



Mekong River Commission

**PROGRAMME DOCUMENT
DROUGHT MANAGEMENT PROGRAMME
2011-2015**

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LIST OF ACRONYMS

AIP	Agriculture and Irrigation Programme
ASEAN	Association of Southeast Asian Nations
BDP	Basin Development Plan
CCAI	Climate Change and Adaptation Initiative
CEO	Chief Executive Officer
CTA	Chief Technical Advisor
DMP	Drought Management Programme
EP	Environment Programme
FAS	Finance and Administration Section
FMMP	Flood Management and Mitigation Programme
GEF	Global Environment Facility
HYCOS	Hydrological Cycle Observation System
IBFM	Integrated Basin Flow Management
ICBP	Integrated Capacity Building Programme
IKMP	Information and Knowledge Management Programme
IWRM	Integrated Water Resources Management
JC	Joint Committee of the Mekong River Commission
LAs	Line Ministries/ Agencies
LMB	Lower Mekong River Basin
MRB	Mekong River Basin
MDGs	Millennium Development Goals
MNRE	Ministry of Water Resources and Environment
MOU	Memorandum of Understanding
M-IWRM	Mekong – Integrated Water Resources Management Support Project
MRC	Mekong River Commission
MRCS	MRC Secretariat
NASA	The National Aeronautics and Space Administration
NCDM	National Committee for Disaster Management
NDVI	Normalised Difference Vegetation Index
NGOs	None Government Organisations
NMC	National Mekong Committee
OEB	Operating Expense Budget
OPD	Operations Division (MRCS)
PD	Planning Division (MRCS)
RBM	River Basin Management
SPI	Standardised Precipitation Index
TOR	Terms Of Reference
TSD	Technical Support Division (MRCS)
UMB	Upper Mekong Basin

EXECUTIVE SUMMARY

During the past decade, drought events in the Mekong River basin (MRB) have increased in frequency and severity. Now considered a common phenomenon in the region, periodic drought inflicts significant socio-economic impacts on the basin's population that is highly dependent on the MRB's water supply, natural resources and food production systems. Measures to mitigate negative socio-economic impacts of drought have frequently been considered under the work of Mekong River Commission (MRC) and its predecessors. The MRC's recent attention to drought management originated with the drought events of 2004-2005 and 2009-2010, when unusually low flows in the MRB and seasonal deficiencies in regional rainfall led to severe agricultural losses in north-eastern Thailand and Cambodia, and critical levels of saline intrusion in the Mekong Delta. These impacts resulted in calls for national and regional action at the highest political levels within the MRC.

In response to concerns over the impacts of frequent and severe droughts in the Lower Mekong Basin (LMB), the MRC Council set a priority in the 2006-2010 Strategic Plan to establish an MRC Drought Management Programme (DMP) as a part of the MRC programme portfolio. A multi-year (2011-2015) DMP was approved in principle by the MRC Council at the 13th MRC Council Meeting in December 2006. The Council instructed the MRC Secretariat (MRCS) to work closely with relevant Development Partners to mobilise necessary technical and financial support for the DMP.

Progress of DMP was reported and discussed regularly in MRC Joint Committee (JC) and Council Meetings; it was discussed with national and local stakeholders through national consultations and regional workshops. The MRCS was instructed to review and revise the DMP in order to make a proposal relevant and justified to Development Partners, and to respond effectively to the urgent need for addressing drought issues. At its 28th Meeting in August 2008, in anticipation of Development Partners' funding for the DMP, the JC approved the request for re-allocating resources from the Administrative Reserve Fund (ARF) and the Water Management Trust Fund. The JC also requested the Secretariat to use in-house experts and support from National Line Agencies to start priority activities.

At the first MRC Summit held in April 2010, Heads of MRC Member Country Governments came together to discuss issues of mutual interest, and set drought and other natural disasters as one of the nine priority areas of action for the MRC in the coming years.

With a limited budget available from the MRC Administration Reserve Fund (ARF), an Initial Drought Management Project was launched in 2010 for a period of one year. The immediate key outputs of the Initial Drought Management Project included drought risk and impact assessment, analysis and mapping of vulnerable areas in the LMB, as well as the collection, collation and analysis of national data, information and knowledge on drought management.

Based on the success of the Initial Drought Management Project, and in line with the recently adopted MRC Strategic Plan 2011-2015 and the 1995 Mekong Agreement, the DMP 2011-2015 is established to continue and strengthen the key activities completed under the Initial Drought Management Project. The overarching long-term objective of the DMP is that the MRC Member Countries will have developed sustainable technical capabilities, and institutional capacity for managing drought risk in the Mekong Basin in an effective, sustainable, and equitable manner. The programme will achieve this objective through the provision of knowledge-based operational services and technical assistance to the MRC Member Countries, their National Mekong Committees (NMCs) and relevant line agencies

on drought forecasting and preparedness, drought awareness and management strategies, and policy development in order to mitigate impacts of drought on livelihoods of vulnerable people in the region.

The DMP 2011-2015 comprises of the following five outcomes that support directly the corresponding Specific Goals of the MRC Strategic Plan 2011-2015:

- Outcome 1:** A regional integrated and comprehensive drought management and mitigation strategy developed and operational
- Outcome 2:** Effective drought risk/vulnerability assessment, and land suitability and social economic analyses conducted, considering future climate change and economic development
- Outcome 3:** Coordination in drought related data/information sharing, and cooperation with Upper Mekong Basin (UMB) countries strengthened
- Outcome 4:** Capacity development for drought preparedness, planning and management assessed and strengthened
- Outcome 5:** Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented

The DMP will be managed and executed by the MRC through its Secretariat, and implemented through relevant line agencies in the four Member Countries, coordinated by the four NMC secretariats, and will engage the private sectors, civil society organisations and experts where appropriate. Technical support and guidance will be provided through regional mechanisms. The MRCS is responsible for ensuring strategic, effective and practical cross-sector integration of all DMP outputs with other MRC Programme work. National level working groups or technical bodies will be established to coordinate and deliver key outputs. National Drought Management Unit in each LMB country will provide support to working groups and coordinate DMP activities at the national level.

DMP implementation will rely on close coordination among existing MRC Programmes. A MRC DMP Steering Committee will be established to secure involvement and active participation of NMCSs, LAs and relevant programmes. The DMP, integrated with other MRC Programmes, will support policy makers in the Member Countries develop and implement drought management policy in order to ensure maximum impact alleviation, enhance disaster awareness and preparedness, and increase agricultural incomes through proper water allocation planning against drought events.

The program will also contribute to addressing crosscutting issues of poverty and sustainable development, gender equality, climate change adaptation and mitigation, integrated water resources management, and transparency and engagement, prioritised in the MRC Strategic Plan 2011-2015.

The DMP is built on an adaptive approach. An initial 3-year programme implementation plan (PIP) for DMP within a 5-year planning horizon is built in the current version of the Programme Document, and will continue to integrate main activities started under the Initial Drought Management Project. In order to monitor and evaluate the process of the programme against the set milestones and expected outcomes, the MRC standard mechanism of monitoring data collection, documentation and reporting will be applied.

Annual work plans will be prepared for each calendar year from 2011 to 2015, as well as component level quarterly reports, and programme level bi-annual and annual reports. Against credible baseline information, these progress-reports prepared by the DMP will outline factors including, what has been done in the past period(s); how much has been spent on various activities; assessment of progress using performance indicators at the output level; and, issues and problems that have arisen. Performance reviews will be conducted on a quarterly, six-month and annual basis. An independent mid-term review and evaluation of the DMP is planned for 2013.

The budget for the DMP 2011-2015 is estimated at US\$ 3.76 million for the five year implementation period from 2011-2015. Funds of US\$ 1.2 million for the initial 3-year period are sought through the Japan-ASEAN Integration Fund (JAIF) to implement the DMP for 2011-2013. Additional US\$ 1 million are being sought from other source in collaboration with/through MRC Climate Change and Adaption Initiative (CCAI). This reflects a funding gap of over US \$1.56 million for certain outcomes and for the remaining years from 2013-2015. The MRCS also has discussions underway with other development partners.

1.0 BACKGROUND

The MRC Drought Management Programme (DMP) 2011-2015 is a result of a series of national and regional consultations with MRC Member Countries and stakeholders, dating back to 2006, and inspired by high level decisions of the Member Countries' Heads of Government (1st MRC Summit), Council, and the Joint Committee. The DMP 2011-2015 is a progressive development of the DMP document (dated 23rd March 2007), DMP Start-Up Project 2008, Initial Drought Management Project 2010-2011, and the decision of the 2nd Regional Meeting which took place in Ho Chi Minh City on March 4, 2011.

The DMP 2011-2015 is well-aligned with the MRC Strategic Plan 2011-2015, which calls for an effective regional framework for integrated and comprehensive drought mitigation and management.

The present DMP Document provides is well-aligned with the MRC Strategic Plan 2011-2015, which calls for an effective regional framework for integrated and comprehensive drought mitigation and management.

The present DMP Document provides a framework for presenting, monitoring and evaluating progress against time-bound milestones and impact of the DMP through clearly prescribing of:

- **The development results** - outcome or impact, results or causal relationship with the outputs of a development intervention, utility of programme outputs by targeted user-groups, observed changes and sustainability; and
- **The development intervention framework** - inputs of budget, time and people, tools, data or techniques, implementation processes/activity sequences, produce value-added "outputs".

1.1 Introduction

The Mekong River Basin (Figure 1.1) is shared by six countries, China and Myanmar in the Upper Mekong Basin, and Cambodia, Lao PDR, Thailand and Viet Nam in the Lower Mekong Basin (LMB). The four LMB countries have developed Mekong water cooperation for five decades, while maintaining dialogue with China and Myanmar.

Figure 1.1 Location map of the Mekong River basin.



The Mekong River Basin is one of the world's largest river basins. Its length of 4,800 km makes it the twelfth longest in the world, while its area of 795,000 km² makes it the twenty-first in terms of size. About 22% of the Basin lies in the People's Republic of China (China), 3% in the Union of Myanmar, 25% in the Lao People's Democratic Republic (Lao PDR), 23% in the Kingdom of Thailand (Thailand), 19% in the Kingdom of Cambodia (Cambodia), and 8% in the Socialist Republic of Viet Nam (Viet Nam). The contribution of these countries to the Mekong River's mean annual discharge of 475,000 million m³ (ranked eighth largest in the world) are 16%, 2%, 35%, 18%, 18% and 11%, respectively. The LMB covers a total downstream area of about 620,000 km² in the countries of Lao PDR, Cambodia, Thailand and Viet Nam.

Compared to other regions in the world in term of actual renewable water resources per capita¹, the Mekong Region is theoretically not a water-stressed river basin. The annual renewable water resources (ARWR) per capita provides the maximum theoretical amount of water available per person, though in reality, a large portion of this water may not be accessible to humans (Ravenge and Mock, 2000). Assuming that current water consumption patterns continue unabated, projections indicate that the most populous countries of China, Viet Nam and Thailand will gradually slip into water stress (with water per capita falling just above or below 1,700 m³ per year) over the next 20 years as water consumption rises (United Nations Secretariat World Population Prospects).

Present statistics indicate that most Mekong Region countries have fairly high amounts of renewable water resources per capita. However, at a closer look, the region (at number locations) faces a series of critical water issues, such as:

- Water shortages in Thailand;
- Intensive salinity intrusion in Viet Nam's Mekong delta;
- Floods and drought in most parts of the LMB;
- Water quality, land-subsidence, and morphological changes in Delta areas; and
- Intensification of sectoral competition within and among the Mekong countries (MRC, 2010a).

Water issues in the Mekong Region are closely related to the unequal spatial and temporal distribution of flow, and the lack of well-informed decision making for water resources development and management, and mitigation of vulnerability. Despite substantial regional rainfall by global standards, what exposes the Mekong region to the impacts of drought is the fact that just about all of the precipitation is confined to a single period of six months between May and October. The rest of the year sees very little rainfall, causing significant deficits in moisture budgets. The Mekong River has an average annual discharge of 13,700 m³/s, a peak wet season average discharge of 52,400 m³/s, causing widespread flooding, and a minimum discharge of 1,600 m³/s (approximately 30 times less than the peak wet season discharge) during dry season, when water demand for food production is higher (ADB and SEI, 2002, and MRC, 2003). Even during the rainy season (the Southwest Monsoon from May/June to October/November) that is characterised by heavy and frequent rains, high humidity, cloudiness and tropical temperature, a drought period is occasionally encountered.

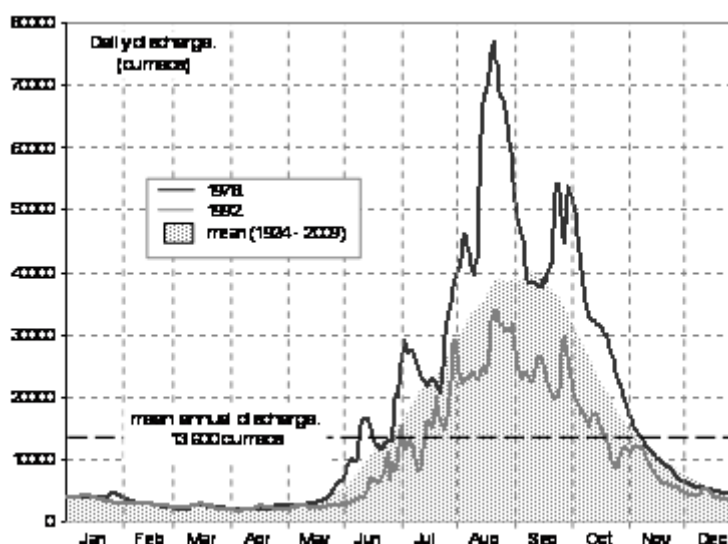
Over many parts of the Basin, annual evaporation and rainfall are roughly equal, as indicated by results for Vientiane and the Mekong Delta. Towards the north (Chiang Saen), a considerable moisture surplus develops as a result of higher rainfall and lower evaporation. The major regional feature, however, is the high moisture deficits that characterise northeast Thailand, as indicated by results from Khon Kaen, where evaporation

¹ According to World Resources Institute, **Per Capita Actual Renewable Water Resources** is the maximum theoretical amount of water actually available on a per person basis for each country. It is a sum of internal renewable resources (IRWR) and external renewable resources (ERWR), including flow for upstream and downstream countries and possible reduction of external flow due to upstream water abstraction. Internal renewable water resources (IRWR) are comprised of the average annual flow of rivers and recharge of groundwater (aquifers) generated from endogenous (internal) precipitation. Even though IRWR measures a combination of surface and groundwater resources, it is typically less than the sum of the two because of overlap--water resources that are common to both surface and groundwater.

exceeds rainfall by almost 700mm in an average year. Here, only two summer months have a surplus of any significance, compared to five and six elsewhere. This means that the area is particularly vulnerable to critically low levels of soil moisture, and therefore faces the highest regional drought risk.

As shown in Figure 1.2, extremes do occur. The 1978 and 1992 hydrographs at Kratie is compared to the mean annual distribution of flow (Kratie in Cambodia represents the point on the mainstream at which over 90% of total flow to the Sea has entered the Mekong). These two years represent the smallest and largest flood season hydrographs observed since 1924. Given that the mean annual volume of flood season flow is 335 km³, the volume in 1978 amounted to 135% of the mean, and that in 1992 just 58%. Extremes, when they do occur, can therefore represent very large departures from average conditions. This is generally understood for exceptionally large floods, but droughts and deficits are less understood for the monsoon Asia.

Figure 1.2 Mekong at Kratie – the two most extreme annual hydrographs observed over the 86 years since 1924.



Source: Adamson and Bird, 2010.

1.2 Drought in the Mekong Cooperation Context

1.2.1 Drought Vulnerability Issue within International and National Priority Focus

The past 50 years have seen a sharp rise in large-scale natural disasters. In the Asia-Pacific region, water-related disasters, more than other types, have increased in frequency and intensity. Economic damage resulting from these water-related disasters has also increased in recent decades. Studies show that water-related disasters are expected to intensify with climate change in the years to come.

In late 2010, the United Nations released a report indicating that countries in Asia and the Pacific are more prone to natural disasters than those in other parts of the world. The report adds that the Asia-Pacific region is four times more likely to be affected by a natural catastrophe than Africa, and 25 times more vulnerable than Europe and North America (United Nations International Strategy for Disaster Reduction Secretariat - Asia and Pacific (UNISDR - AP)).

The International Development Research Centre (IDRC) (2009) confirmed, based on an average annual frequency of occurrence of climate-related hazards from 1980-2000 (cyclones, floods, and droughts), that much of the LMB, especially the Mekong Delta, almost all regions of Cambodia; northern and eastern regions of Lao PDR, and some parts of Thailand are among the most vulnerable in Southeast Asia. Based on an analysis of human sensitivity to climate hazard exposure, including socio-economic factors (income per capita, literacy, life expectancy, poverty, and inequality), technology, and infrastructure, it is evident that Cambodia and Lao PDR have the lowest adaptation and mitigation capacities.

As vulnerability to drought has increased regionally, nationally and globally, greater attention has been directed to mitigate risks associated with its occurrence, through improved institutional operational capabilities (i.e., climate and water supply monitoring) and implementation of drought impact mitigation measures. The UN system and ASEAN commemorated the 2010 International Day for Disaster Reduction, and the ASEAN Day for Disaster Management under the theme "Making Cities Resilient: My City Is Getting Ready."

1.2.2 Drought Vulnerability Issue within Mekong Regional Context

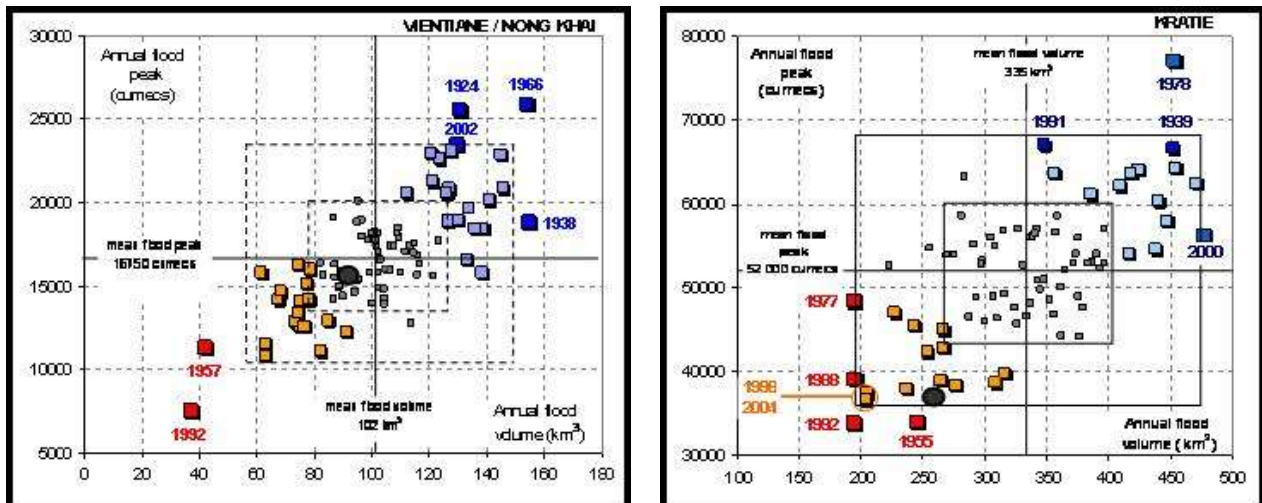
Water issues in the Mekong Region are very complex. Each of the four LMB countries is currently dependent on the resource in different ways and to different degrees. Economic growth in the region continues at a rapid pace, and exerting strong pressure on the water system and its current users. Yet, the Mekong River Basin (MRB) has major development opportunities, which in many cases can be optimised, come to fruition and contribute to the wealth of the region, if each individual country cooperates. Because of high inter-dependencies, uncoordinated or unilateral water development can cause serious harm to other riparian interests, to the environmental values, and indeed, to heavily resource-dependent communities in the host countries. Thus, management of the MRB requires addressing cross-border and cross-sectoral challenges, and raises the need for proper IWRM policies and for basin-based management at the country level.

The notion of drought as a hydro-meteorological risk in tropical monsoon regions is not perhaps one that fits naturally with conventional perceptions, since the term "*Monsoon*" is virtually synonymous with torrential rainfall, moisture surplus, floods and climatic predictability. However, past and recent drought events in the region have served to correct this natural misconception. Droughts are not new to the LMB, but knowledge of historical incidence and severity of drought is inadequate in the region. In fact, historically, they have recurred relatively frequently.

Recent studies undertaken by the four MRC Member Countries under the Initial Drought Management Project indicated that drought events in the region have increased in frequency and severity during the past decades. Regionally, the timing of the onset and end of the south west monsoon is highly predictable, historically having a very low variance from year to year. As recent experience has shown, any significant deviation from these dates can have substantial economic consequences. The regional incidence and severity of hydrological drought (and significant and extreme flood conditions) can be set in their historical context, as described and illustrated in Figure 1.3. By this definition, twelve 'significant' and four 'extreme' drought episodes have occurred since 1924, making them an integral part of the hydrological landscape of the LMB. The most extreme events in 1992, 1997 and 1998, in terms of rainfall and flow volume, coincided with strong El Niño events, which are widely seen as linked to a weak Asian Monsoon (see Clift and Plumb, 2008 and Glantz and Nakayama 1998). However, the extreme Mekong drought of 1955 occurred in a strong La

Niña year, which was conversely linked to a stronger Monsoon and extensive regional floods. Therefore, it is evident that the amount of rainfall during the course of the monsoon season is not the only factor that determines whether drought conditions prevail or not.

Figure 1.3 Scatter plots of the joint distribution of the annual maximum discharge (cumecs) and the volume of the annual maximum hydrograph (km³) Vientiane/Nong Khai (1913 - 2006) and at Kratie (1924 – 2006).



Source: Adamson and Bird, 2010.

A definitive feature of the drought process is the accumulation of a moisture deficit, which may be measured in terms of rainfall, stream flow or soil moisture. However, the most recent regional drought episode of 2004-2005 demonstrated that drought is not merely accumulated rainfall deficits, but also unexpected patterns of rainfall occurrence and changes in surface and ground water conditions. The severity of an event is also determined by the timing of crucial moisture shortfalls. For example, if moisture shortfalls occur during the grain filling stage of crop development, then the severity of the drought event from an agricultural point of view is maximised.

In the MRB there are a range of environments and water demands that respond differently to various and complex elements of a drought event. For example:

- *Below normal flows* during the *flood* season affect timing, depth and duration of wetland inundation and inflows to the Great Lake / Tonle Sap system, incurring negative consequences on fisheries, and as a result, on the economy of Cambodia;
- *Deficient flows* during the *dry* season months permit extensive saline intrusion in the Viet Nam Delta, which reduces water availability for irrigation. This leads to lower yields, reduced planted area, and significant economic losses for one of the world's largest producers of rice. Low water levels also restrict navigability and reduce river-based trade;
- *Deficient flows* further augment the vulnerability of the regional energy sector (hydropower) to drought. For instance, when reservoir storage in Yunnan fell to critically low levels, parts of western China were predicted to have a 20% shortfall in power production, equivalent to the electricity demand during the first six months of 2010 (Xinhua News Agency, February 23rd, 2010). In Viet Nam, Electricity of Viet

Nam (EVN) and the Ministry of Agriculture and Rural Development held intense discussions in early 2011 on the release of water from hydroelectric reservoirs (Ham Thuan hydro dam) to irrigate crops in the north, while ensuring certain energy generation level, as Viet Nam was suffering a severe shortage of water – not for the first time (Viet Nam Net Bridge, March 12, 2011);

- *Rainfall shortfalls* and unexpected precipitation patterns in both wet and dry seasons can result in agricultural losses, which can become so large that they lead to reductions in regional and national economic growth targets, as has happened in north-eastern Thailand in 2004; and
- *Severe water shortages due to an early end to the rainy season* affected both agriculture, and energy production, and day to day life the Central Highland provinces of Viet Nam (Viet Nam News, March 17, 2011, September 14, 2010, February 25, 2005). Kon Tum province struggled to deal with water shortage as 220 out of 550 wells were dry, and the remainder were running low, as water levels in local reservoirs located near the Pleikrong Hydro-electrical Plant were extremely low (Viet Nam News of March 17, 2011). Students at Sa Binh Secondary School were sent home because there was not enough water for daily activities, while nearly 5,000 ha of crops, mainly coffee and rice, in the Central Highland province of Dak Lak were devastated by the drought (Viet Nam News of March 17, 2011). In 2010, many small and medium hydropower plants this region did not have enough water to operate efficiently. Most hydroelectric companies in Dak Lak complained that production reached only about half of their targets due to the drought-like weather conditions (Viet Nam News, September 14, 2010). In the severe drought of 2005, approximately 2,800 hectares of rice fields and 68,000 hectares of coffee crops in Dak Lak province were either damaged or destroyed (Viet Nam News, February 25, 2005).

The 1993 and 1999 drought events extended across every region of Thailand and caused water shortages for the agriculture, industrial and domestic sectors. The 1998 drought was also severe in the Mekong Delta in Cambodia and Viet Nam. Flood season flows were low, with critically low flood plain inundation. The Tonle Sap Great Lake recorded a maximum level of only 6.85 m and flooded area of 7,000 km², compared to typical seasonal maxima of 8 to 9 m and 15,000 km². In six provinces of the central highlands of Viet Nam, stretching 400 km north from Hue, severe meteorological drought and resultant agricultural losses were reported.

Severe economic, social and environmental impacts of droughts in the LMB indicated the increased vulnerability of people living in affected areas. For example, millions of farmers and low income earners were affected by the most recent drought of the year 2004, which caused considerable agricultural losses in north-eastern Thailand and Cambodia, a significant reduction in the second rice crop in Lao PDR, and critical levels of saline intrusion in the Mekong Delta.

In 2004-2005 drought events, rice production was hit hard, with estimated 1.6 million hectares of rice lost. Sugar crop production fell by 30%. Farm production costs increased by an average of 40% due to rising water bills and increased fuel costs. Farmers' incomes fell by 20% in line with a 30% fall in farm outputs, while supply shortages increased farm product prices by about 8%. In Cambodia droughts threatened up to 2 million people with food shortages. Up to 30% of the country's farmland was affected. The economy of Lao PDR is extremely vulnerable to drought, as almost all of the country's rural population depends on rain-fed rice. In 2004 the area planted for second wet season rice crop was reduced by 25%.

Table 1.1 Typical examples of impact of drought and floods in Cambodia.

Disaster	Date	Affected (person)	Damage (1000s US\$)	Source
Flood	June 1996	1,470,000	100	IDD
Flood	July 2000	1,300,000	1,500	IDD
Flood	August 2001	3,448,053	160,000	IDD
Flood	August 2002	1,669,182	15,000	IDD
Drought	2003 to 2005	2,000,000	Unknown	ADB
Drought	June 2004	5,000,000	100,000	IDD

IDD = International Disaster Database; ADB = Asian Development Bank

Table 1.2 Typical examples of impact of drought and floods in Lao PDR (1966-2002).

Disaster	No. Events	Affected (person)	Source
Drought	5	4,250,000	WFP
Flood	16	3,244,150	WFP

WFP = World Food Programme

Table 1.3 Typical examples of impact of drought and floods in Thailand.

Disaster	Date	Affected	Impact	Source
Drought	2003 to 2005	650,000 ha	Increased farm production cost 40%	ADB
Drought	2009	2,444,010 persons	Decreased agricultural product	GAR
Flood	2009	819,822 persons	Unknown	GAR
Drought	2010	Unknown	Lost 75% of xassava production & increased price 60%	Bangkok Post

ADB = Asian Development Bank; GAR = Global Assessment Report

Table 1.4 Typical examples of impact of drought and floods in Viet Nam.

Disaster	Date	Affected	Impact	Source
Drought	2003 to 2005	Unknown	\$ 60 million (Cuu long delta)	ADB
Drought (North central)	June 2010	40,000 households, 250,000 ha	Not enough clean water; crops dried up; high tem.	Viet NamNet

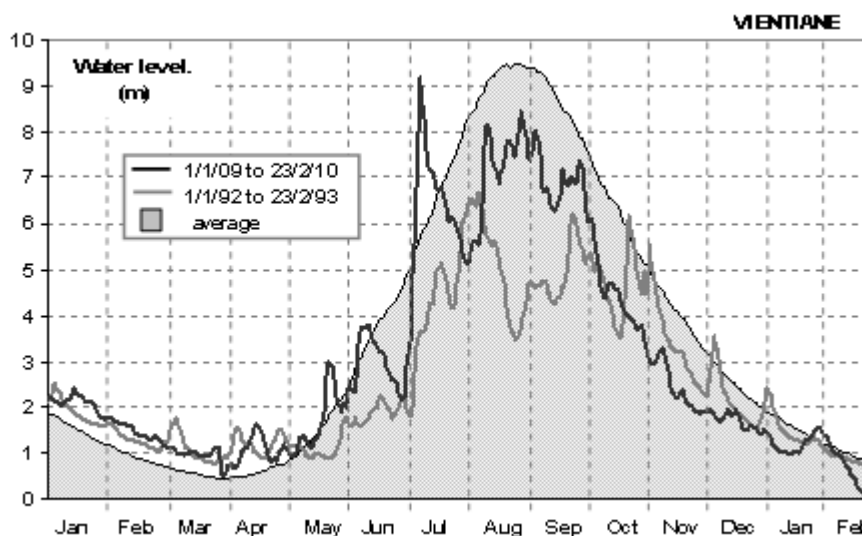
ADB = Asian Development Bank

Agriculture in the Viet Nam delta was already suffering from the impacts of extremely low level of Mekong floods in 2004. More than 10,000 hectares of the winter-spring rice crop were adversely affected by saltwater intrusion caused by lower than normal flows in the Mekong mainstream. Losses were amongst the most severe ever experienced. Coffee exports from the central highlands fell significantly, while at the subsistence level, vegetable garden failures reduced the availability of cheaper source of food for households.

Drought events of 2009-2010 also illustrated the vulnerability of the regional energy sector (largely composed of hydropower) to drought. River-based trade and tourism were also disrupted in northern Laos and Thailand due to extremely low water levels. The comparison of water levels in the mainstream Mekong in 2009-2010 and 1992-1993 showed that water levels at Chiang Saen were kept artificially high by upstream reservoir releases from China, until late January when they receded, and levels at Luang Prabang and Vientiane were lower than 1992-1993. Based on available information, it appears that flows from tributary rivers in Lao PDR and northern Thailand are at levels that were amongst the lowest recorded in the recent decades. This situation represents a regional and transboundary hydrological drought affecting all countries in the Basin.

In 2009, Monsoon rainfall was lower and total seasonal rainfall throughout the region fell significantly below average. The most severe deficits occurred in the upper Basin in Yunnan, where only 65 to 75% of the normal rainfall occurred. The severity of the ensuing drought was worsened by the very early end of the monsoon rains, which after July were amongst the lowest observed. Dry conditions that developed in western China were considered to be the most extreme in 50 years. In the LMB, there was a similar, though less severe seasonal pattern. Deficient seasonal rainfall meant that towards the end of the flood season, water levels in natural catchments, in terms of groundwater and soil storage was already low. By mid-October water levels at Vientiane had fallen well below the most severe conditions observed previously in 1992-1993. Water levels in large tributary systems were also unprecedentedly low.

Figure 1.4 Mekong at Vientiane – water levels between January 2009 and February 2010 compared to their long term average and those of 1992/3, previously the lowest on record.



A major challenge in integrating drought management in LMB is the fact that impacts reach across many countries and sectors, and therefore involves coordination amongst multiple government agencies. Impacts extend across agriculture, forestry, water supply, industry, water transport, inland fisheries and the environment in general. The scale and timing of impacts in each sector can be very different. In an international river basin such as the Mekong, this complexity increases by an order of magnitude, making a coherent regional response an even greater challenge.

Historically, more emphasis has been given to flood management than drought management in LMB. With increasing pressure on water and other natural resources because of increasing and shifting populations and development need pressures, it is imperative for all MRC Member Countries to improve their capacity to manage water supplies during water-short years. Increasing society's capacity (internal factor of drought vulnerability) to cope more effectively with the extremes of climate and water resources variability (i.e., floods and droughts) – external factor of vulnerability is a critical aspect of the integrated water resources management (IWRM). The drought mitigation and management will contribute substantially to the climate change adaptation initiatives being considered and implemented by the MRC Climate Change Adaptation Initiative (CCAI).

Numerous studies show that from an institutional point of view, learning today to deal more effectively with extreme climatic events such as drought will benefit in preparing proper response strategies to long-term climate-related issues. Drought and projected changes in climate caused by increasing concentrations of carbon dioxide and other atmospheric trace gases have become inextricably linked. Changes in climate would lead to an increased frequency and intensity of drought (Gathara *et al*, 2006).

To make progress in reducing the serious consequences of drought, the MRC Member Countries need to improve their understanding of the hazard and the factors that influence vulnerability. Therefore, it is useful to discuss and agree definitions and indicators.

1.2.3 Drought Definitions

Drought, considered by many as the least understood of all major natural hazards, has also been demonstrated as the most costly (Wilhite, 1993); a fact that is as true in the MRB, and particularly in LMB, as it is elsewhere. The definition of drought varies on the basis of the situation or area for which drought is being defined. In a simple definition, it is understood as a period of water shortage that can range from a few days or weeks for some crops to a few months and years for large reservoirs or ground-water aquifers, and as little as an inch of precipitation for shallow root crops to as much as several feet of precipitation for water supplies that rely on stream-flow or ground water (Gathara *et al*, 2006). Drought is conceptually relative to some long-term average conditions of the balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area. It is also related to the timing (principal season of occurrence, delays in the start or early end of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness (i.e., rainfall intensity, number of rainfall events) of the rains. However, it is required to move beyond conceptual definitions to give an operational definition of drought (Gathara *et al*, 2006).

Drought risk is a product of a region's exposure to the natural hazard and its vulnerability to extended periods of water shortage (Wilhite, 2000a). The severity of a drought is dependent not only on its duration, intensity and spatial extent, but also on the specific environmental and the economic activities carried out within it. Hence, drought is the result of many external and internal factors:

- Natural factors - climate of the area; antecedent conditions as exemplified by the amounts of soil moisture, rain, and snow; the distribution of rain and snow in time and space; water-table levels during the drought; water quality; and soil type; and

- Human factors - socio-economic development, degree of development of water storage and distribution systems; patterns of water use and per capita consumption; legal and policy aspects; project operating rules; relevant water quantity and quality standards; economic considerations; availability of required technology and resources, and many more (Gathara *et al*, 2006).

According to the Glossary of Meteorology (1959), a drought is defined as "a period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area." The World Meteorological Organisation (WMO) defines six types of drought, referring to meteorological, climatologic, atmospheric, agricultural, and hydrological and water management drought. Each type is a result of a specific causes, effects and impacts. In order to characterise prevailing conditions in the LMB, the following types of drought are applicable to the region:

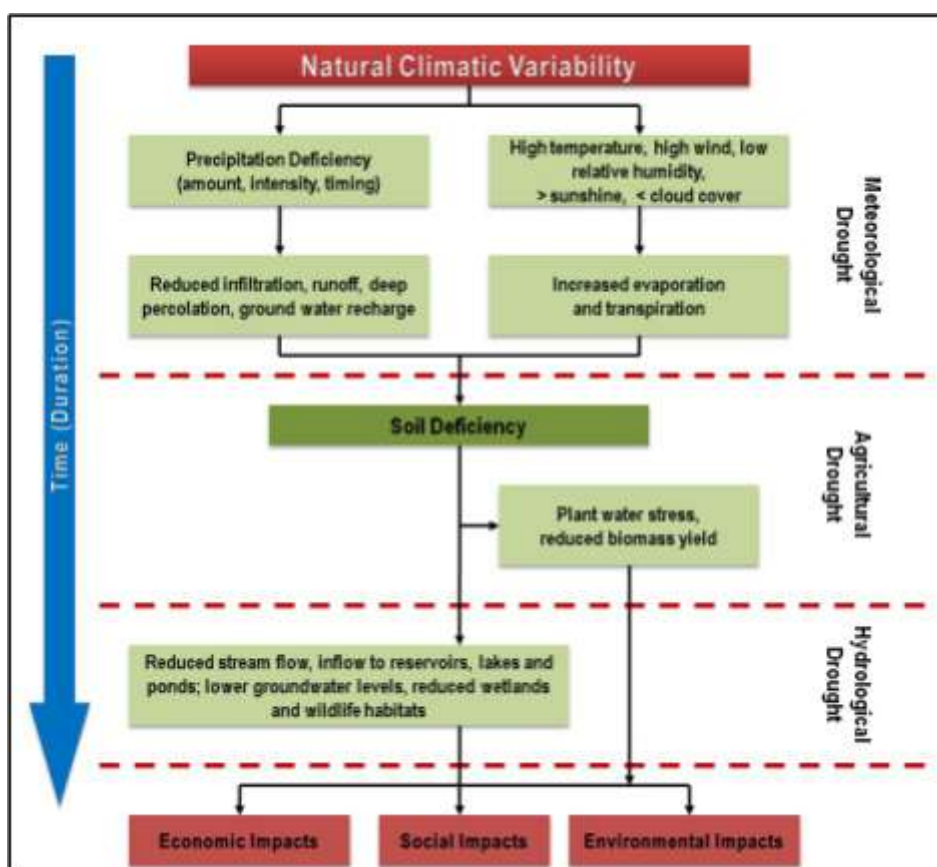
1. ***Meteorological or climatologic drought*** focuses on the degree of "dryness" in terms of accumulated rainfall deficit and is principally defined by a deficiency of precipitation from expected or "normal" over an extended period of time. Drought is the consequence of a natural reduction in the amount of precipitation received over an extended period of time, usually a season or more in length, although other climatic factors (such as high temperatures, high winds, and low relative humidity) are often associated with it in many regions of the LMB and can significantly aggravate the severity of the event. Drought is also related to the delays in the start of the rainy season, early end of the rainy season, and/or prolonged dry spells during the rainy season, as well as occurrence of rains in relation to principal crop growth stages and the effectiveness of the rains (i.e., rainfall intensity, number of rainfall events). Meteorological drought is the prime mover in the sequence. The first consequence of an accumulated rainfall deficit is a reduction in soil moisture storage, which once it reaches a critical level, has impacts upon crops and animal grazing. Hence, it is critical to better understand the drought climatology (i.e., the probability of drought at different levels of intensity and duration) and establish comprehensive and integrated drought indicators that incorporate climate, soil, and water supply factors such as precipitation, temperature, soil moisture, snow pack, reservoir and lake levels, ground water levels, and stream flow.
2. ***Hydrological drought*** is best defined by deficiencies in surface and subsurface water supplies (i.e., reservoir and ground water levels, stream-flow, and snowpack). As the rainfall and moisture deficit continues to accumulate, hydrological drought begins to manifest itself. Firstly natural stream flow decreases and falls below normal, ultimately causing a water resources shortfall. This can take the form of critically low river flow, drawn-down reservoir storage, and deeper groundwater levels, which make pumped abstraction too expensive or mechanically impossible, and impact energy productivity level. If the event has a long duration and particularly in the case of multi year droughts, groundwater levels fall and abstraction can become too expensive, too damaging or even mechanically impossible.
3. ***Agricultural drought*** is best characterised by deficiencies in soil moisture and is a critical factor in defining crop production potential. It generally applies to rain-fed agriculture, though irrigated crops can be affected when water resources become restricted or too expensive. Agricultural impacts are therefore the first to appear and in most cases provide the first confirmation that there is in fact a

drought of any sort at all. These impacts can vary from crop to crop, farm to farm, region to region and depend upon the crop and its resistance to moisture stress, the stage in its growth, whether there are alternative water supplies other than rainfall and whether livestock can be provided with alternative grazing.

4. ***Socio-economic*** drought is associated with the supply and demand consequences for economic goods. Drought becomes apparent as a *socio-economic process of water shortages* and their impacts. There may be food price increases due to reduced domestic agricultural output and (possibly) their replacement with more expensive imports. There may be power rationing due to reduced generating capacity and some industries that are high consumers of water (petrochemicals, metallurgical, bottling plants) have to reduce production, with secondary consequences for employment, prices, the availability of goods and national economic growth.
5. ***Water-management drought*** is characterised as water-supply shortages caused by the failure of water-management practices or facilities, such as an integrated water-supply system and surface or subsurface storage, to bridge normal or abnormal dry periods and equalise the water supply throughout the year (Gathara et al, 2006, Matthai, H.F., 1979). It is associated with curtailment of water resources from competitive uses during droughts. There are industrial, agricultural, environmental and social consequences from such curtailment.
6. ***Land use related drought*** involves two interlocking, complex systems: the natural ecosystem such as periodic stresses of extreme and persistent climatic events – drought, and the human social (human use and abuse of sensitive and vulnerable dry land ecosystems) (WMO, 2005). Long-term food productivity is threatened by soil degradation, which is now severe enough to reduce agricultural yields in many critical regions in the LMB.

These types of drought may coexist or may occur separately.

Figure 1.5 Drought processes, factors, relationships and impacts in LMB.



1.2.4 Drought Indices

Internationally, a range of indices is readily available and widely used (ref. Box 1 below). The trend is to rely on multiple drought indices with a range of threshold values that trigger mitigation and response actions depending on the intensity and stage of a drought (Wilhite et. al 2004).

Box 1: Some Potential Drought Indices

1. Meteorological drought indices:

- *Percent of normal rainfall:* A simple calculation suited to the needs of more general audiences (Wilhite, Hayes et al. 2000) and used to prepare easy to understand maps.
- *Standardised Precipitation Index (SPI).* Is based on the probability of precipitation over any duration of interest (weeks, months, growing season etc). It can provide early warning that meteorological drought conditions are developing and aid in the assessment of drought severity. To date SPI is finding more applications in Asia than other drought indices due to its practical data requirements, flexibility and simple calculation.
- *Rainfall Deciles.* This index is the current Australian standard for identifying the onset of meteorological drought. Monthly rainfall is organised into deciles.
- *Effective Drought Index (EDI).* This measure (Byun and Wilhite. 1999) also uses only rainfall data, but in this case focuses upon the amount of precipitation needed to return to “normal” conditions and overcome the accumulated shortfall deficit. The concept is straightforward in principle but requires careful interpretation.

- *Palmer Drought Severity Index (PDSI)*: The first comprehensive drought index developed in the US (Palmer 1965). It is a soil moisture procedure calibrated for regions that are relatively homogenous in terms of climate, landscape, soil, geology, vegetation and land use and is the standard USDA measure for activating drought mitigation and response programmes. Its application in Asia, where observational networks are not extensive, is therefore considered as limited.
2. Agricultural drought indices:
- *Crop moisture index (CMI)*: The Crop Moisture Index (CMI) uses a meteorological approach to monitor week-to-week crop conditions. It is based on the mean temperature and total precipitation for each week within a climate division, as well as the CMI value from the previous week. The CMI responds rapidly to changing conditions, and it is weighted by location and time.
 - *Normalised Difference Vegetative Index (NDVI)*: enables crop water stress monitoring.
3. Hydrological drought indices
- Daily stream flow (forecasts);
 - Average groundwater level;
 - Average reservoir storage level; etc.

Source: Adamson (2005); <http://www.drought.unl.edu/whatis/indices.htm>

While indices for metrological, agricultural and hydrological drought are frequently used, this is not the case for other droughts such as socio-economic, land use and water management drought. Nevertheless, it appears that the concept of a socio-economic drought is increasingly being linked to the vulnerability or coping capacity concept. Following an approach suggested by the ADB (2004), levels of vulnerability for social groups can be determined through two broad categories: First, vulnerability score, which is associated with physical remoteness from markets, infrastructure, social services, and cultural insulation (including degree of access to information and participation in decision-making beyond the local community); and second, the poverty status: poverty is assumed to cause social, cultural and economic risks to people, presenting few or no alternatives for improving current livelihood systems. The risk rating is achieved by multiplying the vulnerability score with the estimated level of (poverty) stress. Together these give relative but subjective vulnerability scores.

Earlier work identified the need for indicators that would sufficiently describe cause-effect relations and impacts with regards to three dimensions (MRC, 2002b):

1. **Status Indicators**: Indicating the properties of the system. These may refer to the severity level indicated by the above described drought indices or include socio-economic parameters;
2. **Impact Indicators**: Describing the deterioration of water related system functions and economic, social and environmental values. Example may include a loss of income from reduced land productivity, reduction of food supplies due to a decline in agricultural production resulting from water soil fertility, biodiversity, water quality,).
3. **Response Indicators**: Measuring effects resulting from strategies to offset and/ or mitigate the negative impact of an activity (e.g. water conservation, increasing water storage, improving land use planning and cropping patterns, afforestation, etc.).

Building upon on this valuable conceptual framework work, an opportunity arises for the DMP to develop a consistent suite of clear drought definitions and appropriate indicators, in order to provide a coherent platform and terminology for judging and evaluating drought conditions in various parts of the basin. This is seen as a precondition for facilitated formulation of drought response strategies, plans and actions.

1.3 PROBLEM ANALYSIS

1.3.1 Core and Associated Problems

Based on regional and national studies and consultation, the core problem is stated as 'increased vulnerability of people and water related resource systems to severe drought conditions in parts of the Lower Mekong Basin.' Notably, the key emphasis of this statement is not on the occurrence of drought in the basin, but on the vulnerability of people and water related resource system to drought stresses.

The complexity of drivers behind drought and the vulnerability of people and systems imply a range of associated problems that need to be accounted for, as they add meaning and clarity, and support the core problem statement. Associated problems are summarised as follows:

Problem 1: Lack of appropriate drought and climate change risk and vulnerability assessment and awareness

Drought is considered by many to be the most complex but least understood of all natural hazards, affecting more people than any other hazard. Hence, there are many challenges before the MRC Member Countries if they are to improve management of droughts. First of all, drought must be accepted as a natural hazard by regional and national decision-makers and communities. This lack of awareness in turn has resulted in an under-appreciation of drought and its far-reaching impacts. It is precisely this confusion that explains, to some extent, the lack of progress in drought management in the LMB. Regional and national decision-makers and communities will be able to make informed decision on drought mitigation and management if drought characteristics and impacts are better understood and documented.

There is a need to improve risk and impact assessment capabilities and approaches so that drought impacts on socio-economics, environment and people's livelihoods are systematically assessed, documented, and used for awareness raising and policy development to respond to risks and opportunities of drought and other developments. These needs include:

- There are many definitions exist that may not adequately define drought in meaningful terms for decision-makers, risk coordinators and communities. These will include defining thresholds for declaring drought that will be linked to specific impacts in key economic sectors and assessment of impact in these sectors;
- Several types of drought, and factors or parameters that define it need to be properly assessed, documented and discussed. These types of drought may coexist or may occur separately. Understanding of these parameters is a critical factor in defining, for example, crop and energy production potential;

- While it is important to characterize drought with its far-reaching impacts and effects on society, economy and environment, it is difficult to identify and quantify its impacts. This area continues to represent a formidable challenge to those involved in operational climate assessments; and
- It is important to understand drought within the context of climate change, i.e., more frequent and/or severe fluctuations in weather patterns; therefore, increase awareness and build capacity to conduct vulnerability assessments and develop adaptation and mitigation measures to address broader impacts of climate change, as a means of alleviating drought-related impacts.

Problem 2: Insufficient availability of detailed information/knowledge on the extreme variability of climatic and hydrological conditions in drought-prone parts of the LMB

The problem refers to inability to adequately measure the distribution of local rainfall, soil moisture condition and stream flows, to:

- make predictions of the regional macro-climate driven rainfall patterns and to make predictions on seasonal and intra-seasonal flow regime of the mainstream Mekong River and its major tributaries;
- make predictions on soil water depletion in major land use types and soils in the affected areas; and
- disseminate information to those who need it as a reference for informed decision making at multiple levels.

This problem is concerned with information needs of people directly affected by drought and those who work within agencies in charge of drought management. These parties currently lack the required information, reference or basis to make decisions regarding preparation for or mitigation of drought impacts. A functional drought projection and monitoring system is currently not available to agencies in any of the Member Countries.

Problem 3: Insufficient know-how of improved and tested drought preparedness, management and mitigation strategies

The third problem affects the vulnerability of people and water-related sectors in various ways. The problem also refers to the current policy focus on short-term drought. The past and current attempts to manage drought and its impacts through a reactive, crisis management approach have been ineffective, poorly coordinated, and untimely. Associated with it, there is the absence of a comprehensive and integrated longer-term drought management strategy comprising both structural and non-structural measures and know-how. Disaster management agencies are more accustomed to responding to impacts of emergency events that are structural and localised.

Progress on drought preparedness and policy development has been slow for a number of reasons. They include:

- the slow-onset characteristics of drought and the lack of an appropriate and generally accepted definition make timely warning, impact assessment, and response challenging for policy makers, natural resource Coordinators, and scientists;

- characterisation of the magnitude of drought vulnerability can only be evaluated best with multiple indicators and indices;
- Drought and its impacts are not as visual as other natural disasters, making it challenging to communicate the significance of drought events and vulnerability to the public; and
- The lack of methodologies for planners to guide them through drought management planning processes (either in the form of natural disaster or sustainable development plan, an integrated water resources management plan, or a stand-alone drought mitigation plan).

Tasks of drought vulnerability mitigation and the formulation of regional and national drought plans are further complicated by the lack of accurate, reliable, and timely estimates of impact severity. Other issues include the absence of drought impact assessment capacity (tools and human resources) within responsible agencies, and insufficient land use planning capacity to test and implement new and improved strategies. Another contributing factor to vulnerability is the relatively poor capacity of government agencies to communicate and provide extension services to people living in drought-prone areas.

Problem 4: Lack of proper understanding of land use/suitability, land use management and planning, and mismatch of water supply and demand in drought-prone parts of the LMB

The ability of the LMB natural resources to provide the needs of its growing population is a fundamental issue for the MRC Member Countries. At the same time, essential natural resources, such as land and water, are declining both in quantity and quality due to such factors as mounting pressure on natural resources, and climate variability. Sustainable management of land resources in the context of climate variability (more frequent flooding and drought events) requires sound land use management and planning based on knowledge of these resources, the demands of the use to which the resources are put, and the interactions between land/land use and water conditions.

The unbalance between water supply and demand is one of the most critical factors causing increased vulnerability of people and resource systems to drought. If water supply from streams, groundwater sources and storage are in serious decline, the entire local economy can be affected in terms of irrigation, drinking water supply, power generation and industrial output. For example, insufficient storage capacity is the most pressing problem in the drought hot spots in Cambodia and northeast Thailand.

Furthermore there is a considerable level of uncertainty associated with potential impacts of upstream developments and operations on drought conditions elsewhere in the Basin. The water demand and supply (at critical spaces and time) will be further compounded by increased economic activities and climate change. A number of major development projects are being considered and/or undertaken in the MRB.

There are relatively large grey areas where the proposed DMP, in close collaboration with other MRC Programmes, will make a positive contribution. These areas include:

- Land use and land suitability assessment, and land use management and planning in the context of climate variability including frequent drought;

- Water resource needs assessment in the formulation of water resource development scenarios to form a part of the Basin Development Planning process;
- Land use policy, and water supply and demand policy formulation based on a proper evaluation of both land suitability and water supply and demand management options;
- Evaluation of economic tools such as land productivity, water saving incentive systems, water pricing and financing systems;
- Improved water demand management - i.e., increasing the water use efficiency in agriculture for irrigated and non-irrigated systems at multiple scale such as farm, system and the basin;
- Cropping pattern optimisation particularly where rice is dominant; economic pricing to discourage water-demanding practices, etc.; and
- Adoption of crop varieties to suit the soil characteristics to enhance crop productivity, and resilience to water shortages.

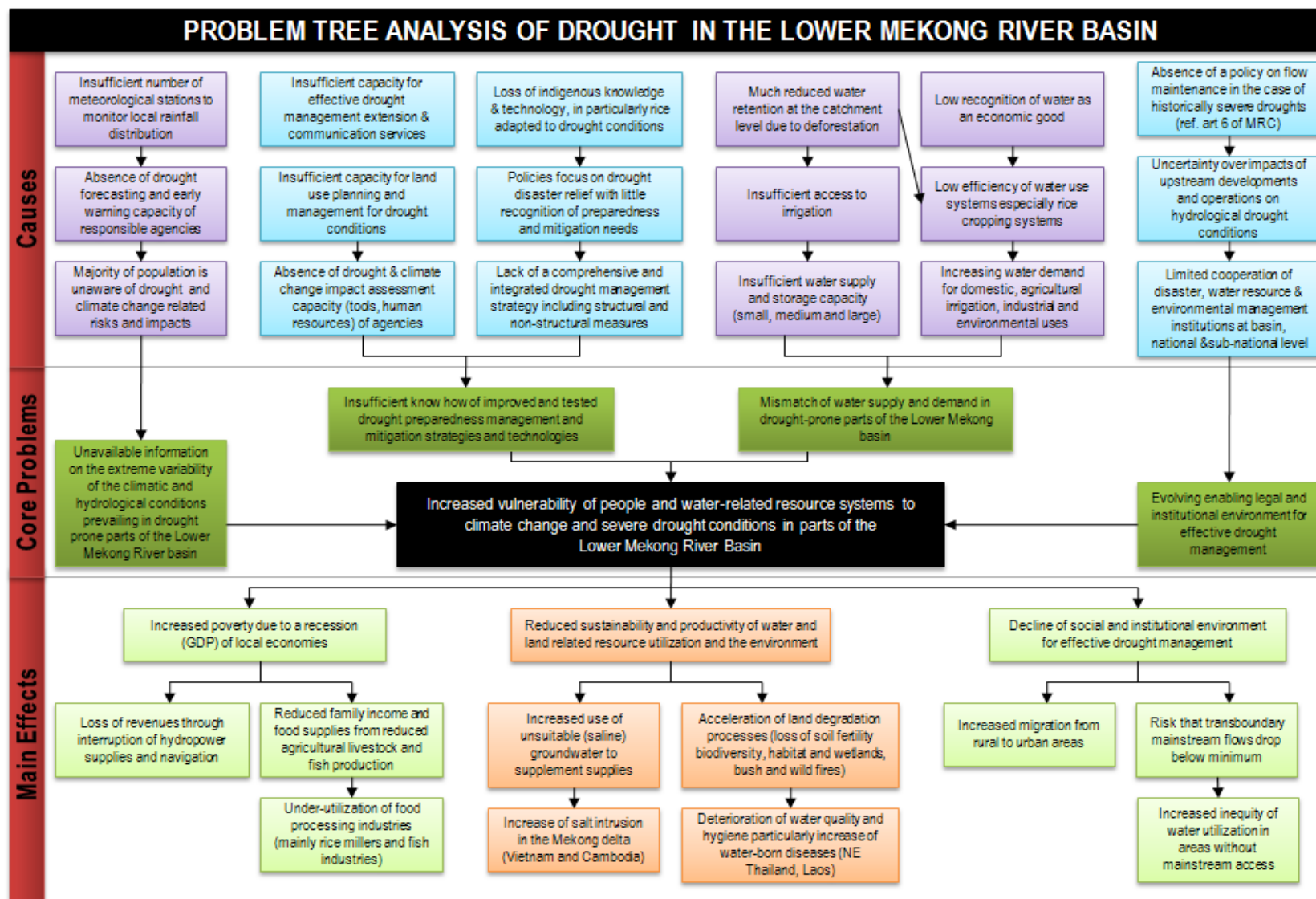
Problem 5: Weak institutional, organisational and financial capacity for effective drought management

Despite considerable progress made in the field of emergency response at the international level, and at national levels by MRC Member Countries, drought management is constrained by somewhat incomplete institutional, organisational and financial capacities at the basin, sub-basin, national and sub-national levels.

Article 6 of the 1995 Mekong Agreement makes an explicit exception for the maintenance of flow procedures *in the case of historically severe droughts and floods*. In spite of this exception, the MRC Member Countries need to overcome the lack of common regional strategy and policy on drought management in such a case.

There is also a considerable level of uncertainty with regards to possible impact of upstream developments and operations in the Upper Mekong, and other critical upper catchments on drought conditions elsewhere in the Basin.

Figure 1.6 Drought problem tree analysis.



1.3.2 Main Effects

Based on the analysis of problems and main causes, three main areas were identified to be affected by the core problem:

- Decline in social and institutional stability in affected riparian populations, as poverty and vulnerability inevitably go hand in hand. The poor are usually more susceptible to disease, are generally more exposed to natural hazards such as droughts, and are less likely to have resources to recover from economic and material loss;
- Reduced sustainability and productivity of the environment and water and land-related resource utilisation; and
- Increased poverty due to the decline in local economies.

Agriculture and other water sectors contribute a large portion to the GDP of the MRC Member Countries, and provide income and nutrition (protein) to local communities. Immediate effects of droughts are the reduction in family incomes and food supplies from declining agricultural, livestock and fish production. Since commercial farming and food-processing industries (rice millers and fish industries) are a part of the chain, their facilities are also likely to be under-utilised. Droughts impose severe negative socio-economic implications for vulnerable groups, and more people are likely to fall below the poverty line.

Droughts incur high agricultural production costs, as the price of water for irrigation increases with water shortages, as observed in Northeastern Thailand during 2004-2005 and 2010 droughts.

Another important immediate economic effect of drought relating to water supply systems is the loss of revenues from interruptions to navigation and hydropower generation. Droughts also reduce sustainability and productivity of water- and land-related resources and the environment. These losses are manifested through accelerated land degradation processes such as decline in soil fertility, biodiversity, habitat and wetlands.

Another major concern is the deterioration of water quality and hygiene in drought prone areas. Increased utilisation of unsuitable and potentially contaminated groundwater can be identified as a drought coping strategy by people, in order to ensure survival. In areas where the groundwater is saline, drought implies increased soil salinity and a loss of productivity and crop fertility.

Saline intrusion is a major adverse effect of drought - especially under advanced hydrological drought conditions in the Mekong Delta. The national drought study reports that drought is a threat to extremely vulnerable acid sulphate soils in the Mekong Delta. Their subsoil contains acids, which, if present in the top layers, would cause significant damage to fertility. As long as moisture is maintained in the top layer, this is not a serious threat. However, as soon as water is depleted from the top layer by evaporation, the direction of water movement in the sub-soil changes upwards surfacing the acids, which result in a rapid soil acidification and degradation process.

Finally, a decline of social and institutional stability of the riparian population, namely those who interface with water resources in drought-prone areas and beyond, is another effect of the core problem. An example from north-eastern Thailand may illustrate the dimension: many people from this region migrate to urban centres and coastal areas in search of

employment. During the dry season they frequently return and engage in irrigated rice production and other enterprises in order to supplement their limited incomes. Under drought conditions many people will stay away from the affected provinces and try to survive where they are. Others may leave the north-eastern region in the hope of finding employment, income and food elsewhere, often with little or no success.

1.4 Management of Drought in the Lower Mekong Basin

1.4.1 Regional Concern and Policy Responses

In response to the 2004-2005, the MRC Council set a priority in the 2006-2010 Strategic Plan in the establishment of a DMP as part of the MRC programme portfolio. The DMP was considered as a realistic and strategic MRC response to concerns over severe social, environmental and economic damages caused by frequent severe droughts in LMB.

In pursuant to the above-mentioned Strategic Plan, the DMP formulation in 2006 and 2007 produced the following two documents:

1. MRC DMP Strategic Framework: Description of a cohesive and coordinated overall strategic framework for a DMP at the MRC. A *working consensus* on the content of this strategic framework was reached at the Regional Validation Workshop (October 2006). This included an agreement on seven *guiding principles* for regional coordination and cooperation in drought management. Based on suggestions and recommendations from that workshop, the document was further revised and issued as a draft dated 27th October 2007; and
2. DMP Document: Describing a DMP for the MRC, including its objectives and outputs, required expertise and estimated budgets. It is intended that this document provides sufficient content and detail to be used as a basis for engaging prospective MRC development partners and other partners interested in providing funding for the DMP. An initial draft was presented at the Regional Validation Workshop in October 2006, following which extensive revisions were made, and internal reviews were conducted by the MRCS. The Council, at its 13th Meeting in December 2006, approved in principle the DMP document for sharing with Development Partners for fundraising purposes on the basis of the MRC DMP Strategic Framework.

A regional meeting held on 26-27 February, 2007 discussed the DMP and provided further comments and suggestions, which were presented in a draft version, dated 23rd March 2007. The MRC JC at its 26th Meeting in August 2007 instructed the Secretariat to review and revise the DMP, in order to make the proposal more streamlined and justified to the Development Partners. In response to this request, the Technical Support Division (MRC TSD) with financial support from the Information and Knowledge Management Programme (MRC IKMP) carried out a short consultancy work to review and revise the programme in early 2008 in close consultation with all relevant MRC programmes.

As an outcome of that work, a three-year DMP Start-up Project proposal was drafted. The Start-up Project was to be executed by the MRC DMP team with a limited budget. Start-up activities included regional drought forecasting and warning, climate variability and changes, drought and flood vulnerability, drought management policy, trans-boundary impacts of land use changes, water harvesting, soil and water conservation practices, irrigation efficiency improvement, and assessment of drought impacts. The DMP Start-up

Project activities were also expected to contribute to the MRC Basin Development Plan (BDP). The implementation of these interventions would have mitigated the negative socio-economic impacts of regional droughts in the LMB, -benefiting the most vulnerable people.

The Proposal for initial drought management activities was drafted at the request of the MRC Joint Committee (JC) at its 28th Meeting in August 2008. In anticipation of Development Partners' funding opportunities, the JC approved re-allocation of financial resources from the MRC Administrative Reserve Fund (MRC ARF) for the Initial Drought Management Project activities. The JC also requested the Secretariat to use in-house experts and support from National Line Agencies to start priority activities such as drought risk mapping.

With a limited budget available from the MRC ARF, the Initial Drought Management Project officially started in February 2010 for a period of one year. The most immediate key result included drought risk and impact assessment, analysis and mapping of the vulnerable areas in the LMB. The focus was on collection, collation and analysis of national data, information and knowledge on drought management, and ensuring that outcomes were relevant and useful to the MRC Member Countries and Mekong communities.

The regional response to drought vulnerability issues summarised above highlights the value-added of the MRC - i.e. enabling a regional approach achieved through cooperation amongst the Member Countries. At the first MRC Summit held in April 2010, the Heads of Government of the four Member Countries gathered together to discuss issues of mutual interest, and reaffirm their political commitment to the principles and implementation of the 1995 Mekong Agreement. Sustainable management of Basin water resources was highlighted as crucial to the economic and social well-being of the riparian population and to the poverty alleviation efforts of the Governments of MRB countries, especially under accelerated development of water and related resources and challenges posed by climate change. One of the nine priority areas of action were identified by the Heads of Government in the Summit Declaration as the focus of the MRC in the coming years is related to drought and other disasters:

*“2. Intensifying efforts to effectively manage the risks from flood, **drought** and sea level rise including establishment of forecasting and warning systems across the whole basin”.*

The recently adopted 2011-2015 MRC Strategic Plan clearly defines the underlying principles of sustainable development shared by all Member Countries including pro-poor development, environment protection, climate change, and flood and drought disaster management.

1.4.2 Past Regional Technical Responses – Opportunities and Threats

Some scientific research has been carried out at the national level to measure and assess impacts, and to identify the most effective way to monitor the movement of drought conditions. Nevertheless, no proper mitigation mechanism nor appropriate monitoring and forecasting system have been designed due to the complexity of the problem. In this respect, regional coordination and assistance from MRCS is considered crucial to the enhancement of basin-wide assessment and understanding of drought vulnerability and impacts of climate change, and to support MRC Member Countries in reducing drought and climate change risk to vulnerable populations, especially farmers living in the LMB region.

Drought Projection and Monitoring

A suitable procedure for hydrological dry season flow forecasting has already been developed within the MRC, which may be applicable as a basis for a systematic monitoring system. In August 2005, the MRC finalised a study on drought forecasting and management (Adamson, 2005) which presented a scientific basis for a statistically-based forecasting methodology for hydrological drought onset, specifically for critically deficient dry season flows on the mainstream.

This innovative methodology is based on *seasonal flow pattern recognition* using statistical measures of the flood season hydrograph and linking them with the magnitude and pattern of flows in the following dry season, starting in December of each year. The parameters of the current flood season hydrograph are evaluated in November and matched with the nearest historical set. The corresponding subsequent historical dry season was then used as the forecasting model. The method permits the projection of hydrological drought of 30, 60 and 90 day minimum flows with some level of accuracy. However, there is limited experience, information and tools for projection and monitoring of meteorological, agricultural and socio-economic droughts.

There are some key hydrological and meteorological stations along the Mekong mainstream, and some key catchments in Thailand and Viet Nam. However, there are only a few stations in key catchments of Lao PDR and Cambodia, and to some extent in Viet Nam.

Drought impact assessment

The Integrated Basin Flow Management (IBFM) flow assessment framework put into place by the MRCS provides some useful starting points for drought (i.e. low flow only) impact assessments. However, social impact assessments are also complex, involving consideration of factors such as population growth, migration trends, urbanisation, changes in land use, government policies, water use trends, diversity of economic activities, cultural compositions and so forth. Such tools and know-how for identification and classification of droughts, which are also complex, are not readily available in the LMB. It is done elsewhere through the application of drought indicators which integrate a variety of physical, environmental, and climatic variables to produce useful numerical drought *indices*. Development of appropriate drought indices acceptable for application in all Member Countries in the Mekong Basin are required in order to facilitate regional collaboration and harmonisation in mitigating negative impacts of drought.

The main outcomes of the Initial Drought Management Project to date were a provision of a knowledge base for implementing the DMP once funding is secured. A number of National and Regional consultation meetings were carried out with National Mekong Committees (NMCs) and relevant line agencies. The main impacts of drought occurring in each MRC Member Country were broadly discussed and a broad range of drought-related problems were identified and recognised, including trans-boundary water management issues which need to be coordinated at the regional level. Critical drought prone areas of the LMB have been identified and mapped out for further action.

In addition to the national study on drought mapping and analysis by the countries, drought hazard, vulnerability index, and risk index maps using remote sensing data, integrating precipitation, vegetation conditions, socioeconomics and condition of access to water resources were analysed and mapped. In addition to the indicator thresholds, drought monitoring on meteorological and agricultural indices in Standardised Precipitation Index

(SPI) and Normalised Difference Vegetation Index (NDVI) were estimated, and regarded as preliminary results of the drought monitoring work. Monthly SPI values and 16-day composite of NDVI deviation were estimated to detect precipitation and vegetation condition change anomalies. The scope of work was anticipated to be further carried out by the DMP 2011-2015.

A very significant achievement of the Initial DMP Project was the development of threshold values for some drought indicators, including monthly precipitation baseline values, which define the level of vulnerability in terms of rainfall deficit, and monthly vegetation condition threshold values for agricultural production. The Initial DMP Project made use of the outputs from other programmes such as hydrological indicators consisting of baseline values of discharge volumes and water levels of the mainstream from the IKMP, as well as threshold values for soil moisture and air temperature from the EP.

1.5 Cross Cutting Issues analysis

The 2011-2015 MRC Strategic Plan clearly defines the underlying principles of sustainable development shared by all Member Countries including pro-poor development, environmental protection, climate change, closing development and capacity gaps, and stakeholder engagement and gender mainstreaming; most of them are of cross-cutting nature.

1.5.1 Climate Change, Drought and Integrated Water Resources Management

In general risks of drought are increasing as a result of climate change, which is partly caused by modern industrialisation inevitable for economic growth of countries. According to the Intergovernmental Panel on Climate Change (IPCC), the region is likely to experience the upper extremes of the climate scenarios forecast. Through the MRC Climate Change and Adaptation Initiative (CCAI) and other initiatives, global climate change impacts on the Mekong waters and related resources, as well as socio-economic impacts are assessed. The preliminary climate change downscaling method conducted by the MRC predicted that the mean annual average temperature will increase 0.9°C, 0.7°C and 0.7°C for the UMB, LMB and the entire Mekong Basin respectively. The highest temperature increase will be in the uppermost part of the UMB. The increase will be less in the LMB but slightly higher in the lower part of the LMB and the Delta (MRC Technical Paper No. 29, 2010b).

Droughts are expected to become more frequent and severe, with increasing demands, limited and uncertain supplies, and effects of climate change and climate variability. The most obvious evidence of drought phenomenon is that rainfall deficiency and higher temperatures intensify drought in the Mekong Region substantially. Rainfall projections vary, though an increase in the annual regional mean is generally anticipated, the consensus figure lying between 10 and 15%. These average estimates however hide the increased intensity and frequency of extreme events, not least the frequency and severity of typhoons and severe tropical storms on the one hand and an increase in the incidence and severity of drought conditions. In addition sea level rise of up to one metre by 2100 will cause widespread inundation and increase salinity intrusion in the Mekong Delta.

More intensive drought occurrence will be a major consequence of climate change, and thereby intensify the need for adaptation and mitigation activities. Changes in the hydrological regime will also result from more direct human-induced change such as construction of a significant number of hydropower projects, including those in China, on the tributaries of the LMB and, potentially, on the mainstream of the LMB. In tributary rivers, any diversion for irrigation could potentially intensify drought conditions downstream if safeguards for minimum flows are not developed.

Faced with these challenges, decision makers need information to help prepare for droughts, allocate resources effectively, and reduce impacts. Drought preparedness planning is considered an essential component of climate change adaptation and integrated water resources management (IWRM). The likely impact of possible future climate change on drought behaviour and risk in the LMB will be assessed under DMP 2011-2015 with special reference to tools and capacity to assess such a likely impact and to plan for and implement drought mitigation and management.

1.5.2 Poverty and Sustainable Livelihood

The MRC Member Countries, especially Thailand and Viet Nam, have made significant progress in achieving the Millennium Development Goals (MDGs); however, poverty and food security issues are still widespread in many parts of the region, and the gap between the rich and the poor remains wide. Severe impacts of natural disasters, particularly those caused by flood and drought in the LMB remains a significant factor affecting agricultural productivity and livelihoods of rural farmers (MRC 2011-2015 Strategic Plan). Many parts of the LMB are potentially at risk due to climate variability and unsustainable management of the river. The poor population that depend on local fisheries and subsistence livelihoods remain the most vulnerable. Technical and financial capacities are also distributed unevenly between the countries. Water in the Mekong River currently serves an economic or social purpose, and therefore, shifting water uses to other activities will inevitably affect current users.

Governments of LMB countries have targeted “poverty reduction strategies” within national socio-economic and sector development plans, all of which include the development of water resources. At the same time, countries realise that the need to develop water resources to achieve benefits for rural people must be balanced with the existing needs of the poor, who depend heavily on the river’s fisheries and water resources for agriculture and aquaculture cultivation purposes.

DMP as per definition has strong pro-poor impacts:

- Poor people are the most adversely affected by drought conditions, as they usually live in the most drought prone areas. Appropriate drought management is translated into effective management outcomes that directly benefit vulnerable communities;
- Poor do not get easily compensated for their drought losses as there are no mechanisms to help poor drought victims to recover from losses as quickly as possible;
- Drought mitigation and adaptation measures and emergency drought management capacity strengthening address poverty alleviation issues directly. Reliable and timely information on drought and its impacts may indirectly contribute to poverty reduction; and
- Elderly people, women and children are the most vulnerable groups in society. Effective drought projection and monitoring, and strengthening of drought mitigation and adaptation capacities will reduce their vulnerability.

The MRC 2011-2015 Strategic Plan reiterates that floods and droughts in the LMB have major economic and social consequences. Droughts, unlike floods, have no clear benefit to the Basin’s population. Although droughts do not cause physical damage to community

infrastructure or assets, their direct costs include the loss of crops and reduced yields of livestock and fisheries. As climate change is expected to increase the risk of extreme weather events such as droughts and extended rainfall periods, people's vulnerability to poverty and food insecurity will also increase.

1.5.3 Gender Equality

Female-headed households are often the poorest and most vulnerable. The MRC Gender Policy and Strategy aims to mainstream gender perspectives in all of MRC's development efforts, ensuring that all MRC programmes benefit women and men equally, and ensuring equal participation of men and women at all levels.

Men and women who are equal partners of the society play equally important roles in the DMP process. However, roles of women in drought management and mitigation in the Mekong Basin are different from country to country, and from place to place. There is a strong role for women to play in household and community decision-making in drought management. Gender issues are highly relevant and are considered directly in at least two main fields; land use management, and drought mitigation and adaptation. Women play very effective roles in disseminating information and motivating communities to take preventive actions before, during and after drought events. It is also necessary to consider gender sensitivity during relief and rehabilitation.

Equal opportunities for women in institutional and technical components of the DMP need much more attention, in line with the MRC Gender Policy. Women need to be encouraged to choose and participate in information processing and related activities in the DMP, as well as in the Member Countries.

Gender equality is an integral part of DMP 2011-2015.

1.5.4 Engagement and Transparency

Environmental engagement and transparency defines the manner in which people involve in and exercise decision making, implementation and monitoring of natural resources development activities. The flow of information and data, institutional capacity, and transparent decision making involving all relevant stakeholders have been identified as key indicators of enhanced trans-boundary environmental governance (2011-2015 MRC Strategic Plan). These key issues are being addressed in DMP 2011-2015, as well as within the broader MRC Public Participation Policy. Stakeholder engagement and information flow will be incorporated during the implementation of DMP 2011-2015.

The programme will work closely with other MRC programmes such as IKMP and FMMP to ensure that the capacity building strategy of the Drought Management Programme will be integrated into the MRC's capacity building programme and be in line with similar activities of other MRC programmes. Technical services of drought projection and monitoring as well as management capacity will be delivered to national agencies and institutions which are directly or indirectly responsible for drought mitigation and management.

1.6 Objective Analysis

The overall long-term development objective of the DMP, defined during programme formulation, is to support the MRC Member Countries in achieving balanced development and equitable utilisation of Basin water and related resources with medium to long-term impacts on poverty alleviation and environmental sustainability. This objective highlights

the MRC unique capability- i.e. enabling a regional approach achieved through cooperation amongst the Member States in the Lower Mekong Basin. The vision for sustainable development of the Mekong River Basin clearly prescribed in the MRC Strategic Plan (2011-2015), the MRC State of the Basin Report (2010), and as embodied in the 1995 Mekong Agreement.

The DMP 2011-2015 will strategically provide MRC Member Countries with technical support for effective use of the Mekong River's water and related resources to reduce the vulnerability of people and water-related resource systems to severe drought conditions. The programme will work with Member Countries' NMCs and national line agencies to provide knowledge-based operational services and technical assistance on drought preparedness, drought awareness, and management strategy in order to mitigate impacts of drought on livelihoods of vulnerable people in the region.

The DMP goals and objectives are detailed in Section 3.0

2.0 JUSTIFICATION

2.1 Regional Relevance

Considering climate-related challenges foreseen for the Mekong Region, the MRC DMP will play a critical role in facilitating poverty alleviation and environmental sustainability. By integrating with other MRC programmes, the DMP will support policy makers and communities in Member Countries develop and implement drought management policies and strategies to ensure impact alleviation, enhance disaster awareness and preparedness, and increase agricultural incomes through a proper water allocation planning against drought events.

According to the analysis, the basin-wide justifications for regional intervention through the MRC DMP can be summarised as follows:

1. The Mekong River Basin covers Cambodia, China, Lao PDR, Myanmar, Thailand and Viet Nam. These four countries are parties to the “Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin” and are members of the Mekong River Commission (MRC). They are all members of the ASEAN, Greater Mekong Sub-region (GMS) and other relevant international organisations, including the United Nations Convention to Combat Desertification (UNCCD). The MRC has formal agreements for cooperation with a range of regional and international organisations, and holds official dialogue with two other states of the Mekong River Basin, China and Myanmar.
2. Trans-boundary impacts of hydrological, meteorological, agricultural and economic droughts are considered an important area of cooperation between the MRC Member Countries. Increasing technical cooperation between the Member Countries and Dialogue Partners (China and Myanmar) is considered extremely relevant for drought management and mitigation at the various levels.
3. Regional disaster vulnerability mitigation and management efforts are not new to the LMB, and measures to mitigate negative socio-economic impacts have been frequently considered under the work of the MRC and its predecessors. Existing regional knowledge platforms and tools for flood forecasting and river monitoring and over half a century of data and information collection and management can be further expanded to serve MRC Member Countries in their efforts to reduce drought vulnerability.
4. MRC has been developing a platform for sharing key hydrological and meteorological data with upstream country, China. This regional platform is important for monitoring meteorological and hydrological conditions such as changes in precipitation, snow melt and flow releases from reservoirs upstream.
5. Drought develops insidiously, and can inflict millions of dollars of damage throughout LMB in a single drought year. No region or sector is immune to drought impacts, which can linger for years after the drought event. To prepare for droughts and respond more effectively, the MRC and its Member Countries need a comprehensive regional program on drought to provide

advance warning of drought events, monitor and assess drought conditions, develop drought plans, and enable decision-makers to reduce the risks and damages of droughts.

6. The causality and nature of drought vulnerability are both local and transboundary, and requires strong synergies between local, regional, and national strategies. It is also clear that economic growth in the region will continue at a rapid pace, and this development will exert strong pressure on the water system and its current users. Thus, management of the Mekong River requires addressing cross-border, as well as cross-sectoral challenges through proper integrated water resources planning or a stand-alone drought vulnerability mitigation plan that can be adapted at any level of government.
7. New opportunities are available for improved drought management and mitigation. The MRC is already pursuing such opportunities with its recently implemented real-time water level monitoring (covering both its Member Countries and Yunnan), and the initial DMP Project activities. The most immediate key result of these efforts include drought risk and impact assessment, and analysis and mapping of vulnerable areas in the LMB, which are relevant and useful to the Member Countries and Mekong communities. The sense of ownership in the initial DMP Project in particular, and the DMP in general, demonstrated by the MRC Member Countries shows regional relevance of the DMP.
8. Each of the four LMB countries has different levels of drought management capacities. As members of the MRC, they have made a commitment to share information with, learn lessons from and support each other. Hence, the MRC is well-positioned to establish and sustain regional framework and networks to develop joint drought adaptation and mitigation strategies and capacity development programs with special emphasis on agriculture, fisheries and energy. The MRC will build on advanced capacities and experience from Thailand and Viet Nam to draft appropriate drought management strategies for the region.

The Member Countries' decision to use their Administrative Reserve Fund (ARF) for implementing the Initial Drought Management Project further confirmed their strong commitment to drought management in the region. There has been discussion in the Southeast Asian region about the need for a regional centre for drought disaster management and mitigation. It reflects a growing recognition of the role of regional mechanisms for managing droughts.

The DMP highlights the value-added of the MRC – i.e. enabling a regional approach achieved through cooperation amongst the MRC Member Countries, establishing effective drought planning and management mechanisms in the LMB supported by best available tools and know-how, and facilitating the implementation of high priority programmes and multi-purposes projects. With additional financial and technical assistance, the MRC is well-positioned to support the Member Countries realise their aspirations and commitment to sustainable management of the Basin's water resources as a crucial condition for poverty alleviation, particularly under accelerated development of water and related resources and increasing challenges posed by climate change.

2.2 Stakeholder Analysis

The ultimate beneficiaries of the DMP 2011-2015 will be the vulnerable people, especially farmers who are directly affected by drought events. The implementation outcomes will also benefit national authorities and decision makers of the four MRC Member Countries who are engaged directly in policy making on drought management and mitigation.

Table 2.1 Target beneficiaries.

Target Beneficiaries	Justification	Potential benefits
Poor people, with special reference to most vulnerable, women and children	Fulfil national development priorities to alleviate poverty, address gender gaps, improve living standards, contribute to political harmony, and fulfil priorities of development partners.	Raised living standards and improved health, particularly for the poor and disadvantaged.
Line Agencies	Identification of capacity development needs and build capacity to apply and mainstream drought management mechanisms into the planning processes at various levels.	Capacity built and technical capabilities used in planning and implementation of national policies related to drought management.
National Drought Management Agencies and Centres	Identification of capacity development needs and build capacity to improve drought forecasting, monitoring, and response to minimise drought vulnerability.	Capacity built and technical capabilities used to improve national drought forecasting, monitoring, assessment and information dissemination. Improved drought forecasting, monitoring, assessment and timely response to drought impacts, contributing to reduction in crop losses and economic losses, and raised living standards and improved health.
Research and planning institutions	Identification of capacity development needs and build capacity for applying and mainstreaming drought management knowledge into curricula of these institutes.	Capacity built and IWRM experiences included in the curriculum.
NMCs	Development of capacity of the national entities to coordinate and implement drought management activities.	Strengthened coordination and management capabilities, especially between MRC programmes at national levels.
National Decision Makers	Decision making process requires clear insight into the importance of knowledge-based drought management.	Provision of drought monitoring and assessment for drought mitigation decisions. Sector policies and programmes include drought management, and therefore are better aligned with requirements for sustainable development.

The main stakeholders/beneficiaries will be:

- The ministries responsible for water resource management i.e. Ministry of Water Resources and Meteorology (MOWRAM) in Cambodia, and the Ministry of Natural Resources and Environment (MONRE or MNRE) in Lao PDR, Thailand and Viet Nam;
- National authorities responsible for Disaster Management i.e. National Committee for Disaster Management (NCDM) and National Red Cross in Cambodia, National Disaster Management Office in Lao PDR, and Department of Natural Disaster in Thailand;
- National and international NGOs in the LMB region working on climate change adaptation issues;
- National Mekong Committees which are tasked by their respective governments to coordinate between all agencies and stakeholders in the four LMB countries;
- Sector agencies requested to integrate drought management issues in planning and implementation of all development policies and activities; and
- Local government authorities and local communities in drought prone areas.

Table 2.2 Potential key stakeholders/beneficiaries in DMP 2011-2015.

Management Level and Strategy	Coordination or Management Body	Roles/Interest	Partner, Supporting or Implementing Bodies.
Basin Scale: IWRM-based Basin Development Strategy	MRC	Guides water-related development and management in the LMB.	National water resources management agencies; Agencies for Agriculture and fisheries, and NMCs
National: National IWRM Strategy (linked to basin scale strategy)	MOWRAM MONRE MNRE MONRE	Plans actions to achieve national development objectives, follows an IWRM approach, taking into account of the basin scale strategy.	Sector agencies, Disaster Management Agencies, private and non-government stakeholders
National Disaster Management	NCDM, National Red Cross; Disaster Management Office Department of Natural Disaster	Coordinate national level disaster management activities.	Sector agencies, Disaster Management Agencies, private and non-government stakeholders
Sub-basin or hot spot: pilot sites	River Basin Organisations Province level coordinating mechanism Relevant local authority.	Plans actions for local level assessment and mitigation strategies	National sector agencies (province and district level)
Watershed: Watershed Plan of Action	Watershed Committees	Provides information for sub-basin level plans	Districts and Commune Agencies, local communities.

The Programme promotes the participation of stakeholders at all levels in accordance with the MRC Stakeholder Participation and Communication and Disclosure Policies. Stakeholder opinions and inputs become very important when new development scenarios and proposed mitigation measures could affect environmental and socio-economic issues positively or negatively, particularly when poorer communities in the basin are the main groups that suffer.

New approaches to stakeholder participation and consultation are also being developed in all four LMB countries. Each country has its own systems, approaches and cultures relating to community or mass participation. These must be respected and integrated into a coherent and structured stakeholder participation policy and a set of processes for DMP implementation.

2.3 RELATION TO MRC MANDATE AND STRATEGY

2.3.1 Relation to the 1995 Agreement

The 1995 “Mekong Agreement on the Cooperation for Sustainable Development of the Mekong River Basin” (MA95) outlines the legal mandate of the Mekong River Commission. The Member Countries, by signing the Agreement, committed

‘to cooperate in all fields of sustainable development, utilisation, management and conservation of the water and related resources of the Mekong River Basin...In a manner to optimise the multiple-use and mutual benefits of all riparians and to minimise the harmful effects that might result from natural occurrences and man-made activities’.

Under this Agreement, the MRC was created as the institutional framework for cooperation in the LMB, and to extend cooperation with upstream Dialogue Partners, China and Myanmar.

The scope of MRC’s work is defined in the first three articles of the Mekong Agreement, which outline areas of cooperation related to coordinated and/or joint planning for balanced and socially just development in the MRB, and which oblige the signatories to protect the environment and maintain the ecological balance of the MRB.

Ultimately, the objective of cooperation among Member Countries is to promote optimal and well-balanced development of the Basin, while ensuring the equitable sharing of benefits among all users of Basin water and related resources, preventing any harmful effects from hindering the continued functioning of the Mekong River systems, and ensuring the continuation of multi-generational benefits that the Mekong River brings to all its people (Article 1, MA95).

Thus, mitigation of harmful effects from ‘natural’ drought risk and any ‘man-made’ activities that increase drought risk sit squarely on the MRC’s agenda of ‘cooperation’.

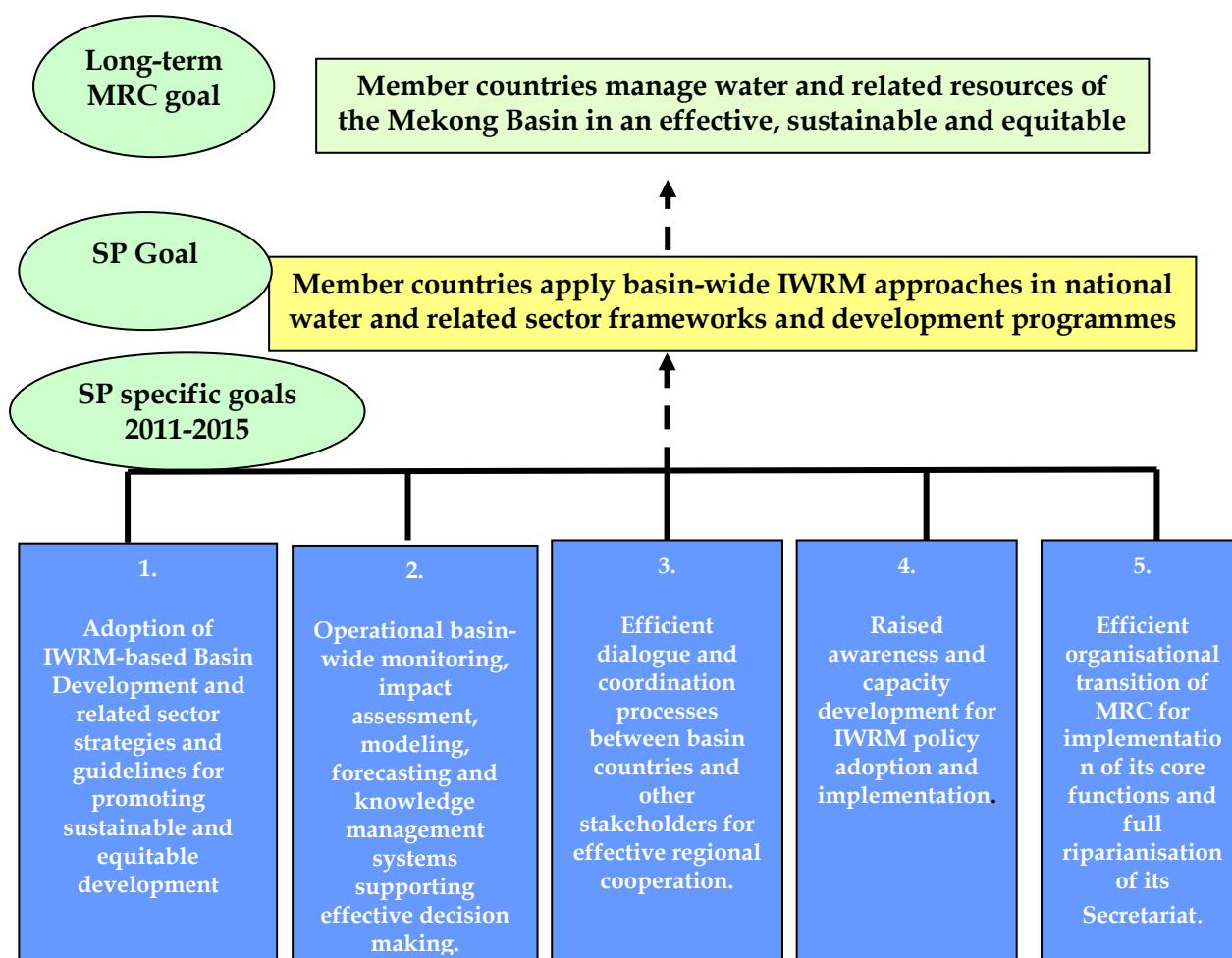
2.3.2 Relation to the Strategic Plan 2011-2015

The 2011-2015 Strategic Plan was approved by the MRC Council on January 26, 2011. This Strategic Plan not only has the consensus of the MRC Member Countries but also reflects, to the greatest extent possible, feedback received from its stakeholders, on key challenges and opportunities facing the MRB and collective actions needed to address these challenges and capitalise on opportunities.

The vision of the four Member Countries of MRC is “an economically prosperous, socially just and environmentally sound Mekong River Basin”. The expected achievements at the basin scale with regards to economic prosperity, environmental sustainability and socially just development. Based on the Basin Vision, it is clear that a drought management programme is essential to ensure the achievement of goals and objectives stated under the MRC’s Vision and Mission.

Given these overall goals, the current situation of the MRB, its environmental and socio-economic status, development plans and institutional perspectives, five specific goals were formulated for the 2011-2015 period as shown in Figure 2.1.

Figure 2.1 The Goals of the MRC Strategic Plan 2011-2015.



The Strategic Plan underlines a grave concern about predicted changes in precipitation and temperature and their impacts on the Mekong River flows, e.g. increased flows in the wet season will heighten the risk of flooding, and longer dry seasons may increase the frequency and severity of droughts, sea-level rise and salt water intrusion. Intensification of floods and droughts in the LMB has major economic and social consequences. Droughts are expected to increase people’s vulnerability to poverty and food insecurity. Droughts, unlike floods, have no clear benefit to the Basin’s population. Their direct costs include the loss of crops and reduced yields of livestock and fisheries.

The Strategic Plan underlines the importance of DMP as follows:

“Although as yet under-funded, the Drought Management Programme (DMP) has taken on a new priority as the LMB recently experienced severe drought conditions and their consequences which have drawn considerable public response. Drought is also a trans-boundary water management issue.

The long-term objective of the Programme is to promote more effective use of the Mekong water and related resources to reduce vulnerability of people and water related resource systems to severe drought conditions.

The DMP Start-up Project (2011-2015) has an immediate objective of establishing effective drought awareness, preparedness, planning and management mechanisms in the LMB supported by the best available tools and know-how, and facilitate implementation of high priority national and regional programmes, and multi-purpose projects.

To achieve this objective, DMP will coordinate its activities largely with AIP, CCAI, IKMP, FMMP, ISH, and M-IWRMP.”²

The Strategic Plan further notes that water availability will be a critical factor in determining how water is shared and managed for different uses, ranging from subsistence livelihoods and ecosystem services to large-scale development purposes such as irrigated agriculture and hydropower development. It envisages both structural and non-structural measures for reducing the risk of droughts in the LMB, such as the provision of irrigation, local storage and conjunctive use of groundwater with surface water, as well as drought forecasting and early warning, impact assessment, management policy and capacity building in future risk management in the LMB.

The 2011-2015 Strategic Plan defines MRC Core Functions. The 2nd MRC Core Function, River Basin Management (RBM), is crucial for drought management, with special reference to Item 1 under RBM, “Data acquisition, exchange and monitoring”; and Item 4, “Forecasting, Warning and Emergency Response”. Other RBM sub-functions are also important for drought management. Drought management can potentially contribute to and support the analysis, modelling and assessment, planning, and implementing MRC Procedures, promoting dialogue and communication; and reporting and information dissemination.

The core functions clearly refer to regional and trans-boundary activities, with special reference to capacity building, consulting and advisory services. The 3rd MRC core function - Capacity Building and Tools Development - is broad-based and relevant for all MRC programmes vis-à-vis the MRC Member Countries, line agencies, national centres, disaster management agencies etc. These Core functions have major consequences for the formulation of core and other functions of the DMP 2011-2015.

² MRC Integrated Capacity Building Programme (ICBP) will also play very active role in the integrated drought risk management capacity need assessment and capacity development activities.

Table 2.3 Summary of the description of the core function categories of the MRC.

Categories	Description	Examples of Functions
I. Secretariat Administrative and Management Functions	Routine and recurrent functions of management and administration of the Secretariat and provision of support to MRC governance processes and non-technical processes under the 1995 Mekong Agreement.	<ul style="list-style-type: none"> ▪ Governance of the MRC ▪ Financial and administrative management ▪ Personnel management ▪ International cooperation ▪ Communications
II. River Basin Management Functions	Routine engagement of water resources development and management issues at different scales in the Mekong Basin	<ul style="list-style-type: none"> ▪ Data acquisition, exchange and monitoring ▪ Analysis, modelling and assessment ▪ Planning support ▪ Forecasting, warning and emergency response ▪ Implementing MRC Procedures ▪ Promoting Dialogue and Coordination ▪ Reporting and Dissemination
III. Capacity Building and Tools Development Functions;	Provision of continuous capacity building to the MRCS, NMC Secretariats and line agencies, and maintenance and updating of data holdings, data processing and analysing.	<ul style="list-style-type: none"> ▪ Capacity building for Member Countries and MRCS across all themes ▪ State of the art tool development
IV. Consulting and Advisory Services Functions	Make available the technical expertise, databases, modelling capacities, and expert networks of MRCS to support studies and assessments commissioned by others for sustainable water resources development, both at the programme level, and at the basin wide and cumulative level.	<ul style="list-style-type: none"> ▪ Consulting services ▪ Commissioned studies ▪ Expert advice

Source: MRC Strategic Plan for 2011-2015.

2.4 Regional and National Priorities

MRC Member Countries all engaged in drought and flood management and mitigation through their national line agencies and disaster management organisations at different levels of the government. Each of the MRC Member Countries has its legal frameworks, has dedicated national policies and strategies on disaster management and mitigation. However, Member Countries are clearly at different levels of development, and therefore, have: i) relatively low capacities in data collection and processing systems and capabilities to deal with various integrated drought management steps; ii) hydrological and meteorological services for drought management purposes are at early stages of development in most MRC Member Countries, iii) drought forecasting tools are almost non-existent in some Member Countries, and iv) no coordinated/integrated policies and procedures for drought monitoring, warning, preparedness, emergency response and rehabilitation.

Awareness of drought risk assessment and management is different and the embedding of drought risk management principles in various planning processes also varies greatly. Structure and effectiveness of communication between different sectors and levels of government varies as well.

National priorities in drought management and mitigation are clearly expressed in the MRC Hua Hin Declaration (April 5, 2010) by the Heads of Governments of the MRC Member Countries. They have committed themselves to

“cooperate further to tackle critical emerging challenges in the Mekong Basin that include: reducing the loss of life and assets at risk from flooding and loss of livelihoods from drought conditions; and better integrating sustainability considerations into the development of the Basin’s significant hydropower potential; ensuring effective management of water for agricultural production, particularly as part of drought management strategies; preparing for climate change adaptation measures to minimise poverty and food insecurity among vulnerable communities; minimising any deterioration of water quality, loss of wetlands and deforestation, which present risks to biodiversity and peoples’ livelihoods; better managing the Basin’s unique natural fisheries; and reducing the risks associated with expansion of river transport”.

Member Countries are working to improve flood and low flow monitoring, not only on the mainstream Mekong River, but also in key tributaries and remote sub-basins. Extension of the monitoring network, especially in Lao PDR and Cambodia, is considered extremely relevant.

Under this context, it is not surprising that the MRC Member Countries strongly support the follow-up and consolidation of activities launched by the Initial DMP Project 2010 under the DMP 2011-2015. Commitment of key stakeholders in Member Countries is expressed through their active participation in the development of the DMP, and concrete decisions and actions by the Heads of Governments, and the MRC Council and Joint Committee. The sense of ownership in the initial DMP Project in particular, and the DMP in general, by the MRC Member Countries shows the regional relevance of the DMP.

MRC Member Countries have committed to contribute in-kind human resources, data and information, office facilities and high-quality coordination to the programme, and to scale up national contributions to the MRC operational and technical budgets. The table below summarises key national policies and plans indicating the national priorities in flood and drought vulnerability management and mitigation in all four LMB countries.

Table 2.4 Overview of existing national policies, strategies and plans relating to disaster management in the LMB.

Country	National Water Policy and Strategy	National Disaster Management Plan
Cambodia	National Strategic Development Plan Law on Water Resources Management Strategy for Agriculture and Water National rice policy	Establishment of the National Committee for Disaster Management (NCDM) in 2002 Provincial Committees for Disaster Management in 2007 Royal Cambodian Government, NCDM and MoP launched the strategic National Action Plan for Disaster Risk Reduction 2008–2013 (SNAP-DRR) in 2009 Current: Disaster Management Law has been drafted and is under review by the Ministry of Interior

Country	National Water Policy and Strategy	National Disaster Management Plan
Lao PDR	<p>1996 Law on Water and Water Resources</p> <p>2001 Law on Water and Water Resources implementing decree 204/PM</p> <p>Establishment of Water Resources and Environment Administration (WREA) in 2007</p> <p>In 2010, Draft National Water Resources Strategy and Action Plan 2011 to 2015</p>	<p>Country Programme Action Plan (CPAP) 2007-2011 includes the development of national and local capacities to better prepare for and respond to disasters and for disaster risk management</p> <p>Lao PDR has committed itself to the Hyogo Framework for Action 2005-2015</p> <p>National Disaster Management Committee (NDMC) and its secretariat have the responsibility to develop national and local capacities for disaster risk management</p>
Thailand	<p>Five-year National Economic and Social Development plans:</p> <ul style="list-style-type: none"> ▪ management of natural resources and the environment by enhancing participation of all sectors in society, employing effective, transparent as well as trustworthy regulations, and conducting practical research. 	<p>In 2002, Thailand established the Department of Disaster Prevention and Mitigation under the Ministry of Interior</p> <p>Department of Water Resources initiated the Water Crisis Management Center to provide information on river basins during periods of disaster preparedness and crisis</p> <p>The Centre also acts as the coordinating mechanism among various concerned agencies</p>
Viet Nam	<p>Socio-economic Development Strategy</p> <p>Water Resource Development Plan and Tentative Development Plan (MARD)</p> <p>Agriculture and Rural Development Plan</p>	<p>National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (SRV, November 2007)</p> <p>Mekong River Delta's a 'living with flood' approach for natural disaster prevention, response and mitigation, ensuring safety for sustainable development; and taking initiatives to prevent storm, thunderstorm, whirlwind, salinity intrusion, drought at the same time</p>

2.5 Linkages with MRC programmes

This section provides an assessment of main linkages for the DMP in relation to other MRC programmes. They reflect discussions and views that were expressed in consultations with key MRCS programme staff members.

Agriculture and Irrigation Programme (AIP)

Important linkages and complementarities exist between the MRC's Agriculture and Irrigation Programme (AIP) and the DMP. The AIP promotes cooperative sustainable development and land and water use in support of basin communities, and contributes to poverty alleviation and food security through the improvement of agricultural water and water management. The primary focus of the AIP is on the assessment of water resource related trans-boundary effects of land use changes at the level of catchments. The work assumes that cause and effect relationships are in need of clarification and their impacts on river systems need to be evaluated. A better understanding of *cause-impact chains* would enable the development of management strategies and policy recommendations, in order to maintain a healthy state of the river systems and mitigate adverse impacts accordingly.

In this context, drought is clearly a key problem and the programme's envisaged approach is to develop and use tools and systems that permit up-scaling of agricultural irrigation and land use experiences to formulate policy recommendations at the provincial and/or national level. There is considerable scope for cross-fertilisation between agricultural irrigation and the DMP in fields such as:

- Land suitability and land and water use planning, including socio-economic valuation of the proposed adaptation and mitigation options,
- Evaluation of economic tools such as water saving incentive systems, water pricing and financing systems;
- Improved water demand management – i.e. increasing water use efficiency in agriculture for irrigated and non-irrigated systems at multiple scales such as farm, system and the basin;
- Cropping pattern optimisation, particularly where rice is dominant; economic pricing to discourage water-demanding practices, etc.;
- Mitigation measures - structural and non-structural cost effective methods for reducing negative impacts of drought:
 - Increasing storage and control capacities for surface and groundwater;
 - Improving access to irrigation facilities mainly in the form of medium to small-scale systems (e.g., supplementary irrigation based on water harvesting, conjunctive use of groundwater, and soil water conservation);
 - Improved water reuse, either through groundwater recharge in combination with pumping or through the uses of treated waters; and
 - Managing flow releases from hydropower dams, as well as inter and intra basin water transfer of water from water surplus to water deficient areas.

Basin Development Plan (BDP)

During the implementation of the BDP several trans-boundary stakeholder consultations were organised in which drought was identified as an important issue of trans-boundary dimension. Current phase of the BDP is in a position to support DMP and MRC Member Countries in water resource needs assessment in the formulation of water resource development scenarios and water supply and demand policy formulation based on a proper evaluation of both water supply and demand management options. DMP can potentially support BDP in integrating drought and adaptation concerns into the overall assessment and mitigation measures for addressing drought and climate change implication on hydrology, water related resources, and issues including key ecosystems and biodiversity, fisheries, agriculture , hydropower, navigation, floods and droughts and vice versa.

Climate Change and Adaptation Initiative (CCAI)

In 2009, the MRC Environment Programme (EP) initiated the Climate Change and Adaptation Initiative (CCAI), which aims to clarify the relevance of climate change relevance to MRC and to integrate climate change components into the activities of MRC programmes.

The CCAI has discussed the potential for cooperating with DMP in the field of drought management, as managing regional and local drought vulnerability is considered a useful instrument in identifying eventual climate change impacts. The CCAI 2011-2015 has set its objective to achieve the following “climate change adaptation planning and implementation is guided by improved strategies and plans at various levels and in priority locations throughout the Lower Mekong Basin”. Many of CCAI outputs are of high relevance and potential for synergy with DMP.

The methods, tools and database to be delivered under the CCAI Outcome 1 – Adaptation planning and implementation – can potentially support the drought vulnerability assessment and adaptation planning in the drought pilot/demonstration and at basin-wide level. Specifically, its Outcome 1.6 – Drought risk and vulnerability analysis considering climate change and options for adaptation – will support DMP, FMMP and CCAI in formulating and assessing long-term drought management options of basin-wide/transboundary nature in the context of both upstream-development and sea level rise in the Mekong Delta.

Environment Programme (EP)

The Environment Programme's (EP) main aim is to assist the Member Countries to protect the environment and maintain the ecological balance of the basin, and to ensure environmental and social sustainability of economic development undertaken within the region. Livelihoods and prosperity of a growing population living in the Mekong River Basin depends on a healthy environment. The EP is developing a river health management strategy to provide a framework for managing the Mekong River and an indicative Mekong Basin Environmental Report card to inform the people of the basin about environmental conditions.

There are specific interests and linkages related to drought in the EP activities. The EP is exploring how wetland productivity is affected by drought, and what are the safeguard/coping strategies of people to sustain livelihoods on such wetlands. The EP is responsible for the identification of potential climate change impacts in the LMB and the integration of climate change into MRC's activities.

Fisheries Programme (FP)

There is a well established relationship between fish productivity and inundated area. Fish ecologies react to drought in various ways depending on type, species and management systems. Drought is clearly recognised as a major concern by the Fisheries Programme (FP) and there are a number of significant opportunities for the DMP to benefit from their knowledge and expertise.

It appears that significant complementarities to the DMP exist in the following three areas:

1. Drought projection and monitoring: Considering the basin-wide ecology of most fish species the FP is in an excellent position to advise the DMP on critical areas;
2. Drought impact assessment: the FP can provide valuable knowledge relevant for both monitoring and impact assessment of drought impacts on fisheries; and
3. The most important contribution of the FP to the DMP would be in the development of mitigation and management strategies.

Flood Management and Mitigation Programme (FMMP)

Important linkages and synergies exist with the Flood Management and Mitigation Programme (FMMP) 2011-2015 and the DMP in at least two main areas: strengthening of disaster and basin planning strategy and planning processes, and in operational basin-wide flood and low flow forecasting, impact assessment, modelling, monitoring and knowledge management.

The Integrated Flood Risk Management (IFRM) approach promoted by the FMMP is highly relevant to the DMP, since to manage flood and drought risk effectively, it is necessary to adopt an integrated approach that considers the risks, relevant management measures, all stakeholders, the need to adopt consistent programmes at all levels of government, and the need to assess the impacts of future developments and climate change on flood and drought behaviour and flood and drought risk. As such, integrated drought risk management (IDRM) and IFRM are essential components that need to be embedded within the MRC's Basin Development Planning process and related national sector strategies.

The FMMP and DMP's plan for improved provision of accurate and relevant flood forecasts and drought projection to the Member Countries is considered to be 'core' business of the Mekong River Commission. FMMP and IKMP have applied flood simulation models for flood forecasting and for evaluating and mapping flood risk and flood hazard that should support DMP in its developing and disseminating drought projection and drought related information. Their use of this information for assessing the impacts of structural flood mitigation measures, other infrastructure (such as road and rail embankments and dams), and land-use and climate changes on flood behaviour and flood risk, can be further extended to assess drought behaviour and drought risk.

Information and Knowledge Management Programme (IKMP)

The IKMP moves towards a follow-up phase from 2011 to 2015 (IKMP-2). IKMP and DMP will maintain a very close relationship, as IKMP deals with data and knowledge management and hydrologic/hydrodynamic modelling in the LMB. IKMP completes testing of automatic data transfer systems of the MRC Hydromet Network (ANHIP and HYCOS). DMP, FMMP and the IKMP need a close cooperation to improve the reliability of automatic data transfer and to gradually integrate automatic data transfer in the RFMCC's flood forecasting and drought monitoring systems.

Closely linked to the FMMP are two hydro-meteorological projects: i) Appropriate Hydrological Network Improvement Project (AHNIP) and, ii) Mekong HYCOS. The AHNIP was established in April 2001. Until March 2006 the project established and improved a total of 18 hydrological stations along the Mekong mainstream, all of which are equipped with telemetry systems to support MRC capability for real-time flood forecasting and early warning. However, its current restriction in terms of the number of parameters (water level and rainfall) needs to be reviewed in light of the requirements to support the DMP, with the possibility of including improved water flow and possible water quality parameters.

The Mekong HYCOS is a new project aimed at strengthening both the technical and institutional capacity for hydrological and meteorological monitoring in the Mekong Basin. It is complementary to the existing hydro-meteorological network, including AHNIP, and will provide reliable real-time data from the Mekong mainstream and its major tributaries. The Mekong HYCOS project installs a total number of 21 water level and rain gauging stations and one tidal measuring station. Meteorological parameters other than water level and rainfall are not proposed at this stage. Aspects of drought have not been considered in the selection of monitoring station sites. The DMP needs to make proposals to the Mekong HYCOS as to drought-specific requirements and locations.

There is a need for the DMP to address requirements for drought-specific meteorological and hydrological monitoring systems, which would support the development of a drought monitoring system. In order to make the project design a success, lessons learned from the past experience with AHNIP and Mekong HYCOS will be considered carefully.

Mekong IWRM

The Mekong Integrated Water Management (M-IWRM) Project has been developed as a continuation of the Water Utilisation Programme (WUP-2) funded by the World Bank and AusAID. The opportunity for the DMP is to apply the Integrated Basin Flow Management (IBFM) flows assessment framework as an expert-based impact assessment tool, thus providing objective scientific knowledge on primary and secondary ecological and socio-economic impacts in drought-prone ecosystems. The World Bank-initiated Mekong Region Water Resources Assistance Strategy (MWRAS) is presently promoting three regional studies, which are likely relevant from a drought management and mitigation perspective:

1. Options for joint water resources development and management between Lao PDR and Thailand in the Mekong Basin (Lao/Thai options study) – supported by the World Bank;
2. Options for joint water resources development and management between Cambodia and Viet Nam in the Mekong Delta – supported by the World Bank; and
3. Identifying opportunities for collaboration in the Se Kong, Se San and Sre Pok Basins in Cambodia, Lao DPR and Viet Nam (3-Ss study) – supported by the ADB.

Initiative on Sustainable Hydropower

The Initiative on Sustainable Hydropower (ISH) is the MRC's response to the need to sustainably manage the increasing number of hydropower developments in the Lower Mekong Basin. The Initiative provides a platform for governments, non-government organisations, and the private sector to cooperate; and it allows the MRC Member Countries to factor sustainable hydropower considerations into national policy and regulatory frameworks. The Initiative enables informed decisions at all stages of infrastructure development, from strategic planning and options assessment for water and energy service provision, through project site selection, design, implementation, and long-term operation stages. ISH is continuously updating and expanding the MRC's technical, environmental, social and economic database related to existing, planned and proposed hydropower projects. This data and knowledge are highly relevant to the DMP works.

The relationship between the DMP and the initiative for Sustainable Hydropower (ISH) can be built on ISH hydropower expertise, for the consideration of effects on DMP monitoring and forecasting works.

Integrated Capacity Building Programme

The DMP will collaborate with the Integrated Capacity Building Programme (ICBP) in defining and developing capacity needs assessment and capacity development for effective drought management and mitigation. There will be close coordination and synergy in designing and conducting on-the-job trainings and special training sessions on IWRM and Integrated Drought Risk Management.

Section 4.5 provides detailed synergy and inputs from all relevant MRC Programmes and Initiatives to relevant DMP Outcomes and Outputs.

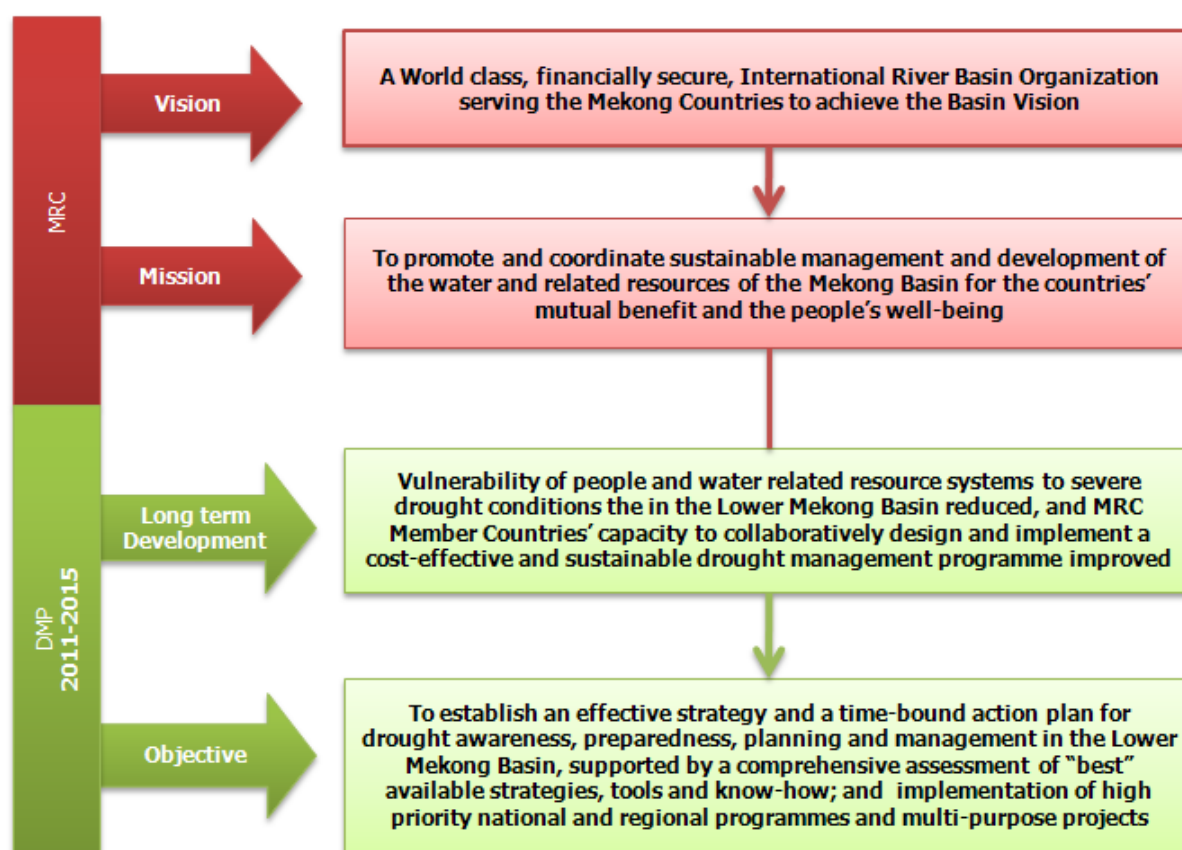
3.0 OBJECTIVE AND PROPOSED PROGRAMME FRAMEWORK

3.1 Programme long-term impact and contribution to MRC Long Term Goal

At the 2nd Regional Meeting which took place in Ho Chi Minh City on March 4, 2011, and series of national consultations in May and June 2011, the four MRC Member Countries reaffirmed their need for moving forward in developing an effective regional drought risk management strategy to cope with meteorological, hydrological, land use and water management, and agricultural and socio-economic drought vulnerability. The suggested strategic focus for drought management in the LMB is well aligned with the Heads of MRC Member Country Governments decision at the MRC Summit in April 2010. The objective is to address or minimise the core problem *‘increased vulnerability of people and water related resource systems to severe drought conditions in parts of the Lower Mekong Basin’*.

The MRC sets the long-term development result of the MRC DMP as shown in Figure 3.1:

Figure 3.1 Objective and Long-term Development Goal of the MRC and the DMP.



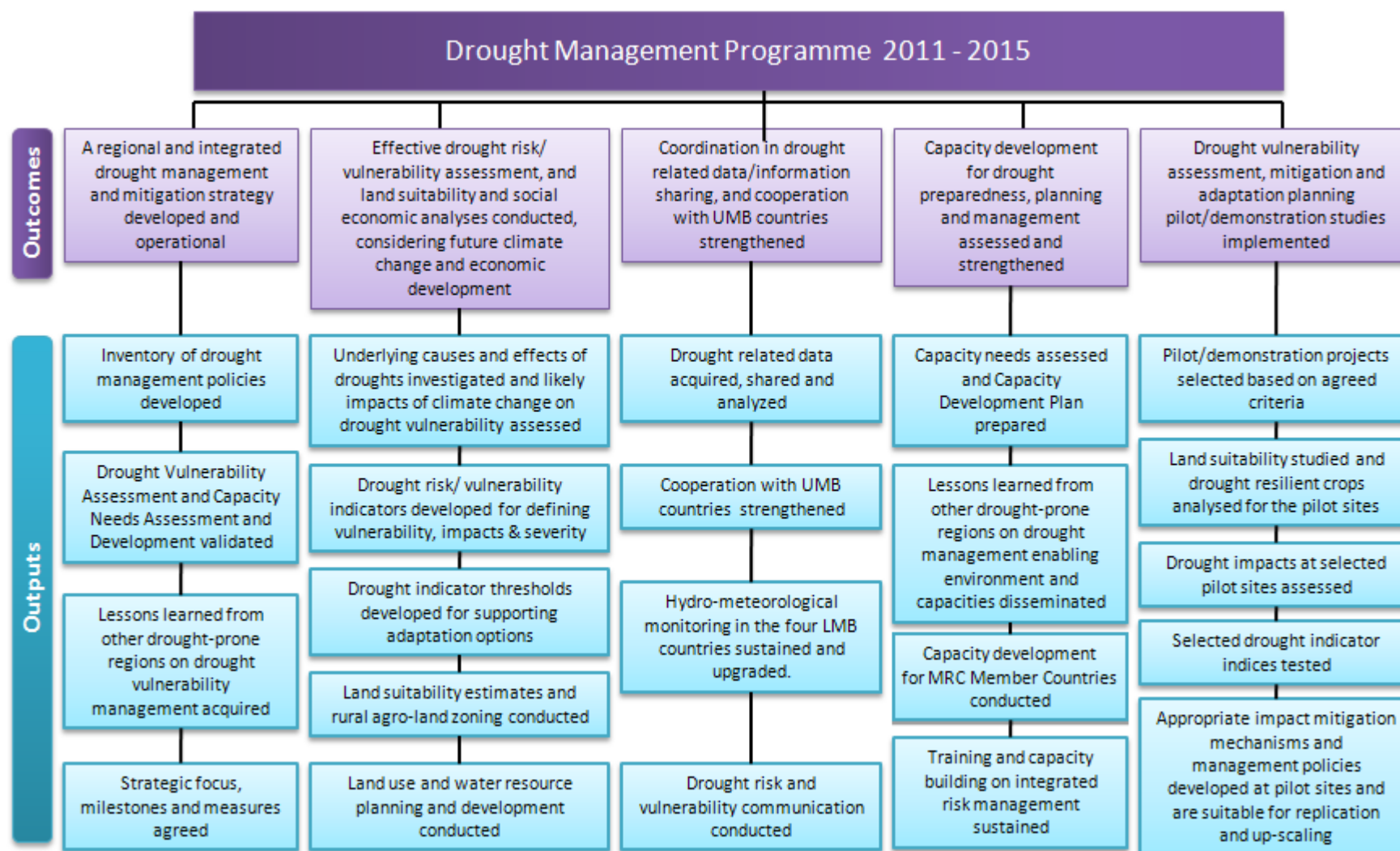
Notably, the key aspect of the impact statement is not only the very occurrence of drought in the basin, but also the *vulnerability of people and water-related resource system to drought stresses*. MRC aims to facilitate this change by achieving the overall long-term objective of DMP *“to support Member Countries developing sustainable capabilities and capacity for managing drought vulnerabilities in the LMB in an effective, sustainable and equitable manner”* in line with the IWRM and Integrated Risk Management principles. Hence the MRC DMP’s long-term Goal is *“Member Countries manage drought risks in the Mekong Basin in an effective, sustainable and equitable manner”*.

By addressing this core problem and goals, the DMP will produce positive long-term development results, and contribute to the achievement of the MRC's Vision for the Mekong River Basin "*An economically prosperous, socially just and environmentally sound Mekong River Basin*"; and its Mission "*to promote and coordinate sustainable management and development of water and related resources for the countries' mutual benefit and the people's well-being*", formulated in 1999 and re-affirmed in the MRC Strategic Plan 2006-2010 and 2011-2015.

Building on the outcomes of the final round of the national consultations conducted in all four MRC Member Countries during May and June 2011, the MDP 2011-2015 is to achieve its objective, stated in Figure 3.1.

DMP management and implementation will be decentralised to Line Agencies (LAs) and NMCs in line with the 2011-2015 Strategic Plan.

Figure 3.2 Structure of the Drought Management Programme 2011 – 2015.



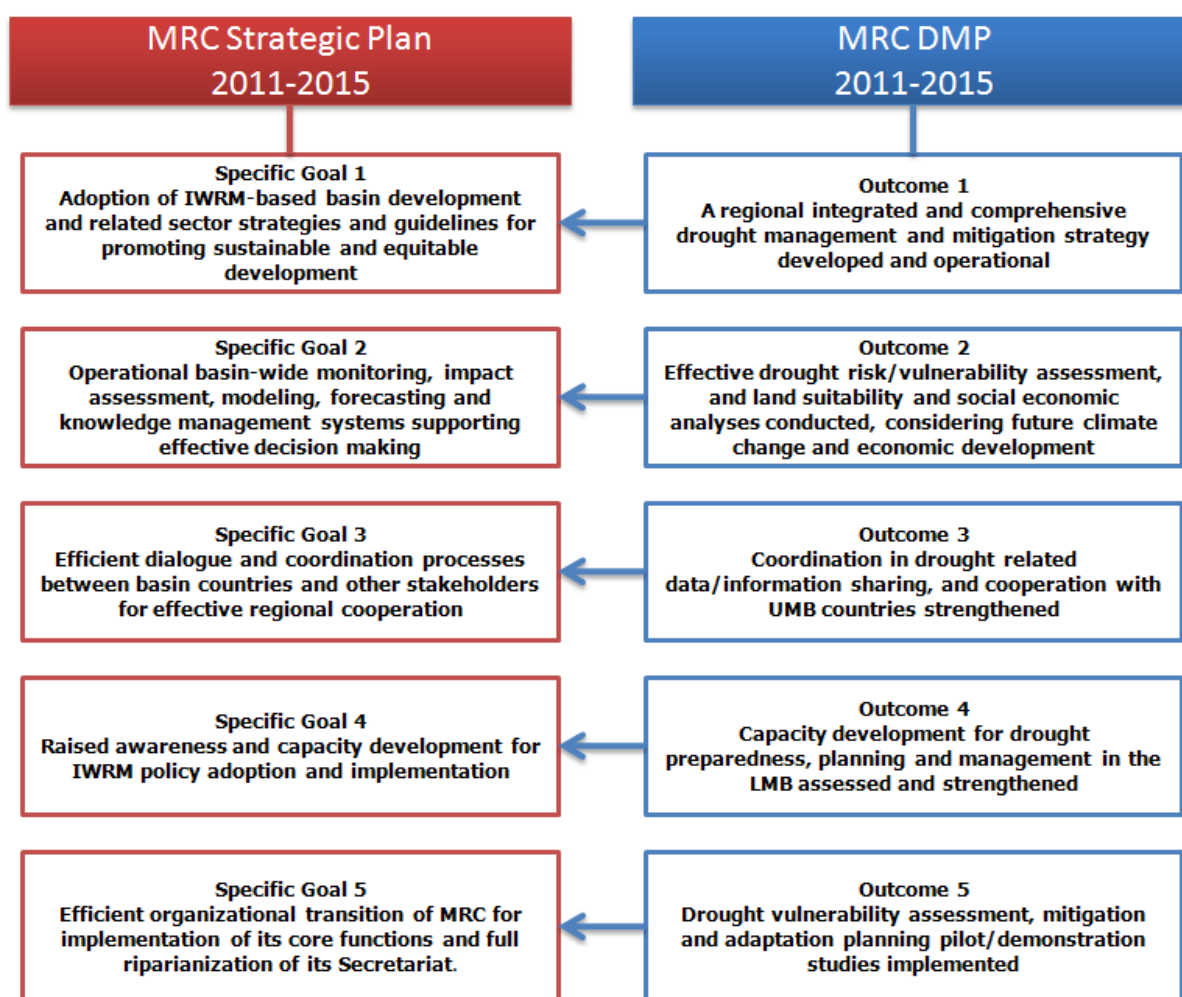
3.2 Programme Results Chain (Outcomes and outputs)

The DMP 2011-2015 Objective is: *to establish effective strategy and time-bound action plan for drought awareness, preparedness, planning and management in the Lower Mekong Basin supported by a comprehensive assessment and “best” available strategy, tools and know-how and facilitating the implementation of high priority national and regional programmes and multi-purpose projects.* This is designed to contribute to achieving the long term objective of the DMP that the MRC Member Countries develop technical capabilities and institutional capacity to manage drought in the MRB in an effective, sustainable and equitable manner. The DMP 2011-2015 will achieve and set the right conditions for achieving this long-term objective through the provision of support to the MRC Member Countries achieving the following outcomes (Figure 3.2). The outcomes and outputs are grouped to support achieving corresponding Specific Goals of the MRC Strategic Plan 2011-2015:

- Outcome 1:** A regional integrated and comprehensive drought management and mitigation strategy developed and operational
- Outcome 2:** Effective drought risk/vulnerability assessment, and land suitability and social economic analyses conducted, considering future climate change and economic development
- Outcome 3:** Coordination in drought related data/information sharing, and cooperation with Upper Mekong Basin (UMB) countries strengthened
- Outcome 4:** Capacity development for drought preparedness, planning and management assessed and strengthened
- Outcome 5:** Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented.

Each of the above outcomes of the DMP 2011 – 2015 will be aligned with Specific Goals of the MRC Strategic Plan 2011 – 2015, as shown in Figure 3.3.

Figure 3.3 DMP’s Alignment with the MRC Strategic Plan



3.3 Outcomes and Outputs of the DMP 2011-2015

3.3.1 Outputs and Activities of Outcome 1

Outcome 1: A regional integrated and comprehensive drought management and mitigation strategy developed and operational

Outcome 1 is to contribute to the achievement of the Specific Goal 1 of the 2011-2015 MRC Strategic Plan through developing and implementing an integrated drought risk management approach, a drought strategy and guidelines for promoting sustainable and equitable development. The drought vulnerability assessment in Outcome 2, and capacity need assessment and development in Outcome 4 will be fed into the development of a bankable and action-able Regional Drought Management and Mitigation Strategy.

The Strategy will support the drought planning process, and will provide an opportunity to involve numerous stakeholders. All of these actions can help improve public awareness of the importance of water resources management and drought management and mitigation in the LMB carried out under Outcome 3. This outcome process will enable drought preparedness and mitigation strategies to be formulated addressing economic, socio-political and environmental impacts to vulnerable people and water related resource systems.

There are four outputs which contribute to Outcome 1:

Output 1.1 Inventory of drought management policies developed

Past and present drought management policies, practices, and plans assessed, and lessons learned from other drought prone regions about risk management and approaches for crisis management studied.

Output 1.2 Drought Vulnerability Assessment and Capacity Needs Assessment and Development validated

Understanding improved and knowledge accumulated through activities under "Drought Vulnerability Assessment", and "Capacity Needs Assessment and Development" for designing relevant strategic focus and policy responses validated for supporting strategic focus of the integrated drought management strategy.

Output 1.3 Lessons learned from other drought-prone regions on drought vulnerability management acquired

Lessons learned from other regional and local drought management and mitigation planning strategies and mechanisms, as well as the required enabling environment and capacities documented and critically analysed.

Output 1.4 Strategic focus, milestones and measures agreed

Integrated drought management and mitigation strategy agreed upon for improving operational, technological and institutional capabilities to prepare for, respond to and recover from drought episodes; for implementing short and long term mitigation measures during and in advance of droughts; emergency response; and, post disaster recovery.

The indicative list of proposed activities for achieving these outputs is provided in Annex 1.

3.3.2 Outputs and activities of Outcome 2

Outcome 2: Effective drought risk/vulnerability assessment, and land suitability and social economic analyses conducted, considering future climate change and economic development.

Outcome 2 of the Drought Management Programme (DMP 2011-2015) is to contribute to the achievement of the Specific Goal 2 of the 2011-2015 MRC Strategic Plan through conducting and applying drought vulnerability assessment and generating knowledge for informed decision-making. It is well aligned with Outcome 1 of the CCAI 2011-2015, hence makes it well positioned to assist CCAI in realising its expected outputs and outcomes.

Outcome 2 will provide a framework for drought impact and vulnerability assessment considering future climate change and economic development, which will serve as a basis for the identification and elaboration of drought preparedness, projection/monitoring systems, mitigation strategies and planning.

Severe economic, social and environmental impacts of droughts in the Mekong River Basin confirmed a growing level of vulnerability of the people living in affected areas. Once in full gear, economic, social and environmental consequences pose a serious threat to those who rely on secure water availability, including farmers, fishermen, domestic households, and the like. Vulnerability of people is further aggravated by land use changes, population growth and migration, urbanisation, government policies, water use patterns, or the diversity of income generating activities, changing cultural practices and so forth. A proper water resource and land use planning integrating both land use activities and socio economic concept of the affected people will pave the way to more secure water utilisation in the region especially for agricultural purpose in rural communities.

The DMP 2011-2015 will provide methodologies for developing indicators and triggers, using them across multiple scales and sectors, and determining which ones are most effective for decision-making and drought mitigation. There are four outputs which contribute to Outcome 2:

Output 2.1 Underlying causes and effects of droughts investigated and likely impacts of climate change on drought vulnerability assessed

Technical approaches and tools for definition and characterisation of drought, and for identification of accurate, reliable, and timely estimates of severity and impacts of droughts will be selected and applied. The economic, social and environmental impacts of drought on vulnerable people and water related resource systems will be assessed.

Output 2.2 Drought risk/vulnerability indicators developed for defining vulnerability, impacts and severity.

Drought indicators will characterise drought vulnerability, severity and economic, social and environmental impacts, and provide tools for appropriate drought planning and response.

Output 2.3 Drought indicator thresholds developed for supporting adaptation options

Developing critical regional and local thresholds, reflecting increasing levels of risk and vulnerability to drought, as agreed by stakeholders. These thresholds will be used for drought monitoring and projection.

Output 2.4 Land suitability estimates and rural agro-land use zoning conducted

FAO and other applicable agro-ecological zoning and ecological- economic zoning approach and procedures will be used to balance physical factors and crop production with socio-economic factors and a wider range of land uses in land use and suitability definitions. This will help identify areas where particular uses may be encouraged through development programmes, services, financial incentives, to identify areas with special needs and problems, and to provide a basis for infra structural development.

Output 2.5 Land-use and water resource planning and development conducted:

Land and water utilisation scenario and future prediction of the LMB developed taking into account socio economic analysis of land use application. Tools and capacity developed for supporting the process of land-use negotiations among potential stakeholders on the basis of preparing an objective inventory and evaluation of natural resource conditions, and their alignment with land utilisation alternatives, leading to a consensus on the future use of the various units of land.

The indicative list of proposed activities for achieving these outputs is provided in Annex 1.

3.3.3 Outputs and activities of Outcome 3

Outcome 3: Coordination in drought related data/information sharing, and cooperation with UMB countries strengthened

Outcome 3 of the DMP 2011-2015 is to contribute to the achievement of the Specific Goal 3 of the 2011-2015 MRC Strategic Plan by contributing to dialogue and coordination processes between basin countries and other stakeholders for effective regional cooperation on drought management. Outcome 3 of the DMP 2011-2015 will contribute to the evolvement of such a management and policy environment as a framework for improved cooperation among riparian countries and with other key stakeholders, and for reaching out to other Programmes, partner organisations and the public.

There are four outputs which contribute to Outcome 3:

Output 3.1 Drought related data acquired, shared, and analysed

Availability of timely and reliable information on which to base decisions through strengthening of existing hydro-meteorological and other drought-related data acquisition networks, and regional cooperation mechanisms for sharing information improved.

Output 3.2 Cooperation with UMB countries strengthened

Cooperation with other MRC Programmes (IKMP and ICCS) strengthened for furthering technical cooperation on drought-related issues with UMB countries (especially with China).

Output 3.3 Hydro-meteorological monitoring in the four LMB countries sustained and upgraded

An inventory of existing and functioning hydro-meteorological monitoring stations will be developed, and national capacities for effective drought monitoring and forecasting will be assessed in collaboration with NMCs and LAs. Based on findings of this assessment, a tangible plan will be developed for upgrading hydro-meteorological facilities in selected parts of the LMB. DMP will also support the maintenance and upgrading of selected key monitoring stations.

Output 3.4 Drought risk and vulnerability communication conducted

Primary communication will be conducted through the drought monitoring and project webpage on the MRC website on the current prevailing conditions and projected situation of drought in the region and national capacity for forecasting/projection by concerned LA and posting the results in their respective websites strengthened.

The indicative list of proposed activities for achieving these outputs is provided in Annex 1.

3.3.4 Outputs and activities of Outcome 4

Outcome 4: Capacity development for drought preparedness, planning and management in the LMB assessed and strengthened.

Outcome 4 of the DMP 2011-2015 is to contribute to the achievement of the Specific Goal 4 of the 2011-2015 MRC Strategic Plan through contributing to awareness raising and capacity development for integrated drought risk management and IWRM implementation. Outcome 4 of the DMP 2011-2015 will provide institutional, organisational and financial analysis and advice for capacity-building with relevant partners and networks. It is to be built upon an understanding that implementation of an effective DMP can only be done in an enabling institutional and management environment, both internally and externally. The capacity for characterising and predicting droughts and assessing impacts on socio-economics, natural environments and people's livelihoods must be sustained for appropriate and timely policy responses to minimise vulnerability to droughts. The main purpose of Outcome 4 is to improve and sustain the application of "best"³ available tools and know-how, and human resource development to facilitate and support the implementation of high priority national and regional drought management and resource development projects. This outcome will also contribute to the evolution of such a management and policy environment as a framework for improved cooperation within the Programme and beyond, reaching out to other MRC Programmes, NMCs, partner organisations and the public.

There are five outputs which contribute to Outcome 4:

Output 4.1 Capacity needs assessed and Capacity Development Plan prepared

A systematic assessment of relevant drought-related policies and procedures, including sector advisory policy analyses, and technical capacity and capabilities in Member Countries with particular emphasis on trans-boundary drought management issues conducted. Human and institutional development Plan for mobilising funding and technical support for building up regional and national institutional capacity and technical capabilities for implementing comprehensive and integrated drought mitigation and management strategy and plan developed.

³ The term "best" as used here means the best that can be delivered within the scope of human and financial resources available under the Project recognising that it is more important to move forward with implementation of actions than to wait for perfection.

Output 4.2 Lessons learned from other drought-prone regions on drought management enabling environment and capacities disseminated

More explicit lessons about success and failure of past efforts to manage drought vulnerability will be compiled from other regions, as well as the Mekong region, and will be evaluated and discussed with relevant MRC Programmes, NMCs, Line Agencies and other key stakeholders through in-house seminars and workshops to support designing of capacity development programs.

Output 4.3 Capacity development for the MRC Member Countries conducted

Capacities of the MRC, NMCs and other programme partner organisations to effectively and efficiently plan, organise, direct and control the implementation of the DMP and drought management strategy and policy strengthened.

Output 4.4 Training and capacity building on integrated risk management sustained

Impact-oriented training and capacity building activities in drought projection, impact/vulnerability assessment and communication, and institutional development for integrated drought management conducted and sustained.

The indicative list of proposed activities for achieving these outputs is provided in Annex 1.

3.3.5 Outputs and activities of Outcome 5

Outcome 5: Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented.

Outcome 5 of the DMP 2011-2015 is to support the Specific Goal 5 of the MRC Strategic Plan 2011-2015, through supporting effective organisational transition of the MRC in decentralisation of its core functions to the national level. It is well aligned with Outcome 1 of the CCAI 2011-2015, hence makes it well-positioned to assist CCAI in realising its expected outputs and outcomes in piloting and demonstrating drought vulnerability assessment, adaptation planning and implementation at selected sites. Outcome 5 will provide technical inputs to the development and application of technical tools and methods developed under Outcome 1 to the selected pilot sites in drought-prone areas by LAs concerned with the coordination by NMCSs and technical support from MRCS. This Outcome focuses on collaborating with relevant MRC Programmes, especially Climate Change Adaptation Initiative (CCAI) and M-IWRM to implement pilot activities to address acute drought issues. In order to promote regional collaboration and transfer of experience, site selection criteria will be developed jointly with MRC Member Countries. Selecting sites where bilateral or multi-lateral cooperation and joint actions are needed for drought and water resources management will be encouraged. There are five outputs which contribute to Outcome 5:

Output 5.1 Pilot/demonstration projects selected based on agreed selection criteria

Local pilot project sites are selected and are working in the LMB countries for building synergy with other on-going or planned demonstration sites for climate change and Mekong IWRM.

Output 5.2 Land suitability studied and drought resilient crops analysed for the pilot sites

Land suitability for particular crops are studied and the crops' resistance capability to soil-moisture and water shortage condition is analysed to identify the most appropriate land use type/crop and water development measures for particular soil characteristics at the pilot sites; to contribute to adaptation; and, to draw upon and upscale local experience.

Output 5.3 Drought impacts at selected pilot sites assessed

Economic, social and environmental impacts of drought on vulnerable people and water related resource systems at selected pilot sites assessed.

Output 5.4 Selected drought indicator indices tested

Selected drought indicator indices are tested locally for accuracy, and indicator thresholds are uniformly estimated for the determination of the level of vulnerability. Drought vulnerability defined and characterised in terms of economic, social and environmental impacts using drought vulnerability indicators, and indices considering site specific conditions.

Output 5.5 Appropriate impact mitigation mechanisms and management policies developed at pilot sites and are suitable for replication and up-scaling

The most appropriate impact mitigation mechanisms and management policies are developed to prevent drought impacts in a range of sectors, such as rain-fed agriculture, fisheries, water supply, environment and livelihoods.

The indicative list of proposed activities for achieving these outputs is provided in Annex 1.

4.0 IMPLEMENTATION AND MANAGEMENT

4.1 Implementation strategy

The DMP implementation and stakeholder engagement strategy is based on cooperation among a triangle of partners (MRC, NMC/NMC Secretariat and line ministries/agencies) delivering outputs, engaging with their respective stakeholders, and cooperating with regional bodies and other development partners.

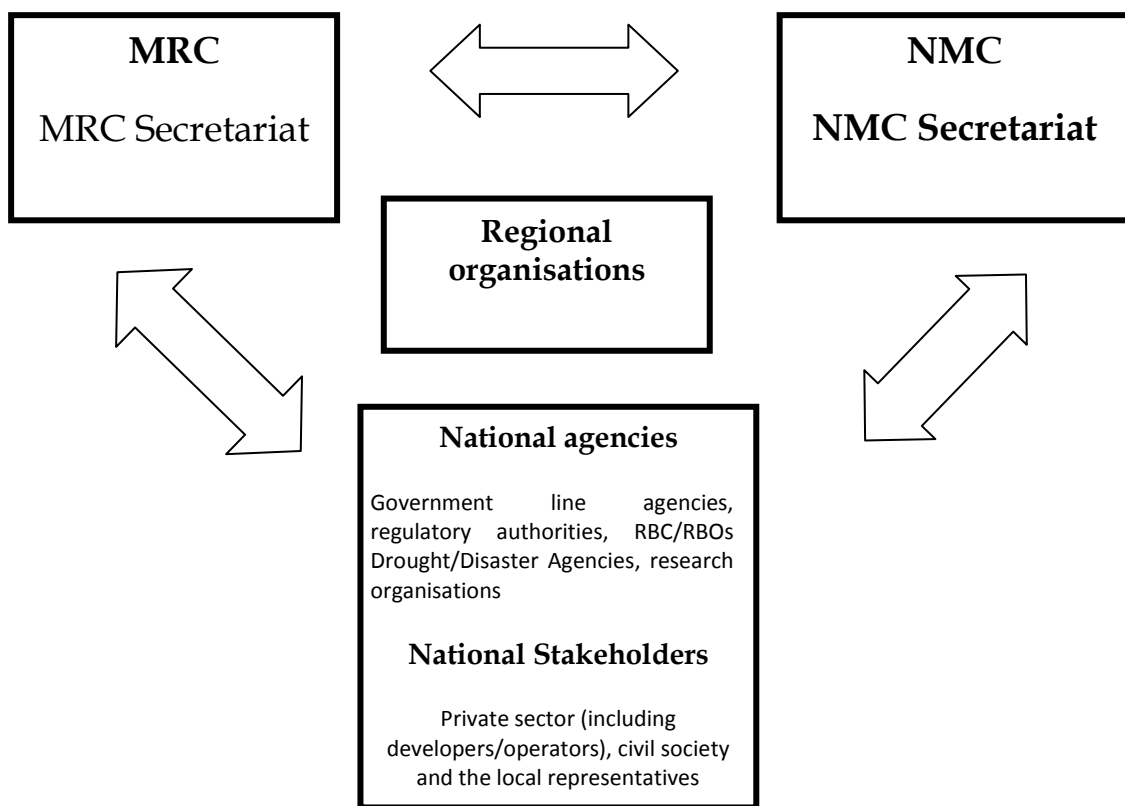
Figure 4.1 conceptually illustrates the implementation partners for DMP outputs 2011-2015 in line with the need for institutional re-alignment stated in the MRC Strategic Plan 2011-2015.

The role of the national partners is implementation of for national level activities, the role of MRC is coordination, guidance, technical assistance, regional synthesis and capacity building and the regional organisations support knowledge production, development of new methodologies and tools and provide capacity building. MRCS DMP will facilitate and support knowledge development based on experience and best practices from other regions, dissemination of methodologies and tools most relevant, and capacity building required for their use.

NMCS play a coordination role in their respective countries, in particular for output-related workshops, capacity building, and related stakeholder engagement, consistent with current NMC/NMCS roles. National line agencies play a primary role in implementing outputs (e.g. conducting sustainability assessments, applying good practice within the country planning and regulatory systems) and liaising with relevant end-users on the adoption and use best practices.

This overall model would work differently according to the topic and type of activity. The concept is illustrated in Figure 4.1 suggesting the implementation of the model that would support the move towards MRC Core functions gradually increasing the national level responsibility. As the riparian governments' capacities increase the role of the DMP will shift to monitoring and reporting implementation.

Figure 4.1 Implementation strategy of DMP.



As a wider strategy for stakeholder engagement, the DMP will work in cooperation with other MRC Programmes for multi-stakeholder partnerships and outreach. This will avoid duplication, and capture synergies in engaging with key basin and sub-basin stakeholders. The operational strategy will progressively scale-up DMP outputs on a priority basis. DMP staffing levels in MRCS will be increased to the approved level, and be sustained through 2011-2015.

4.2 INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS

Programme management arrangement is based on cooperation between the MRC, NMCs, NMC Secretariat, and line ministries/agencies (Figure 4.2). To fulfil the need for institutional re-alignment stated in the MRC Strategic Plan 2011-2015, this partnership is responsible for delivering outputs, engaging with stakeholders, and cooperating with regional bodies and other development partners.

4.2.1 DMP Management Arrangements

The Programme is managed and executed by the MRC through its Secretariat and implemented through the relevant water sector (drought) and disaster management line agencies in the four Member Countries coordinated by the four NMC Secretariats and engaging national research institutes, universities and experts where appropriate.

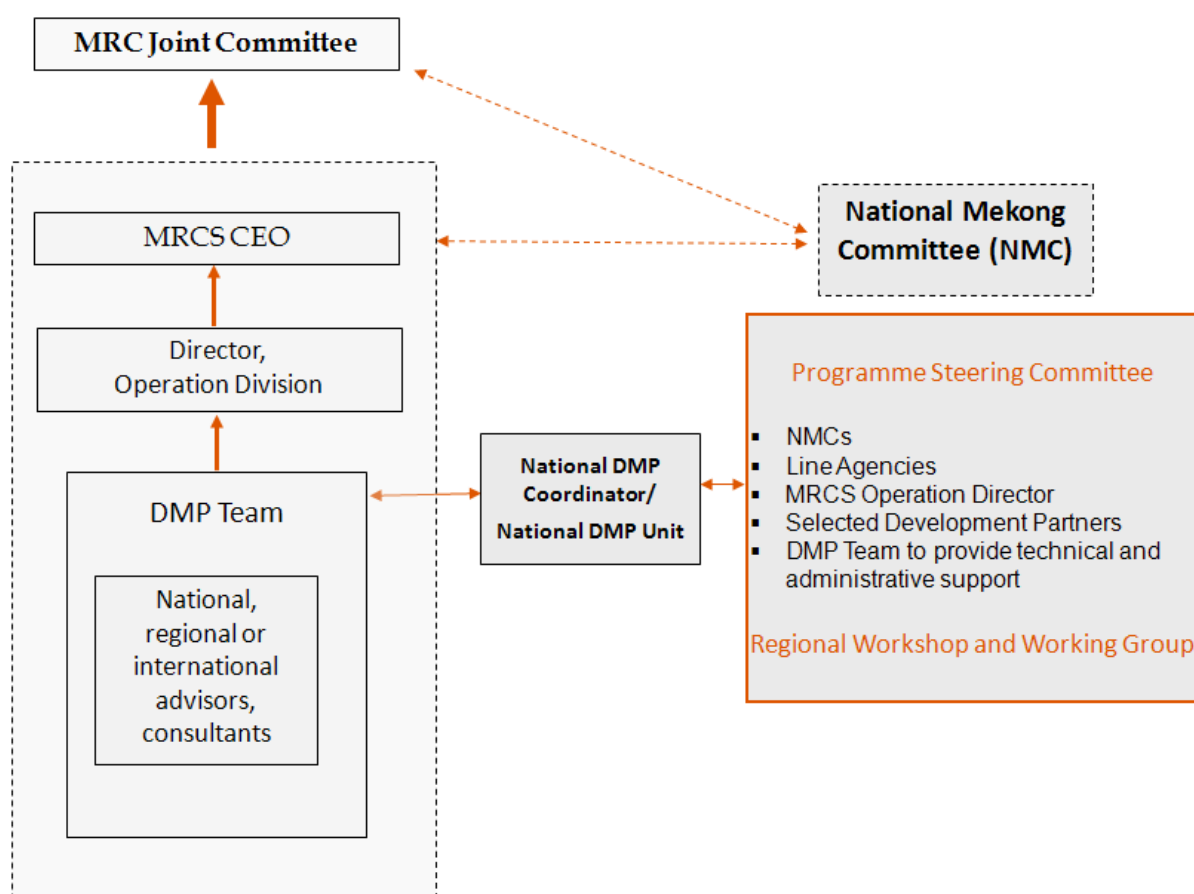
Regional level

MRCS is responsible to the Joint Committee to ensure the strategic, effective and practical cross-sector integration of all DMP outputs with other MRC Programme work (i.e., the DMP being a cross-cutting initiative working with, and through other MRC Programmes). The Programme Steering Committee and Regional Consultation Workshop will have two channels to offer advice and guidance to MRC Bodies (i) directly to MRCS Senior Management, and (ii) to the MRC Joint Committee through MRCS and/or through their respective JC Members.

DMP Programme Steering Committee: The Steering Committee consists of high level representatives from the Member Country line agencies responsible for water sector (drought) and disaster management at Director or Director General level, the MRC OP Division Director, and Core Donor Partners to oversee the strategic direction of the DMP Programme implementation. The focus of the Steering Committee includes progress and necessary adjustments towards achieving the outcomes, sustainability aspects and risk management and how to maximise the national uptake and benefits of the DMP. The Chair of the Steering Committee is the representative of the country chairing the MRC Joint Committee. The Steering Committee meets once a year.

The MRCS provides necessary technical and administrative support to the Programme Steering Committee. The Steering Committee may invite other ad hoc Members / Observers from CSO and Private Sector and/or Area Experts / International Bodies.

Figure 4.2 Overall DMP management structure and accountability lines.



The four countries differ in institutional arrangements and thus there is variation in the arrangements for the NMC Secretariats to fulfil their roles. MRCS is responsible for the strategic, effective and practical cross-sector integration of all DMP outputs with other MRC Programme work. The MRCS reports to the Joint Committee, and the Regional Workshop.

National level

NMCS play a coordination role in their respective countries for workshops, capacity building, and related stakeholder engagement, consistent with current NMC/NMCS roles. National line agencies play a primary role in implementing activities to generate outputs (e.g. conducting sustainability assessments, and applying good practices within country planning and regulatory systems) and liaising with relevant end-users for the adoption and use of best practices.

The national DMP coordinators in NMCSs and Drought Specialists in national drought vulnerability management agencies serve as the focal points for coordination and management of programme activities and outputs at the national level. The National Drought Management Unit based in NMCSs will provide support to the national level working group in coordinating DMP activities within their respective country. The unit will provide facilitation and coordination support with its national line agencies when needed. It will be headed by a national coordinator of the National Mekong Committee Secretariats of the four MRC Member Countries and consist of national staff.

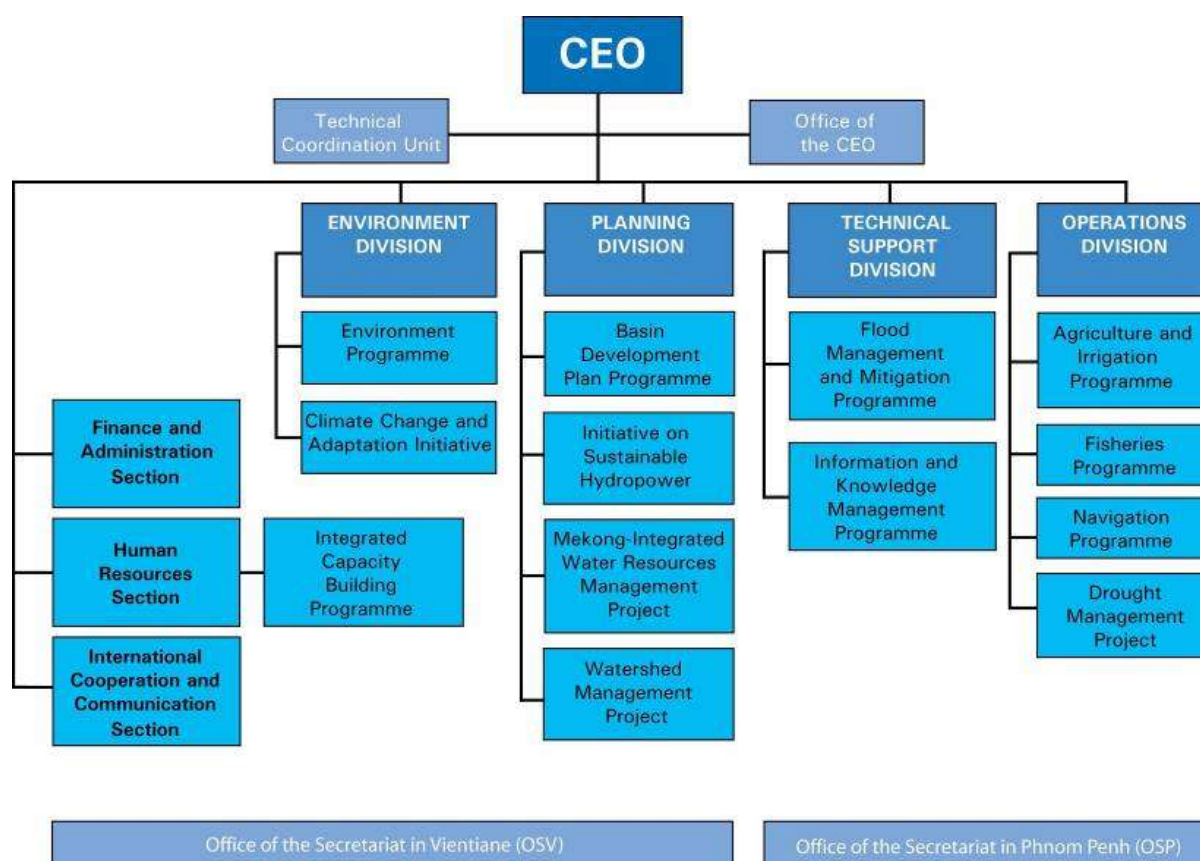
MRC Secretariat

The DMP is within the Operations Division (OPD) of the MRCS. The DMP Team is based in the MRC Office of the Secretariat in Phnom Penh, together with the following programmes: Flood Management and Mitigation Programme (FMMP) in the Regional Flood Management and Mitigation Center (RFMMC); Information, and Knowledge Management Programme (IKMP); Agricultural Irrigation Programme (AIP); and, other programmes of the Technical Support Division (TSD) and Operations Division (OPD). The DMP Team at OPD is responsible for the implementation of activities in accordance with the objectives as stated in the programme Document.

Since the drought management programme involves various concepts from relevant sectors, coordination and supervision from other MRC programmes are important for its effective and efficient implementation. A Task Force will therefore be established to secure the involvement and active participation of all other relevant MRC programmes.

The DMP implementation will rely on close coordination among existing MRC programmes through a MRCS DMP Task Force. The concepts and suggestions from respective task force members reflecting the member's programme perception will be incorporated into the DMP plans for effective implementation. The Task Force will be chaired by the DMP Coordinator and comprise one participant assigned from each of the following MRC programmes: Information and Knowledge Management Programme (IKMP), Flood Management and Mitigation Programme (FMMP), Climate Change and Adaptation Initiatives (CCAI), Environment Programme (EP), Basin Development Programme (BDP) and Agriculture and Irrigation Programme (AIP). A full-time riparian DMP Coordinator will be assisted by a part-time international Chief Technical Advisor.

Figure 4.3 MRC secretariat organisational structure.



Other MRCS management arrangements

- **Internal Coordination Meetings**, where national DMP coordinators, national drought specialists, the OPD Division Director, the DMP Coordinator, staff and resident consultants discuss output progress and implementation actions.
- **MRCS Senior Management Meeting**: The CEO and the MRC Division Directors will provide oversight for DMP implementation at the MRCS level. They are responsible for monitoring outcome achievement, risk management, and for the overall coordination within MRCS. They are also responsible for ensuring implementation from the Regional Consultation Workshop and NMC/NMCS, through the CEO for briefing and progress reports, to the MRC Joint Committee and the MRC Council.
- **The MRCS Programme Coordination Meetings** are institutionalised through the Technical Coordination Advisor (TCA), Technical Coordination Unit (TCU) in the Office of the CEO (OCEO). They are responsible for meeting to coordinate and implement specific organisational policies (e.g. the performance monitoring system). Programme Coordination meetings will be used to integrate key MRC Programmes and to move them towards MRC core function.

4.2.1.1 DMP Staff Structure

The Programme Coordinator is responsible for the implementation of the programme as delegated by the CEO and the Director of OPD.

DMP Staff's main tasks and responsibilities:

- **The DMP Coordinator (with hydro-met and drought programme management background)** will be responsible for overall programme management work including the development of a detailed programme work plan, budget planning and facilitation and coordination with national line agencies of the countries.
- **The Chief Technical Advisor (with strong drought vulnerability, socio-economic assessment and resource economics background)** will provide technical advice to both the DMP Coordinator and drought vulnerability assessment and capacity need assessment team to ensure the quality of the DMP implementation outputs. He/she will report to the DMP Coordinator.
- **The Drought Specialist** (drought management, social studies, poverty reduction specialist) will be in charge of drought vulnerability assessments and report to the DMP Coordinator.
- **The Land Use and Scenario Specialist** (with drought capacity development and land use [soil] planning and scenario development background) will be in charge of land use and land suitability, and socio-economic analysis, and report to the DMP Coordinator.
- **National Drought Specialists and National DMP Programme Coordinators** of the four MRC countries serve as the focal points for coordination and management of programme activities and outputs at the national level. They assist in engaging with the national line agencies, experts and NMC stakeholders and ensure that activities are implemented in a way that suits the country's needs and context (i.e., the DMP being a cross-cutting initiative working with, and through other MRC Programmes). They will work in cooperation with other MRC Programmes for multi-stakeholder partnerships and outreach to avoid duplication, and capture synergies in engaging with key basin and sub-basin stakeholders.

Key responsibilities of DMP staff are summarised in Annex 4.

4.3 DMP Schedules

DMP indicative Work Plan is provided as Annex 2 of this document. In order to monitor and evaluate the progress of the programme against the set milestones and expected outcomes, the MRC standard mechanism of monitoring data collection, documentation, and reporting will be applied, and the following documents will be produced:

- Inception report with Programme Implementation Plan (PIP);
- Annual work plans;
- Bi-annual progress reports at the programme level;
- Annual progress report at the programme level; and
- Technical reports at the MRC level.

4.3.1 Programme Implementation Plan

The DMP 2011-2015 is built on adaptive approach. An initial 3-year period programme implementation plan is built in the current version of DMP Programme Document and will be further updated during the Mid-Term Review scheduled for early 2013.

The DMP will select/assign a full time Coordinator and a part-time chief technical advisor to produce a detailed programme implementation plan (PIP) and a detailed budget, and perform the recruitment for all key positions of the programme for approval by the DMP Steering Committee. The detailed implementation plan will specify the sequential/parallel steps for the programme implementation.

4.3.2 Annual Work Plan

An annual work plan will be prepared for each calendar year in 2011-2015 in accordance with MRCS procedures. As noted in previous sub-sections of this document, outputs are centred on five areas of MRC/DMP support to Member Countries. Advancement of regional and transboundary cooperation will be prioritised in the 2011 and 2012 work-plans.

4.4 DMP Planning, Monitoring and Reporting

In order to monitor and evaluate the progress of the programme against the set milestones and expected outcomes, the MRC standard mechanism of monitoring data collection, documentation, and reporting will be applied.

In principle the monitoring and evaluation on the progress of the programme implementation 2011-2013 will be performed through the following activities:

1. **Quarter performance review:** Quarter performance review aims at reviewing the progress made during the first quarter of the calendar year. The review will look into the start-up performance of the DMP regarding its relevance, results, management, and most importantly direction of the implementation activities. The assessment will also emphasise on the expected outputs whether the activities are in line with key objectives of the DMP. Constrains and lessons learned during the first quarter progress will also be reviewed for develop recommendations and suggestions to achieve a better performance. Each outcome is required to submit quarter performance report for the review.
2. **Six month performance review:** Lessons learned and recommendations made during the first quarter performance review will be reported in a bi-annual report to programme management as part of the six month performance review. The performance review will evaluate the process of the DMP with respect to the principles of transparency, stakeholder participation and contestability with subsequent sharing of the resulting reports with those who are involved. The common MRC-wide format will be used and the performance review results will be recorded on the MRC PMS database.
3. **Annual performance review:** The annual performance review is conducted with a greater degree of independence for the review team than the bi-annual review. The results will available for development partners' evaluation purposes. All outcomes from DMP will be evaluated and commented on for improved implementation.

4. **Mid-term and Final Independent Evaluation:** The final independent evaluation is expected to be carried out upon the completion of the DMP outcomes. At the request of the Donors, a mid-term review may be produced. The relevance, effectiveness, efficiency, and sustainability of the programme will be evaluated. Lessons learned, as well as recommendations made, will allow for future programme improvement and development. The results of this final independent evaluation of the programme will be officially recorded in the MRC database system and the executive summary documents will be made available to the public online through the MRC website.

4.5 Coordination of DMP with other MRC Programmes

Drought management is highly cross-cutting and cross-sectoral by nature, and hence the implementation of the DMP 2011-2015 will have to be implemented in close collaboration with all relevant MRC Programmes and other regional and national initiatives. Table 4.1 outlines integration between the DMP and other MRC programmes and Initiatives for the delivery of DMP outcomes and outputs for 2011-2015.

Table 4.1 DMP outcome/outputs integrated with other MRC programmes and initiatives.

DMP Outputs	Programmes Involved and Input Required
Outcome 1. A regional integrated and comprehensive drought management and mitigation strategy developed and operational	
1.1. Inventory of drought management policies developed.	DMP with inputs from ICCS, CCAI, FMMP on their previous institutional and policy assessment works
1.2. Drought Vulnerability Assessment and Capacity Needs Assessment and Development validated	DMP with inputs from ICCS, CCAI, FMMP on their previous institutional and policy assessment works
1.3 Lessons learned from other drought-prone regions on drought vulnerability management acquired	DMP with CCAI and AIP
1.4. Strategic focus, milestones and measures agreed	DMP with CCAI and AIP
Outcome 2. Effective drought risk/vulnerability assessment, and land suitability and social economic analyses conducted, considering future climate change and economic development	
2.1. Underlying causes and effects of droughts investigated and likely impacts of possible climate change on drought vulnerability assessed	With CCAI, Inputs from BDP (main stream data), IKMP, EP, FMMP, and AIP in defining underlying causes and effects.
2.2. Drought risk/ vulnerability indicators developed for defining vulnerability, impacts & severity	Provision of relevant knowledge, tools and approaches from IKMP, FMMP, BDP and CCAI. Fishery related data and perspectives from FP.
2.3. Drought indicator thresholds developed for supporting adaptation options	With participation of CCAI and inputs from SIMVA, FMMP, IKMP, and BDP (PMFM).
2.4 Land suitability estimates and rural agro-land use zoning conducted	Cross-fertilisation between CCAI, AIP and the DMP
2.5 Land-use and water resources planning and development conducted	BDP (basin wide) to support DMP, CCAI (technical involvement) and Member Countries in land use and water resource planning and development

DMP Outputs	Programmes Involved and Input Required
Outcome 3: Coordination process in drought related data/information sharing, and cooperation with UMB countries strengthened	
3.1. Drought related data acquired, shared, and analysed	<p>Close collaboration with IKMP and FMMP ref AHNIP (18 stations) and Mekong HYCOS, (21 stations) and MRC data and information sharing exchange.</p> <p>DMP needs to make proposals to Mekong HYCOS on drought-specific requirements and locations.</p> <p>TSD IKMP modelling team and hydro-met team in improving drought projection information processing and disseminating capacity.</p> <p>DMP, FMMP and IKMP need close cooperation to improve the reliability of automatic data transfer, and to integrate automatic data transfer in the flood forecasting and drought monitoring systems.</p>
3.2. Cooperation with UMB countries strengthened	Using existing channels of ICCS, IKMP BDP, CCAI and FMMP for collaboration with UMB countries.
3.3 Hydro-meteorological monitoring in the four LMB countries sustained and upgraded	DMP with CCAI (monitoring), FMMP, and IKMP
3.4. Drought risk and vulnerability communication conducted	ICCS, CCAI, FMMP and DMP in delivering drought communication products as per MRC Communication and Disclosure Policy.
Outcome 4. Capacity development for drought preparedness, planning and management in the LMB assessed and strengthened	
4.1. Capacity needs assessed and Capacity Development Plan developed	DMP, FMMP and CCAI/ ICBP coordination and contribution to development and implementation of capacity training
4.2 Lessons learned from other drought-prone regions on drought management enabling environment and capacities disseminated	DMP with CCAI and AIP
4.3 Capacity development for the MRC Member Countries conducted	DMP with ICBP
4.4. Training and capacity building on integrated risk management sustained	ICBP coordination and DMP, FMMP and CCAI contribution to implementation of capacity development activities.
Outcome 5: Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented.	
5.1 Pilot/demonstration projects selected based on agreed selection criteria	Coordinate with CCAI and inputs from FMMP, and NMCs and LAs. Linking with M-IWRM transboundary projects' and CCAI pilot sites.
5.2. Land suitability studied and drought resilient crops analysed for the pilot sites	Inputs and contribution from relevant IKMP (land cover map), CCAI, FMMP, FP programmes in NMCs and LAs. Linking with M-IWRM transboundary projects' and CCAI pilot sites.
5.3. Impacts at selected hotspots assessed	Inputs and contribution from relevant IKMP, CCAI, FMMP, FP programmes in NMCs and LAs. Linking with M-IWRM transboundary projects' and CCAI pilot sites.
5.4. Selected drought indicator indices tested	Inputs and contribution from relevant IKMP, CCAI, FMMP, FP programmes in NMCs and LAs. Linking with M-IWRM transboundary projects' and CCAI pilot sites.

DMP Outputs	Programmes Involved and Input Required
5.5. Appropriate impact mitigation mechanisms and management policies developed at the pilot sites and are suitable for replication or up-scaling	<p>Inputs and contribution from relevant IKMP, CCAI, FMMP, FP programmes in NMCs and LAs.</p> <p>Cross-fertilisation between CCAI, AIP and the DMP in fields such as:</p> <p>Evaluation of economic tools (water saving incentive systems, water pricing and financing systems);</p> <p>Improved water use efficiency;</p> <p>Cropping pattern optimisation and economic pricing;</p> <p>Increasing storage and control capacities for both surface and groundwater;</p> <p>Improving access to irrigation facilities;</p> <p>Improved water reuse;</p> <p>Managing flow releases from hydropower dams, and,</p> <p>Water transfer.</p>

4.6 Risks and Risk Management

A number of assumptions have been formulated for each of the DMP 2011-2015 Outcomes. These assumptions can become 'risks' if they were proven to be invalid. The Logical Framework for DMP 2011-2015 (Annex 1) defines risks for each of the five outcomes of DMP 2011-2015. The levels of risk are to be assessed in terms of likelihood and potential impact.

4.7 DMP BUDGET

4.7.1 Finance and Administrative Support

The Financial and Administrative Support by the Office of the Secretariat Phnom Penh (OSP), as per the MRC Council co-hosting decision (Hua Hin, Dec. 2009) according to relevant MRCS Manuals and Policy - Financial Manual, Administrative Manual and Personnel Manuals.

4.7.2 Budget

The proposed budget and summary breakdown of DMP 2011-2015 is in Annex 2.

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6.0 ANNEXES

Annex 1: Design and Monitoring Framework for DMP 2011-2015

Design summary	Indicators	Source of Data	Risk and Assumptions
MRC Long-term Goal			
Member Countries manage water and related resources of the Mekong Basin in an effective, sustainable and equitable manner.	<ul style="list-style-type: none"> ▪ National legislation, policy and institutional frameworks in Member Countries address Mekong aspects; and ▪ The degree to which decision making on water and related resources in the Mekong Basin is seen by communities and stakeholders as balancing economic benefits, environmental and social costs and impacts from drought management and other economic activities. 	Government statistics. Provincial statistics. Programme reports. MRC Sector evaluation studies. Programme baseline data at the program inception. Independent evaluation at completion. MRC stakeholder satisfaction survey.	Highest level political commitment to the MRC long-term goal will be maintained.
MRC Strategic Plan 2011-2015 Goal			
MRC Member Countries manage drought risks in the Mekong Basin in an effective, sustainable and equitable manner.	<ul style="list-style-type: none"> ▪ The degree to which national water and related policies and strategies, socio-economic development plans and planning in LMB consider drought vulnerability and impacts on the Basin's biodiversity and equitable sharing of benefits and costs/impacts between riparian countries and population groups; and ▪ Extent that Member Countries and stakeholders see the basin-wide drought vulnerability mitigation approaches produced by the MRC as relevant and effective. 	National reports. Drought and disaster strategies and policies. National Socio-economic development plans, water and related sector plans with emphasis on drought management. MRC stakeholder survey.	Highest level political commitment to the MRC long-term goal and DMP objectives will be maintained.
Drought Management Programme 2011-2015 Objective			
Long-term Objective: To support MRC Member Countries in developing sustainable capabilities and capacity for managing drought risks in the LMB in an effective, sustainable and equitable manner.	Drought impacts on socio economics, environment and people's livelihoods are assessed. Impacts and vulnerability are determined and used for awareness raising and policy responses; Human capacity and collaborative platforms are assessed and a capacity development plan is developed for facilitating drought data and	Programme reports. Programme monitoring report. Meeting and workshop records. MRC stakeholder survey.	Assumptions <ul style="list-style-type: none"> ▪ Support from national, provincial, and district authorities; ▪ Support from communities and civil society organisations; and ▪ Adequate budget appropriations and staff

Design summary	Indicators	Source of Data	Risk and Assumptions
<p>Long-term development result: Vulnerability of people and water related resource systems to severe drought conditions in parts of the Lower Mekong Basin reduced and MRC Member Countries capacity and capability in collaboratively designing and implementing cost-effective and sustainable drought management programme improved in a long term</p> <p>Immediate Objective: To establish effective strategy and time-bound action plan for drought awareness, preparedness, planning and management in the Lower Mekong Basin supported by a comprehensive assessment and “best” available strategy, tools and know-how; and implementation of high priority national and regional programmes and multi-purpose projects.</p>	<p>information sharing, providing technical and institutional capacity development support to relevant national agencies directly engaged in drought vulnerability mitigation and management activities;</p> <p>Regional Strategy for Drought Management and Mitigation for supporting development and implementation of guidelines on mitigation measure and drought impact management are developed for both erratic and persistent drought; and</p> <p>By 2015, the drought programme management and implementation will have been fully decentralised to LAs and NMCs in line with the 2011-2015 Strategic Plan.</p>		<p>resources for drought risk management</p> <p>Risk Differences in country perspectives on regional cooperation and investment Priorities.</p>
<p>Outcome 1: A regional integrated and comprehensive drought management and mitigation strategy developed and operational</p>	<p>Capacity development programs implemented continuously to improve drought preparedness and response, and technical capabilities to do high quality vulnerability assessment;</p> <p>Regional cooperation mechanisms for sharing, drought-related data and information will be established with existing and new initiatives;</p> <p>Appropriate drought-related information provided to decision makers, Coordinators, and vulnerable communities through various media, including websites of MRC, NMCs and Line Agencies;</p> <p>Structural and non-structural interventions developed and implemented at the local and national level to respond to drought vulnerability, including changes to water supply and demand management planning.</p> <p>At least 80% of the government officials state that</p>	<p>Government statistics. Provincial statistics. Programme reports. MRC Sector evaluation studies. Programme baseline data at the program inception. Independent evaluation at completion. MRC stakeholder satisfaction survey</p>	<ul style="list-style-type: none"> ▪ Political will at the sector/ institutional level to apply and share data and information is strong; ▪ Coordination between the water resources management agencies, sector and disaster management agencies and local governments will be strengthened; and <p>Target national agencies have appropriate institutional structures, human and financial resources, monitoring and oversight to contribute to and implement drought management.</p>

Design summary	Indicators	Source of Data	Risk and Assumptions
	<p>resources and training provided through the DMP has enhanced their capacity to implement successful responses to drought events in their respective countries.</p> <p>At least 70% of the stakeholder interviewees state that projection of seasonal temperature and precipitation provided up to a year in advance has saved money for water management agencies, farmers and industries by avoiding impacts.</p>		
Activities of Output 1.1: Inventory of drought management policies developed			
1.1.1. To conduct Inventory of drought management policies focusing on past and present drought management policies			
1.1.2. To document and share understanding and applicability of risk and vulnerability management through the application of preparedness, mitigation/adaptation, emergency response, and post disaster recovery.			
Activities of Output 1.2: Drought Vulnerability Assessment and Capacity Needs Assessment and Development validated			
1.2.1. To analyse and validate findings from “Inventory of drought management policies”, “drought vulnerability assessment”, and “capacity needs assessment and development” for designing relevant strategic focus and policy responses, categorisation of significant impacts, assessment of underlying causes (problem analysis), and solution objective analysis.			
1.2.2. To validate findings through stakeholder and sector policy analysis and dialogue.			
Activities of Output 1.3. Lessons learned from other drought-prone regions on drought vulnerability management acquired			
1.3.1. To document first-hand experiences from other drought-prone regions to enable MRC and its Member Countries to learn from success and failure of past efforts to manage drought vulnerability compiled from other regions and the Mekong region.			
1.3.2. To conduct dissemination workshops to distil those lessons learnt and potential for adapting to the LMB specific condition/situation.			
Activities of Output 1.4. Strategic focus, milestones and measures agreed			
1.4.1. To draft the Regional Drought Management and Mitigation Strategy in consultation with NMCs, LAs, and relevant stakeholders.			
1.4.2. To submit final draft to the MRC governance system for approval and endorsement.			

Design summary	Indicators	Source of Data	Risk and Assumptions
<p>Outcome 2: Effective drought risk/vulnerability assessment, and land suitability and social economic analyses conducted, considering future climate change and economic development</p>	<ul style="list-style-type: none"> ▪ Utilisation of the vulnerability assessment of the regional drought processes, appropriate drought characterisation, and identification of critical regional and local drought thresholds in drought management related decisions made by MRC Member Countries; ▪ 80% of the targeted stakeholders involved in the drought vulnerability assessment indicated that their understanding of drought vulnerability and needs for its mitigation and management have significantly improved (based on entry and exit survey questionnaires); ▪ 70% of drought vulnerability Coordinators and government officials involved stated that their understanding of applicable definitions of drought risk/hazard and the factors that influence vulnerability; and drought-prone regions, have significantly improved; ▪ 80% of vulnerability Coordinators and government officials involved stated that their understanding and utility of methods and approaches for quantification of drought vulnerability and impacts have strengthened substantially; and ▪ High quality assessment of region’s water supply and demand, as well as water utilisation scenarios and future predictions in the LMB based on comprehensive water resource planning and management and socio-economic assessment is available for policy makers for drafting impact mitigation and adaptation strategies. ▪ Drought vulnerability assessment report is adopted by the MRC Member Countries and is used for development of Regional Strategy and follow-up actions. ▪ Agreement on land use and suitability assessment will lead to a more concerted and 	<p>Government statistics. Provincial statistics. Programme reports. MRC Sector evaluation studies. Programme baseline data at the program inception. Independent evaluation at completion. MRC stakeholder satisfaction survey. List of prioritised Interventions Progress, interim, and draft final Reports.</p>	<p>Assumptions</p> <ul style="list-style-type: none"> ▪ Adequate coordination between the water resources management and disaster agencies, sector and planning agencies and local governments will improve regional efforts; ▪ Target national agencies strengthen further their appropriate institutional structures, human and financial resources, monitoring and oversight to contribute to and implement the Basin Development Strategy; ▪ DMP, IKMP and BDP staff are able and capable to engage communities and National Agencies in this assessment that will heavily affect the credibility of the process and associated decision making; and ▪ Engagement of policy makers and communities in provision and verification of the analytical results and findings is strong. ▪ Coordination between the water resources, land use and agriculture management agencies, sector and disaster management agencies and local governments will be strengthened; and

Design summary	Indicators	Source of Data	Risk and Assumptions
	<p>more proactive cooperation and collaboration on land use and water resources planning for addressing drought issues among the MRC Member Countries and concerned stakeholders;</p> <ul style="list-style-type: none"> ▪ Increased interest among decision-makers and development partners in land and water planning for drought vulnerability mitigation and management; ▪ The land and water issues and priority are discussed at one regional and four national meetings, and at least one MRC-Development Partners Meeting; and ▪ At least 70% of the stakeholder interviewees are satisfied with the opportunity to involve and up-take of their comments and concern into the programme key outputs. 		
Activities of Output 2.1. Underlying causes and effects of droughts investigated and likely impacts of possible climate change on drought vulnerability assessed			
2.1.1 To assess and apply appropriate technical approach and tools for defining, characterisation of drought, and for accurate, reliable, and timely estimates of severity and impacts of droughts			
2.1.2. To assess and propose a concrete action plan for improving existing data collection and management systems and networks for drought and water management purpose.			
2.1.3. To conducting comprehensive drought impact and vulnerability surveys in representative drought-prone areas focusing on vulnerable people’s livelihoods, agriculture, industry, drinking water supplies, energy, environment, forestry, and the health sector.			
2.1.4. To develop VAM to support MRC Member Countries in assessing drought vulnerability across sectors and subsectors based on three primary variables: 1) exposure; 2) sensitivity; and 3) adaptive capacity.			
Activities of Output 2.2. Drought risk/ vulnerability indicators developed for defining vulnerability, impacts & severity			
2.2.1. To assess drought indicators developed elsewhere in Mekong region and in similar climatic areas worldwide.			
2.2.2. To develop indicators and thresholds establishing onset, ending, and severity levels of drought, and recommended measures to be taken in each drought phase and applicable drought types and select most applicable standard drought indicators.			
2.2.3. To develop a systematic approach to combine indicators to support MRC and relevant agencies decide on a systematic method for combining, using, and evaluating indicators to define drought conditions (appropriate scales and scopes of analysis and temporal and spatial variability).			

Design summary	Indicators	Source of Data	Risk and Assumptions
Activities of Output 2.3: Drought indicator thresholds developed for supporting adaptation options			
2.3.1. To conduct consultations for developing relevant drought indicators and indices to enable agreement by affected stakeholders on critical regional and local drought thresholds reflecting increasing levels of risk and vulnerability			
2.3.2. To organise a highly participatory process by NMCs and concerned National Line Agencies on drought related issues to agree on acceptable thresholds indicating levels of drought severity – i.e., risk and vulnerability and to develop technical guidelines and policy recommendations.			
2.3.3. To develop drought mitigation and management options for key sectors and livelihood.			
Activities of Output 2.4: Land suitability estimates and rural agro-land use zoning conducted			
2.4.1. To assess the capacity and tools to evaluate land use suitability and water demand and availability due to development and other changes, and explore options and socio-economic analysis.			
2.4.2. To collect information for characterising tracts of land by quantified information on various climate change conditions including land resource inventory, inventory of land utilisation types and crop requirements, and land suitability evaluation (potential maximum yield calculation and matching of constraints and requirements)			
2.4.3. To describe land productivity and suitability assessment include maps showing land utilisation types and crop climatic adaptability, agro-ecological zones and land suitability			
Activities of Output 2.5: Land-use and water resources planning and development conducted			
2.5.1. To conduct quantitative estimates on potential crop areas, yields and production arable land and land use optimisation (land degradation assessment, productivity modelling, population support capacity assessment and land-use optimisation modelling).			
2.5.2. To characterize socio-economic conditions and perspectives for specific use and bio physical qualities of each identified natural land unit with the requirements of each envisaged land utilisation type and land growing period.			
2.5.3. To support a process of land-use negotiations among the various potential stakeholders on the basis of the objective inventory and evaluation of the natural resources conditions and their matching with land utilisation alternatives, leading to a consensus on the future use of the various units of land.			
<p>Outcome 3: Coordination in drought related data/information sharing, and cooperation with UMB countries strengthened.</p>	<p>At least 50 MRCS and Member Countries' staff and 25 representatives of Civil Society Organisation and Development Partners are interviewed for assessing i) past and present drought management policies, practices and, ii) principles to govern the management of drought vulnerability, and, iii) capabilities and capacity for seasonal and shorter-term forecasts, developing integrated monitoring and drought warning and associated information delivery systems;</p> <p>Regional cooperation mechanisms for sharing, drought-related data and information will be</p>	<p>Government statistics. Provincial statistics. Programme reports. MRC Sector evaluation studies. Programme baseline data at the program inception. Independent evaluation at completion. MRC stakeholder satisfaction survey</p>	<ul style="list-style-type: none"> ▪ Political will at the sector/ institutional level to apply and share data and information is strong; ▪ Coordination between the water resources management agencies, sector and disaster management agencies and local governments will be strengthened; and, ▪ Target national agencies have appropriate institutional structures, human and financial resources, monitoring and oversight to contribute to

Design summary	Indicators	Source of Data	Risk and Assumptions
	<p>established with existing and new initiatives; Appropriate drought-related information provided to decision makers, coordinators, and vulnerable communities through various media, including websites of MRC, NMCs and Line Agencies;</p> <p>At least 80% of the government officials state that resources and training provided through the DMP has enhanced their capacity to implement successful responses to drought events in their respective countries.</p>		and implement drought management.
Activities of Output 3.1. Drought related data acquired, shared, and analysed			
3.1.1. To work closely with and build upon the two hydro-meteorological projects and MRC data and information sharing exchange procedures and guidelines and propose measures for ensuring they are fully operational and capable for drought projection and monitoring.			
3.1.2. To develop a concrete action plan for improving existing data collection and management systems and networks for improving and coordinating information flow and to make it available for analysis, interpretation and application.			
3.1.3. To address current restrictions in terms of number of parameters (water level and local rainfall distribution and temperatures, agro-metrological monitoring of soil moisture and evapotranspiration) and locations to include improved flow data (stream-flow and reservoir outflow), and possible groundwater parameters.			
3.1.4. To propose measures for addressing monitoring station capability in some MRC Member Countries for providing data and information for drought projection and vulnerability assessment.			
3.1.5. To provide sustained support and capacity building to the modelling team and database management team in MRCS, NMCs and relevant Line Agencies to improve drought projection information processing and disseminating capacity.			
Activities of Output 3.2: Cooperation with UMB countries strengthened			
3.2.1. To work closely with other MRC Programmes (IKMP, CCAI and FMMP) in furthering technical cooperation with up			
3.2.2. To work toward augmenting the existing data sharing agreements between the MRC and China to include other drought -relevant hydro-meteorological data and technical information (e.g. dry season hydro-meteorological data, operating rules) on the mainstream hydropower schemes.			
3.2.3. To document and share understanding of planned and existing water management structure and hydro-meteorological information from upper Mekong River (Lancang Jiang) for drought management purpose.			
Activities of Output 3.3: Hydro-meteorological monitoring in the four LMB countries sustained and upgraded.			
3.3.1. To obtain an inventory of functioning existing hydro-meteorological monitoring sites in the LMB.			
3.3.2. To assess national hydro-meteorological monitoring capacities of the four Member Countries in collaboration with NMCs and line agencies.			

Design summary	Indicators	Source of Data	Risk and Assumptions
3.3.3. To develop a tangible plan for upgrading hydro-meteorological monitoring facilities in selected parts of the LMB for effective drought monitoring and forecasting.			
3.3.4 To support efforts to maintain and upgrade existing hydro-meteorological monitoring stations in the LMB.			
Activities of Output 3.4: Drought risk and vulnerability communication conducted			
3.4.1. To propose measure for strengthening existing information dissemination to provide appropriate information to decision-makers			
3.4.2. To make effective use of the MRC's, NMCs' and Line Agencies' websites as the main public platforms to encourage a greater use of drought related products.			
3.4.3. To conduct reporting on drought events from a results-based perspective and in a highly responsible manner (publications series to reach target audiences such as policy briefs and newsletters focusing more on the results and benefits to stakeholders of MRC DMP			
3.4.4. To conduct regular meetings such as the Drought Symposium, the Annual Mekong Forum and other annual meetings for greater interaction with key stakeholders, community of practice and media.			
<p>Outcome 4: Capacity development for drought preparedness, planning and management in the LMB assessed and strengthened</p>	<p>Capacity need assessment and proposed capacity development is adopted by countries, and developed into strategic objectives and key outcome areas in the Regional Strategy for Drought Management and Mitigation for further follow-up at both national and regional levels;</p> <p>At least 50 MRCS and Member Countries' staff and 25 representatives of Civil Society Organisation and Development Partners are interviewed for assessing i) past and present drought management policies, practices and, ii) principles to govern the management of drought vulnerability, and, iii) capabilities and capacity for seasonal and shorter-term forecasts, developing integrated monitoring and drought warning and associated information delivery systems;</p> <p>The capacity need assessment process and its outcomes are used for raising awareness and interest in drought vulnerability by decision-makers and external donors in at least one regional and four national drought meetings, and at two MRC-Development Partners Meetings; and</p> <p>Capacity needs assessment and capacity</p>	<p>Government statistics. Provincial statistics. Programme reports. MRC Sector evaluation studies. Programme baseline data at the program inception. Independent evaluation at completion. MRC stakeholder satisfaction survey.</p>	<ul style="list-style-type: none"> ▪ Political will at the sector/ institutional level to apply and share data and information is strong; ▪ Coordination between the water resources management agencies, sector and disaster management agencies and local governments will be strengthened; and ▪ Target national agencies have appropriate institutional structures, human and financial resources, monitoring and oversight to contribute to and implement drought management.

Design summary	Indicators	Source of Data	Risk and Assumptions
	development plan is discussed at the regional workshop. The bankable and actionable plan and strategy is approved by the MRC Member Countries and ready for implementation.		
Activities of Output 4.1. Capacity needs assessed and Capacity Development Plan developed			
4.1.1. To conduct critical assessment of relevant drought-related policies and procedures			
4.1.2. To map relevant national bodies that have a duty to manage water and related resources and natural disasters			
4.1.3. To report and conduct consultation on the outcomes of multiple-level capacity needs assessment focusing on drought management policy			
4.1.4. To develop through consultation with relevant partners the human and institutional development Plan.			
Activities of Output 4.2. Lessons learned from other drought-prone regions on drought management enabling environment and capacities disseminated			
4.2.1. To document first-hand experiences from other drought-prone regions to enable MRC and its Member Countries to learn from success and failure of past efforts to manage drought vulnerability compiled from other regions and the Mekong region.			
4.2.2. To conduct dissemination workshops to distil those lessons learnt and potential for adapting to the LMB specific condition/situation.			
Activities of Output 4.3: Capacity development for the MRC Member Countries conducted			
4.3.1 To conduct a series of regional and national level training and capacity building workshops for NMCs and other relevant government agencies in the four LMB countries on drought preparedness, forecasting, management and mitigation.			
4.3.2 To coordinate with ICBP, CCAI and other MRC programmes and activities to strengthen organisational and institutional capacities and enabling environment for drought management.			
4.3.3 To conduct site visits to relevant drought management sites in the Mekong Basin for exchange of experience.			
Activities of Output 4.4. Training and capacity building on integrated risk management sustained			
4.4.1. To conduct series of capacity development activities to capacity development interventions according to an agreed plan and priority.			
4.4.2. To coordinate with ICBP and CCAI in the conduct of organisational capacity needs assessment and planning workshops and to develop capacity interventions at enabling environment, organisational and individual level.			
4.4.3. To conduct specific technical capacity development to continuously improve preparedness and response, capacity and technical capabilities to do high quality vulnerability assessment, drought projection and communication and mitigation/adaptation response.			
4.4.4. To conduct site visit and study tour to relevant drought management sites in the Mekong Basin for exchange of experience.			

Design summary	Indicators	Source of Data	Risk and Assumptions
<p>Outcome 5: Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented.</p>	<p>At least two pilot programme sites in each country have adopted and tested technical approaches and tools for drought characterisation and accurate, reliable, and timely estimation of drought impacts.</p> <p>Utilisation of water resource systems assessments results for development of future scenarios of water utilisation requirements and water resource management planning based on IWRM principles at pilot project sites.</p> <p>Drought impact mitigation mechanisms and management policies developed at the local level to prevent the degradation of community livelihoods and decline of agricultural productivity.</p> <p>At least 70% of drought vulnerability Coordinators, local administrative officials and government officials involved state that their understanding of applying drought management tools and approaches to site specific situations has significantly improved.</p>	<p>Government statistics. Provincial statistics. Programme reports. MRC Sector evaluation studies. Programme baseline data at the program inception. MRC EP and CCAI Independent evaluation at completion. MRC stakeholder satisfaction survey</p>	<ul style="list-style-type: none"> ▪ Willingness demonstrated at the local level to learn and apply drought management and mitigation tools and approaches; ▪ Engagement of policy makers and communities in provision and verification of the analytical results and findings is strong; ▪ Close collaboration is maintained with EP and CCAI to implement pilot project activities and engage communities and National Agencies in pilot studies; <p>Target national agencies have appropriate institutional structures, human and financial resources, monitoring and oversight to contribute to and implement drought management.</p>
<p>Activities of Output 5.1. Pilot/demonstration projects selected based on agreed selection criteria</p>			
<p>5.1.1. To develop jointly with NMCs and LAs, and all relevant MRC Programmes including CCAI, M-IWRM, selection criteria</p>			
<p>5.1.2. To conduct consultation with all NMCs and LAs, as well as other key stakeholders on pilot sites section</p>			
<p>Activities of Output 5.2. Land suitability studied and drought resilient crops analysed for the pilot sites</p>			
<p>5.2.1. To coordinate plans and activities with regional/basin-wide land-use and land suitability assessment under Outcome 3.</p>			
<p>5.2.2. To contribute to and adapt the land use and land suitability approach/procedures and tools developed under Outcome 3</p>			
<p>5.2.3. To describe pilot sites' land productivity and suitability assessment include maps showing agro-ecological zones and land suitability, soil available water holding capacity (AWC) moisture balance and land growing period – such as temperature regime, total rainfall and evapotranspiration and the incidence of climatic hazards).</p>			
<p>Activities of Output 5.3. Drought impacts at selected pilot sites assessed</p>			
<p>5.3.1. To test and refine conceptual model for operationalisation and measurement of drought vulnerability variables at specific pilot locations.</p>			
<p>5.3.2. To conduct comprehensive drought impact and vulnerability surveys to investigate underlying causes and effects of droughts, and support and benefit at the selected pilot sites.</p>			

Design summary	Indicators	Source of Data	Risk and Assumptions
5.3.3. To assess the economic, social and environmental impacts of drought on vulnerable people and water related resource systems at pilot sites to provide a sound reference of the main social and economic impacts that affect respective sectors and environmental health at the local scale.			
Activities of Output 5.4. Selected drought indicator indices tested			
5.4.1. To support and benefit from Output 1.3 for providing tools for drought planning and response.			
5.4.2. To test and refine appropriate drought indicators/indices at site-specific scale.			
5.4.3. To assess data and information gaps and needs, and development of a concrete action plan for improving existing data collection and management systems and networks.			
Activities of Output 5.5. Appropriate impact mitigation mechanisms and management policies developed at the pilot sites and are suitable for replication or up-scaling			
5.5.1. To propose appropriate structural and non-structural measures for drought mitigation and adaptation and appropriate enabling environment for their implementation.			
5.5.1. To assess and recommend replication for drought impacts mitigation and adaptation (nationally or regionally) as appropriate.			

No.	Activity	Timeline																			
		2011				2012				2013				2014				2015			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4	Capacity development for drought preparedness, planning and management																				
4.1	Develop capacity needs assessment and Capacity Development Plan				■	■	■														
4.2	Disseminate lessons learned on drought management from other regions											■	■	■	■	■	■	■	■	■	■
4.3	Conduct capacity development of Member Countries							■						■			■				■
4.4	Sustain training and capacity building on integrated risk management																■	■	■	■	
5	Drought vulnerability assessment, mitigation and adaptation planning pilot studies																				
5.1	Selection of pilot projects based on selected criteria				■	■	■														
5.2	Study land suitability and drought resilient crops													■	■						
5.3	Assess drought impacts at selected pilot sites							■	■	■											
5.4	Test selected drought indicator indices										■	■	■								
5.5	Develop appropriate impact mitigation mechanisms and management policies at pilot sites															■	■	■			

Activities
 Milestones
 Process

Annex 3: Estimated Budget DMP 2011-2015

Programme Name: Drought Management Programme

Organisation: Mekong River Commission

Relevant Value Used: US Dollars

Contribution:

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Outcome 1: A Regional and integrated drought management and mitigation strategy developed and operational						
Reporting and publication lump sum		1,200		1,200		2,400
Contracted National Organisations						
National DMP Coordinators (4): 1,000x12x 4			48,000			48,000
Official Travel and Per Diem						
National workshops and trainings (4): 7,000 x 4		28,000				28,000
Regional workshops (1): 12000*1	12,000		12,000			24,000
International consultant strategy development(1): \$800 *40 days		32,000	32,000			64,000
Regional consultants lesson learnt (2): \$300 *80 days	48,000		48,000			96,000
Miscellaneous 5%						15,520
					Sub-total	325,920
Outcome 2: Effective drought risk/vulnerability assessment, and land suitability and social economics analyses conducted, considering future climate change and economic development						
Reporting and publication lump sum	1,200	1,200	1,200	1,200	1,200	6,000
Contracted National Organisations						
National drought forecasting expert (4): 1,000x12x 4	48,000					48,000
National DMP Coordinators (4): 1,000x12x 4	48,000					48,000
Official Travel and Per Diem						
National workshops and trainings (4): 7,000 x 4	28,000	28,000				56,000
Regional workshops (1): 12000*1	12,000	12,000	12,000			36,000
International consultant indicator development (2): \$800 *60 days		96,000	96,000			192,000
Regional consultants data gap filling and vulnerability asses (2): \$300 *80 days	24,000		24,000			48,000
Non-Expendable Equipment/ Remote Sensing & mapping		40,000	40,000	40,000		120,000

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Miscellaneous 5%						27,700
					Sub-total	581,700
Outcome 3: Coordination in drought related data/information sharing, and cooperation with UMB countries strengthened						
Reporting and publication lump sum		1,200		1,200		2,400
Contracted National Organisations						
National drought forecasting expert (4): 1,000x12x 4					48,000	48,000
National DMP Coordinators (4): 1,000x12x 4					48,000	48,000
Official Travel and Per Diem						
National workshops and trainings (4): 7,000 x 4		28,000	28,000	28,000	28,000	112,000
Regional training (1): 15000*1				15,000	30,000	45,000
Un-dispensable Equipment:						
- Desktop (4)	8,800					8,800
- Laptop (2)	5,000					5,000
- Hydro-met station (5, 7, 8) ⁽³⁾			50,000	70,000	80,000	200,000
- Handling GPS (10) ⁽⁴⁾		6,952				6,952
- DGPS (1) ⁽⁵⁾		10,000				10,000
Miscellaneous 5%						33,407
					Sub-total	711,559
Outcome 4. Capacity development for drought preparedness, planning and management assessed and strengthened						
Reporting and publication lump sum	1,200		1,200		1,200	3,600
Contracted National Organisations						
National drought forecasting expert (4): 1,000x12x 4		48,000				48,000
National DMP Coordinators (4): 1,000x12x 4		48,000				48,000
Official Travel and Per Diem						
National workshops and trainings (4): 7,000 x 4	28,000	28,000	28,000			84,000

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Regional workshops (1): 12000*1		12,000	12,000			24,000
International consultant capacity development (1): \$800 *20 days		16,000				16,000
On-job-training (2 batches of 4 trainees): 1500 x 12		72,000		72,000		144,000
Miscellaneous 5%						18,380
					Sub-total	385,980
Outcome 5: Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented						
Reporting and publication lump sum		1,200		1,200		2,400
Contracted National Organisations						
National drought forecasting expert (4): 1,000x12x 4				48,000		48,000
National DMP Coordinators (4): 1,000x12x 4				48,000		48,000
Official Travel and Per Diem						
National workshops and trainings (4): 7,000 x 4		28,000	28,000	28,000	28,000	112,000
Regional consultants lesson learnt (4): \$300 *40 days		48,000	48,000	48,000	48,000	192,000
Miscellaneous 5%						20,120
					Sub-total	422,520
Programme Management and Technology						
Programme coordinator (1): 4,000 x 12	48,000	48,000	48,000	48,000	48,000	240,000
Regional drought expert (1): 3,200 x 12	38,400	38,400	38,400	38,400	38,400	192,000
Land Use and Scenario Specialist (1): 3,200 x 12	38,400	38,400	38,400	38,400	38,400	192,000
Chief technical advisor (1) 8000*6	32,000	48,000	48,000	48,000	48,000	224,000
Miscellaneous 5%						46,200
Total 5 Years	3,381,879					
Management and Administration Fee (11%)	372,007					
Grand total	3,753,886					

Annex 4: Budget Gap Analysis

The total budget is US\$ 3.76 million for the five year. US\$ 1.2 million for the initial 3-year period are sought through the Japan-ASEAN Integration Fund (JAIF), and US\$ 1 million are to be sought from EU through MRC CCAI. Additional US \$1.56 million is to be sought from other sources.

Outcomes and Outputs	Fund expected from JAIF (USD)	Fund expected from CCAI (USD)	CCAI Aligned Output	Fund to be raised from other sources (USD)
Outcome 1. A regional integrated and comprehensive drought management and mitigation strategy developed and operational	300,000	200,000	1.6.3	350,000
1.1. Inventory of drought management policies developed.	50,000			50,000
1.2. Drought Vulnerability Assessment and Capacity Needs Assessment and Development validated	50,000			100,000
1.3 Lessons learned from other drought-prone regions on drought vulnerability management acquired	50,000			100,000
1.4. Strategic focus, milestones and measures agreed	15,000	200,000	1.6.3	100,000
Outcome 2. Effective drought risk/vulnerability assessment, and land suitability and social economic analyses conducted, considering future climate change and economic development	200,000	400,000		200,000
2.1. Underlying causes and effects of droughts investigated and likely impacts of climate change on drought vulnerability assessed		150,000	1.6.2	
2.2. Drought risk/vulnerability indicators developed for defining vulnerability, impacts, and severity.		150,000	1.6.1	
2.3. Drought indicator thresholds developed for supporting adaptation options		100,000	1.6.1	
2.4 Land suitability estimates and rural agro-land use zoning conducted	100,000			100,000
2.5 Land-use and water resources planning and development conducted	100,000			100,000
Outcome 3: Coordination process in drought related data/information sharing, and cooperation with UMB countries strengthened	300,000	200,000		
3.1. Drought related data acquired, shared, and analysed	50,000			
3.2. Cooperation with UMB countries strengthened	50,000			

3.3 Hydro-meteorological monitoring in the four LMB countries sustained and upgraded	200,000			
3.4. Drought risk and vulnerability communication conducted		200,000	1.6.4	
Outcome 4. Capacity development for drought preparedness, planning and management in the LMB assessed and strengthened	300,000			300,000
4.1. Capacity needs assessed and Capacity Development Plan developed	50,000			
4.2 Lessons learned from other drought-prone regions on drought management enabling environment and capacities disseminated	50,000			
4.3 Capacity development for the MRC Member Countries conducted	50,000			100,000
4.4. Training and capacity building on integrated risk management sustained	150,000			200,000
Outcome 5: Drought vulnerability assessment, mitigation and adaptation planning pilot/demonstration studies implemented	100,000	200,000		700,000
5.1 Pilot/demonstration projects selected based on agreed selection criteria		100,000	1.2.1	
5.2. Land suitability studied and drought resilient crops analyzed for the pilot sites				300,000
5.3. Drought impacts at selected hotspots assessed	50,000			100,000
5.4. Selected drought indicator indices tested	50,000			100,000
5.5. Appropriate impact mitigation mechanisms and management policies developed at the pilot sites and are suitable for replication or up-scaling		100,000	1.2.5	200,000

Annex 5: Outlines of TORS for key programme personnel

1. **The DMP Coordinator (with hydro-met and drought programme management background)** will be responsible for overall programme management work including the development of a detailed programme work plan, budget planning and facilitation, and coordination with national line agencies of the countries.

- Head the DMP Team at MRC Secretariat;
- Manage and coordinate all technical, administrative and financial aspects of the DMP in full compliance with the MRC procedures and standards and applicable donor funding agreements;
- Support OPD Director in running MRCS DMP Task Force;
- Lead the process to work with Member Countries and stakeholders to ensure that appropriate institutional mechanisms and participatory processes are in place to for a participatory and transparent basin development planning and to achieve the Programme objective;
- Lead the needs assessment and design and implementation of institutional and capacity development activities of DMP with the aim to sustain the integrated drought management;
- Ensure the coordination and integration between DMP and other MRC Programmes/activities;
- Liaise, network and promote exchange of MRC/DMP with relevant international and regional organisation, programmes and initiatives;
- Lead the preparation of Programme Implementation Plan (PIP) and annual work plan with clear Performance Management System;
- Manage the budget and mobilise additional financial resources required for its implementation in line with the overall framework of the MRCS;
- Prepare progress, financial and other routine reports in accordance with MRC procedures and specific requirements of the Programme;
- Ensure the timely and effective recruitment of programme staff and mobilisation of personnel and resources required to deliver the Programme outputs and outcome;
- Analyse the needs for training/capacity building for drought mitigation planning at country and regional level and work closely with the Integrated Capacity Building Programme and other DMP specialists to support the design and implementation of DMP-related training/capacity building activities; and
- Facilitate technical support and monitoring of the capacity development activities at the country level.

2. **Chief Technical Advisor (with strong drought vulnerability, socio-economic assessment and resource economics background)** will provide technical advice to both the DMP Coordinator and drought vulnerability assessment and capacity need assessment team to ensure the quality of the DMP implementation outputs. He/she will report to the DMP Coordinator.

- Support DMP Coordinator in identification of scope, technical requirements and required resources for analyses of vulnerability, capacity need and formulation of strategy, as scenario and other assessment of water demand and supply;

- Guide the Drought Specialists to work closely with MRC Programmes, working groups and other partners to ensure the delivery of quality analyses and assessments;
- Assist DMP Coordinator in managing the DMP activities relating to programme level review and assessment, including provision of technical inputs of expertise areas;
- Provide technical directions and inputs including preparation of training materials and guidelines for the design and implementation of training/capacity development activities of the DMP;
- Assist DMP Team in drafting inception report, manage and contribute to the drafting of the important reports and strategic documents of DMP;
- Support DMP Task Coordinator in preparing progress reports and other routine reports in accordance with MRCS procedures and specific requirements of the programme;
- Identify training and capacity building needs with emphasis on complex drought vulnerability;
- Assist the DMP Coordinator in the analysis of the needs for training/capacity building for drought mitigation planning at country and regional level;
- Work closely with the Integrated Capacity Building Programme and other DMP specialists to support the design and implementation of DMP-related training/capacity building activities;
- Assist the DMP Team in the facilitation, technical support and monitoring of the capacity development activities at country level; and
- Provide inputs under areas of responsibility to the Programme Implementation Plan (PIP), Annual work plan and reporting.

3. **The Drought Specialist** (drought management, social studies, poverty reduction specialist) will be in charge of drought vulnerability assessments and report to the DMP Coordinator.

- Identify the needs for socio-economic and other data and information for drought vulnerability assessment and mitigation;
- Ensure that social and economic concerns are incorporated in the drought management works;
- Provide social and economic related inputs to the overall vulnerability assessment framework, strategic studies, development scenario assessment and other impact assessments;
- In coordination with concerned MRC Programmes/Divisions, National Coordinators, working groups and other planning partners, ensure timely mobilisation of inputs and delivery of quality socio-economic data and information and assessments;
- Work closely with the BDP Economist/Capacity Development Specialist for the management and update of the socio-economic databases;
- Contribute to the overall MRC socio-economic activities, including but not limited to the monitoring and regular updates on macro socio-economic development trends in the LMB;
- Participate in the improvement and development of relevant economic tools and guidelines for basin-wide scenario and other assessments;

- Identify training and capacity building needs with emphasis on socio-economic and vulnerability aspects;
 - Assist the DMP Coordinator in the analysis of the needs for training/capacity building for basin development planning at country and regional level;
 - Contribute to the overall MRC socio-economic activities including, but not limited to, the Social Impact Monitoring and Vulnerability Assessment (SIM/VA) led by EP and the assessment of vulnerabilities to climate change by CCAI, etc.; and
 - Ensure the mainstreaming of poverty reduction and gender equity in drought management.
4. **The Land Use and Scenario Specialist** (with drought capacity development and land use [soil] planning and scenario development background) will be in charge of characterisation of meteorological, agricultural and hydrological drought, and report to the DMP Coordinator.
- Assist the DMP Coordinator in the analysis and development of proposals for institutional arrangements (national and regional level);
 - Assess past and current land-use practices and drought protection measures for increasing natural resilience and minimising drought vulnerability;
 - Identify general links between drought and land use and suitability planning and food generally and food security (loss of productive agricultural land);
 - Propose structural and non-structural measures for coping with drought impacts on land use productivity;
 - Formulate objectively verifiable, quantitative standards for land use with respect to agriculture and irrigation water use;
 - Carry out stakeholder consultations to gather information and views; and
 - Conduct stakeholder seminar to discuss and endorse recommendations from the review and assessments of existing land use planning.
5. **National Drought Specialists (four countries)**
- Assist in engaging with the national line agencies, experts and NMC stakeholders and ensure that activities are implemented in a way that suits the country needs and context (i.e., the DMP being a cross-cutting initiative working with, and through other MRC Programmes);
 - Coordinate and mobilise the resources and technical requirements for the main activities of the DMP;
 - Organise assessment of national DMP training needs and identifying training activities consistent with on-going national capacity building;
 - Take parts in conducting vulnerability assessment, capacity need assessment and development, and in delivering workshops and training within their respective countries; and
 - Maintaining regular communication with MRC-DMP team, including the preparation of semi-annual reports (6 monthly reports).

6. National DMP Coordinators (four countries)

- Act as a focal person for coordination and management of the programme activities;
- Be Responsible for coordinating and managing the day-to-day implementation of the DMP Programme at national level;
- Supervise and Coordinate the work of the national consultants, national DMP Staff and NMC staff for effective planning and implementation of DMP and related activities;
- Prepare and manage national Programme Implementation Plan (PIP) and budget;
- Prepare agenda, background information and reports for meetings;
- Arrange and participate in the drafting of work plans, terms of reference, budgets and employment of national consultants and/or line agency sub-contracts for activities at the national level required to support the DMP;
- Arrange meetings and workshops as required and specified in work plans;
- Manage and be accountable for funds provided from the MRC Secretariat for implementation of approved activities;
- Prepare reports for submission to the relevant Line Agencies and NMCs to keep them informed of DMP progress;
- Maintain regular communication with MRC-DMP team, including the preparation of semi-annual reports (6 monthly reports); and
- Perform any other duties related to the coordination and management of national DMP implementation plan including interaction with national stakeholders as assigned.