Translation

Kingdom of Cambodia
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ROYAL GOVERNMENT OF CAMBODIA

NATIONAL ADAPTATION PROGRAMME OF ACTION TO CLIMATE CHANGE (NAPA)

October 2006
Ministry of Environment

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Endorsed by the Council of Ministers in its Meeting on 20 October 2006

October 2006
Ministry of Environment

#48, Samdech Preah Sihanouk Blvd, Sangkat Tonle Bassac, Khan Chamkar Mon, Phnom Penh
Tel./Fax: (855-23)212-540

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MESSAGE FROM SAMDECH HUN SEN, PRIME MINISTER OF THE ROYAL GOVERNMENT OF CAMBODIA

Climate change has become a real challenge for all countries throughout the world. The Royal Government of Cambodia (RGC) clearly recognises this issue and is fully committed to the global efforts to address climate change, both at the national and international levels. Therefore, Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995 and acceded to its Kyoto Protocol in 2002.

As a least developed agrarian country, Cambodia is highly vulnerable to climate change, the more so as it has low adaptive capacity to changing climate conditions. In recent years, we have witnessed more frequent and severe floods and droughts, which have resulted in a significant number of fatalities and considerable economic losses. For this reason, we have recently taken our first steps in developing a Cambodian National Adaptation Programme of Action to Climate Change (NAPA).

The main goal of the Cambodian NAPA is to provide a framework to guide the coordination and implementation of adaptation initiatives through a participatory approach, and to build synergies with other relevant environment and development programmes. Cambodia's NAPA presents priority projects to address the urgent and immediate needs and concerns of people at the grassroots level for adaptation to the adverse effects of climate change in key sectors such as agriculture, water resources, coastal zone and human health.

The Cambodian NAPA is supportive of the Government's development objectives as outlined in the "Rectangular Strategy for Growth, Employment, Equity and Efficiency" adopted in July 2004, as well as in the "National Strategic Development Plan 2006-2010 (NSDP)" adopted in May 2006. Both the Rectangular Strategy and the NSDP 2006-2010 stress the need to improve agricultural productivity through the expansion of irrigation and the management of water resources to reduce vulnerability to natural disasters. All concerned ministries and agencies shall make their utmost efforts to integrate the priority projects identified in this National Programme into their respective sectoral plans.

Implementation of the Cambodian NAPA will significantly contribute to the achievement of the Cambodia Millennium Development Goals and national sustainable development objectives as articulated by the Royal Government of Cambodia. Therefore, our next task is to mobilise resources, to establish a mechanism for inter-ministerial cooperation, coordination and monitoring for the implementation of this Programme, and to raise awareness on climate change issues, including on NAPA. Involvement of all key stakeholders - vulnerable groups, commune councils, concerned Government ministries and agencies, NGOs, and donor agencies - is a prerequisite for

the successful implementation of NAPA. It is our hope that the commitment of Cambodian stakeholders will elicit a similar commitment by the international community.

On behalf of the people of Cambodia, I would like to take this opportunity to express our sincere gratitude to all stakeholders for their support and cooperation with the RGC in developing this NAPA Document. Specifically, I thank the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) for their support and cooperation in preparing the Cambodian NAPA. The RGC looks forward to cooperating with all stakeholders to ensure successful implementation of the Cambodian NAPA.

Phnom Penh, 25 December 2006
Prime Minister

Signature: **Hun Sen**

LETTER OF ACKNOWLEDGMENTS FROM H.E. DR. MOK MARETH, SENIOR MINISTER, MINISTER OF ENVIRONMENT

I have the privilege to serve the Royal Government of Cambodia as the Minister of Environment and as the National Focal Point of Cambodia for the UNFCCC. In this quality, I am fortunate to be supported by Prime-Minister Samdech Hun Sen, my enthusiastic and competent staff, as well as to have fruitful cooperation with other ministries/agencies and international organisations in carrying out the environment mandate of the RGC, in particular, in fulfilling the country's commitments under the UNFCCC and in addressing climate change impacts in the Kingdom of Cambodia.

Having recognised adverse impacts of climate change on social and economic development, the environment and livelihoods, in particular, those of poor rural communities, the Ministry of Environment has worked hard with other Government ministries and agencies, and donor partners to formulate a Cambodian NAPA. This is a realistically achievable country-driven programme of action and priority activities addressing the urgent and immediate needs and concerns of the country for adaptation to the adverse effects of climate change. Through a series of consultations from the grassroots to policy-makers, national and provincial workshops, stakeholder interviews and surveys of rural communities, we have identified 39 adaptation projects in key sectors such as agriculture, water resources, coastal zone, and human health. These are "no-regrets" adaptation options that can be divided into three categories: (i) capacity building/training (ii) awareness raising/education, and (iii) infrastructure development. The proposed projects include: the construction of community water reservoirs, the development and improvement of community irrigation systems, the rehabilitation of coastal protection infrastructures, reforestation activities, the local production of bio-pesticides for mosquito control, the wider distribution of mosquito nets, and other much needed initiatives that will allow Cambodia to both adapt to climate change and achieve its national sustainable development objectives.

As we can see, the Cambodian NAPA is in line with the RGC's development objectives as outlined in the "Rectangular Strategy for Growth, Employment, Equity and Efficiency", the Cambodian Millennium Development Goals, as well as the National Strategic Development Plan for 2006-2010, which has already been approved by the National Assembly for official use. Implementation of the proposed adaptation projects will help significantly improve the adaptive capacity of the most vulnerable communities as well as achieve the poverty reduction targets of the RGC.

In preparing the Cambodian NAPA, the Ministry of Environment has made its utmost efforts to use the most recent official and existing data of the RGC and concerned ministries and agencies. In addition, we have collected missing data for preparing this document.

The Ministry of Environment is committed to work together with other concerned stakeholders to translate the Cambodian NAPA into real actions and tangible results. In this regard, I would like to appeal for support and cooperation from all Government ministries and agencies, NGOs, and the donor community to ensure the successful implementation of this programme.

In conclusion, I would like to thank all those who have contributed to the Cambodian NAPA for their dedication and hard work. I sincerely wish to thank our partners from the Global Environment Facility and the United Nations Development Programme for their constructive and fruitful cooperation in preparing this important document. I would like to assure our commitment to the successful implementation of the Cambodian NAPA.

Phnom Penh, 21 December 2006
Senior Minister, Minister of Environment

Signature: **Dr. Mok Mareth**

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ACRONYMS

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AFSC	American Friends Service Committee
APS	Associazione per la Partecipazione allo Sviluppo
AusAID	Australian Agency for International Development
CAAEP II	Cambodia Australia Agricultural Extension Project Phase II
CARDI	Cambodia Agricultural Research and Development Institute
CCCO	Cambodian Climate Change Office
CMDG	Cambodian Millennium Development Goals
CNM	National Centre for Malaria Control
CNMC	Cambodia National Mekong Committee
CoP	Conference of the Parties
CPE	Cambodian Pharmaceutical Enterprise
CRC	Cambodian Red Cross
CRCD	Cambodian Research Centre for Development
DANIDA	Danish International Development Agency
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FWUC	Farmer Water User Communities
GDP	Gross Domestic Product
GEF	Global Environment Facility
GRET	Groupe de Recherche et d'Echanges Technologiques
GTZ	German Development Cooperation
HU	Health Unlimited
IDRC	International Development Research Centre
IEC	Information, Education and Communication
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
LEG	Least Developed Countries Expert Group
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEYS	Ministry of Education, Youth and Sports
MIME	Ministry of Industry, Mines and Energy
MLMUPC	Ministry of Land Management, Urban Planning and Construction
MoE	Ministry of Environment
MoH	Ministry of Health
MoT	Ministry of Tourism
MOWRAM	Ministry of Water Resources and Meteorology
MPWT	Ministry of Public Works and Transport
MRC	Mekong River Commission
MRD	Ministry of Rural Development
NAPA	National Adaptation Programme of Action to Climate Change
NCDM	National Committee for Disaster Management
NGOs	Non-governmental Organisations
NIS	National Institute of Statistics
PFD	Partners For Development
PoPs	Persistent Organic Pollutants
PRASAC	Support Programme for the Agriculture Sector in Cambodia
RGC	Royal Government of Cambodia
RUPP	Royal University of Phnom Penh
SEDP II	Second Socio-economic Development Plan 2001-2005

SEILA	Decentralised Rural Development Programme (Cambodian Government/UNDP)
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
WB	World Bank
WFP	United Nations World Food Programme
WUG	Water User Group

I. INTRODUCTION AND SETTING

1.1 National Circumstances

The Kingdom of Cambodia is located in mainland Southeast Asia between latitudes 10° and 15° N and longitudes 102° and 108° E. Cambodia covers an area of 181,035 km^2 with a total population projected at about 14.1 million people in 2004 (NIS, 1998). Approximately 80 percent of this population lives in rural areas. In 2002, 36% of population lived below the national poverty line (RGC, 2002). Administratively, the country is divided into 20 provinces and 4 municipalities with a total of 183 districts and 1,609 communes (NIS, 2004). The climate is characterised by a dry season from mid November to mid May and a rainy season from mid May to mid November. The annual average temperature is 27°C, and rises to a maximum of 38°C in April or May and falls to a minimum of 14°C in January or December.

Cambodia is a least developed country, with a GDP per capita of US $297 in 2002 (NIS, 2003). On average, agriculture has accounted for more than 40% of GDP. Agricultural production is dependent on the annual flooding and recession of the Tonle Sap Lake and the Mekong River, which brings fertile alluviums to the central plains.

1.2 Project Background

In its 2001 report on impacts, adaptation and vulnerability to climate change, the Intergovernmental Panel on Climate Change (IPCC) concluded that there was high confidence that recent regional changes in temperature had discernible impacts on physical and biological ecosystems (IPCC, 2001). In particular, there is emerging evidence that human systems have been affected by increases in floods and droughts. Projected changes in climate could have major consequences on hydrology and water resources, agriculture and food security, terrestrial and freshwater ecosystems, coastal zones and marine ecosystems, and human health. Adverse impacts include increased flood and drought magnitude and damages in temperate and tropical Asia, reductions in crop yields, decrease water availability, and increase in the number of people exposed to vector and water-borne diseases.

Because it is not currently possible to predict the adverse impacts of climate change at the regional and local levels, the IPCC has argued for the strengthening of adaptive capacity to climate variability and extremes (IPCC, 2001). Least developed countries have the least resources and capacity to adapt, and are therefore the most vulnerable. The project entitled Formulation of the National Adaptation Programme of Action to Climate Change (NAPA) aims to develop a realistically achievable country-driven programme of action and priority activities addressing the needs of Cambodia for adapting to the adverse effects of climate change (UNDP, 2003). Specifically, the project's goals include: the synthesis of available information on the adverse impacts of climate change, climate variability and adaptation to climate hazards in Cambodia; the identification and prioritisation of potential activities to adapt to current climate variability, climate extremes and climate change. The NAPA project is funded by the international donor community through its contributions to the Global Environment Facility (GEF).

1.3 Objectives of the National Adaptation Programme of Action to Climate Change

The Annotated Guidelines for the Preparation of National Adaptation Programmes of Action, based on Decision 28 of the 7th Conference of the Parties (CoP) of the United Nations Framework Convention on Climate Change (UNFCCC), provides the methodological basis for the development of NAPAs in least developed countries (UNFCCC, 2002). The identification of priority adaptation activities is the main goal of the NAPA formulation exercise. The formulation of the NAPA follows a participatory process that involves those who are most affected by climatic impacts, that

is rural people and the poor. The NAPA builds upon existing coping strategies implemented by local communities in order to enhance their adaptation capacity. More specifically, the objectives of the NAPA project are: (1) to understand the main characteristics of climate hazards in Cambodia (flood, drought, windstorm, high tide, salt water intrusion and malaria); (2) to understand coping mechanisms to climate hazards and climate change at the grassroots level; (3) to understand existing programmes and institutional arrangements for addressing climate hazards and climate change; (4) to identify and prioritise adaptation activities to climate hazards and climate change.

1.4 Consultation Process

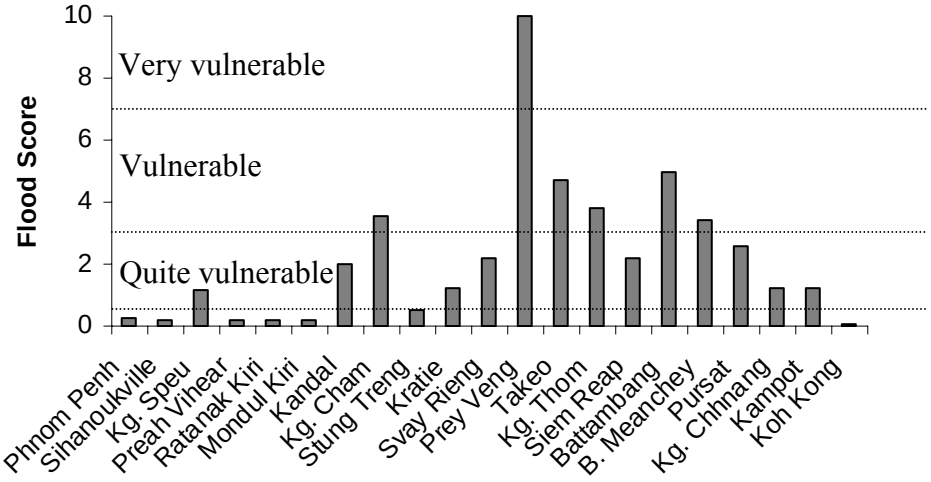
The formulation of the NAPA has followed a participatory process through which programmes of action for adaptation to climate change have been developed. The focus is on country-driven adaptation measures that have direct impacts on the lives of local people, in particular the poorest. The NAPA process has consisted of consultations from the grassroots level to policy-makers, national and provincial workshops, stakeholder interviews and surveys of rural communities.

II. FRAMEWORK FOR ADAPTATION PROGRAMME

2.1 Vulnerability to Climate Change

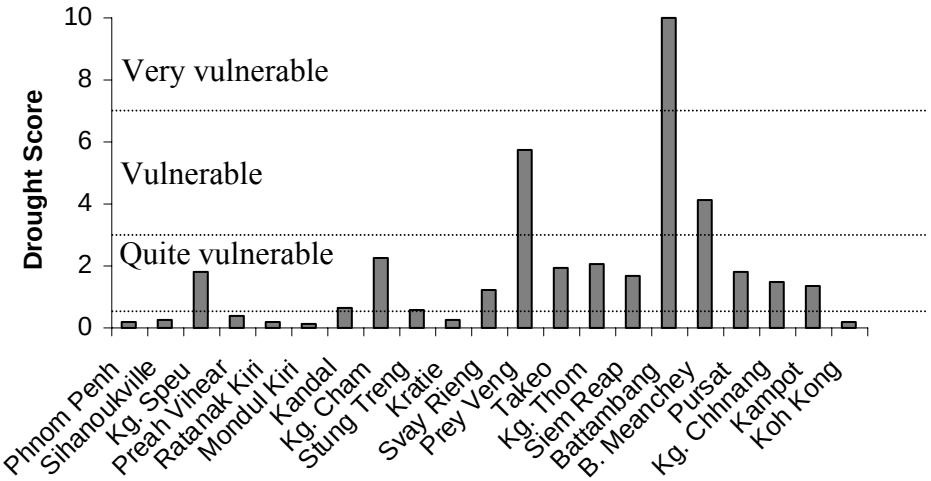
As an essentially agrarian country, the Kingdom of Cambodia is highly vulnerable to the impacts of climate change (Figure 1 and 2). Cambodia's Initial National Communication under the UNFCCC examines the country's vulnerability to climate change (MoE, 2002). The frequency and intensity of floods may increase with changing climate conditions, and cause severe damage to rice harvests. Successions and combinations of droughts and floods have resulted in a significant number of fatalities and considerable economic losses. Losses arising from floods have been further exacerbated by deforestation. Floods have accounted for 70% of rice production losses between 1998 and 2002, while drought accounted for 20% of losses.

Figure 1. Level of Vulnerability to Floods by Provinces



Source: CCCO

Figure 2. Level of Vulnerability to Droughts by Provinces



Source: CCCO

Sea level rise may also affect the 435-km long coastline, which already suffers from storm surges, high tide, beach erosion and seawater intrusion. Low-lying areas, including settlements, beach resorts, seaports, coastal fisheries, and mangroves forests, may become submerged with rises in sea levels.

In addition, vector-borne diseases, in particular malaria, may become more widespread under changing climatic conditions. With some 800 deaths per year, Cambodia already has the highest fatality rate from malaria in Asia (CNM, 2003). The actual death toll due to malaria may be 5-10 times the officially recorded figures (RGC, 2002). Poor infrastructures and high poverty rates make malaria treatment unaffordable for large segments of the population. Only 55% of the population have geographic access to public health facilities (RGC, 2001).

2.2 National Socio-Economic Development Objectives

The Second Socio-economic Development Plan 2001-2005 (SEDP II) articulates the objectives of the national economic growth and poverty reduction strategy. The Government's stated vision is to have "a socially cohesive, educationally advanced and culturally vibrant Cambodia without poverty, illiteracy and disease". Achieving this vision required the adoption of a "triangle strategy" in 1998, which comprised three main pillars: (1) economic growth that is broad enough to include sectors where the poor derive livelihood, (2) social and cultural development, (3) sustainable use of natural resources and sound environmental management.

Agriculture (including agro-forestry) and rural development are recognised to be of enormous importance to poverty reduction. Rural livelihoods are marked by wet-dry seasonality and are vulnerable to changing weather patterns. To minimise the vulnerabilities of the rural poor to adverse climate events, in particular flooding and drought, the Government intends to further develop relief and emergency services, meteorological and hydrological networks, as well as natural disaster prevention and preparedness.

Furthermore, the Government adopted in July 2004 a "rectangular strategy for growth, employment, equity and efficiency", which stresses the need to improve agricultural productivity through the expansion of irrigation and the management of water resources to reduce vulnerability to natural disasters (RGC, 2004).

2.3 NAPA Links with Cambodia's National Development Objectives

The goal of the Cambodian NAPA is to provide a framework to guide the coordination and implementation of adaptation initiatives through a participatory approach, and to build synergies with other relevant environmental and development programmes. It presents priority activities to address the urgent and immediate needs and concerns of the grassroots people for adaptation to the adverse effects of climate change in key sectors such as agriculture, water resources, coastal zone, and human health. These priority activities have been identified based on comprehensive stakeholder consultations and policy reviews, and are supportive of the Government's development objectives. If implemented, the NAPA will significantly contribute to the country's achievement of sustainable development under changing climate conditions.

A number of barriers to the implementation of the NAPA have been identified. These include: (i) inadequate technical, financial and institutional capacity of Government agencies and of local communities in dealing with climate hazards Government agencies, and limited coordination among them; (ii) limited integration of climate change issues into national policies and programmes; and (iii) limited awareness of climate change issues.

While some of the proposed activities will partially address these barriers, other interventions are required to remove them. These may include: integration of NAPA's priority activities into relevant sectoral plans, resource mobilisation efforts, establishment of a coordination mechanism for NAPA implementation, and specifically designed awareness raising campaigns.

III. IDENTIFICATION OF KEY ADAPTATION NEEDS

This section summarises the key findings of a gaps and policies analysis and a survey of households, informal leaders, local authorities, and non-governmental organisations, conducted in 17 out of Cambodia’s 24 provinces and municipalities, to identify, at the grassroots level, existing coping mechanisms to climate hazards and climate change impacts, as well as key adaptation needs (CCCO, 2005).

3.1 Analysis of Policies to Address Climate Change Impacts

A comprehensive gaps and policies analysis has been conducted to: (i) review the impacts of climate hazards and climate change in Cambodia; (ii) review and assess sectoral policy gaps; and (iii) identify long-term programmes for increasing sectoral adaptive capacity to changing climate conditions.

Climate hazards occurring in Cambodia include flood, drought and windstorms. In coastal areas, underground water salinisation, and seawater intrusion are common problems. The occurrence of drought and flood is widespread in Cambodia, which are recognised as the main contributors of poverty. The severe floods that occurred from 2000 to 2002 resulted in 438 casualties and caused damages amounting to US $205 million (NCDM, 2002).

With support from various donors, Cambodia has implemented a number of projects to address climate hazards: for the period of 1995-2003, Cambodia implemented 98 projects to address institutional strengthening, infrastructure development, and human resource development with a total value of approximately US $328 million.

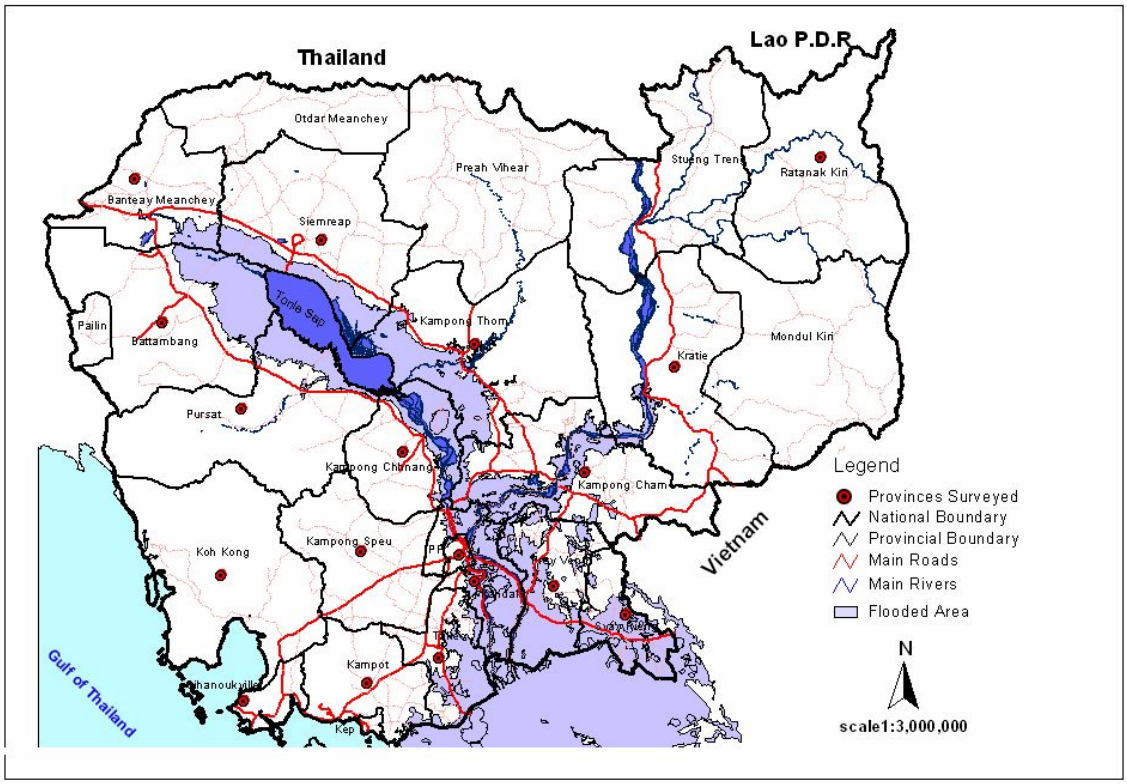
However, the analysis shows that current national policies and programmes do not integrate global policies on climate change, focusing mainly on post-disaster emergency relief. Programmes for improving community capacity and enhancing community-based initiatives to cope with climate

hazards and adapt to climate variability receives little attention. Furthermore, these programmes have limited geographical coverage of areas identified as vulnerable to climate hazards. It also indicates that programmes for developing and disseminating climate forecast are limited and long-term programmes on research and education for addressing climate variability and climate change have not been well developed.

3.2 Adaptation to Climate Hazards

A total of 684 households in 17 provinces were surveyed for the following climatic hazards: flood, drought, windstorm, seawater intrusion and high tide (Figure 3). Without exception, all 17 provinces surveyed have suffered from both floods and droughts. A total of 15 provinces have also experienced windstorms. Seawater intrusion was reported in all three coastal provinces, while high tide was recorded only in two coastal provinces. Villagers cite flood and drought as the most severe climate hazards in all 17 provinces surveyed.

Figure 3. Map of Provinces Surveyed for Climate Hazards Vulnerability and Adaptation



Villagers were asked to share their experiences of dealing with floods and to describe existing ways to adapt to floods. Almost 20% of villagers interviewed did not make any preparations for flood at all. About 17% just planted their crops as usual. Traditional adaptation measures include building elevated enclosures for livestock, increasing the household's foodstock, increasing feedstock for animals, and preparing boats. An insignificant number of households interviewed moved to a safer place in anticipation of floods.

Water shortages are a common occurrence all year-round: 81% of households interviewed suffered from water shortages for agricultural uses, while 54% suffered from water shortages for personal uses. Although villagers have traditionally coped with drought in a variety of ways, there appear to be serious limits to the extent to which people may adapt. Thus, 24% of villagers interviewed simply organise religious ceremonies in the hope that these will bring rain. Approximately 16% of the survey respondents plant crops as usual, again hoping that there will be enough rain for

agriculture. Some 17% of households reduce water consumption: for instance, limiting bathing to a few times a week; or just wiping oneself with a wet cloth instead of taking a full bath.

Local people have a high understanding of climatic hazards and of their causes. Villagers are clearly aware of changes in hydrological patterns resulting from the construction of dams, dikes and roads and from deforestation, which may increase the frequency and intensity of floods, and the sedimentation of water storage structures.

Traditional resignation to climate change and to climate extremes should not be equated to preparedness and adaptation. People may be used to yearly losses of lives, damages to property and agricultural fields, but a habit of acceptance does not imply successful adaptation. For large proportions of the population, coping mechanisms simply consist of praying for rain or planting as usual.

The preparedness of villagers to extreme climate events is low, as is their adaptation capacity to climate change. There are cases where local communities are resourceful when dealing with climate hazards, but these are exceptions and usually coincide with settlements with higher social capital and stronger local institutions.

Villagers may be aware of possible coping and adaptation mechanisms such as rehabilitating water storage structures and irrigation canals, building dikes and water control structures, strengthening dwellings against windstorm etc. However, the lack of financial resources has generally prevented local communities from implementing these projects.

Much of the efforts of authorities have focused on post-disaster management, rather than on disaster prevention and adaptation to extreme climate events. While post-disaster management needs to be expanded to all victims, successful prevention and adaptation will require additional commitment from Government and international organisations.

According to observations by villagers, the frequency and intensity of floods, droughts and windstorms have increased since the year 2000 or so. There is anecdotal evidence that floods and windstorms now occur in areas that had historically been spared.

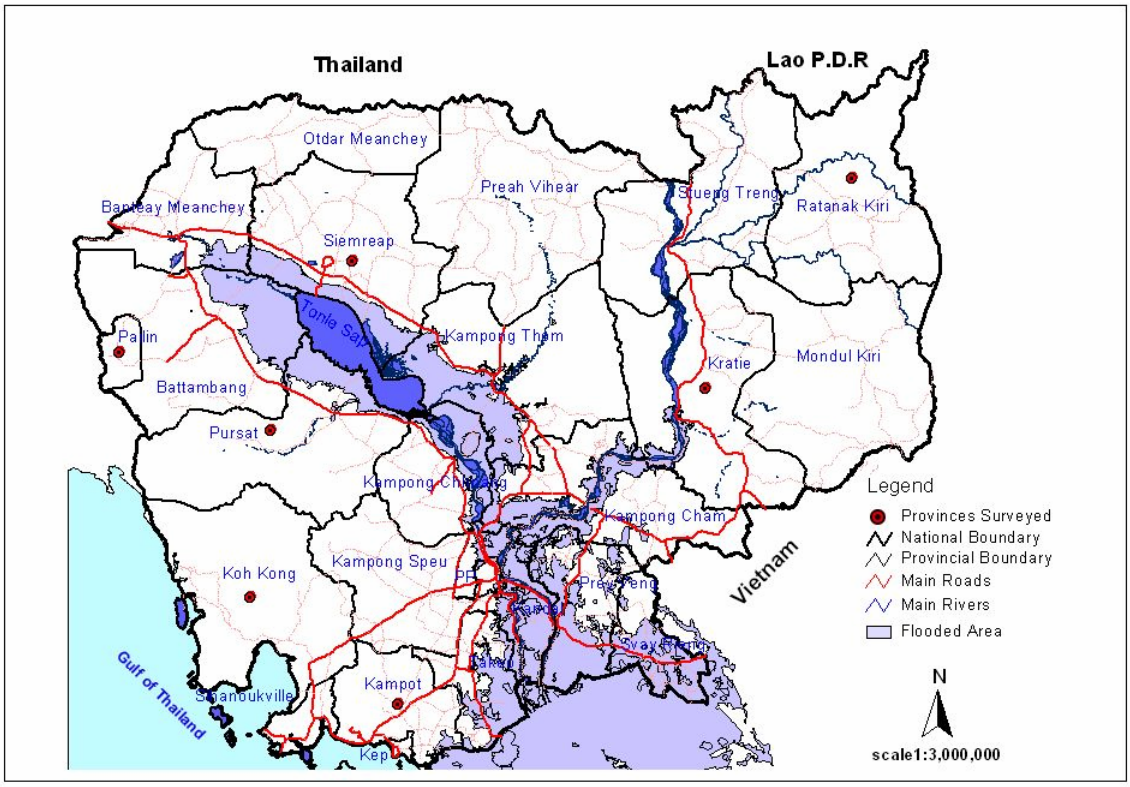
In some cases, local communities have attempted to adapt to recently changing patterns of climate hazards. However, several cases of failed adaptation were recorded. Villagers have shifted planting dates without success, as there is no forecast of local weather. Others have switched to flood resistant rice varieties, but these could not survive periods of droughts. In some areas, farmers have constructed wells to pump groundwater to irrigate agricultural fields, but these have yielded water for a season only and subsequently lowered the water table.

Accurate and reliable local forecasts of extreme climate events are non-existent in Cambodia. Villagers in downstream areas essentially rely on word of mouth from upstream areas to ready themselves for floods. Windstorms and high tides similarly find local communities unprepared. Information about water levels, which may be occasionally advertised in public areas, leave local people perplexed about how to interpret them.

3.3 Adaptation to Malaria

A malaria survey was conducted in 7 provinces: Battambang, Kampot, Koh Kong, Kratie, Pursat, Ratanak Kiri and Siem Reap (Figure 4). A total of 172 households were interviewed in 12 districts, 19 communes and 40 villages.

Figure 4. Map of Provinces Surveyed for Malaria Vulnerability and Adaptation



In about 26% of cases, malaria was contracted while cultivating *chamkar*, or agricultural fields. This compares to 28% of cases while logging in the forest, and 18% while staying at home. Almost 63% of households contracted malaria during the wet season, 12% during the dry season, and 8% in both seasons.

There is still much confusion about malaria and a number of erroneous traditional beliefs at the grassroots level. These include contracting malaria from drinking contaminated water, the existence of a malaria vaccine and the need for injections when diagnosed with malaria.

Less than a third of households interviewed believe that the distribution of mosquito nets would be an efficient strategy against malaria prevention. Nets have been used as blankets during colder nights. In addition, nets are of little use when villagers contract malaria while logging or collecting firewood in forests, or working in orchards and *chamkar*. For the majority of households interviewed, cost is the main factor determining the choice of malaria treatment. Almost half of households had to travel more than 5 km to receive treatment.

IV. CRITERIA FOR SELECTING PRIORITY ACTIVITIES

4.1 Priority Sectors

The findings from previous climate change enabling activities conducted in Cambodia under the UNFCCC indicate that agriculture, forestry, human health, and coastal zone are the sectors most vulnerable to the impacts of climate change. Due to its inseparable link with the four earlier mentioned sectors, and its importance for Cambodia's socio-economic development, the water resource sector has been included as a priority sector for the NAPA preparation, particularly inasmuch as it affects agriculture and food security. The appropriateness of the selection of these

sectors has been confirmed by the results of the gaps and policies analysis and of the survey of households, which are summarised above.

4.2 Project Selection Process

The identification of priority activities for adaptation to climate change in the selected priority sectors in Cambodia and the selection of the targeted geographic areas for their implementation have relied on a combination of five sources:

(1) Field surveys and nationwide consultation of households;
(2) National consultation workshops on priority activities;
(3) Provincial consultation workshops on priority activities;
(4) Face-to-face interviews of Government and non-government stakeholders; and
(5) Gaps and policies analysis.

NAPA project activities can be broadly divided into 3 categories: (i) capacity building/training (ii) awareness raising/education, and (iii) infrastructure development. A total of 39 priority activities have been identified and developed. These largely constitute "no regrets" options, that is, these projects are already justified by current climate conditions and provide a host of social and economic benefits for local people. Under changing climate conditions, which could include higher frequencies of climate hazards, the selected priority activities would be even more attractive.

Each project profile outlines the rationale, objectives, activities, outputs, location, timeframe, estimated budget, related developments and other pertinent information for potential donors. The estimated budget for each project profile has been based on expert judgement, analogical comparison with similar projects implemented in the past and estimation of costs of expected inputs required. It is important to note that project information needs to be further refined during the project design phase. Project profiles for the 20 most urgent activities are provided in the final section of the present document (Annex 2). Project profiles for the remaining activities are included in Annex 3 of this document.

Table 1. Distribution of Priority Activities by Sector and by Climate Hazard

Distribution by Sector	***Distribution by Climate Related Hazard***
Coastal Areas: 8 projects	Coastal Protection: 3 projects
Malaria: 6 projects	Drought: 9 projects
Water Resources /Agriculture: 20 projects	Flood: 5 projects
Cross Sectoral: 5 projects	Malaria: 6 projects
	Multiple Climate Hazards: 16 projects
Total: 39 projects	

4.3 Project Prioritisation

The prioritisation of Cambodia's project profiles for adaptation to climate change was validated through a series of provincial and national consultation workshops. The aim of the prioritisation of the proposed adaptation project activities is to select the most crucial and urgent projects for immediate funding in a circumstance where financial resources for project implementation are limited to those that support Cambodia's sustainable development objectives. Project profiles have been prioritised according to a set of 14 criteria developed for non-health projects and a sub-set of 9 criteria for health projects (compare Table 2). These criteria have been defined based on the existing RGC's development priorities as articulated in the Rectangular Strategy for Growth, Employment, Equity and Efficiency, the Cambodian Millennium Development Goals (CMDG) and

other Cambodia's existing laws, regulations, policies, statements and commitments to international conventions. The Least Developed Countries Expert Group (LEG) Guidelines for the Preparation of NAPA have also been used in developing these criteria. The criteria encompass the economic, social, cultural, environmental and technological aspects of development.

Table 2. Project Ranking Criteria

Non-Health Projects

Criteria	Score		
	-	0	+
1. Death and casualty			
2. Livelihood			
3. Human health			
4. Food security and agriculture			
5. Water availability and accessibility			
6. Water quality			
7. Biodiversity and other environmental goods and services			
8. Appropriate and environmentally friendly technology			
9. Cultural and historical heritage			
10. Protection, rehabilitation or construction of infrastructure			
11. Responsiveness to immediate needs of affected communities			
12. Capacity building			
13. Synergy and complementarity with other projects			
14. Sustainability			
Total			

Health Projects

Criteria	Score		
	-	0	+
1. Death and casualty			
2. Human health			
3. Biodiversity and other environmental goods and services			
4. Appropriate and environmentally friendly technology			
5. Protection, rehabilitation or construction of infrastructure			
6. Responsiveness to immediate needs of affected communities			
7. Capacity building			
8. Synergy and complementarity with other projects			
9. Sustainability			
Total			

Due to the almost complete lack of data for applying a more quantitative assessment technique such as cost benefit analysis, each project is scored on a simple scale, indicating negative, zero, or positive impacts with regards to each ranking criterion. The initial scoring of the identified project profiles has been conducted via a series of consultation meetings of representatives of key ministries/agencies with subsequent validation by a series of national and provincial consultation workshops. According to their aggregate scores, projects are divided into three broad categories (Table 3):

1. High priority projects;
2. Medium priority projects; and
3. Low priority projects.

Table 3. Project Scoring Categories

Non-Health Projects	**Health Projects**
High Priority ≥ 9	High Priority ≥ 7
8 ≥ Medium Priority ≥ 6	6 ≥ Medium Priority ≥ 4
Low Priority ≤ 5	Low Priority ≤ 3

Out of the initial 39 project profiles, the ranking yields 20 high, 17 medium and 2 low priority projects (Table 4). The detailed scores for all proposed projects are provided in Annex 1 of the document.

Table 4. Project Prioritisation Matrix

Sector	No	Project Title	Scoring*			Priority Ranking**
			-	0	+	
Cross-Sectoral	1	Enhancement of the National Weather Forecast Centre (Department of Meteorology)	0	7	7	M
	2	Awareness Raising and Education in Climate Change Issues	0	10	4	L
	3	Development of School Extra-Curricular Materials on Climate Hazards	0	8	6	M
	4	Vegetation Planting for Flood and Windstorm Protection	0	4	10	H
	5	Strengthening of Community Disaster Preparedness and Response Capacity	0	4	10	H
Agriculture and Water Resources	6	Development and Improvement of Community Irrigation Systems	0	5	9	H
	7	Water Gates and Water Culverts Construction	0	4	10	H
	8	Establishment and Improvement of Farmer Water User Communities	0	7	7	M
	9	Safer Water Supply for Rural Communities	0	4	10	H
	10	Groundwater Extraction for Crop Cultivation	0	7	7	M
	11	Development and Improvement of Small-Scale Aquaculture Ponds	0	4	10	H
	12	Development and Rehabilitation of Flood Protection Dikes	0	3	11	H
	13	Development of Community and Household Flood Safe Areas	0	7	7	M
	14	Traditional Wooden Boat Distribution	1	7	6	M
	15	Cement Water Tanks Construction	0	6	8	M
	16	Promotion of Food Supplements in Household Cattle Raising	0	8	6	M
	17	Development of Community Rice Banks	0	7	7	M
	18	Improving Farmers' Adaptive Capacity to Climate Change	0	6	8	M
	19	Community Agro-Forestry in Deforested Watersheds	0	7	7	M
	20	Introduction of Short-Period Rice Varieties in Areas Affected by Seawater Intrusion and Drought	0	7	7	M
	21	Rehabilitation of a Multiple-Use Reservoir in Takeo Province	0	2	12	H
	22	Rehabilitation of Upper Mekong and Provincial Waterways	0	3	11	H
	23	Training of Village Veterinary Workers	0	8	6	M
	24	Promotion of Household Integrated Farming	0	4	10	H

Sector	No	Project Title	Scoring*			Priority Ranking**
			-	0	+	
	25	Rehabilitation of Multiple-Use Dams in Takeo and Kampong Speu Provinces	0	2	12	H
Coastal Zone	26	Rehabilitation of Coastal Protection Infrastructure	0	4	10	H
	27	Community and Household Water Supply in Coastal Provinces	0	2	12	H
	28	Rehabilitation of Multiple-Use Canals in Banteay Meas District, Kampot Province	0	3	11	H
	29	Community Mangrove Restoration and Sustainable Use of Natural Resources	0	5	9	H
	30	Assessment of Needs for Setbacks, Vegetation Buffers and Protection Structures in Coastal Areas	0	12	2	L
	31	Community Based Agricultural Soil Conservation in Srae Ambel District, Koh Kong Province	0	5	9	H
	32	Community Agroforestry in Coastal Areas	0	6	8	M
	33	Development of Drainage Systems for Road Protection	0	8	6	M
Human Health	34	Treated Mosquito Net Distribution	0	3	6	M
	35	Malaria Education and Mosquito Habitat Clearance Campaigns	0	2	7	H
	36	Production of Biopesticides	0	1	8	H
	37	Strengthening Malaria Surveillance Programme	0	3	6	M
	38	Development of Healthcare Centres and Posts	0	1	8	H
	39	Provision of Safe Water in High Risk Malaria Regions	0	1	8	H

* See Annex 1.
** H – High, M – Medium, L – Low.

V. LIST OF HIGH PRIORITY ACTIVITIES

The identified 20 high priority projects, of which 16 are non-health and 4 are health related (Table 5 and 6), have been further analysed to produce a ranked list of priority adaptation activities in line with the NAPA guidelines. Projects which have a higher positive score are identified to be more urgent and thus warrant to be implemented first. In cases where projects have an equal amount of positive scores, projects that are thought to have positive impacts on higher-priority criteria, e.g. on reducing death and casualties and enhancing livelihoods, are ranked higher. Table 7 displays the final priority ranking for non-health and health related projects as well as a summary of the project profiles. The complete profiles for the 20 proposed high priority projects are shown in Annex 2 while the remaining 19 medium and low priority project profiles are provided in Annex 3 of this NAPA Document.

Table 5. Ranked Non-Health High Priority Projects[1]

Project No.	Sector	Project Title	No. of positive scores (maximum 14)	Final Priority Ranking
21	Agriculture and Water Resources	Rehabilitation of a Multiple-Use Reservoir in Takeo Province	12	1a
25	Agriculture and Water Resources	Rehabilitation of Multiple-Use Dams in Takeo and Kampong Speu Provinces	12	1b
27	Coastal Zone	Community and Household Water Supply in Coastal Provinces	12	1c
12	Agriculture and Water Resources	Development and Rehabilitation of Flood Protection Dikes	11	2a
22	Agriculture and Water Resources	Rehabilitation of Upper Mekong and Provincial Waterways	11	2b
28	Coastal Zone	Rehabilitation of Multiple-Use Canals in Banteay Meas District, Kampot Province	11	2c
4	Cross-sectoral	Vegetation Planting for Flood and Windstorm Protection	10	3a
5	Cross-sectoral	Strengthening of Community Disaster Preparedness and Response Capacity	10	3b
7	Agriculture and Water Resources	Water Gates and Water Culverts Construction	10	3c
9	Agriculture and Water Resources	Safer Water Supply for Rural Communities	10	3d
11	Agriculture and Water Resources	Development and Improvement of Small-Scale Aquaculture Ponds	10	3e
24	Agriculture and Water Resources	Promotion of Household Integrated Farming	10	3f
26	Coastal Zone	Rehabilitation of Coastal Protection Infrastructure	10	3g
6	Agriculture and Water Resources	Development and Improvement of Community Irrigation Systems	9	4a
29	Coastal Zone	Community Mangrove Restoration and Sustainable Use of Natural Resources	9	4b
31	Coastal Zone	Community Based Agricultural Soil Conservation in Srae Ambel District, Koh Kong Province	9	4c

Table 6. Ranked Health High Priority Projects

Project No.	Sector	Project Title	No. of positive scores (maximum 9)	Final Priority Ranking
36	Health	Production of Biopesticides	8	1a
38	Health	Development of Healthcare Centres and Posts	8	1b
39	Health	Provision of Safe Water in High Risk Malaria Regions	8	1c
35	Health	Malaria Education and Mosquito Habitat Clearance Campaigns	7	2

[1] Projects are ranked equally if they have scored equally on the same criteria.

Table 7. Summary of the 20 High Priority NAPA Activities

Sector: Non Health

Priority No.	Project Title	Objectives	Location	Time-frame	Estimated Budget, US$	Agencies Involved		Status
						Lead	Cooperating	
1a	Rehabilitation of a Multiple-Use Reservoir in Takeo Province	- To improve water storage capacity for multiple uses including irrigation, water supply for urban areas, recreational uses and enhanced aquatic biodiversity.	Takeo	3 years	4,000,000	MOWRAM	MoE, MAFF, MIME and MRD	This is a new initiative.
1b	Rehabilitation of Multiple-Use Dams in Takeo and Kampong Speu Provinces	- To improve water management for multiple uses including irrigation, water supply rural communities, recreational uses and aquatic biodiversity enhancement.	Takeo, Kampong Speu	2 years	2,500,000	MOWRAM	MoE, MAFF, MRD and local authorities	Minor repairs have been conducted since the 1980s by local authorities. MOWRAM plans to undertake a detailed study of this project.
1c	Community and Household Water Supply in Coastal Provinces	- To provide safer water for rural communities in coastal areas; and - To reduce the incidence of water-related diseases.	Kampot Kep and Koh Kong	1 year	1,000,000	MRD	Commune councils, NGOs	Wells and ponds have been constructed in Kampot and Kep by FAO, Food for Hunger, UNICEF and the WFP. Some NGOs have also distributed water filters.
2a	Development and Rehabilitation of Flood Protection Dikes	- To protect settlements and agricultural fields from flood.	Battambang, Kampong Cham, Kandal, Kratie, Pursat, Sihanoukville and Svay Rieng	3 years	5,000,000	MOWRAM	MPWT, local authorities and NGOs	MOWRAM has developed flood protection structures in a number of provinces.
2b	Rehabilitation of Upper Mekong and Provincial Waterways	- To reduce risks caused by Mekong floods - To improve fishery resources - To improve rural livelihoods by supplying sufficient water for irrigation and domestic uses; and - To improve provincial water transportation.	Provinces along upper Mekong, Koh Kong, Prey Veng, Pursat and Svay Rieng	3 years	30,000,000	MOWRAM	MPWT and local authorities	Provincial waterways rehabilitation has been carried out by MOWRAM with support from ADB, JICA and WB in Banteay Meanchey, Battambang and Kampong Speu.

Priority No.	Project Title	Objectives	Location	Time-frame	Estimated Budget, US$	Agencies Involved		Status
						Lead	Cooperating	
2c	Rehabilitation of Multiple-Use Canals in Banteay Meas District, Kampot Province	- To enhance water storage capacity for general use in the village during the dry season.	Kampot	1 year	1,500,000	MOWRAM	NGOs and local authorities	In Kampot, the construction of wells and ponds has been undertaken with the assistance of FAO, Food for Hunger, UNICEF and WFP.
3a	Vegetation Planting for Flood and Windstorm Protection	- To reduce flood and windstorm damage to property and crops.	Kampong Thom, Kampot, Kratie, Sihanoukville, Takeo, Prey Veng, Battambang and Banteay Meanchey	3 years	4,000,000	MAFF	MoE and local authorities	In the 1980s, MAFF started promoting the plantation of Acacia and Eucalyptus throughout the country including in coastal areas. Need to promote indigenous species.
3b	Strengthening of Community Disaster Preparedness and Response Capacity	- To ensure preparedness for and effective response to climate hazards at the community level; and - To reduce climate hazard risks for local communities.	Banteay Meanchey, Kampong Cham, Kampong Speu, Kampot, Kandal, Prey Veng, Svay Rieng and Takeo	5 years	5,000,000	NCDM	MoH, local authorities and NGOs	NCDM has prepared a strategic plan mentioning community disaster preparedness. Oxfam has worked on a comprehensive disaster management programme in Takeo Province including preparedness, mitigation and risk reduction.
3c	Water Gates and Water Culverts Construction	- To regulate flood water around the newly rehabilitated road network; and - To minimise road and crop damage caused by flood.	Banteay Meanchey, Kampong Cham, Kandal, Kratie, Prey Veng, Siem Reap, Svay Rieng and Takeo	2 years	10,000,000	MPWT and MOWRAM	Local authorities	The construction of water gates and culverts has been undertaken by some NGOs and NCDM in selected provinces.
3d	Safer Water Supply for Rural Communities	- To provide safe water in sufficient quantities for rural communities; and - To reduce the risk of contracting water-related diseases.	Battambang, Kampong Cham, Kampong Speu, Kampong Thom, Kandal, Kratie, Prey Veng, Ratanak Kiri and Takeo	3 years	5,000,000	MRD	MoH, local authorities and NGOs	The construction of wells and ponds in selected areas has been carried by CONCERN, CRCD, FAO, UNICEF, WFP, etc. In some places, locally made water filters have been provided by some NGOs.

Priority No.	Project Title	Objectives	Location	Time-frame	Estimated Budget, US$	Agencies Involved		Status
						Lead	Cooperating	
3e	Development and Improvement of Small-Scale Aquaculture Ponds	- To ensure food security in the areas where wild fish stocks are insufficient to meet demand; and - To increase the income of people living in these areas.	Kampong Cham Kampong Speu Kandal, Kratie, Sihanoukville and Svay Rieng	3 years	4,000,000	MAFF	Local authorities and NGOs	Limited implementation of small-scale aquaculture. MAFF has provided extension service and training to farmers about fishpond cultures, as well as rice-fish culture in Kandal, Prey Veng, Svay Rieng and Takeo.
3f	Promotion of Household Integrated Farming	- To increase agricultural productivity; and - To improve farmers' incomes, food security and livelihoods in the areas affected by flood and drought.	Banteay Meanchey, Battambang, Kampong Speu, Prey Veng, Svay Rieng and Takeo	3 years	2,500,000	MAFF	Local authorities and NGOs	MAFF with support from ADB has implemented similar projects in selected areas of Banteay Meanchey, Battambang, Pursat and Siem Reap. Some NGOs has implemented similar project in Prey Veng and Svay Rieng.
3g	Rehabilitation of Coastal Protection Infrastructure	- To increase agricultural production in coastal areas.	Kampot, Kep, Koh Kong and Sihanoukville	2 years	2,000,000	MOWRAM	MOWRAM's Provincial Departments and concerned NGOs in collaboration with local authorities	Damaged coastal protection structures have been identified and initial limited repairs conducted. GRET has repaired the Prey Nob polder in Sihanoukville and operates it with local communities.
4a	Development and Improvement of Community Irrigation Systems	- To provide sufficient water for rice farming; - To reduce the risk of crop failures from water shortage; and - To enhance food security and assist in eliminating poverty among rural people.	Banteay Meanchey, Battambang, Kampong Cham, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Kandal, Kratie, Prey Veng, Pursat, Ratanak Kiri, Siem Reap, Svay Rieng and Takeo	3 years	45,000,000	MOWRAM	MOWRAM's and MAFF's Provincial Departments, local authorities	A number of governmental and non-governmental organisations and other donors such as ADB, APS (Italian Government), the Japanese Government, etc., have built medium-scale irrigation schemes in several provinces, including Battambang, Kampong Cham, Kampong Speu, Kampong Thom, Prey Veng, and Svay Rieng.

Priority No.	Project Title	Objectives	Location	Time-frame	Estimated Budget, US$	Agencies Involved		Status
						Lead	Cooperating	
4b	Community Mangrove Restoration and Sustainable Use of Natural Resources	- To stabilise shoreline; - To reduce sea water intrusion; - To reduce coastal erosion; and - To protect coastal areas from storm.	Kampot, Kep and Koh Kong	3 years	1,000,000	MoE	NGOs, local authorities and SEILA	There are at least three modules of similar community based natural resource management established and/or functioning in coastal areas with support from IDRC/MoE and DANIDA.
4c	Community Based Agricultural Soil Conservation in Srae Ambel District, Koh Kong Province	- To reduce soil erosion from agricultural land in the coastal watershed; and - To increase food security.	Koh Kong	3 years	2,000,000	MAFF	MAFF's Provincial Department, local authorities and NGOs	AFSC has worked with local communities in Srae Ambel in the following areas: sustainable agriculture, and community forestry and fisheries.

Sector: Health

Priority No.	Project Title	Objectives	Location	Time-frame	Estimated Budget, US$	Agencies Involved		Status
						Lead	Cooperating	
1a	Production of Biopesticides	- To reduce malaria incidence by introducing biopesticides	CNM and CPE	5 years	3,000,000	CNM	CPE, University of Health Sciences, RUPP and NGOs	Limited biopesticide research has been conducted in Cambodia.
1b	Development of Healthcare Centres and Posts	- To assist the Ministry of Health in developing healthcare centres and posts in high risk malaria regions and in areas highly vulnerable to climate change.	Selected villages in high-risk malaria regions	3 years	750,000	MoH	CNM and local authorities	Budget constraints have limited MoH construction of healthcare centres and posts.
1c	Provision of Safe Water in High Risk Malaria Regions	- To reduce risk of mosquito bites while collecting water from rivers and streams; and - To provide communal water sources.	Selected villages in high-risk malaria regions and in areas highly vulnerable to climate change	3 years	100,000	MRD	NGOs and international organisations	MRD in collaboration with NGOs and international organisations has constructed wells in a number of provinces.

Priority No.	Project Title	Objectives	Location	Time-frame	Estimated Budget, US$	Agencies Involved		Status
						Lead	Cooperating	
2	Malaria Education and Mosquito Habitat Clearance Campaigns	- To raise public awareness of malaria prevention and treatment; - To promote behavioural changes towards malaria prevention and treatment; and - To reduce the extent of mosquito habitats.	Kampong Thom, Koh Kong, Mondul Kiri, Preah Vihear, Pursat, Ratanak Kiri, and Siem Reap	3 months from Feb. to Apr. every year	500,000 per year	CNM	MoH Provincial Departments, local authorities and concerned NGOs	This project complements existing malaria education by CNM, HU and PFD under the global fund.

VI. NAPA PREPARATION PROCESS

Preparation of the Cambodian NAPA Document started in late August 2003 and was completed in March 2005. It was based on an all-inclusive approach: policy analysis, field surveys, stakeholder consultations, and expert judgments. The NAPA process followed five major steps: (i) synthesis of available information on adverse impacts of climate change and current adaptation in Cambodia, (ii) identification and prioritisation of potential activities to adapt to climate change, (iii) development of the draft Cambodian NAPA Document, (iv) facilitation of public and Government review of the draft NAPA Document, and (v) Government endorsement and dissemination of the NAPA document. The Ministry of Environment has acted as the Executing Agency responsible for project planning, overall management and outputs delivery. An inter-ministerial Project Steering Committee was established to provide policy guidance and support to the project. The NAPA Team consisting of Government representatives from concerned ministries was responsible for technical tasks with support from the Multi-Disciplinary (MD) Team of national and regional consultants. UNDP has acted as the GEF implementing agency and has provided technical and advisory support throughout project implementation.

ANNEX 1. PROJECT SCORING

Sector: Cross-Sectoral

Project	Criteria	Score		
		-	0	+
1. Enhancement of the National Weather Forecast Centre (Department of Meteorology)	1. Death and casualty			x
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology		x	
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		0	7	7

Project	Criteria	Score		
		-	0	+
2. Awareness Raising and Education in Climate Change Issues	1. Death and casualty		x	
	2. Livelihood		x	
	3. Human health		x	
	4. Food security and agriculture		x	
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities		x	
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	10	4

Project	Criteria	Score		
		-	0	+
3. Development of School Extra-Curricular Materials on Climate Hazards	1. Death and casualty			x
	2. Livelihood		x	
	3. Human health		x	
	4. Food security and agriculture		x	
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	8	6

Project	Criteria	Score		
		-	0	+
4. Vegetation Planting for Flood and Windstorm Protection	1. Death and casualty			x
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Project	Criteria	Score		
		-	0	+
5. Strengthening of Community Disaster Preparedness and Response Capacity	1. Death and casualty			x
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Sector: Agriculture and Water Resources

Project	Criteria	Score		
		-	0	+
6. Development and Improvement of Community Irrigation Systems	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	5	9

Project	Criteria	Score		
		-	0	+
7. Water Gates and Water Culverts Construction	1. Death and casualty			x
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building		x	
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Project	Criteria	Score		
		-	0	+
8. Establishment and Improvement of Farmer Water User Communities	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology		x	
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	7	7

Project	Criteria	Score		
		-	0	+
9. Safer Water Supply for Rural Communities	1. Death and casualty			x
	2. Livelihood		x	
	3. Human health			x
	4. Food security and agriculture		x	
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Project	Criteria	Score		
		-	0	+
10. Groundwater Extraction for Crop Cultivation	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology		x	
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		0	7	7

Project	Criteria	Score		
		-	0	+
11. Development and Improvement of Small-Scale Aquaculture Ponds	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Project	Criteria	Score		
		-	0	+
12. Development and Rehabilitation of Flood Protection Dikes	1. Death and casualty			x
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage			x
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	3	11

Project	Criteria	Score		
		-	0	+
13. Development of Community and Household Flood Safe Areas	1. Death and casualty			x
	2. Livelihood		x	
	3. Human health			x
	4. Food security and agriculture		x	
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building		x	
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	7	7

Project	Criteria	Score		
		-	0	+
14. Traditional Wooden Boat Distribution	1. Death and casualty			x
	2. Livelihood		x	
	3. Human health		x	
	4. Food security and agriculture		x	
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services	x		
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage			x
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building		x	
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		1	7	6

Project	Criteria	Score		
		-	0	+
15. Cement Water Tanks Construction	1. Death and casualty		x	
	2. Livelihood		x	
	3. Human health			x
	4. Food security and agriculture		x	
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building		x	
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	6	8

Project	Criteria	Score		
		-	0	+
16. Promotion of Food Supplements in Household Cattle Raising	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		0	8	6

Project	Criteria	Score		
		-	0	+
17. Development of Community Rice Banks	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	7	7

Project	Criteria	Score		
		-	0	+
18. Improving Farmers' Adaptive Capacity to Climate Change	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	6	8

Project	Criteria	Score		
		-	0	+
19. Community Agro-Forestry in Deforested Areas	1. Death and casualty		x	
	2. Livelihood		x	
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	7	7

Project	Criteria	Score		
		-	0	+
20. Introduction of Short-Period Rice Varieties in Areas Affected by Seawater Intrusion and Drought	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	7	7

Project	Criteria	Score		
		-	0	+
21. Rehabilitation of a Multiple-Use Reservoir in Takeo Province	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	2	12

Project	Criteria	Score		
		-	0	+
22. Rehabilitation of Upper Mekong and Provincial Waterways	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		0	3	11

Project	Criteria	Score		
		-	0	+
23. Training of Village Veterinary Workers	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		0	8	6

Project	Criteria	Score		
		-	0	+
24. Promotion of Household Integrated Farming	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Project	Criteria	Score		
		-	0	+
25. Rehabilitation of Multiple-Use Dams in Takeo and Kampong Speu Provinces	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	2	12

Sector: Coastal Zone

Project	Criteria	Score		
		-	0	+
26. Rehabilitation of Coastal Protection Infrastructure	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	4	10

Project	Criteria	Score		
		-	0	+
27. Community and Household Water Supply in Coastal Provinces	1. Death and casualty			x
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality			x
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	2	12

Project	Criteria	Score		
		-	0	+
28. Rehabilitation of Multiple-Use Canals in Banteay Meas District, Kampot Province	1. Death and casualty			x
	2. Livelihood			x
	3. Human health			x
	4. Food security and agriculture			x
	5. Water availability and accessibility			x
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	3	11

Project	Criteria	Score		
		-	0	+
29. Community Mangrove Restoration and Sustainable Use of Natural Resources	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	5	9

Project	Criteria	Score		
		-	0	+
30. Assessment of Needs for Setbacks, Vegetation Buffers and Protection Structures in Coastal Areas	1. Death and casualty		x	
	2. Livelihood		x	
	3. Human health		x	
	4. Food security and agriculture		x	
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology		x	
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities		x	
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability		x	
Total		0	12	2

Project	Criteria	Score		
		-	0	+
31. Community Based Agricultural Soil Conservation in Srae Ambel District, Koh Kong Province	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality			x
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	5	9

Project	Criteria	Score		
		-	0	+
32. Community Agroforestry in Coastal Areas	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture			x
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services			x
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure		x	
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building			x
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	6	8

Project	Criteria	Score		
		-	0	+
33. Development of Drainage Systems for Road Protection	1. Death and casualty		x	
	2. Livelihood			x
	3. Human health		x	
	4. Food security and agriculture		x	
	5. Water availability and accessibility		x	
	6. Water quality		x	
	7. Biodiversity and other environmental goods and services		x	
	8. Appropriate and environmentally friendly technology			x
	9. Cultural and historical heritage		x	
	10. Protection, rehabilitation or construction of infrastructure			x
	11. Responsiveness to immediate needs of affected communities			x
	12. Capacity building		x	
	13. Synergy and complementarity with other projects			x
	14. Sustainability			x
Total		0	8	6

Sector: Human Health

Project	Criteria	Score		
		-	0	+
34. Treated Mosquito Net Distribution	1. Death and casualty			x
	2. Human health			x
	3. Biodiversity and other environmental goods and services		x	
	4. Appropriate and environmentally friendly technology			x
	5. Protection, rehabilitation or construction of infrastructure		x	
	6. Responsiveness to immediate needs of affected communities			x
	7. Capacity building			x
	8. Synergy and complementarity with other projects			x
	9. Sustainability		x	
Total		0	3	6

Project	Criteria	Score		
		-	0	+
35. Malaria Education and Mosquito Habitat Clearance Campaigns	1. Death and casualty			x
	2. Human health			x
	3. Biodiversity and other environmental goods and services		x	
	4. Appropriate and environmentally friendly technology			x
	5. Protection, rehabilitation or construction of infrastructure		x	
	6. Responsiveness to immediate needs of affected communities			x
	7. Capacity building			x
	8. Synergy and complementarity with other projects			x
	9. Sustainability			x
Total		0	2	7

Project	Criteria	Score		
		-	0	+
36. Production of Biopesticides	1. Death and casualty			x
	2. Human health			x
	3. Biodiversity and other environmental goods and services			x
	4. Appropriate and environmentally friendly technology			x
	5. Protection, rehabilitation or construction of infrastructure		x	
	6. Responsiveness to immediate needs of affected communities			x
	7. Capacity building			x
	8. Synergy and complementarity with other projects			x
	9. Sustainability			x
Total		0	1	8

Project	Criteria	Score		
		-	0	+
37. Strengthening Malaria Surveillance Programme	1. Death and casualty			x
	2. Human health			x
	3. Biodiversity and other environmental goods and services		x	
	4. Appropriate and environmentally friendly technology		x	
	5. Protection, rehabilitation or construction of infrastructure		x	
	6. Responsiveness to immediate needs of affected communities			x
	7. Capacity building			x
	8. Synergy and complementarity with other projects			x
	9. Sustainability			x
Total		0	3	6

Project	Criteria	Score		
		-	0	+
38. Development of Healthcare Centres and Posts	1. Death and casualty			x
	2. Human health			x
	3. Biodiversity and other environmental goods and services		x	
	4. Appropriate and environmentally friendly technology			x
	5. Protection, rehabilitation or construction of infrastructure			x
	6. Responsiveness to immediate needs of affected communities			x
	7. Capacity building			x
	8. Synergy and complementarity with other projects			x
	9. Sustainability			x
Total		0	1	8

Project	Criteria	Score		
		-	0	+
39. Provision of Safe Water in High Risk Malaria Regions	1. Death and casualty			x
	2. Human health			x
	3. Biodiversity and other environmental goods and services		x	
	4. Appropriate and environmentally friendly technology			x
	5. Protection, rehabilitation or construction of infrastructure			x
	6. Responsiveness to immediate needs of affected communities			x
	7. Capacity building			x
	8. Synergy and complementarity with other projects			x
	9. Sustainability			x
Total		0	1	8

ANNEX 2. PROPOSED HIGH PRIORITY NAPA ACTIVITIES

Non-health Projects

HIGH PRIORITY PROJECT 1A: REHABILITATION OF A MULTIPLE-USE RESERVOIR IN TAKEO PROVINCE

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Due to sedimentation, frequent floods and lack of maintenance, the reservoirs storage capacities have significantly decreased, resulting in water shortage for irrigation and poor water quality in the dry season. In addition, prolonged droughts occurring in recent years have further decreased water availability for households and irrigation. The project aims to increase the storage capacity of the reservoir by 3 million m^3.

Description

- Objective
  - To improve water storage capacity for multiple uses including irrigation, water supply for urban areas, recreational uses and enhanced aquatic biodiversity.

- Activities
  - Dredge the reservoir;
  - Repair a dike and a water gate; and
  - Establish reservoir maintenance scheme.

- Short-term outputs
  - 3 million m^3 of soil removed from the 100 ha reservoir;
  - 1,200 m dike repaired; and
  - 1 water gate repaired.

- Potential long-term outcomes
  - 750 ha of dry season paddy fields and 150 ha of wet season paddy fields irrigated;
  - Fish stock in the reservoir increased;
  - Agricultural production increased; and
  - Water quality for Takeo City improved.

- Location
  The project will be implemented in Takeo Province (Takeo Town, Doun Kaev District).

- Time frame
  3 years.

- Budget
  US $4,000,000.

Implementation

- Institutional arrangement
  MOWRAM will be the lead agency in coordination with MoE, MAFF, MIME and MRD.

- Risks and barriers
  Insufficient coordination among concerned ministries/institutions.

- Evaluation and monitoring
  The following indicators will be used: water storage capacity, length of dike repaired, and a gate repaired.

Related developments

This is a new initiative.

HIGH PRIORITY PROJECT 1B: REHABILITATION OF MULTIPLE-USE DAMS IN TAKEO AND KAMPONG SPEU PROVINCES

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

A system of dams were built in the 1970s in Kampong Speu Province to retain runoff water from nearby mountains and to control flood. These dams have played a crucial role in rice production and water supply for rural communities in Samraong District (Takeo Province) and Basedth District (Kampong Speu province). By 1983, one of the main dams, named Slapleng, was disused due to damage caused by frequent floods and improper maintenance. As a result, storage capacities have significantly decreased, resulting in water shortage for irrigation and household use in the dry season. In addition, areas of rice fields that can no longer be cultivated continue to expand due to increasing sand sedimentation by flash floods every year.

Description

- Objectives
  - To improve water management for multiple uses including irrigation, water supply rural communities, recreational uses and aquatic biodiversity enhancement.

- Activities
  - Reconstruct Slapleng dam and repair other dams as required;
  - Repair irrigation canal systems, water gates;
  - Remove sand deposits from rice fields;
  - Establish dam maintenance scheme;
  - Reforest Slapleng watershed; and
  - Explore options for reforestation of other watersheds.

- Short-term outputs
  - 1 dam reconstructed;
  - 2 dams repaired;
  - Irrigation canal systems and water gates repaired;
  - 100 ha of rice fields freed from sand deposits;
  - Dam maintenance scheme established;
  - 1watershed reforested; and
  - Options for watershed reforestation recommended.

- Potential long-term outcomes
  - 500 ha of dry season paddy fields irrigated;
  - Fish stock in the reservoir increased;
  - Agricultural production increased;
  - Forest and non-timber forest products available; and
  - Water quality and water supply for rural communities improved.

- Location
  The project will be implemented in Takeo Province (Samraong District) and in Kampong Speu Province (Basedth District).

- Time frame
  2 years.

- Budget
  US $2,500,000.

Implementation

- Institutional arrangement
  MOWRAM will be the lead agency in implementing this project in coordination with MoE, MAFF, MRD and local authorities.

- Risks and barriers
  Insufficient coordination among concerned ministries/institutions, limited information about local hydrology.

- Evaluation and monitoring
  The following indicators will be used: water storage capacity, length of dam and canals repaired, number of water gates repaired and constructed, areas of rice fields freed from sand deposits, rice production.

Related developments

Minor repairs have been conducted since the 80th by local authorities. MOWRAM plans to undertake a detailed study of this project.

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

There are few water sources available for household consumption and general use in the coastal communities of Kampot Province and Kep Municipality. The situation is compounded by the fact that both surface and underground waters are under the influence of seawater during the dry season and flood during the rainy season. The consumption of contaminated water is a cause of ill health, thus weakening people's capacity to prepare for flood and other climate disasters.

Description

- Objectives
  - To provide safer water for rural communities in coastal areas; and
  - To reduce the incidence of water-related diseases.

- Activities
  - Construct community ponds for water storage;
  - Create flood safe areas by raising ground using soil dug from ponds;
  - Provide advice and guidance for rainwater harvesting; and
  - Provide locally made water jars, and biological filters to households.

- Short-term outputs
  - Twenty community ponds with average storage capacity of 3,000m^3 constructed; and
  - 10,000 water filters and 10,000 water jars provided.

- Potential long-term outcomes
  - Access to safer water improved;
  - Water-related diseases reduced; and
  - Poverty reduced.

- Location
  The project will be implemented in selected communities along the coastline: Kampot Province (2 coastal communities in Banteay Meas District, 5 communities in Kampong Trach District, 1 community in Dang Tong District and 1 in Praek Ampil Commune), Kep Municipality (11 coastal communities in Damnak Chang'aeur District), and Koh Kong Province (3 communities in each of Thma Bang, Botum Sakor and Kaoh Kong Districts).

- Time frame
  The project time frame is 1 year, with fieldwork beginning in the dry season around January and ending in the beginning of the rainy season in May.

- Budget
  US $1,000,000.

Implementation

- Institutional arrangement
  MRD will implement the project in collaboration with the commune councils of the districts selected and concerned NGOs. The commune councils will assist in the

selection of project locations and ensure appropriate maintenance of the ponds after the completion of the project.

- Risks and barriers
  Potential land use conflict, weak social capital in local communities, and limited data on local hydrology and geology.

- Evaluation and monitoring
  The following indicators will be used: number of ponds constructed, number of water filters and tanks provided and used, and incidence of water-related diseases.

Related developments

In Kampot, the construction of wells and ponds has been undertaken with the assistance of FAO, Food for Hunger, UNICEF and the World Food Programme. However, most of the assistance covered areas further inland where groundwater sources are available. In Kep, 15 ponds have been constructed. Most of the projects were undertaken between 1985 and 2000.

Resource Development International and International Development Enterprises are two NGOs working on producing ceramic water filters for sale at low cost in Kandal and Kampong Chhnang provinces respectively. Other NGOs have produced slow sand filters for free distribution in Kratie, Stung Treng and other provinces in the northeast of the country.

HIGH PRIORITY PROJECT 2A: DEVELOPMENT AND REHABILITATION OF FLOOD PROTECTION DIKES

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Many existing flood protection infrastructures are not fully functional and require rehabilitation. The lack of adequate protection makes settlements and agricultural fields vulnerable to floods. Under changing climatic conditions, the frequency and intensity of floods may increase. It is therefore essential that adequate protection infrastructures be developed.

Description

- Objective
  - To protect settlements and agricultural fields from flood.

- Activities
  - Identify priority sites for flood protection infrastructure development;
  - Develop and rehabilitate flood protection dikes; and
  - Establish community associations for maintenance.

- Short-term outputs
  - 200 km of flood protection dikes developed.

- Potential long-term outcomes
  - Settlements and agricultural fields protected from flood;
  - Agricultural productivity increased; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Battambang (Moung Ruessei District), Kampong Cham, Kandal (Kandal Stueng, Khsach Kandal, Ponhea Lueu, Lvea Aem, Kien Svay, Kaoh Thum, S'ang and Leuk Daek Districts), Kratie, Pursat (Sampov Meas, Bakan, Phnum Kravanh and Kandieng Districts), Svay Rieng (Svay Rieng District), and Sihanoukville Municipality (Prey Nob District).

- Time frame
  3 years.

- Budget
  US $5,000,000.

Implementation

- Institutional arrangement
  MOWRAM will implement the project in collaboration with MPWT, local authorities and NGOs.

- Risks and barriers
  Insufficient coordination among concerned ministries/institutions, limited participation of local communities, land use conflict, limited hydrological data.

- Evaluation and monitoring
  The following indicators will be used: kilometres of dikes developed, number of communities participating in associations.

Related developments

MOWRAM has developed flood protection structures in a number of provinces.

HIGH PRIORITY PROJECT 2B: REHABILITATION OF UPPER MEKONG AND PROVINCIAL WATERWAYS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

In recent years, Cambodia has experienced frequent floods, which are believed to be caused by climate change. The upper Mekong and provincial waterways are essential for flood mitigation, provision of fertile silts for farming lands, fisheries, provision of water for irrigation and household consumption, and for transportation. Currently, a number of waterways along the upper Mekong and waterways in the provinces of Svay Rieng, Prey Veng, Pursat and Koh Kong are silted, and have become too shallow, resulting in significant reduction of flood water absorbing capacity, losses of fishery resources, decreasing agricultural yields, and limits to transportation.

Description

- Objectives
  - To reduce risks caused by Mekong floods;
  - To improve fishery resources;
  - To improve rural livelihoods by supplying sufficient water for irrigation and domestic uses; and
  - To improve provincial water transportation.

- Activities
  - Identify and select waterways to be rehabilitated;
  - Conduct feasibility studies of the selected projects;
  - Rehabilitate identified waterways; and
  - Train staff of local authorities on maintenance and management of waterways.

- Short-term outputs
  - 5 main waterways along the upper Mekong rehabilitated;
  - 3 provincial waterways of a total length of 100 km rehabilitated; and
  - Local authorities staff trained in maintenance and management of waterways.

- Potential long-term outcomes
  - Agricultural productivity and fishery resources increased;
  - Water transportation improved; and
  - Poverty reduced.

- Location
  The project will be implemented in the provinces along the upper Mekong, Koh Kong, Prey Veng, Pursat, and Svay Rieng.

- Time frame
  3 years.

- Budget
  US $30,000,000.

Implementation

- Institutional arrangement
  MOWRAM will implement the project in collaboration with MPWT and local authorities.

- Risks and barriers
  Potential land use conflict, adverse environmental impacts, lack of community participation.

- Evaluation and monitoring
  The following indicators will be used: length of waterways rehabilitated, increase of fishery resources, agricultural land irrigated, cropping index, waterway traffic.

Related developments

Provincial waterways rehabilitation has been carried out by MOWRAM with support from ADB, JICA and WB in Banteay Meanchey, Battambang and Kampong Speu Provinces.

HIGH PRIORITY PROJECT 2C: REHABILITATION OF MULTIPLE-USE CANALS IN BANTEAY MEAS DISTRICT, KAMPOT PROVINCE

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

A seven-kilometre dike and two canals on both sides of the dike were built under the Khmer Rouge to irrigate the rice fields in Prey Tonle Village, Banteay Meas District. The dike has been used as a road and a flood refuge. The canals have been used for irrigation, navigation, and to provide freshwater for household use and livestock raising. The canals, which are also affected by seawater intrusion and high tide, require rehabilitation; the water gates also need repair. Rules governing the use of the gates and canals need to be established.

Description

- Objective
  - To enhance water storage capacity for general use in the village during the dry season.

- Activities
  - Rehabilitate the canals and the dike;
  - Repair the gates; and
  - Establish water utilisation groups and fee collection for maintenance and operations.

- Short-term outputs
  - Two canals, seven kilometres in length rehabilitated;
  - A dike rehabilitated; and
  - A water utilisation group established.

- Potential long-term outcomes
  - Access to water improved; and
  - Poverty reduced.

- Location
  The project will be implemented in Kampot Province (Prey Tonle in Banteay Meas District)

- Time frame
  1 year. The canal and dike rehabilitation should be undertaken during the dry season.

- Budget
  US $1,500,000.

Implementation

- Institutional arrangement
  The project will be coordinated by MOWRAM and implemented by concerned NGOs in collaboration with local authorities.

- Risks and barriers
  Land use conflict, weak social capital in local communities, and limited data on local hydrology and geology.

- Evaluation and monitoring
  The following indicators will be used: canals, dike and gates rehabilitated and functioning, and water user group established.

Related developments

In Kampot, the construction of wells and ponds has been undertaken with the assistance of FAO, Food for Hunger, UNICEF and the World Food Programme. However, most of the assistance covered areas further inland where groundwater sources are available. In Kep, 15 ponds have been constructed. Most of the projects were undertaken between 1985 and 2000.

HIGH PRIORITY PROJECT 3A: VEGETATION PLANTING FOR FLOOD AND WINDSTORM PROTECTION

Sector: Cross-Sectoral

Rationale/justification in relation to climate change, including sectors concerned

A number of provinces in Cambodia have experienced frequent floods and windstorms. The houses of the poor are rarely sturdy enough to withstand the harsh weather. Crops are planted in exposed areas, leaving them vulnerable to windstorms. Floods and windstorms cause frequent damage to property and crops. By planting locally available tree species, damage to property and crops may be reduced.

Description

- Objective
  - To reduce flood and windstorm damage to property and crops.

- Activities
  - Select communities for project implementation;
  - Raise awareness on the need for adaptation to climate hazards;
  - Assess the potential for planting tree for flood and windstorm protection;
  - Select indigenous tree species that are suitable for use as protection;
  - Coordinate with local authorities to identify and select sites for planting;
  - Plant selected tree species; and
  - Monitor and evaluate the results of the project.

- Short-term outputs
  - Protection vegetation for crops and property planted;
  - Public awareness of the significance of adaptation measures increased; and
  - Local communities organised to care for protection vegetation.

- Potential long-term outcomes
  - Damage to property and agricultural crops reduced;
  - Fuelwood and other non-timber forest products provided; and
  - Poverty reduced.

- Location
  The project will be implemented in provinces that are susceptible to windstorms and floods in the following provinces: Kampong Thom (Stoung, Kampong Svay and Sandan Districts), Kampot (Prek Kreos in Kampong Trach District and Prey Tonle in Banteay Meas District), Kratie (Chloung, Preaek Prasab, Kracheh and Sambour Districts), Takeo (Borei Chulsar, Angkor Borei Districts), Sihanoukville Municipality (Toek Thla, Toek Laak and Samaki in Prey Nob District), Prey Veng (Along the lower Mekong), Battambang (Degraded forest areas of upstream Sangke and Dauntry Rivers as well as along these rivers), and Banteay Meanchey (Degraded forest area of upstream Si Sophon River).

- Time frame
  3 years.

- Budget
  US $4,000,000.

Implementation

- Institutional arrangement
  MAFF will coordinate the project with broad participation of local people and local authorities. The Climate Change Office, the Forestry Administration and MAFF's Provincial Departments Agriculture, Forestry and Fisheries will provide technical and advisory support.

- Risks and barriers
  Weak coordination among stakeholders, limited participation of local people in the project as it is not an income generating activity, lack of suitable land.

- Evaluation and monitoring
  The following indicators will be used: number trees planted and surviving, number of households participating in the project, and extent of agricultural land covered by the project.

Related developments

In the 1980s, MAFF started promoting the plantation of Acacia and Eucalyptus throughout the country including in coastal areas. Although useful as windbreaks, both species are non-native to Cambodia. Indigenous species will be favoured by the proposed project as they are more adapted to local environmental conditions and may cause less damage to existing ecosystems.

HIGH PRIORITY PROJECT 3B: STRENGTHENING OF COMMUNITY DISASTER PREPAREDNESS AND RESPONSE CAPACITY

Sector: Cross-Sectoral

Rationale/justification in relation to climate change, including sectors concerned

The capacity of Cambodian governmental institutions to assist local communities in preparing and responding to climate hazards is restricted to post-disaster rehabilitation and relief. The capacity of local communities to prepare and respond to climate hazards is very limited. Grassroots intervention is required to develop local communities capacity to prepare for and cope with climate hazards.

Description

- Objectives
  - To ensure preparedness for and effective response to climate hazards at the community level; and
  - To reduce climate hazard risks for local communities.

- Activities
  - Raise awareness and understanding of local communities and authorities (up to the commune level) about the necessity and benefits of preparedness for climate hazards using mass media;
  - Develop for individual settlements a flood hazard and response map that includes information on patterns of flood, routes to safety areas, flood levels for evacuation, preparation of food stocks and temporary refuge, sanitation and healthcare during floods, and communications before and during flood;
  - Train local communities on preparedness and response to storms, including selection of sites for building houses, establishing windbreaks, construction design for windstorms, measures to protect lives and property during windstorms;
  - Train local authorities on relief coordination, rescue operations, emergency assistance; and
  - Supply basic equipment to local authorities and households on a shared cost basis (boats, shelters, communication equipment, life rafts, etc.).

- Short-term outputs
  - Local communities and authority better prepared for climate hazards;
  - Disaster preparedness and response issues incorporated into commune development plans; and
  - Community flood hazard and response maps developed and available for use.

- Potential long-term outcomes
  - Risk of climate hazards to local communities reduced;
  - Capacity for coping with climate hazards at the community level improved; and
  - Poverty reduced.

- Location
  The project will be implemented in eight provinces: Banteay Meanchey, Kampong Cham, Kampong Speu, Kampot, Kandal, Prey Veng, Svay Rieng, and Takeo.

- Time frame
  5 years.

- Budget
  US $5,000,000.

Implementation

- Institutional arrangement
  NCDM will coordinate the project and implement it in the existing framework for strengthening capacity for disaster management in cooperation with MoH, local authorities and NGOs.

- Risks and barriers
  Weak coordination among stakeholders, limited participation of local people in the project as it is not an income generating activity, difficulty of access to remote areas.

- Evaluation and monitoring
  The following indicators will be used: number of communities and local authorities participating in the project, number of basic equipment supplied, and level of ability to prepare for and respond to climate hazards.

Related developments

NCDM has prepared a strategic plan emphasising the need for developing community disaster preparedness but no implementation has been initiated. Oxfam has been working on a comprehensive disaster management programme in Takeo Province including preparedness, mitigation and risk reduction.

HIGH PRIORITY PROJECT 3C: WATER GATES AND WATER CULVERTS CONSTRUCTION

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

The road network of Cambodia has been rehabilitated in recent years without due consideration for hydrological aspects. This has resulted in the disruption of natural flooding patterns, causing increased damage to agricultural crops and infrastructure.

Description

- Objectives
  - To regulate flood water around the newly rehabilitated road network; and
  - To minimise road and crop damage caused by flood.

- Activities
  - Identify areas affected by flood subsequent to road rehabilitation; and
  - Install water gates and water culverts.

- Short-term outputs
  - Water gates and water culverts installed along the road network;
  - Flood regime regulated;
  - Agricultural productivity increased; and
  - Damage to road network reduced.

- Potential long-term outcomes
  - Water-related diseases reduced; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Banteay Meanchey (Mongkol Borei District), Kampong Cham, Kandal (Khsach Kandal, Ponhea Lueu, Lvea Aem, Kien Svay, Kaoh Thum, S'ang and Leuk Daek Districts), Kratie, Prey Veng (Kampong Trabaek, Preah Sdach and Peam Ro Districts), Siem Reap (Srei Snam, Angkor Chum, Varin, Banteay Srei and Svay Leu Districts), Svay Rieng (Svay Rieng District), and Takeo (Kaoh Andaet District).

- Time frame
  The time frame for the project is 2 years. The project construction phase should start at the beginning of the dry season.

- Budget
  US $10,000,000.

Implementation

- Institutional arrangement
  MPWT and MOWRAM will coordinate the project and MPWT Provincial Departments will implement it in collaboration with local authorities in the selected districts.

- Risks and barriers
  Insufficient coordination among concerned ministries/institutions, potential land use conflict, and limited long-term data on flood.

- Evaluation and monitoring
  The following indicators will be used: number of gates and culverts installed, reduction of damage to agriculture.

Related developments

The construction of water gates and culverts has been undertaken by the Cambodian Farmer Association for Agriculture Development in Svay Ta Yean commune (Kampong Rou District), Prey Ankunh Commune (Chantrea District) in Svay Rieng Province. Construction of water culverts has been carried out by NCDM in Kandieng District (Pursat), Romeas Haek District (Svay Rieng), Odongk District (Kampong Speu), and Lvea Aem District (Kandal).

HIGH PRIORITY PROJECT 3D: SAFER WATER SUPPLY FOR RURAL COMMUNITIES

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Sufficient supply of safer water remains critical for rural Cambodians, which would enable them to better adapt to changing climate conditions. Approximately 30 percent of the rural population have access to safe water supply for domestic use, while the remaining experiences insufficient supply of safe water leading to water-related diseases. The problem has been aggravated by the prolonged droughts that have occurred more frequently in recent years.

Description

- Objectives
  - To provide safe water in sufficient quantities for rural communities; and
  - To reduce the risk of contracting water-related diseases.

- Activities
  - Construct wells and ponds;
  - Establish water user committees;
  - Train community members in the maintenance and operation of wells and ponds; and
  - Provide locally-made water filters for household use.

- Short-term outputs
  - 500 wells and 100 ponds constructed; and
  - 10,000 locally-made water filters provided.

- Potential long-term outcomes
  - Access to safe water improved;
  - Water-related diseases reduced; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Battambang (Moung Ruessei District), Kampong Cham (Kang Meas, Srei Santhor, Memot and Stueng Trang Districts), Kampong Speu (Aoral and Phnum Sruoch Districts), Kampong Thom (Prasat Sambour and Kampong Svay Districts), Kandal (Kien Svay District), Kratie (Preaek Prasab, Sambour, Kracheh and Chhloung Districts), Prey Veng (Me Sang, Ba Phnum, Kamchay Mear and Kampong Trabaek Districts), Ratanak Kiri (Lumphat District), and Takeo (Tram Kak, Kaoh Andaet and Borei Cholsar Districts).

- Time frame
  3 years.

- Budget
  US $5,000,000.

Implementation

- Institutional arrangement
  MRD will coordinate the project and MRD Provincial Departments and concerned NGOs will implement it in collaboration with MoH and Commune Councils of the selected districts.

- Risks and barriers
  Potential land use conflict, weak social capital of local communities, limited data on groundwater resources and local hydrology.

- Evaluation and monitoring
  The following indicators will be used: number of wells and ponds constructed, number of water filters provided and used, incidence of water-related diseases reduced.

Related developments

The construction of wells and ponds in selected areas has been carried by CONCERN, CRCD, FAO, UNICEF, WFP, etc. Provisions of household water filters designed by International Development Enterprises have been undertaken by a number of organisations in the north-eastern provinces and, to a lesser extent in Pursat and Kampong Chhnang Provinces.

HIGH PRIORITY PROJECT 3E: DEVELOPMENT AND IMPROVEMENT OF SMALL-SCALE AQUACULTURE PONDS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Fish stocks have declined in recent years due to overfishing, destructive fishing practises, pollution, reduced water availability and destruction of fish habitat. Development of water resources, particularly dam construction has resulted in changes in water flows and levels, which in turn hinders fish migration in some areas. Water availability is expected to fluctuate under different climate conditions, which will have further negative impacts on fish stocks. Small-scale aquaculture contributes to food security in areas where wild fish is no longer available and in seasons when wild fish is in short supply.

Description

- Objectives
  - To ensure food security in the areas where wild fish stocks are insufficient to meet demand; and
  - To increase the income of people living in these areas.

- Activities
  - Construct new ponds and dredge existing ones in selected districts;
  - Provide fish fry; and
  - Introduce sustainable aquaculture technologies.

- Short-term outputs

  - 500 small-scale aquaculture ponds developed;
  - Fish production increased;
  - Sustainable aquaculture technologies introduced.

- Potential long-term outcomes
  - Rural livelihoods improved; and
  - Food security improved; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Kampong Cham (Chmakar Leu and Tboung Khmum Districts), Kampong Speu, Kandal (Angk Snuol and Kandal Stueng Districts), Kratie (Sambo, Kracheh and Chhloung Districts), Svay Rieng, and Sihanoukville Municipality (Stueng Hav District).

- Time frame
  3 years.

- Budget
  US $4,000,000.

Implementation

- Institutional arrangement
  MAFF will implement the project in collaboration with local authorities and NGOs.

- Risks and barriers
  Potential land use conflict, weak social capital in local communities, soil characteristics, water availability, and water pollution.

- Evaluation and monitoring
  The following indicators will be used: number of ponds constructed, number of fish species successfully raised, and fish production.

Related developments

MAFF has provided support to aquaculture with a focus on commercial exploitations, but small-scale aquaculture in ponds has only been introduced on a limited basis. MAFF has provided extension service and training to farmers about fishpond cultures, as well as rice-fish culture in Kandal, Prey Veng, Svay Rieng and Takeo Provinces.

HIGH PRIORITY PROJECT 3F: PROMOTION OF HOUSEHOLD INTEGRATED FARMING

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Most Cambodian farmers depend on subsistence rainfed rice farming, which is vulnerable to climate hazards such as flood and drought. Official records indicate that the frequency and severity of flood and drought have increased in Cambodia in recent years. This has resulted in increased crop losses, which in turn leads to food shortages and poor health. As a result, affected people migrate en masse to seek jobs and higher incomes in cities and in the neighbouring countries. Some of them go to forest to log or to collect non-timber forest products to meet their needs. The promotion of household integrated farming, which includes multi-cropping, livestock raising and aquaculture, will assist farmers in generating higher incomes, and improve food security and rural livelihoods.

Description

- Objectives
  - To increase agricultural productivity; and
  - To improve farmers' incomes, food security and livelihoods in the areas affected by flood and drought.

- Activities
  - Identify areas suitable for the project;
  - Select households for pilot project implementation;
  - Train selected farmers on sustainable farming, livestock, and aquaculture technologies;
  - Implement pilot project in selected areas; and
  - Disseminate experience and technologies to other areas.

- Short-term outputs
  - 300 households trained in the pilot phase;
  - Agricultural productivity improved; and
  - Sustainable integrated farming introduced and successfully implemented.

- Potential long-term outcomes
  - Food security improved;
  - Rural livelihoods improved;
  - Sustainable integrated farming expanded to other areas; and
  - Poverty reduced.

- Location
  The pilot project will be implemented in six provinces: Banteay Meanchey, Battambang, Kampong Speu, Prey Veng, Svay Rieng, and Takeo.

- Time frame
  3 years.

- Budget
  US $2,500,000.

Implementation

- Institutional arrangement
  MAFF will coordinate the project and MAFF Provincial Departments will implement it in collaboration with local authorities and concerned NGOs.

- Risks and barriers
  Potential land use conflicts and land availability, weak social capital in local communities, water availability.

- Evaluation and monitoring
  The following indicators will be used: number of households trained, number of farming systems successfully implemented, household income, agricultural production.

Related developments

MAFF with support from ADB has implemented similar projects in selected areas of Banteay Meanchey, Battambang, Pursat and Siem Reap. A number of NGOs have implemented integrated farming projects in Prey Veng and Svay Rieng Provinces.

HIGH PRIORITY PROJECT 3G: REHABILITATION OF COASTAL PROTECTION INFRASTRUCTURE

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

Many of the existing earth dikes that protect agricultural land in coastal areas were built prior to the 1960s. These dikes have been damaged by harsh environmental conditions and the lack of proper maintenance leaving land exposed to seawater intrusion and making it unsuitable for agriculture. Coastal areas do not produce sufficient rice for local consumption. The restoration of the dikes would enable the rehabilitation of farmland and improve food security, in turn strengthening capacity to adapt to climate change.

Description

- Objective
  - To increase agricultural production in coastal areas.

- Activities
  - Assess coastal protection structures for agricultural land to determine rehabilitation potential;
  - Rehabilitate priority small-scale protection structures; and
  - Establish user association for operations and maintenance.

- Short-term outputs
  - 10 small-scale coastal protection infrastructures rehabilitated;
  - 10 user associations established; and
  - Rehabilitation potential of coastal protection structures for agricultural land assessed.

- Potential long-term outcomes
  - Agricultural production increased;
  - Food security improved; and
  - Poverty reduced.

- Location
  The project covers all coastal provinces and municipalities: Kampot, Koh Kong (Srae Ambel, Botum Sakor Districts), Kep and Sihanoukville.

- Time frame
  2 years.

- Budget
  US $2,000,000.

Implementation

- Institutional arrangement
  MOWRAM will coordinate the project and MOWRAM's Provincial Departments and concerned NGOs will implement it in collaboration with local authorities.

- Risks and barriers
  Land use conflict, limited community participation, and weak sense of ownership.

- Evaluation and monitoring
  The following indicators will be used: number of dikes rehabilitated, number of user associations established and functioning.

Related developments

MOWRAM's Provincial Departments in Koh Kong Province and Sihanoukville Municipality have identified damaged coastal protection structures and initiated limited repairs in selected locations. A sea dike in Kandaol, Koh Kong Province, was rehabilitated using loan from the World Bank. GRET has repaired the Prey Nob polder in Sihanoukville Municipality and operates it with local communities.

HIGH PRIORITY PROJECT 4A: DEVELOPMENT AND IMPROVEMENT OF COMMUNITY IRRIGATION SYSTEMS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Cambodia's agriculture is mainly based on rain-fed rice and mixed crops. There is evidence of an increase in the intensity and frequency of extreme weather events, including floods and droughts in Asia throughout the 20th century (IPCC, 2001). Cambodia has experienced increased rainfall in the wet season and prolonged drought in the dry season. Only about 19.5 % (approximately 400,000 ha) of cultivated land in Cambodia benefits from irrigation.

Description

- Objectives
  - To provide sufficient water for rice farming;
  - To reduce the risk of crop failures from water shortage; and
  - To enhance food security and assist in eliminating poverty among rural people.

- Activities
  - Rehabilitate existing community irrigation schemes;
  - Construct new community irrigation systems (including water reservoirs);
  - Establish water user associations; and
  - Train community members on the maintenance and operation of irrigation systems.

- Short-term outputs
  - 15 community irrigation systems constructed;
  - 15 existing community irrigation systems rehabilitated; and
  - Sufficient water supplied for rice farming in the project areas.

- Potential long-term outcomes
  - Agricultural productivity increased; and
  - Food security for rural people ensured.

- Location
  The project will be implemented in the following provinces: Banteay Meanchey (Svay Chek District), Battambang (Moung Ruessei and Koas Krala Districts), Kampong Cham (Kang Meas and Batheay Districts), Kampong Chhnang (Baribour and Kampong Tralach Districts), Kampong Speu (Samraong Tong and Chbar Mon Districts), Kampong Thom (Stueng Saen District), Kampot (Chum Kiri District), Kandal (Kandal Stueng, Khsach Kandal, Ponhea Lueu, Angk Snuol and Kaoh Thum Districts), Kratie (Kracheh and Chhloung Districts), Prey Veng (Sithor Kandal, Peam Chor, Kampong Trabaek, Preah Sdach and Peam Ro Districts), Pursat (Bakan, Sampov Meas, and Phnum Kravanh Districts), Ratanak Kiri (Lumphat District), Siem Reap (Kralanh District), Svay Rieng (Svay Chrum, Romeas Haek, Rumduol and Svay Teab Districts), and Takeo (Tram Kak District).

- Time frame
  3 years.

- Budget
  US $45,000,000.

Implementation

- Institutional arrangement
  MOWRAM will coordinate the project and MOWRAM's Provincial Departments will implement it in collaboration with MAFF's Provincial Departments and local authorities.

- Risks and barriers
  Potential land use conflict, weak social capital in local communities.

- Evaluation and monitoring
  The following indicators will be used: number of irrigation schemes rehabilitated/built, number of water user associations established and well functioning.

Related developments

A number of governmental and non-governmental organisations and other donors such as ADB, APS (Italian Government), the Japanese Government, etc., have built medium-scale irrigation schemes in several provinces, including Battambang, Kampong Cham, Kampong Speu, Kampong Thom, Prey Veng, and Svay Rieng.

HIGH PRIORITY PROJECT 4B: COMMUNITY MANGROVE RESTORATION AND SUSTAINABLE USE OF NATURAL RESOURCES

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

Mangrove forests are essential for shoreline stabilisation, prevention of seawater intrusion, and provision of biodiversity products for local communities. Some portions of mangroves in the coastal area have been converted to saltpans, shrimp farms and have been degraded from firewood extraction.

Description

- Objectives
  - To stabilise shoreline;
  - To reduce sea water intrusion;
  - To reduce coastal erosion; and
  - To protect coastal areas from storm.

- Activities
  - Replant mangrove species in degraded areas through community participation;
  - Restock mangroves with fish and crab;
  - Assist local communities in sustainable mangrove utilisation and management; and
  - Develop a sustainable harvest method of natural resources from restored mangroves.

- Short-term outputs
  - 500 ha of mangroves replanted and protected;
  - 4 mangrove user communities established; and
  - Areas defined with formal authorisation from relevant authorities placed under community management.

- Potential long-term outcomes
  - Neighbouring areas protected from windstorm, seawater intrusion and coastal erosion;
  - Mangrove products and biodiversity enhanced; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Kampot (Treouy Koh in Kampot District), Koh Kong (Botum Sakor and Mondol Seima Districts), and Kep Municipality (Angkoul in Damnak Chang'aeur District).

- Time frame
  3 years.

- Budget
  US $1,000,000.

Implementation

- Institutional arrangement
  MoE will coordinate the project and NGOs will implement it in collaboration with local authorities and SEILA.

- Risks and barriers
  Potential land use conflict, land availability, and weak social capital in local communities.

- Evaluation and monitoring
  The following indicators will be used: extent of mangroves planted and protected, and number of community of mangrove users established.

Related developments

There are at least three modules of similar community based natural resource management established and/or functioning in coastal areas including at Peam Krasaop Wildlife Sanctuary supported by the Participatory Management of Mangrove Resources of IDRC/MoE, the community fishery at Ream National Park, and the mangrove management model of Thmei Village supported by DANIDA's coastal zone management project.

HIGH PRIORITY PROJECT 4C: COMMUNITY BASED AGRICULTURAL SOIL CONSERVATION IN SRAE AMBEL DISTRICT, KOH KONG PROVINCE

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

Loss of forest cover and inappropriate land use has accelerated erosion in the coastal watershed. This has led to increased sedimentation in coastal waters and has affected coral reefs, seagrass beds, and fisheries productivity.

Description

- Objectives
  - To reduce soil erosion from agricultural land in the coastal watershed; and
  - To increase food security.

- Activities
  - Train farmers in soil conservation techniques, including appropriate cropping systems;
  - Identify with local communities farming practises that reduce soil erosion; and
  - Implement with local communities farming practises that reduce soil erosion.

- Short-term outputs
  - Soil conservation practises implemented in 50 farms;
  - 100 farmers trained in soil conservation techniques; and
  - Farm productivity increased.

- Potential long-term outcomes
  - Soil erosion reduced;
  - Sediment load in coastal waters reduced; and
  - Soil conservation practises transferred to other farmers in the area.

- Location
  The project will be implemented in Koh Kong Province (Srae Ambel and Botum Sakor Districts).

- Time frame
  3 years.

- Budget
  US $2,000,000.

Implementation

- Institutional arrangement
  MAFF will coordinate the project and MAFF's Provincial Department in Koh Kong will implement it in collaboration with local authorities and NGOs.

- Risks and barriers
  Lack of participation and interest from farmers.

- Evaluation and monitoring
  The following indicators will be used: number of farmers trained and number of participating farms.

Related developments

AFSC has worked with local communities in Srae Ambel in the following areas: sustainable agriculture, and community forestry and fisheries.

Health Projects

HIGH PRIORITY PROJECT 1A: PRODUCTION OF BIOPESTICIDES

Sector: Human Health

Rationale/justification in relation to climate change, including sectors concerned

Changes in rainfall patterns and mean temperatures may contribute to the spread of insect vectors such as mosquitoes, flies and fleas which could expand disease transmission, especially in tropical regions where the environment is more favourable to insect development but technology and capacity limited.

Malaria is transmitted by anopheles mosquitoes and threatens a majority of rural Cambodians. This disease kills more than 400 Cambodians per year and records the highest amount of total inpatients in the country. The introduction of bio-pesticides and botanical insect repellents may help reduce malaria incidence with few environment impacts, when compared to chemical insecticides. This would further support the implementation of the Convention on Persistent Organic Pollutants (POPs) of which Cambodia is a signatory member.

Description

- Objective
  - To reduce malaria incidence by introducing bio-pesticides.

- Activities
  - Identify and study local plant species, e.g. *Azadirachta indica*, and their effectiveness in repelling anopheles mosquitoes;
  - Train CNM, CPE and RUPP staff on production of biopesticides;
  - Organise overseas study tours within the region to visit bio-pesticides producing projects;
  - Facilitate pilot investment in the production of bio-pesticides;
  - Plant selected species; and
  - Socially market biopesticides.

- Short-term outputs
  - 30 technical staff trained and 10 participating in study tours;
  - Knowledge of bio-pesticide plant species researched;
  - Pilot production initiated; and
  - Bio-pesticides tested and distributed.

- Potential long-term outcomes
  - Malaria incidence and fatalities reduced;
  - Use of chemical repellents reduced;
  - Awareness and interest in bio-pesticides increased;
  - Employment for local farmers created; and
  - Poverty reduced.

- Location
  CNM and CPE.

- Time frame
  This project would require at least 5 years, as experimental research has to be conducted in order to get high quality products.

- Budget
  US $3,000,000.

Implementation

- Institutional arrangement
  CNM will coordinate and implement the project in collaboration with CPE, University of Health Sciences and RUPP. In the final stage, NGOs that have extensive experience in this area will implement the social marketing of the products.

- Risks and barriers
  Limited data on local plant species for bio-pesticide production, limited national technical expertise, people acceptance of the product, product effectiveness undetermined.

- Evaluation and monitoring
  The following indicators will be used: number of staff trained, quantity and quality of botanical insect repellents produced, distributed and sold.

Related developments

Limited biopesticide research has been conducted in Cambodia.

HIGH PRIORITY PROJECT 1B: DEVELOPMENT OF HEALTHCARE CENTRES AND POSTS

Sector: Human Health

Rationale/justification in relation to climate change, including sectors concerned

Changes in rainfall patterns and mean temperatures may contribute to the spread of insect vectors such as mosquitoes, flies and fleas which may expand disease transmission, especially in tropical regions where the environment is more favourable to insect development but technology and capacity are limited.

Malaria is transmitted by anopheles mosquitoes and threatens a majority of rural Cambodians. This disease kills more than 400 Cambodians per year and records the highest amount of total inpatients in the country. Furthermore, floods and droughts have threatened public health due to spreads of water-borne diseases and poor hygiene resulting from insufficient water for consumption. In remote areas, access to healthcare is difficult for local people, which results in a higher number fatalities caused by malaria and other infectious diseases.

Description

- Objective
  - To assist the Ministry of Health in developing healthcare centres and posts in high risk malaria regions and in areas highly vulnerable to climate change.

- Activities
  - Identify and select villages within high risk malaria regions and in areas highly vulnerable to climate change where healthcare posts or centres may be developed;
  - Identify and train local staff to enable them to deliver at least a minimum healthcare package including ability to treat casual malaria cases;
  - Construct and equip healthcare facilities;
  - Provide healthcare management training to healthcare staff and managers; and
  - Assist in initial operation of the centres and posts.

- Short-term outputs
  - 5 healthcare centres and 10 posts developed;
  - Local staff trained and able to operate the centres/posts; and
  - Effective management established.

- Potential long-term outcomes
  - Fatalities caused by malaria and other infectious diseases minimised;
  - Basic healthcare services accessible for local communities; and
  - Poverty reduced.

- Location
  Selected villages in high-risk malaria regions.

- Time frame
  3 years.

- Budget
  US $750,000.

Implementation

- Institutional arrangement
  The Ministry of Health will implement the project in close collaboration with CNM and local authorities.

- Risks and barriers
  Low population density in high risk malaria regions, availability of qualified local staff, difficulty in accessing high risk malaria regions, limited incentives for staff to work and live in remote areas.

- Evaluation and monitoring
  The following indicators will be used: number of healthcare centres/posts built, number of staff trained and posted, number of patients seeking consultations and treatment.

Related developments

Budget constraints have limited MoH construction of healthcare centres and posts.

HIGH PRIORITY PROJECT 1C: PROVISION OF SAFE WATER IN HIGH RISK MALARIA REGIONS

Sector: Human Health

Rationale/justification in relation to climate change, including sectors concerned

Changes in rainfall patterns and mean temperatures may contribute to the spread of insect vectors such as mosquitoes, flies and fleas which could expand disease transmission, especially in tropical regions where the environment is more favourable to insect development but technology and capacity limited.

Malaria is transmitted by anopheles mosquitoes and threatens a majority of rural Cambodians. This disease kills more than 400 Cambodians per year and records the highest amount of total inpatients within the country. Malaria risk is high in areas where there is no water source near settlements, forcing local people to collect water from streams and rivers. This project will assist the Ministry of Rural Development (MRD) in providing open wells and organising water user associations in selected high risk malaria regions.

Description

- Objectives
  - To reduce risk of mosquito bites while collecting water from rivers and streams; and
  - To provide safe communal water supply in high risk malaria areas.

- Activities
  - Identify villages/communities requiring water supply in high risk malaria regions;
  - Organise village meetings to discuss well construction and to form well user associations;
  - Train 5 staff for each water user association on the use and maintenance of wells; and
  - Construct 100 open wells.

- Short-term outputs
  - 100 wells constructed;
  - 100 well user associations established; and
  - Risk of mosquito bites reduced.

- Potential long-term outcomes
  - Water related diseases reduced;
  - Time for water collection reduced; and
  - Poverty reduced.

- Location
  Selected villages in high-risk malaria regions.

- Time frame
  3 years.

- Budget
  US $100,000.

Implementation

- Institutional arrangement
  MRD will coordinate the project in partnership with NGOs and international organisations.

- Risks and barriers
  Groundwater quality and availability, and local participation in construction and maintenance of wells.

- Evaluation and monitoring
  The following indicators will be used: number of wells constructed, number of well user associations established.

Related developments

MRD in collaboration with NGOs and international organisations has constructed wells in a number of provinces.

HIGH PRIORITY PROJECT 2: MALARIA EDUCATION AND MOSQUITO HABITAT CLEARANCE CAMPAIGNS

Sector: Human Health

Rationale/justification in relation to climate change, including sectors concerned

Changes in rainfall patterns and mean temperatures may contribute to the spread of insect vectors such as mosquitoes, flies and fleas which could expand disease transmission, especially in tropical regions where the environment is more favourable to insect development but technology and capacity limited.

Malaria is transmitted by anopheles mosquitoes and threatens a majority of rural Cambodians. This disease kills more than 400 Cambodians per year and records the highest amount of total inpatients in the country. Most rural Cambodians have limited understanding of malaria prevention measures and treatment. This project will further assist CNM in reducing mosquito bites in vulnerable groups, which in turn will minimize malaria cases and fatalities.

Description

- Objectives
  - To raise public awareness of malaria prevention and treatment;
  - To promote behavioural changes towards malaria prevention and treatment; and
  - To reduce the extent of mosquito habitats.

- Activities
  - Review existing IEC materials, and develop/adapt new ones as required;
  - Coordinate and organise training of trainers (school teachers, women association members, local authorities, monks, village health volunteers, etc.);
  - Establish community volunteer groups for mosquito habitat clearance campaigns;
  - Provide necessary materials and equipment for the campaigns; and
  - Conduct mosquito habitat clearance campaigns.

- Short-term outputs
  - People awareness of malaria treatment and prevention raised;
  - Teams of trainers and volunteer groups formed and functioning; and
  - Mosquito populations and habitats reduced.

- Potential long-term outcomes
  - People's behaviour changed towards better malaria prevention and treatment;
  - Malaria incidence and deaths minimised; and
  - Poverty reduced.

- Location
  The project will be implemented in high risk malaria regions, especially in forested areas such as Kampong Thom, Koh Kong, Mondul Kiri, Preah Vihear, Pursat, Ratanak Kiri, and Siem Reap Provinces.

- Time frame
  3 months from February to April every year. Project activities have to be completed before the start of the rainy season since malaria is dependent on rainfall patterns and as remote areas are not accessible in the rainy season.

- Budget
  US $500,000/year.

Implementation

- Institutional arrangement
  CNM is responsible for coordinating this project. MoH Provincial Departments, local authorities and concerned NGOs are responsible for project implementation.

- Risks and barriers
  Variability in the start of the rainy season, difficulty to access high-risk malaria regions, lack of interest in target population, weak communication skills of service providers.

- Evaluation and monitoring
  The following indicators will be used: number of trainers trained, number of volunteer groups formed, number of campaigns conducted, malaria cases reduced.

Related developments

This project complements existing malaria education by CNM, HU and PFD under the global fund.

ANNEX 3. PROPOSED MEDIUM AND LOW PRIORITY NAPA ACTIVITIES

Non-health Projects

MEDIUM PRIORITY PROJECT 1A: CEMENT WATER TANKS CONSTRUCTION

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Sufficient supply of water remains critical for rural Cambodians, which would enable them to better adapt to changing climate conditions. Approximately 30 percent of the rural population have access to safe water supply for domestic use, while the remaining experiences insufficient supply of water. Large cement water tanks can store sufficient rainwater water and allow households to better cope with droughts.

Description

- Objective
  - To provide households with sufficient water to cope with droughts.

- Activity
  - Select project areas and identify households in need of water tanks;
  - Develop a cost-sharing mechanism; and
  - Construct 50,000 cement water tanks.

- Short-term outputs
  - Sufficient water for household consumption during droughts provided; and
  - 50,000 cement water tanks constructed.

- Potential long-term outcomes
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Banteay Meanchey (Preah Netr Preah District), Battambang (Moung Ruessei District), Kampong Cham (Batheay and Stueng Trang Districts), Kampong Thom (Prasat Sambour District), Kandal (Kandal Stueng, Khsach Kandal and Angk Snuol Districts), Kratie (Districts along the Mekong River), Prey Veng (Kanhchriech District), Rattanak Kiri (Lumphat District), Siem Reap (Kralanh and Chi Kreng Districts), Svay Rieng (Chantrea District), and Takeo (Tram Kak District).

- Time frame
  2 years.

- Budget
  US $4,000,000.

Implementation

- Institutional arrangement
  NCDM will implement the project in collaboration with local authorities and NGOs.

- Risks and barriers
  Weak coordination among concerned ministries/institutions.

- Evaluation and monitoring
  The following indicator will be used: number of cement water tanks constructed.

Related developments

EU/PRASAC has implemented the project in selected provinces.

MEDIUM PRIORITY PROJECT 1B: IMPROVING FARMERS' ADAPTIVE CAPACITY TO CLIMATE CHANGE

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Crop failures due to flood and drought are common in Cambodia. Farmers' capacity to anticipate the events is very low. There are a number of farming practises available to adapt to flood and drought. These include direct seeding, minimum tillage, mulching, changing cropping patterns, etc. The use of these practises remains limited in Cambodia.

Description

- Objectives
  - To reduce crop damage due to extreme climate events.

- Activities
  - Identify suitable crop management strategies to adapt to drought and floods;
  - Improve agricultural extension workers' knowledge of adaptation technologies;
  - Introduce drought and flood resistant crop varieties;
  - Introduce cultivation practises for mitigating the impacts of flood and drought; and
  - Implement demonstration plots.

- Short-term outputs
  - 100 agricultural extension workers trained;
  - 500 farmers trained; and
  - 50 demonstration plots established.

- Potential long-term outcomes
  - Impacts of flood and drought on crops reduced;
  - Agricultural productivity increased; and
  - Poverty reduced.

- Locations
  The project will be implemented in the following provinces: Banteay Meanchey (Svay Chek and Phnum Srok Districts), Battambang (Koas Krala District), Kampong Cham, Kampong Speu (Samraong Tong, Chbar Mon, Kong Pisei and Phnum Sruoch Districts), Kampong Thom (Kampong Svay and Stueng Sen Districts), Kampot (Banteay Meas District), Kandal, Kratie, Prey Veng (Prey Veng District), and Takeo (Samraong District).

- Time frame
  3 years.

- Budget
  US $4,000,000.

Implementation

- Institutional arrangement
  MAFF's Department of Agricultural Extension will coordinate the project in collaboration with CARDI, concerned NGOs and local authorities.

- Risks and barriers
  Limited number of trained agriculture development agents, social acceptability of new practises, limited proven practices available locally.

- Evaluation and monitoring
  The following indicators will be used: number of agricultural extension workers trained, number of farmers trained, number of demonstration plots successfully established.

Related developments

ACIAR has implemented a project focusing on the improvement of rice productivity and crop sequences diversification in Battambang, Kampong Thom, Kampot, Prey Veng, Siem Reap and Takeo Provinces.

MEDIUM PRIORITY PROJECT 1C: COMMUNITY AGROFORESTRY IN COASTAL AREAS

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

Deforestation in coastal areas has resulted in increased vulnerability of agricultural land to storm damage and in a shortage of fuelwood for local people. Community agro-forestry, through the planting of trees on degraded forestland, protects agricultural fields from storm and soil erosion, and provides local people with fuelwood, fruits and other non-timber forest products.

Description

- Objectives
  - To enhance crop protection through community agro-forestry;
  - To provide fuelwood for community use; and
  - To enhance agricultural production through the maintenance of soil fertility.

- Activities
  - Identify suitable sites for community agro-forestry;
  - Plant trees in degraded forest areas around agricultural land; and
  - Establish community agro-forestry.

- Short-term outputs
  - Four community agroforestry groups established and functioning; and
  - Four sites planted with indigenous tree species.

- Potential long-term outcomes
  - Sustainable fuelwood produced; and
  - Agricultural crops protected from storm.

- Location
  The project will be implemented in the four coastal provinces and municipalities.

- Time frame
  5 years.

- Budget
  US $1,000,000.

Implementation

- Institutional arrangement
  Local authorities will coordinate the project with broad participation of local people. MoE, and MAFF's Forestry Administration and Department of Agronomy will provide technical and advisory support.

- Risks and barriers
  Land use conflict, lack of participation, and environmental suitability.

- Evaluation and monitoring
  The following indicators will be used: number of participants, number of trees planted, and tree survival rate.

Related developments

Community forestry groups have been established on public land and in degraded forest areas. However, no community forest has been developed in agricultural areas.

MEDIUM PRIORITY PROJECT 2A: ENHANCEMENT OF THE NATIONAL WEATHER FORECAST CENTRE (DEPARTMENT OF METEOROLOGY)

Sector: Cross-Sectoral

Rationale/justification in relation to climate change, including sectors concerned

The Cambodian National Weather Forecast Centre has made its efforts in providing accurate and regular weather forecast as well as forecast on natural disasters and phenomena to ensure better preparedness and management. Weather forecasting is critical for timely crop planting. National agencies, local authorities and communities would benefit from weather forecasts to better cope with climate hazards, including flood, drought, windstorms and high tide.

Description

- Objectives
  - To produce regular and timely weather forecast; and
  - To disseminate weather forecast to all concerned stakeholders.

- Activities
  - Upgrade existing and establish additional provincial hydro/meteorological stations;
  - Procure and install all necessary equipment;
  - Train technical staff for operations and maintenance; and
  - Create weather forecast dissemination network.

- Short-term outputs
  - All existing hydro/meteorological stations upgraded and a number of new stations constructed;
  - Rainfall stations upgraded and established in selected provinces and cities
  - Weather forecasting/monitoring equipment procured and installed;
  - Technical staff trained;
  - Weather forecast dissemination network created; and
  - Regular and accurate weather forecast provided.

- Potential long-term outcomes
  - Climate hazard damage reduced;
  - Agricultural productivity increased; and
  - Poverty reduced.

- Location
  The project will be implemented throughout the country, with the National Weather Forecast Centre (Department of Meteorology) located in Pochentong next to Phnom Penh International Airport.

- Time frame
  5 years.

- Budget
  US $30,000,000.

Implementation

- Institutional arrangement
  MOWRAM will implement the project in collaboration with NCDM, MOE, MAFF, MRC and CNMC.

- Risks and barriers
  Weak coordination among concerned ministries/institutions; lack of human resources.

- Evaluation and monitoring
  The following indicators will be used: well-functioning national weather forecast centre, necessary equipment procured and staff trained, timely and accurate weather forecast provided to all concerned stakeholders.

Related developments

With support from JICA, a limited number of MOWRAM staff have received training in the field of agro-meteorology and forecasting. However, the current forecasting capacity of MOWRAM's Department of Meteorology is still limited.

MEDIUM PRIORITY PROJECT 2B: ESTABLISHMENT AND IMPROVEMENT OF FARMER WATER USER COMMUNITIES

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Water supplied by irrigation systems is crucial for farmers who live in areas facing rainwater shortage. A shift towards irrigated rice farming would require better coordination and collaboration among stakeholders. The development of Farmer Water User Communities (FWUCs) empowers farmers to self-manage irrigation and drainage systems and offers potential for reducing the operational costs of irrigation services.

Description

- Objectives
  - To efficiently supply enough water for rice farming; and
  - To ensure the sustainable operations of irrigation systems.

- Activities
  - Identify and assess areas for establishment of FWUCs;
  - Review and develop bylaws (roles & responsibilities, management system, etc.) for FWUCs in collaboration with target farmers and stakeholders;
  - Provide training in technical and financial management of irrigation systems; and
  - Raise awareness on the benefits and management of FWUCs.

- Short-term outputs
  - Management of 207 existing FWUCs improved;
  - 30 new FWUCs established and effectively managed;
  - Sufficient water for rice farming; and
  - Conflicts over water use reduced.

- Potential long-term outcomes
  - Rice production increased;
  - Rural livelihoods improved; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Battambang (Banan District), Kampong Cham (Srei Santhor and Kang Meas Districts), Kampong Speu (Kong Pisei and Odong Districts), Kandal (Kandal Stueng and Ponhea Lueu Districts), Kratie (Sambour and Snuol Districts), Prey Veng (Sithor Kandal, Prey Veng, Pea Reang, and Preah Sdach Districts), and Takeo (Kiri Vong District).

- Time frame
  5 years.

- Budget
  US $3,000,000.

Implementation

- Institutional arrangement
  MOWRAM's Provincial Departments will implement the project in collaboration with MAFF's and MRD's Provincial Departments, local authorities, and other stakeholders.

- Risks and barriers
  Weak coordination among concerned ministries/institutions, limited awareness and participation of farmers.

- Evaluation and monitoring
  The following indicators will be used: number of existing FWUCs managerially improved, number of new FWUCs established, number of conflicts over water use reduced, rice production increased.

Related developments

Activities to establish new FWUCs and to strengthen existing FWUCs have been carried out by MOWRAM's Provincial Departments in selected provinces. However, the following problems have been reported: inefficient management in water distribution and difficulties in collecting water fees.

MEDIUM PRIORITY PROJECT 2C: GROUNDWATER EXTRACTION FOR CROP CULTIVATION

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Increasing frequency and severity of extreme climate events in recent years, combined with rising food demand due to rapid population growth, threatens Cambodian rural livelihoods, in particular in areas without irrigation systems. Cultivated areas have been expanded in an attempt to increase crop, without corresponding extension of irrigation systems.

Description

- Objectives
  - To reduce the risk of crop failure due to water shortage; and
  - To increase planting seasons in areas without irrigation systems.

- Activities
  - Assess groundwater resources;
  - Assess potential environmental impacts of groundwater extraction;
  - Establish Water User Groups (WUG);
  - Conduct training in pumping wells operation and maintenance; and
  - Construct pumping wells.

- Short-term outputs
  - 1,000 pumping wells constructed;
  - 1,000 WUGs established;
  - Planting season increased; and
  - Sufficient water for crop production.

- Potential long-term outcomes
  - Crop production increased;
  - Rural livelihoods improved; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Banteay Meanchey (Mongkol Borei District), Kampong Cham (Chamkar Leu, Tboung Khmum, Batheay Districts), Kandal (Khsach Kandal, Ponhea Lueu, and Kaoh Thum Districts), Kratie (Preaek Prasab District), Ratanak Kiri (Lumphat District), Siem Reap (Kralanh District), Svay Rieng (Chantrea District), and Takeo (Samraong District).

- Time frame
  3 years.

- Budget
  US $3,000,000.

Implementation

- Institutional arrangement
  MOWRAM's Provincial Departments will implement the project in close collaboration with MAFF's and MRD's Provincial Departments, local authorities and other stakeholders.

- Risks and barriers

Weak coordination among concerned ministries/institutions, limited awareness and participation of farmers, limited data on groundwater in most provinces, potential environmental impacts caused by excessive groundwater extraction.

- Evaluation and monitoring
  The following indicators will be used: number of pumping wells constructed, number of WUGs established, crop production increased.

Related developments

Groundwater extraction for irrigation is practised by farmers in Kampong Cham, Prey Veng, and Svay Rieng Provinces. No project of this nature has been implemented by Government or donor organisations.

MEDIUM PRIORITY PROJECT 2D: DEVELOPMENT OF COMMUNITY AND HOUSEHOLD FLOOD SAFE AREAS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

The year 2000 floods in Cambodia caused massive devastation, including an estimated US $150 million worth of damage and the death of over 300 people. In 2001, floods similarly caused US $36 million and killed 62 people. The increase in the frequency and magnitude of floods over the past years calls for the development of flood safe areas at the community level.

Description

- Objective
  - To reduce flood damage and casualties.

- Activities
  - Assess maximum flood levels in selected areas;
  - Develop flood-safe elevated community grounds; and
  - Raise grounds for individual wooden houses.

- Short-term outputs
  - 500 flood-safe community grounds developed; and
  - 5,000 wooden houses raised.

- Potential long-term outcomes
  - Flood damage and casualties reduced; and
  - Poverty reduced.

- Location
  The project will be implemented in districts that are located along the Mekong and Tonle Sap Rivers including major tributaries, Kampot Province (Banteay Meas, Kampong Trach and Angkor Chey Districts), and Takeo Province (Bourei Cholsar and Kaoh Andaet Districts).

- Time frame
  2 years.

- Budget
  US $4,000,000

Implementation

- Institutional arrangement
  NCDM will implement the project in collaboration with local authorities and NGOs.

- Risks and barriers
  Weak coordination among concerned ministries/institutions, limited participation of local communities, land use conflict, limited hydrological data.

- Evaluation and monitoring
  The following indicators will be used: number of flood-safe community grounds developed, number of houses raised.

Related developments

NCDM has implemented the project in selected provinces.

MEDIUM PRIORITY PROJECT 2E: DEVELOPMENT OF COMMUNITY RICE BANKS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Rural families often lose their grain stocks in times of drought, flood and other natural calamities. The establishment of community rice banks is essential to maintain grain reserves and to ensure food security.

Description

- Objective
  - To increase food security in rural communities.

- Activities
  - Train farmer groups and agricultural extension workers in establishing and managing community rice banks;
  - Establish community rice banks in areas prone to climate hazards; and
  - Develop guidelines and regulations for rice bank operations.

- Short-term outputs
  - 30 community rice banks established;
  - 30 farming communities trained; and
  - Rice bank operational guidelines and regulations developed.

- Potential long-term outcomes
  - Community resilience to climate hazards increased;
  - Food security increased; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Banteay Meanchey, Battambang, Kampong Cham, Kampong Speu, Kandal, Kratie, Prey Veng, Siem Reap, Svay Rieng, and Takeo.

- Time frame
  3 years.

- Budget
  US $2,000,000.

Implementation

- Institutional arrangement
  MAFF and MRD will implement the project in collaboration with local authorities, NGOs and farmers associations.

- Risks and barriers
  Weak coordination among concerned ministries/institutions, limited participation of local communities.

- Evaluation and monitoring
  The following indicators will be used: number of community rice banks established, number of communities trained, operational guidelines and regulations developed, and amount of rice deposited, borrowed and returned.

Related developments

Selected NGOs, EU/PRASAC have introduced rice banks in selected areas.

MEDIUM PRIORITY PROJECT 2F: COMMUNITY AGRO-FORESTRY IN DEFORESTED WATERSHEDS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Official records indicate that the intensity and frequency of floods and droughts in Koh Kong and Kampong Thom Provinces have increased in recent years. Surveys of households and local authorities suggest that this may partly be the result of deforestation within these watersheds. Encouraging communities to develop agro-forestry systems in deforested watersheds may increase farmers' income and reduce the impacts of flood and drought.

Description

- Objectives
  - To increase vegetation cover in deforested watersheds; and
  - To improve farmers' livelihoods through agro-forestry.

- Activities
  - Assess the feasibility of agro-forestry systems in targeted sites;
  - Identify suitable tree species;
  - Negotiate with relevant stakeholders on land use terms;
  - Organise farmers' groups to develop and manage the sites;
  - Train farmers in agro-forestry;
  - Provide farmers with seedlings; and
  - Implement demonstration plots.

- Short-term outputs
  - 500 households in 10 farmers groups trained; and
  - 500 ha of agro-forests established.

- Potential long-term outcomes
  - Vegetation cover restored;
  - Flood damage decreased;
  - Agricultural productivity increased and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Kampong Cham (Chamkar Leu and Stueng Trang Districts), Kampong Thom (Kampong Svay and Stueng Sen Districts), Kratie (Kracheh, Sambour and Chhloung Districts), and Koh Kong (Kaoh Kong and Kampong Seila Districts).

- Time frame
  5 years.

- Budget
  US $5,000,000.

Implementation

- Institutional arrangement
  MAFF's Forest Administration and MoE will coordinate the project in collaboration with NGOs and local authorities.

- Risks and barriers
  Land tenure issues, limited interest of local communities.

- Evaluation and monitoring
  The following indicators will be used: number of farmers' groups established, number of households trained, number of community agro-forestry systems established, area of land under agro-forestry.

Related developments

In 2004-2006, FAO intends to develop sustainable fruit farming systems in Cambodia. The use of fruit trees is in line with agro-forestry systems proposed by this project.

MEDIUM PRIORITY PROJECT 2G: INTRODUCTION OF SHORT-PERIOD RICE VARIETIES IN AREAS AFFECTED BY SEAWATER INTRUSION AND DROUGHT

Sector: Agriculture and Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Because of insufficient irrigation, Cambodia's rice production is mainly rain fed. Rice cultivation in areas experiencing little rainfall and affected by drought is sensitive to changing climate patterns. In coastal areas, farmers cannot plant rice at the onset of the rainy season as additional rain is required to wash away seawater from soil. In both cases, the rice planting season is severely limited, which requires the use of varieties that can be harvested over shorter periods than the ones currently planted.

Description

- Objectives
  - To reduce crop losses from water shortage;
  - To increase rice productivity; and
  - To ensure food security.

- Activities
  - Raise awareness of the consequences of planting long-period rice varieties and the need for switching to more adapted short-period rice varieties;
  - Select suitable sites, rice varieties, and farming communities for project implementation;
  - Conduct field demonstration and non-formal education activities; and
  - Provide appropriate short-period rice varieties to target farmers.

- Short-term outputs
  - Demonstration conducted in 30 villages (1 ha in each village);
  - 900 households trained; and
  - 300 households participating in short-period rice trials.

- Potential long-term outcomes
  - Rice production increased; and
  - Use of short-period rice varieties increased.

- Location
  The project will cover communities in the following provinces: Kampong Speu (Samraong Tong, Kong Pisei, Basedth and Odongk districts), and Koh Kong (Srae Ambel and Botum Sakor Districts).

- Time frame
  3 years.

- Budget
  US $1,000,000.

Implementation

- Institutional arrangement
  MAFF's Provincial Departments will implement the project in collaboration with MOWRAM, MRD and CARDI.

- Risks and barriers

Potential land use conflict, limited community participation, availability of suitable rice varieties.

- Evaluation and monitoring
  The following indicators will be used: number of successful demonstration sites, number of households trained, number of households participating in trials, increased rice productivity.

Related developments

PRASAC and CARDI have introduced in Kompong Speu short-period rice varieties, namely CAR6, CAR2, and IR66.

MEDIUM PRIORITY PROJECT 3A: DEVELOPMENT OF SCHOOL EXTRA-CURRICULAR MATERIALS ON CLIMATE HAZARDS

Sector: Cross-Sectoral

Rationale/justification in relation to climate change, including sectors concerned

Children, particularly those in the areas affected by floods and windstorms have limited knowledge of climate hazards and on how to deal with them in a safe manner. Children represent a high percentage of flood and windstorm victims in Cambodia. Children are often left home without adult supervision while their parents are at work. This creates a high-risk situation during flood and storm seasons.

Description

- Objective
  - To reduce casualty risk for children in periods of floods and windstorms by developing their understanding of climate hazards.

- Activities
  - Collect relevant information and develop materials on climate hazards, adapted behaviour and preparedness and response measures;
  - Select schools for project implementation with MEYS Provincial Departments;
  - Develop a teacher's guide and conduct training for teachers in selected areas;
  - Publish and distribute materials;
  - Monitor and evaluate the project.

- Short-term outputs
  - Reading materials and a teacher's guidebook produced;
  - 50 teachers trained; and
  - Children in 20 schools trained.

- Potential long-term outcomes
  - Materials used in other schools;
  - Knowledge transferred to other household members;
  - Risk of climate hazards to children reduced.

- Location
  The project will cover schools in provinces prone to floods and windstorms.

- Time frame
  3 years.

- Budget
  US $500,000.

Implementation

- Institutional arrangement
  MoE's Department of Environmental Education, Information and Communication and MEYS will jointly implement the project in collaboration with the Climate Change Office, NCDM and relevant NGOs.

- Risks and barriers
  School teachers are unfamiliar with the proposed teaching subjects, and time constraints for introducing new teaching materials.

- Evaluation and monitoring
  The following indicators will be used: number of teachers trained, number of training materials produced, number of schools using the materials, and number of hours allocated for teaching climate hazards.

Related developments

General environmental education for school children has been promoted by MEYS, MoE and various NGOs. However, there has been no specific focus on preparedness and response to floods and windstorms for children.

MEDIUM PRIORITY PROJECT 3B: PROMOTION OF FOOD SUPPLEMENTS IN HOUSEHOLD CATTLE RAISING

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Cattle productivity and animal resistance under increased temperatures may be reduced due to related environmental stress (heat, drought, flood etc). This, in turn, increases livestock morbidity. Providing food supplements to cows and buffaloes could increase their productivity under changing climatic conditions.

Description

- Objectives
  - To increase cattle productivity; and
  - To reduce animal morbidity under climate stress.

- Activities
  - Train farmers and agriculture extension workers in producing food supplements for cattle;
  - Develop guidelines on the production and use of cattle food supplements; and
  - Conduct demonstration projects on the production and use of cattle food supplements.

- Short-term outputs
  - 5,000 households trained; and
  - 100 households engaged in demonstration projects.

- Potential long-term outcomes
  - Cattle productivity increased;
  - Cattle morbidity decreased; and
  - Poverty reduced.

- Location
  The project will be implemented in the following provinces: Banteay Meanchey, Battambang, Kampong Cham, Kampong Speu, Kandal, Kratie, Prey Veng, Siem Reap, Svay Rieng, and Takeo.

- Time frame
  2 years.

- Budget
  US $1,000,000.

Implementation

- Institutional arrangement
  MAFF's Provincial Departments will implement the project in collaboration with local authorities, and farmers associations.

- Risks and barriers
  Limited supply of raw materials for producing food supplements.

- Evaluation and monitoring
  The following indicators will be used: number of farmers trained, number of households participating in demonstration projects.

Related developments

Food supplements have been introduced on a limited basis by MAFF.

MEDIUM PRIORITY PROJECT 3C: TRAINING OF VILLAGE VETERINARY WORKERS

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Animal morbidity and mortality tend to increase in periods of floods and drought. During floods, animals are kept in flood safe areas, where high concentration is conducive to disease transmission. During droughts, water shortages and high temperatures, combined with food scarcity, make animals more sensitive to diseases. Farmers' awareness of good animal husbandry practices remains limited. There is a crucial lack of trained veterinary extension workers in rural areas.

Description

- Objective
  - To reduce animal morbidity and mortality under climate stress.

- Activities
  - Identify villages most vulnerable to flood and drought;
  - Select village veterinary workers and train village veterinary workers on good animal husbandry practices;
  - Initiate field operations and provide medical supplies; and
  - Disseminate good animal husbandry practises.

- Short-term output
  - 200 veterinary workers trained.

- Potential long-term outcomes
  - Animal morbidity/mortality decreased;
  - Food security increased; and
  - Poverty reduced.

- Location
  The project will be implemented in flood- and drought-affected provinces.

- Time frame
  2 years.

- Budget
  US $500,000.

Implementation

- Institutional arrangement
  MAFF's Provincial Departments will implement the project in collaboration with local authorities and concerned NGOs.

- Risks and barriers
  Limited participation and interest of farmers, lack of suitable candidates for training.

- Evaluation and monitoring
  The following indicators will be used: number of veterinary workers trained, animal morbidity/mortality.

Related developments

A similar project has been undertaken by MAFF in Kampong Cham, Kampong Chhnang, Kratie, Prey Veng, and Svay Rieng Provinces.

MEDIUM PRIORITY PROJECT 3D: DEVELOPMENT OF DRAINAGE SYSTEMS FOR ROAD PROTECTION

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

Heavy rainfall in the coastal areas of Cambodia annually damages roads, interrupting travel and isolating rural areas. Under changing climate conditions, the intensity and frequency of precipitation is expected to increase, which will further worsen the problem.

Description

- Objectives
  - To reduce road damage by surface flow; and
  - To improve road travel safety and to reduce travel time during the rainy season.

- Activities
  - Identify areas where roads are affected by surface flow; and
  - Design and build appropriate drainage systems along the coastal road network.

- Short-term outputs
  - 200 culverts installed along the road network;
  - Damage to road network reduced; and
  - Travel during the rainy season improved.

- Potential long-term outcomes
  - Life expectancy of coastal roads extended;
  - Damage to crops from water logging reduced; and
  - Poverty reduced.

- Location
  The project will be implemented in all coastal provinces including municipality of Sihanoukville (Sangkat Cheung Kor and Veal Rinh in Prey Nob District).

- Time frame
  2 years.

- Budget
  US $1,000,0000.

Implementation

- Institutional arrangement
  MPWT and MRD will coordinate the project and MPWT's Provincial Departments will implement it in collaboration with local authorities.

- Risks and barriers
  Limited data on local hydrology.

- Evaluation and monitoring
  The following indicators will be used: number of culverts installed and frequency of coastal road repairs.

Related developments

The construction of culverts along the coastal road network has been limited.

MEDIUM PRIORITY PROJECT 4: TRADITIONAL WOODEN BOAT DISTRIBUTION

Sector: Agriculture & Water Resources

Rationale/justification in relation to climate change, including sectors concerned

Floods are a recurring climate hazard in Cambodia, which causes heavy damage to agriculture and infrastructure. Under changing climate conditions, the frequency and intensity of floods may increase. The floods of year 2000 and 2001 resulted in 409 casualties. Boats are a necessity for the evacuation of people and the transportation of belongings to safer grounds. In areas that experience long-lasting floods, boats become an essential mode of transportation and income generation activities, such as fishing and trade.

Description

- Objectives
  - To reduce flood casualties; and
  - To provide households with means of transportation and income generation.

- Activity
  - Distribute 10,000 traditional wooden boats to households in selected areas.

- Short-term outputs
  - Flood casualties reduced; and
  - 10,000 traditional wooden boats distributed.

- Potential long-term outcomes
  - Household income increased; and
  - Poverty reduced.

- Location
  The project will be implemented in districts that are located along the Mekong and Tonle Sap Rivers, including major tributaries.

- Time frame
  1 year.

- Budget
  US $3,000,000.

Implementation

- Institutional arrangement
  NCDM will implement the project in collaboration with local authorities and NGOs.

- Risks and barriers
  Weak coordination among concerned ministries/institutions, availability of timber for wooden boat construction, potential environmental impacts caused by timber extraction for wooden boat construction.

- Evaluation and monitoring
  The following indicator will be used: number of traditional wooden boats distributed.

Related developments

NCDM, CRC and Oxfam have implemented the project in selected provinces.

LOW PRIORITY PROJECT 1: AWARENESS RAISING AND EDUCATION IN CLIMATE CHANGE ISSUES

Sector: Cross-Sectoral

Rationale/justification in relation to climate change, including sectors concerned

Understanding and awareness of the impacts of climate change is generally poor among politicians, decision makers, local authorities, and the general public at large. There is no proper mechanism for information sharing among agencies either. As a result, climate change issues have not been properly taken into account in developing legislation, policies and plans.

Description

- Objective
  - To promote understanding and awareness on climate change issues, including impacts and adaptation measures among various stakeholders including policy makers, Government staff, local authorities, academia, NGOs and the public at large.

- Activities
  - Produce 10,000 copies of a quarterly newsletter for distribution to policy makers highlighting climate change impacts, coping strategies and responses, and implications for Cambodia;
  - Develop simplified IEC (Information, Education, Communication) materials (articles, video/audio spots, posters, booklets, etc.) for public awareness campaigns about climate hazards, their current and potential impacts, making links with livelihoods in specific areas in Cambodia and discussing measures people may take, particularly at the community and household levels; and
  - Provide training to local authorities and Government staff in climate hazard prone provinces in climate hazards, adaptation and response measures, and their integration with indigenous knowledge in weather forecast into local development plans.

- Short-term outputs
  - A quarterly newsletter produced and distributed;
  - IEC materials developed and used; and
  - Awareness of climate hazards and adaptation measures raised among policy makers, Government staff, local authorities, NGOs, academia and the general public.

- Potential long-term outcomes
  - Climate change issues taken into account when developing legislation, policies, and plans;
  - Government allocation of budget for addressing climate issues increased;
  - Legislation, policies and plans for adaptation to climate change implemented; and
  - Behaviour towards sustainable adaptation practises adopted.

- Location
  The project will primarily cover climate hazard prone provinces.

- Time frame
  3 years.

- Budget
  US $1,000,000.

Implementation

- Institutional arrangement
  MoE's Department of Environmental Education, Information and Communication will implement the project in collaboration with MoE's Climate Change Office, Ministry of Information, RUPP, MOWRAM, NCDM, the Cambodian Red Cross, local authorities and NGOs.

- Risks and barriers
  Participation of concerned stakeholders and institutions may be limited due to weak interest in the subject; generally low educational background among rural people and local authorities; difficulty of access to remote areas.

- Evaluation and monitoring
  The following indicators will be used: number of issues and copies of the newsletter produced and distributed, number of IEC materials developed and used, number of trainings conducted and participants attending.

Related developments

Environmental education has been promoted in Cambodia under various themes including general environmental concepts, resource management and community participation, and sustainable development. Mass media such as newspapers, radios and TV channels have been frequently used for public awareness raising. However, climate change issues have received relatively less attention.

LOW PRIORITY PROJECT 2: ASSESSMENT OF NEEDS FOR SETBACKS, VEGETATION BUFFERS AND PROTECTION STRUCTURES IN COASTAL AREAS

Sector: Coastal Zone

Rationale/justification in relation to climate change, including sectors concerned

Uncoordinated agricultural, industrial and urban development in the coastal areas of Cambodia, without consideration for the impacts of climate hazards, changes land use patterns and presents increased risk to human lives and economic activities. The assessment of needs for setbacks, vegetation buffers and protection structures would be essential for mapping residential, industrial, commercial and agricultural areas that require protection from floods, windstorms and seawater intrusion. This will also provide the basis for coordinated and rational land use planning and development in coastal areas.

Description

- Objective
  - To develop the basis for land use planning in coastal areas.

- Activities
  - Conduct satellite imagery interpretation and analysis on trends and current status of land use along the coastline;
  - Conduct a climate hazard risk assessment for coastal areas;
  - Identify areas presenting high risk to climate hazards and assess their needs for protection; and
  - Recommend appropriate protection measures to relevant Government agencies.

- Short-term outputs
  - A map of the areas presenting high risk to climate hazards; and
  - Appropriate protection measures recommended.

- Potential long-term outcomes
  - Risk to climate hazards for coastal areas reduced;
  - Sustainable land use and development in coastal areas implemented; and
  - Poverty reduced.

- Location
  Cambodia's coastline.

- Time frame
  3 years.

- Budget
  US $1,500,000.

Implementation

- Institutional arrangement
  MoE will be responsible for coordinating the project with MLMUPC, MPWT and provincial authorities. Other agencies to be involved in project implementation are: MAFF's Department of Fisheries and Department of Agronomy and Land Improvement, MIME, MoT, MRD, MOWRAM, and RUPP.

- Risks and barriers
  Weak coordination among key stakeholders, and insufficient and unreliable information about climate hazards in coastal areas

- Evaluation and monitoring
  The following indicators will be used: assessment report and maps produced.

Related developments

This is a new initiative.

Health Projects

MEDIUM PRIORITY PROJECT 1: TREATED MOSQUITO NET DISTRIBUTION

Sector: Human Health

Rationale/justification in relation to climate change, including sectors concerned

Changes in rainfall patterns and mean temperatures may contribute to the spread of insect vectors such as mosquitoes, flies and fleas which could expand disease transmission, especially in tropical regions where the environment is more favourable to insect development but technology and capacity are limited.

Malaria is transmitted by anopheles mosquitoes and threatens a majority of rural Cambodians. This disease kills more than 400 Cambodians per year and records the highest amount of total inpatients in the country. Most rural Cambodians have limited understanding of mosquito net use and cannot afford to buy them. This project will further assist CNM in reducing mosquito bites in vulnerable groups, which in turn will minimize malaria cases and fatalities.

Description

- Objective
  - To reduce risk of mosquito bites in bed in high risk malaria regions.

- Activities
  - Distribute treated mosquito nets to people in high risk malaria regions;
  - Re-treat used mosquito nets with insecticides;
  - Educate target population on malaria preventive measures; and
  - Mosquito net usage monitoring.

- Short-term outputs
  - 100,000 mosquito nets distributed or re-treated;
  - Risk of mosquito bites reduced; and
  - Malaria cases and fatalities reduced.

- Potential long-term outcomes
  - Human health improved;
  - Household health expenditure reduced;
  - Labour productivity increased; and
  - Poverty reduced.

- Location
  The project will be implemented in high risk malaria regions, especially in forested areas such as Kompong Thom, Koh Kong, Mondul Kiri, Preah Vihear, Pursat, Ratanak Kiri, and Siem Reap Provinces.

- Time frame
  3 months from February to April each year. Project activities have to be completed before the start of the rainy season since malaria is dependent on rainfall patterns and as remote areas are not accessible in the rainy season.

- Budget
  US $500,000.

Implementation

- Institutional arrangement
  CNM is responsible for coordinating this project in collaboration with MoH Provincial Departments and concerned NGOs.

- Risks and barriers
  Delay in timely disbursing funds and procuring mosquito nets and insecticides, variability in the start of the rainy season, difficulty to access high risk malaria regions, misuse of mosquito nets by target population, weak communication skills of service providers.

- Evaluation and monitoring
  The following indicators will be used: number of mosquito nets distributed and properly used, incidence of malaria.

Related developments

This project is currently implemented by CNM, HU and PFD under the Global Fund, though it does not fully cover all the high risk malaria regions. To enable the achievement of the Millennium Development Goal No 6, Target 12 of the Royal Government of Cambodia to provide 98% of people in high-risk malaria regions with treated mosquito nets by the year 2015, this project would be of critical importance and complement existing CNM activities.

MEDIUM PRIORITY PROJECT 2: STRENGTHENING MALARIA SURVEILLANCE PROGRAMME

Sector: Human Health

Rationale/justification in relation to climate change, including sectors concerned

Changes in rainfall patterns and mean temperatures may contribute to the spread of insect vectors such as mosquitoes, flies and fleas which could expand disease transmission, especially in tropical regions where the environment is more favourable to insect development but technology and capacity limited.

Malaria is transmitted by anopheles mosquitoes and threatens a majority of rural Cambodians. This disease kills more than 400 Cambodians per year and records the highest amount of total inpatients in the country. Accurate information on potential malaria outbreaks, spatial and temporal fluctuation of anopheles mosquitoes is essential to designing effective malaria control programmes especially for emergency response.

Description

- Objective
  - To strengthen and improve existing malaria surveillance.

- Activities
  - Organise training in malaria surveillance methodology;
  - Review, revise and, as necessary, establish surveillance guidelines and procedures incorporating climate change concerns;
  - Refurbish existing laboratory at CNM;
  - Train malaria information programme officers in malaria database management; and
  - Establish malaria information networks in the provinces.

- Short-term outputs
  - Malaria surveillance guidelines and procedures revised;
  - CNM laboratory refurbished;
  - Human resource and institutional capacity strengthened; and
  - Malaria information networks established.

- Potential long-term outcomes
  - Malaria information system management improved and functioning;
  - Malaria cases and fatalities reduced; and
  - Poverty reduced.

- Location
  CNM and malaria regions, especially in forested areas such as Kampong Thom, Koh Kong, Mondul Kiri, Preah Vihear, Pursat, Ratanak Kiri, and Siem Reap Provinces.

- Time frame
  3 years.

- Budget
  US $1,500,000.

Implementation

- Institutional arrangement
  CNM will be responsible for implementing the project in collaboration with MoH Provincial Departments and the Royal University of Medicine.

- Risks and barriers
  Communication between healthcare centres and MoH provincial Departments, reliability of information collected, difficulty in accessing remote areas.

- Evaluation and monitoring
  The following indicators will be used: number of staff trained, number of field surveys conducted, malaria information network established.

Related developments

Selected studies on malaria drug resistance and the effects of counterfeit drugs have been conducted.

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