resilient agricultural biodiversity and indigenous knowledge and innovations.



ANNEX V

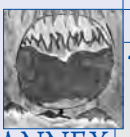
SUMMARY OF ISSUES AND AVAILABLE OPTIONS DRAWN FROM THE CONSULTATION WORKSHOP TOWARDS PREPARATION OF NAPA PRIORITIES FOR AGRICULTURE AND FOOD SECURITY

Sector: Agriculture

s.n.	Key issues identified	Technology options available	Future needs
1	Less availability of quality seed/saplings/fingerlings	varieties of different crops and vegetables	■ develop location specific stress tolerance varieties ■ multiplication of seeds/saplings/fingerlings at local level
2	Inadequate irrigation water	■ micro-irrigation technologies ■ rainwater harvesting ■ conservation agriculture	■ development of efficient irrigation infrastructure ■ promotion of available technology
3	Decline in soil fertility and productivity	■ IPNS and ICM ■ organic farming ■ Agro-forestry ■ SALT technology	■ promotion of available technology ■ further research
4	Increased incidence of pests and diseases	■ IDM/IPM ■ bio-pesticides	■ promotion of IDM/IPM ■ promotion of bio-pesticides ■ judicious use of chemical pesticides
5	Loss of agro-biodiversity (landraces and underutilized /indigenous crops	■ in-situ and ex-situ conservation	■ conservation, utilization, improvement and promotion of existing/ promising landraces and underutilized crops/vegetables
6	Lack of location specific technology/ research	■ indigenous technology	■ verification of indigenous technology ■ development of location specific agricultural technologies ■ strengthen agricultural research systems and network
7	Lack of climate change related information	■ indigenous knowledge ■ agro-meteorological information	■ establishment of sufficient agro-meteorological stations ■ institutional set-up from field to central level to access information products
8	Inadequate coverage of extension	■ extension network ■ printed mass media ■ audio-visuals	■ strengthen extension services
9	Less attention to indigenous knowledge/ practices	■ local level farmers knowledge and technologies	■ documentation, verification and promotion of indigenous knowledge
10	Inadequate post-harvest and marketing support	■ new post harvest facility /technology	■ strengthen post-harvest and market facilities
11	Crop insurance and support price	■ none	■ introduce crop insurance and support price
12	Lack of community awareness in CCA and DRM	■ inadequate knowledge ■ technologies for CCA and DRM	■ Strengthen institutional and technical capacities ■ field demonstration of good practices
13	Early warning system	■ weather and climate forecasts	■ introduce new weather and climate forecasts for agricultural applications

Secctor: Livestock

Livestock	Technology options available	Future needs
Poor emergence and low production of forage crops, Degradation of Pasture Land, Increased Disease prevalence, vector Borne Diseases, Parasitic Diseases, Eroding breeds Shortage of feed ingredients, heat stress, etc.,	Improved varieties of fodder and forage crops Sustainable land management; timely vaccination of animals; improved feed and ingredients	Support integrated approach for producing fodder crops Strengthen livestock support services promoting pro-active risk management/ reduction measures



ANNEX VI

STRATEGIES FOR DRM IN AGRICULTURE AND FOOD SECTOR

Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation	Identify, assess and monitor disaster risks and enhance early warning	Better Knowledge Management for Building a culture of Safety	Reducing Risks in Key Sectors and Establishment of Mechanisms for DRM	Enhance preparedness for Effective Response
The MOAC is to develop a national plan for Disaster Preparedness and Emergency response for the Agricultural sector, with templates for district and community level plans included for areas highly exposed to recurrent hazard risk. The plans should be prepared in a participatory dialogue with all stakeholders and be available in the public domain. The MOAC should ensure that DRM issues are integrated into district agriculture and village agriculture plans. Enhance under the leadership of the Min. of Home Affairs DRM related coordination between MOAC and its departments and offices at the district levels as well as with other line agencies at all levels. Enhance operational and technical capacities of agriculture offices operating at district and area level on disaster risk management. Mandate the Agricultural departments and offices at decentralized levels to participate as key partners in DRM committees at all levels, and as implementing partners of actions jointly decided by the committees at different levels.	Conduct and coordinate with other sectors hazard risk and vulnerability assessment studies and mapping exercises in the agricultural sectors. Establish a simple crop and livestock monitoring system and data base in high risk areas to establish a basis for better emergency needs assessment and response. Translate weather and climate forecast products (from Department of Meteorology) into agricultural impact forecast products and strategic decision support tools for farmers in (slow on-setting) drought prone areas. Establish in collaboration with the Water Dep. a flood and landslide early warning system for local levels. Develop a DRM related communication strategy in agriculture to ensure timely dissemination of early warning and strategic decision support information to farmers. Promote economic assessment studies to monitor the costs of mitigation and adaptation to risk (as compared to losses).	Identify and document good practices for DRM in agriculture, including existing coping practices and indigenous technologies. Strengthen agricultural research institutions to conduct strategic, applied research to identify and promote on farmers fields the testing of new technologies for DRM in agriculture. Promote through the existing extension systems the establishment of national platforms for applied action research and demonstration to introduce, test and disseminate good practices for DRM in Agriculture; this includes the promotion of Local Farmers Organizations and CBOs in implementing community based disaster risk management approaches and initiatives within the AG sector. Promote insurance practices for crops, and livestock in participation of private sector. Include DRM issues into the curricula of agricultural campuses, and at school levels.	Improve local storage practice (farm level food, animal feed, local seeds storage systems). Promote improvement of strategic seed banks and national seeds storage system. Encourage to convert land slide areas in to plantation, discourage settlements in the flood prone areas. Invest on river training especially to reduce flood related risks. Promote land and water conservation practices on farmers' fields. Increase irrigation coverage where water resources are available without negative impacts on ground water. Encourage the use of crops and livestock species and of integrated production systems which are more resistant to natural hazard risks, and diseases. Improve construction standards for animal shelters and hen pens including spatial locations guidelines. Discourage agricultural practices that lead to disaster.	Promote regular contingency planning (from AG perspective) at all levels. Ensure adequate emergency supply of food/ seeds in the disaster prone areas in time of need. Standardize the content/ format of information collection on disaster impacts. Ensure faster Damage assessment and mobilization of resources. Promote the establishment of strategic emergency buffer stocks of seeds, food, and agricultural inputs in District Agricultural Offices or at regional level. Build capacity to know the risks at all levels. Formulate definitions and indicators and triggers about the declaration of emergency situations in AG / food security and phasing of emergency response.

VII ANNEX

INSTITUTIONAL STRENGTHS, GAPS AND POLICY FRAMEWORK FOR CCA AND DRM IN AGRICULTURE

The MOAC has a strong technical manpower from the national to the grass root level. It has two Departments, namely the Department of Agriculture (DOA) and the Department of Livestock Services (DLS). More than 10 000 staffs of various categories are working closely with farming communities at all levels. The comparative advantages of both departments are significant in terms of its human resource capacity. The MOAC could take a crucial role in climate change adaptation and disaster risk management planning and implementation of prioritized activities. The table 2 summarizes MOAC/DOA/DLS strengths related to the area of DRR and CCA. The summary tables clearly suggest the comparative advantage of MOAC for making a shift from a reactive emergency approach to a proactive risk management at all levels. The strengths of MOAC to engage more actively in DRM outweigh its current weaknesses. It is important to better understand how to integrate and use MOAC strengths for better DRM in the agricultural sector and how to overcome its weaknesses.

Strengths of MOAC, DOA and DLS with regard to its role in CCA and DRM

(a) Institutional Strengths	Remarks
MOAC\DOA\DLS have human resources to contribute at all levels in Nepal for DRR and CCA	More than 10 000 staffs are working with different capacities. Good infrastructure in the form of MOAC\DOA\DLS offices at various levels. DOA has strong linkages to a large number of people in rural area. MOAC\DOA\DLS are at various levels already engaged in emergency response and rehabilitation activities. DOA\DLS field officials have regular exposure in dealing with climate extremes and in providing relief to the agricultural community.
DOA\DLS operates training institutes throughout the country which can be utilized for training on climate change adaptation and disaster risk management	DOA\DLS each have five Regional Training Center and those centers can be used for training on DRM and CCA activities. Efforts are underway to integrate sessions on CCA and DRM into regular activities.
Availability of basic data; agricultural data base	A data base in the form of crop area, yield and production for all 75 districts are all available at Agribusiness, Promotion and Statistics Division in the MOAC. The quality of data, specially, district level should be improved by strengthening the Division.
Communication mechanisms of MOAC	The MOAC has an agricultural and communication center which collects and disseminates the agricultural information at all levels. MOAC has the mandate to transfer agriculture technology through mass media like radio, TV, documentary film and is well equipped with technologies and able of delivering good knowledge and information dissemination up to grass root level. These facilities available with MOAC are suitable to be used in the context of DRM and CCA.
Coordination within MOAC\DOA\DLS and Collaboration with other stakeholders Existing linkage between research institutes and rural communities	MOAC has five Divisions. The Gender Equity and Environment Division (GEED) is responsible to look after DRM and CCA. Similarly DOA has three Divisions and Planning and Human Resource Division is responsible to look after DRR and CCA. The DLS has four Directorates. The Planning Section looks after DRM and CCA. Nepal Agriculture Research Council (NARC) is directly under MOAC. NARC does all the research activities in agriculture and their outputs are disseminated by DOA and DLS. The key components of the research extension linkage system and outreach coordination are also linked with DADO and DLSO.

(a) Institutional Strengths	Remarks
A strong institutional basis for implementation of CCA and DRM	a) Strengthening of GEED at MOAC, b) Establishment of cell/desk at DOA c) Establishment of cell/desk at DLS, d) capacity development at NARC e) Capacity development at DADO, DLSO

(b) Technical strengths	Remarks
Sound technical knowhow in agriculture	The MOAC\DOA\DLS staffs at HQ and field level are well trained and experienced in tackling agriculture related problems. They are also fully aware of disaster problems and are involved in managing disaster response. With some additional training on climate change adaptation and DRM, they could also contribute to disaster prevention and preparedness and climate change adaptation in the agriculture sector.
Practical experience in the application of a range of extension and awareness raising methods	MOAC\DOA\DLS is well experienced with a range of extension methods to interact with the target groups, including mass and folk media, agriculture fairs; group discussion, farmer field training and farmers field schools, demonstrations and field visits.
Research Center, NARC, under the MOAC, in charge of developing new technologies	Experimental farms are available to develop and test varieties that are more resistant to flood, drought or salinity. A key aspect of DRR and CCA is to be intensified and further spread.
Development and research projects implementation by MOAC	MOAC has been involved in implementing a number of projects (both development and research). Some of these projects are directly or indirectly related to CCA and DRM activities. The outputs and experiences of such projects, available to MOAC can be used for CCA and DRM in agriculture very efficiently.

Limitations/shortcomings of MOAC to support in CCA and DRM[9]

Institutional and technical gaps	Remarks
Lack of flexibility in decision making	The management system is vertical and all decisions are referred to higher authorities, making it sometimes difficult to respond to local needs in a short time.
No action plan available at present for CCA and DRM in agriculture	Though MOAC is deeply involved in disaster response and relief activities, yet it was not much concerned about systematic disaster preparedness and mitigation aspects until recently. There are few initiatives regarding pre-disaster preparedness, which are not sufficient. The culture of preventive measures for disaster lacks within the department.
MOAC staff have very limited practical experiences in climate change adaptation and proactive disaster preparedness and prevention activities	A mechanism for continuous learning through the practical field demonstrations are needed towards institutionalizing CCA and DRM within the MOAC.
The funding for CCA and DRR activities are not sufficient in the current system	There is no regular budgeting provision for CCA and DRM related activities. Wherever funds are available for some activities, they are not sufficient.
No mechanism for continuous capacity development on CCA and DRM.	Institutional strengthening and integration of climate change and disaster risk management in regular capacity development activities of MOAC, DOA and DLS is the priority.

9 The points cited in the table are the outcome of a number of meetings and discussion held within MOAC and with field officials.

LIST OF WORKSHOPS, MEETINGS AND CONTRIBUTORS FOR THE PRIORITY FRAMEWORK FOR ACTION

1st Brain Storming Workshop
November 18th 2009, Kathmandu

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Mid-term workshop of the TCP/NEP/32021 (D) project;

November 25th 2009, Kathmandu
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First Stakeholder Workshop

14 January 2010, Kathmandu

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23 February 2010, Kathmandu

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Climate Change Adaptation and Disaster Risk Management Priority Framework for Action : 2011 - 2020

A comprehensive priority framework to support and provide strategic direction to the Ministry of Agriculture and Cooperatives, its technical services and agencies for the implementation of Climate Change Adaptation and Disaster Risk Management (DRM) priorities in Agriculture and allied sectors.

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