



Viet Nam National Mekong Committee

NATIONAL INDICATIVE PLAN

**TO IMPLEMENT THE IWRM-BASED BASIN DEVELOPMENT
STRATEGY OF THE MEKONG RIVER COMMISSION**

Hanoi, August 2012

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NATIONAL INDICATIVE PLAN TO IMPLEMENT THE IWRM-BASED BASIN DEVELOPMENT STRATEGY

Executive Summary

The Mekong River with length of almost 4,800 km from its sources in Tibet through China, Myanmar, Lao PDR, Thailand, Cambodia and Viet Nam forms the Delta which is abundant with natural resources but very sensitive with the impact of upstream changes caused by the development, comprises a large part of Mekong Delta in Viet Nam and remaining area of Cambodia. The Mekong river basin with a total area of 795,000 km² has a mean annual discharge of approximately 475 km³ with a very large difference in wet and dry season flow caused by the Southwest monsoon. In almost of area of the Mekong Basin the mean flow in three of dry months accounts for less than 10% of the total annual volume of flow while the flow in three months of wet season occupies more than 50%. The large annual changes of national conditions such as river discharge, flooded areas, the start and end of wet and dry season occurs. In wet season, depending on the fluctuation of water level at Phnom Penh a large 'reversal flow' into Great Lake via Tonle Sap river is created in order to release water to the Mekong Delta in dry season. The large change of hydrology cycle between wet and dry season together with the effect of Tonle Sap river bring a rich ecology for the Delta. In almost flood plain, inundation and drought also frequently occurs. The Mekong is the second most bio-diverse river in the world after the Amazon and supports the world's largest fresh water capture fishery of about 2.3 million tons per year.

The population of LMB is estimated at 60 million (2007), of which about 90% of the population of Cambodia (13 million) and 97% of the population of Lao PDR (5.2 million) are living in the basin. The population of Thailand in the basin accounts for 39% (23 million) of the total in the country (23 million), and 20% of the population of Viet Nam (17 million in the Delta and 3 million in the Central Highland). Population growth in the basin is 1-2% in Thailand, Viet Nam and Cambodia, and 2-3% in Lao PDR. Although urbanization is occurring in all LMB countries, about 85% of the basin's population lives in rural areas. The livelihoods and food security of most of the rural population are closely linked to the water resources in LMB. The rich ecosystem in LMB has a very significant position for the livelihoods of people, especially for poor people who are vulnerable if the river and its ecosystems are degraded. While all LMB countries are making good progress towards achieving MDGs, about 35% of the population of Cambodia and Lao PDR has incomes below the poverty line, with much higher percentages in many rural areas. The LMB is also facing the great challenges of food security and malnutrition. About half of all households have no safe water supply and half all villages are not accessible in bad-weather conditions and isolated in serious flood and storm. Throughout the LMB, inequalities are generally increasing between urban and rural groups.

The average annual withdrawals for agricultural, industrial and other consumptive uses in the LMB are about 60 billion m³ or 12 % of the Mekong's average annual discharge, in which almost is for agricultural production and salinity intrusion's prevention.

At present, there have not been yet any large projects to divert water from the main stream upstream of the Mekong Delta in Viet Nam. Existing reservoir storage of water is less than 5% of the mean annual flow insufficient to redistribute water significantly between seasons. Groundwater use in the Basin is modest except in Northeast Thailand and Viet Nam where surface water is scarce during the dry season.

The flood management projects and programs have just concentrated in the mitigate vulnerability to major flood by non-structural measures such as flood proofing and living with flood etc. Water resources have been developed on a small scale for the improvement of wetlands and aquaculture and this development is normally combined with other uses such as irrigation and flood management. The river's annual flood pulse continues to support a rich fishery; although there are reports of declining catches.

Navigation is important for goods transportation from the countries and zones in the basin. There are two zones with different characteristics that are the Mekong Delta between Viet Nam and Cambodia and upstream serving for China, Myanmar, Lao PDR and Thailand. However, navigation program in the basin is undeveloped as an integrated transport sector in order to link road transport system with navigation to support economic and cultural and tourism development.

The monitoring of river systems in the Mekong Basin indicates the flow regime of the mainstream is mostly in its natural state due to no large projects intervened in the mainstream. Water quality is generally good, except in the Delta and other areas with extensive development, where high nutrient levels are a cause for concern. With increasing demand for timber and land for agricultural cultivation and livelihood, deforestation and soil degradation have occurred in many areas of the basin. The un-sustainability of water and related resources use and exploitation in the basin need to adequately be studied and assessed in future.

1. Development trends and emerging issues

The Mekong region is rapidly growing and integrating into the world's economy. High demand of energy and the availability of private finance are making renewable hydropower increasingly attractive and accelerating its development in the LMB. Global food shortages due to high population and rising prices pertains the development of hydraulic infrastructure systems to serve for agricultural production attracting foreign investments. Climate change can affect to the availability of water resources and water requirements. The Mekong Delta is predicted highly vulnerable to sea level rise. The above issues need to be taken into account, as compulsory condition of the water related development planning in response to global tendency and climate change.

In upper Lan Cang – Mekong basin, China is completing its hydropower cascade on the Lan Cang river: the Manwan, Dachaoshan and Jinghong dams are currently operational; Xiaowan will be soon operational and Nuozhadu will complete in 2014. The Xiaowan and Nuozhadu dams with 9,8 and 12,4 billion m³ of active storage , may cause significant seasonal redistribution of flow from the wet season to the dry season and further reduce sediment transport in the Mekong mainstream, providing both opportunities and risks to downstream countries. The cooperation with China based on the GMS economic integration and other

initiatives to ensure dry season flow security and predict long term water resources planning should be a strategic priority the LMB countries.

In the LMB, economic growth across the LMB is expected to rapidly continue, supported by economic diversification, regional economic integration, and investments in infrastructure and human resource development. Lao PDR and Cambodia make efforts to graduate from least developed country status, while Viet Nam strives to achieve middle-income status by 2030. Increasing populations and living standards and growing economics will accelerate food and electricity demand. Besides it, the LMB countries are still facing persistent rural poverty, challenges of regular and devastating effects of severe flood and droughts which claims lives and property and cause substantial economic losses. To be able to address these issues, all LMB countries have requirements of the intensive use of river potential for irrigation, fisheries, hydropower generation, navigation and flood management and other uses. All countries currently make efforts to integrate poverty reduction strategy into the national and sector socio-economic plans that are closely related to water resources for purposes of irrigated agriculture development and flood management; hydropower development; water supply and other uses with taking into account of climate change issues.

At present, 26 hydropower projects with capacity higher than 10 MW are under construction on tributaries, together with the dams in China, creating 36 billion m³ of additional active storage. Over the next 20 years, further LMB dams are planned, including 12 mainstream dams and 30 tributary dams to add 21 billion m³ of active storage to the Mekong river system. This is a factor need to be cautiously considered in the assessment of development scenarios in future.

In the LMB, there are 12 mainstream dams under consideration and all are run-of- river dams, with limited active storage and regulation potential. The projects could get very high revenues as compared with tributary dams, new jobs in the period of construction and operation is created. However, the environmental and socio-economic impacts caused by the mainstream dams is substantial, about 60% of the biodiversity-rich river channel is lost due to river disconnection, many hotspots are highly impacted, a near-total barrier to fish migration along most of the mainstream could be happened if there is new technology of fish-passage facilities is to be provided, in addition, serious risks to some flagship species such as giant catfish and Irrawaddy dolphin are at risk of extinction. The further impact is to reduction of capture fisheries by 15%. The mainstream dams also cause the trap of sediment and nutrient, and this become more serious in combination with the upper Lan Cang and tributary dams.

There are plans to increase dry season irrigation by 50% (1.2-1.8 million ha) in the next 20 years, with Lao PDR planning to expand irrigation from 100,000 to over 300,000 hectares. Major irrigation expansion is being studied in Cambodia, linked to investments in flood control in the undeveloped Cambodian Delta, and elsewhere linked to hydropower development. Mainstream water diversions have long been considered by Thailand, to complement national approaches to alleviate droughts in the Northeast. LMB countries also plan to further develop aquaculture and improve fisheries management, navigation, flood and drought management and tourism development. Aquaculture growth is forecasted to double to 4 million tons in the next 20 years.

Development on this scale will bring both great opportunities and high risks which are not the same across basin and for each population group. Besides it, while promoting private

investments in water resources development, strong Government's legal and regulation frameworks are required to manage sustainable development.

As soon as the Mekong Agreement 1995 had been signed, one of the MRC priorities was to prepare Basin Development Plan taking into account basin-wide projects (Article 2)

Under the framework of the Basin Development Plan (BDP), MRC has formulated the IWRM-based Basin Development Strategy (hereafter called Strategy). The Strategy will provide guidance for water resources development and management forwards to the sustainability, equitable and reasonable use of the Mekong river water resources precious for more than 60 million people living in the Basin. With such an importance of the implementation of Mekong Agreement, all MRC countries have agreed to raise their cooperation to a new high level through a MRC Summit which first meeting organized in Hua Hin, Thai Lan on the 5th of April 2010.

At the first Summit, all the heads of the MRC countries' Government had reaffirmed their continued commitment to the cooperation and promotion of the sustainable development, utilization, conservation and management of water and related resources to achieve "meeting the needs, keeping the balance toward Sustainable Development of the Mekong Basin". The Summit has emphasized the further cooperation for addressing the important challenges emerging in the Basin, including flood and drought risks management; consideration of hydropower sustainability, mitigation of the deterioration of water quality, loss of wetland and deforestation causing risks to the biodiversity and livelihoods of the people; better management of the source of natural fisheries, and carrying out researches in order to put forward measures to mitigate the threat to livelihoods caused by climate change.

2. The IWRM-based Basin Development Strategy

The IWRM-based Basin Development Strategy is the outcome of the MRC long term aspiration in the process to formulate Mekong basin development planning (BDP). The Strategy, if well implemented will provide valuable guidance for the construction of water infrastructures and management of development under a sustainable manner, and ensure reasonable and equitable share of benefits brought about from the use and exploitation water and related resources.

The Strategy also aims to produce basic principles and necessary actions to support accelerating developments, but toward the sustainability of the basin. At the same time, the formulation is based on the prediction of development scenarios and their impacts to environment, social and economic conditions in order to set forth effective measures of immediate and long term management with national and basin scope. With thus, the Strategy contributes to achieve the basin vision that is "economically prosperous, socially just and environmentally sound".

The Strategy is therefore developed on the base of the assessment of development scenarios impacts with regard to negative and positive perspectives.

The Strategy has defined 13 priorities including:

- Address the opportunities of the on-going developments including development in the Lancang-Upper Mekong Basin.

- Expand and intensify irrigated agriculture for food security and poverty alleviation.
- Improve the sustainability of hydropower development.
- Acquire essential knowledge to address uncertainty and minimize risks of the identified development opportunities.
- Seek options for sharing the potential benefits and risks of development opportunities.
- Adap to climate change.
- Integrate basin development planning considerations into national systems.
- Establish basin objectives and management strategies for water-related sectors.
- Strengthen national level water resources management processes.
- Strengthen basin management process.
- Develop environmental and social objectives and “basinline indicators.
- Implement a targeted IWRM capacity building programme.
- Studies and water resources management and Sector Guidelines.

3. Purpose of the Viet Nam National Indicative Plan

In January 2010, after approving the IWRM-based Basin Development Strategy, the MRC Council had requested the NMCs to prepare their respective National Indicative Plan for the implementation of the priorities mentioned in the Strategy in coordination with the prioritized activities at the regional level.

Overall Goal

Strengthen the integrated water resources management in the Mekong Delta and Central Highland aimed at promoting economic and social development and environmental protection, at the same time to create scientific and legal bases for the cooperation in the Mekong River Commission to successfully implement the IWRM-based Basin Development Strategy.

Immediate Objectives

Define crucial issues Viet Nam needs to address through the formulation of projects, programs to coordinate and support the implementation of national strategies, policies and MRC strategic actions, and supplement knowledge for updating of basin development scenarios and revising the IWRM-based Basin Development Strategy.

4. Focus Areas for Viet Nam and Proposed Projects

To be able to implement the Strategy aimed to capture opportunities and mitigate negative impacts for protection of the Mekong resources’ benefits of Viet Nam in the Mekong Delta and Central Highland, at first step it is necessary for Viet Nam to define its focus areas or issues to be addressed in this strategic period through projects, programs or activities to achieve set out objectives. There are many issues while being resolved which needs cooperation between the MRC countries, some issues need to be studied by individual country in order to have scientific bases for negotiating for national benefits and mutual ones. When defining the focus areas, one of importance is that the focus areas have to reflect or link closely to the national policies, strategies and plans as well as national priorities in water resources development and management.

In Viet Nam territory there are two sub-basins identified in the BDP program, namely 10 V (Mekong Delta) and 7 V (Se San, Srepok river basins). Both sub-basins play a very important strategic role in social and economic development, political security of the country and promotion of the cooperation with the MRC other countries. Each sub-basin has specific characteristics of geography, hydrology and social economic development (see Chapter 1).

To be able to study and select focus areas, Vietnam National Mekong Committee has assessed the above conditions of the both sub-basins and defined their issues to be addressed on the base of cooperation in the MRC for successfully implementing the IWRM-based Basin Development Strategy.

When projects are formulated and entered into the NIP, one of the challenges facing to VNMC is how to mobilize qualified staff and set up effective tools for the implementation and management of the NIP. It is obvious that this is a regular and permanent task and it should be also considered as one of the focus areas based on which projects of capacity building will be prepared and included in the NIP.

Proposed Projects in NIP for the Mekong Delta

Mekong Delta belonging to Viet Nam is located in the most downstream of the Mekong basin. Although it has many good conditions for social and economic development, but the Mekong Delta is also suffering the impacts caused by natural disasters and may be suffered the potential negative impacts caused by the upstream development if there is no proper management. These impacts comprise changes of flow pertaining to bank erosion, shortage of water for irrigation and domestic supply in dry season, risks in flood season, fish migration and breeding and loss of fish capture, reduction of sedimentation and nutrient, salinity intrusion and water pollution. These issues need to be taken into account when national and sector development plans are formulated for meeting the requirements of social economic development while still ensuring environmental objectives for the Mekong Delta.

Focus Area 1. Address the integration and harmonization of national planning process into/with the IWRM-based Basin Development Strategy and Strengthen national water resources management process.

Proposed Projects

- 1.1 Establish processes and procedures for integration of national and sector planning into the IWRM-based Basin Development Strategy of MRC.
- 1.2 Study of the solutions for strengthening water resources management in the Mekong Delta.
- 1.3 Preparation of procedures for notification of water resources infrastructure projects' development and operation in the Mekong Delta
- 1.4 Preparation of Guidelines for data and information sharing for the Mekong Delta in accordance with the requirements of the MRC and country.

Focus Area 2. Development of vision for the Mekong Delta in the context of integrated water resources management; Updating sector management strategies (irrigation, agriculture, navigation etc); Development of environmental, economic and social

objectives to be considered as base line for monitoring water resources development in the Mekong Delta

Proposed projects

- 2.1 Development of vision for the Mekong Delta in the context of IWRM and environmental, economic and social objectives to support the monitoring development projects
- 2.2 Updating the water resources development scenarios for the Mekong Delta to be used for reviewing and improving the basin development scenarios
- 2.3 Preparation of state of environment report for the Mekong Delta
- 2.4 Upgrading and Expansion of monitoring system for water resources and environmental management in the Mekong Delta and upstream development
- 2.5 Improve Knowledge Base in the VNMC Secretariat and concerned line agencies

Focus Area 3. Address the opportunities and consequences of the on-going development including development in the Upper Mekong Basin aimed at enhancing the sustainability of development projects in the Basin

Proposed Projects

- 3.1 Assessment of the impacts of the operation of upstream dams, especially in extremely uncertainty operation in combination with the inter-basin and intra water diversion projects to the Mekong Delta including Cambodia territory and recommendation on mitigation measures
- 3.2 To set forth measures to use new development opportunities for the Mekong Delta under the circumstance of increased dry season flow resulted from reasonable operation of the upstream dams as scientific bases to support for VNMC's negotiation in protecting dry season flow for the Mekong Delta
- 3.3 Effective implementation of the Navigation Agreement between Viet Nam and Cambodia in the context of upstream development and climate change.
- 3.4 Based upon the scientific and realistic justifications to establish principles for defining the potential of agricultural development and preliminary principles for cost/benefit sharing amongst the water use sectors in the Mekong Delta
- 3.5 Mekong Delta study on the impacts of upstream hydropower and water infrastructure development

Focus Area 4. Improvement of water use efficiency for irrigated agriculture to serve for national food security and poverty alleviation policy.

Proposed Projects

- 4.1 Improvement of water use efficiency for irrigated agriculture and fishery development in the Mekong Delta.
- 4.2 Development of Strategy for drought management and water supply.
- 4.3 Diversification of agriculture production and rural development in the situation of upstream development, climate change and sea water rise.
- 4.4 Integrated flood plain management for Viet Nam and Cambodia.
- 4.5 Preliminary study for water allocation at the main canal intake to main stream of Mekong river and environmental flow for the Mekong Delta.

Focus Area 5. Assessment of uncertainties and risks caused by developments and climate change

Proposed Projects

- 5.1 Identification of uncertainties and risks related to mechanism of sediment transport and nutrient; and assessment of the impacts of upstream development to sediment and nutrient entering into the Mekong Delta.
- 5.2 Study of flood impacts to the quality and efficiency of fluvial land use in the Mekong Delta, Viet Nam.
- 5.3 Define the issues and analyze uncertainties and risks affecting to the fishery resources in the context of emerging development in the basin and its implication to the livelihood of people living in the Mekong Delta.
- 5.4 Assessment of tendency and change of biodiversity, environmental hotspots in the Mekong Delta and their impacts to the vulnerable communities.
- 5.5 Assessment and prediction of the immediate and long-term impact of climate change to the Mekong Delta under the condition and tendency of emerging development in the basin.

Proposed Projects in NIP for the Se San and Srepok river sub-basins

The Se San and Srepok basins in the Central Highland accounted for 11% of the total flow volume of the whole Mekong Basin have potentials for the hydropower development. With a rapid hydropower development the Se San and Srepok are facing the environmental challenges caused by the lack of integrated water resources management. These sub-basins with important watershed if not managed in an integrated manner will affect to the whole basin, especially potentials for trans-boundary impacts.

Focus area 6. Integration and harmonization of the national planning process in the sub-basins of Se San and Srepok river with the MRC Strategy and strengthening water resources management process in these sub-basins

Proposed Projects

- 6.1 Development a vision for the sub-basins of Se San and Srepok in the context of IWRM together with environmental, economic and social objectives and State of sub-basins report to support the monitoring of developments and environmental impacts
- 6.2 Preparation of the formulation of Integrated Water Resources Management Strategy taking into account of trans-boundary impacts
- 6.3 Development of the procedures for integration and harmonization of sectors management strategies with the regional strategies with respective to the specific conditions of the two rivers
- 6.4 Development of Procedures for notification of water and related resources infrastructure projects for VNMC aimed to support VNMC in solving trans-boundary impact issues and implementing the IWRM-based basin development Strategy
- 6.5 Strengthening the operation of existing Srepok River Basin Organization
- 6.6 Initial Preparations for the establishment of Se San River Basin Organization

- 6.7 Development a suitable mechanism for cooperation with Cambodia to successfully implement the IWRM-based Basin Development Strategy
- 6.8 Upgrade and expand the network for monitoring water use, especially at the border areas and study to establish network for biodiversity and ecological monitoring for the sub-basins of Se San and Srepok

Focus Area 7. Enhancement of the sustainability of tributaries' hydropower development through mitigation of negative impacts of the construction and operation of hydropower dams in the Se San and Srepok river basins to downstream, including Cambodia territory and mainstream flow change and address the issues of cost and benefit sharing between the sectors and sub-basin's countries

Proposed Projects

- 7.1 Assess the impacts of flow change caused by the development and operation of upstream hydropower dams to downstream and Cambodia territory; recommendations on mitigation measures
- 7.2 Defining the potential of flow contribution and its impacts to the change of flow in the main stream of Mekong river
- 7.3 Conservation of ecological and environmental hotspots through solutions forward the sustainability for the Se San and Srepok sub-basins
- 7.4 Upgrade and preparation of the standards for sustainable hydropower development for the Se San and Srepok basin rivers
- 7.5 Preparation of basic principles and options for cost and benefit sharing as one of important solutions for sustainable development and bases for promoting cooperation in the MRC

Focus Area 8. Assessment of potential impacts of climate change to water and related resources and socio-economic conditions in the sub-basin of the Se San and Srepok, Central Highland of Viet Nam

- 8.1 Identification of the issues of climate change, build up approach and database to support the studies of measures to response to climate change in immediate and long term period
- 8.2 Assess the potential impacts of climate change combined with the construction and operation of projects to the environment, socio-economics of the sub-basin of Se San and Srepok river, including Cambodia territory and integrate the issues of climate change in the sub-basin into the basin scenarios

Capacity building projects

Focus area 9. Improvement of knowledge and raising of awareness to meet requirements of the implementation of the IWRM-based Basin Development Strategy

Proposed Projects

- 9.1 Formulate a Program for raising awareness of the IWRM-based Basin Development Strategy and how to implement it
- 9.2 Prepare a strategy of VNMC for involving the participation of stakeholders and community in implementing the IWRM-based Basin Development Strategy and Mekong Agreement

9.3 Improvement and upgrade of modeling tools for application in the assessment and monitoring of water utilization and support the application of DSF and implementing the MRC procedures

9.4 Development of methodology and approach to study measures to response to climate change

The total of 9 focus areas with 45 proposed projects entered into the NIP will be able to contribute together with other MRC countries, to successfully implement the IWRM-based Basin Development Strategy. However, with a limitation of timing and budget, it is difficult to implement all proposed projects within the strategic period of five years. Therefore, a list of prioritized projects must be made and time table for their implementation beyond the next period need to be clearly specified in PINs and Timetable (see item 4.3 Implementation Plan). Projects will be implemented according to priority order and depends on the fund availability secured for the projects. The NIP will be implemented for the period from 2012-2015 as seen in Table 2, Annex C.

Through the analysis of the projects' necessity, the consideration of priority should concentrate in institutionalizing the integration and development of the in-country procedures into the MRC procedures and strategies as well as regional policies; in studies to assess the impacts caused by the upstream development and water utilization; addressing the risks because of a lack of data and information; and monitoring activities. There are several studies and researches related to the NIP that had been undertaken by the VNMC at the request of the Government in year 2011, for example the project of the assessment of impacts caused by the hydropower development in combination with the upstream water diversion. This project remains some activities in year 2012 and these activities can be linked to the projects proposed in the NIP. Therefore, when elaborating PIN into the project proposal, VNMC will discuss with the line agencies concerned of the on-going activities to avoid any overlaps. The followings are projects which will be implemented in 2012:

- Focus Area 1 consists of projects FA1.1, FA1.2, FA1.3 and FA1.4;
- Focus Area 2 consists of FA2.2, FA2.3 and FA2.5;
- Focus Area 3 consists of FA3.1, FA3.2 and FA3.5;
- Focus Area 4 consists of FA 4.3 and FA 4.4
- Focus Area 5 consists of FA5.1, FA5.3, FA5.4 and FA5.5;
- Focus Area 6 consists of FA6.3, FA6.5, FA6.6, FA6.7 and FA6.9;
- Focus Area 7 consists of FA7.2, FA7.3 and FA7.4;
- Focus Areas 9 consists of FA9.1, FA9.2 and FA9.3.

The total of 27 projects could be implemented in year 2012 and the remaining is recommended for 2013 and may be beyond the strategic period.

The projects of NIP that are approved and financed for implementation must be put in the annual plan of the respective line agencies when they are assigned as implementing and involved agencies. The evaluation of the project's implementation will be followed by the regulation and guidelines of the VNMC and line agencies concerned.

5. Additional Funding Requirement

The fund provided for the projects of NIP will be born from the national budget for the Ministries' Programs, of the VNMC, and MRC programs funded by the development partners and other international initiatives. Annually, Line Agencies are requested to work with the VNMC in preparing the budget estimation for the NIP projects assigned for seeking fund from the Government to provide for the respective Ministries, from VNMC budget and from the MRC. The consideration and approval of budget for the NIP year 2012-2015 need to connect with the decentralization policy of some core function activities of river basin management of the MRC for the period 2011-2015 and next one as committed by the MRC countries.

When reviewing the important strategies and policies shows that the Government of Viet Nam has given attentions to the prevention, control and mitigation of the natural disaster; national strategy for adaptation and response to the climate change; strategic direction of water resources and hydraulic works; national target water program etc. These strategies and policies are interact to each other and required a close coordination and cooperation amongst the Ministries and Sectors concerned for effective implementation and management.

With such, the provision of national budget as well as seeking fund from external source of fund for implementing the national strategies and NIP is issue needs to be carefully considered in order to avoid any overlaps and even leading to different points of view or recommendations. The cost estimation for the implementation of the NIP as indicated in the PIN which is based on the analysis of inheritance of related studies/projects is very complicated and is not made exactly from the beginning. Therefore, the fund requirement needs to be reconsidered and revised during the preparation of the project proposals.

To be able to avoid the delay of project implementation, VNMC Secretariat should review the activities that are implemented by national budget in its plan for 2012-2013 in accordance with the tasks assigned by the Government in order to integrate some of these activities in the NIP. Besides it, the review of bilateral international cooperation projects (WB funded Mekong-IWRM project) and MRC other programs is to seek supports in time at a certain extent for the activities included in the NIP. By doing so, the implementation of the NIP will be smoothly started and effectively continued and at the same time to mitigate financial risks as described in the Chapter 5.

6. Implementation Arrangement

In order to successfully implement the Strategy in general and National Indicative Plan in particular it is necessary to define clearly link between the agencies which are responsible for implement NIP, in supporting and management, in monitoring at all levels. Figure 3 describes the structure for implementing the NIP.

Steering Committee

Vietnam National Mekong Committee will establish a Steering Committee to guide all tasks at national level for implementing the NIP. The Committee will be chaired by Vice-Minister of Ministry of Natural Resources and Environment cum Vice Chairman of VNMC and two Deputies of the Steering Committee will be designated to Director General of VNMC Secretariat and Director of Water Resources Department. Members of the Steering Committee are the representatives of Departments of the Ministry Members of VNMC such as MARD,

MONRE, MOT, MOFA, MPI, Ministry of Industry and Trade (MOIT), Ministry of Construction (MOC).

Responsibilities of the Steering Committee

The Steering Committee assumes responsibility to guide addressing the issues related to the preparation of implementation plans, mobilization of resources and funds, advice of resolving the issues related to policies in integrated water and related resources management and monitoring.

The members of SC participate in the meeting to evaluate NIP progress and discussion and making decision of the solutions for improvement of the coordination in the implementation of the NIP.

Provide advice to the VNMC of activities in the cooperation with the MRC to together set forth measures to mitigate adverse impacts and protect Mekong resources and facilitate in implementing projects to bring in the benefits for the country to serve for the policies of the socio-economic development.

Provide assistance in mobilization of resources of the respective Sectors for successfully implementing the NIP.

Working Group

There will be two working groups established to support the NIP implementation in the Mekong Delta and Central Highland. The working group's members are representatives of the line agencies who are implementing projects, representatives of the related Provincial Departments, Private Sectors responsible for investment in the provinces. The management of the VNMC Secretariat assumes the chairmanship of the working group.

The responsibilities of National Working Group

The Working Group has to provide comments in technical issues in the process of implementation of the NIP, provide with necessary information to support for direction and guidance of the studies and researches for the projects in line with the functions, responsibilities of the respective line agencies.

Take part in the meeting to review and evaluation of the progress of projects, quality of products as well as to mobilize resources for implementing projects.

Make recommendations to the Steering Committee on the measures to overcome difficulties and constraints in the project process in order to have improvements in time.

At any time when projects faced with the sensitive problems and needs to be reported to the Government, the Ministry of Natural Resources and Environment on behalf of the Steering Committee has to report to the National Council for Water Resources for any guidance before reporting to the Government.

NATIONAL INDICATIVE PLAN TO IMPLEMENT THE IWRM-BASED BASIN DEVELOPMENT STRATEGY

1. Introduction

1.1 Background

a. General in natural resources and development situation in the basin

The Mekong River with length of almost 4,800 km from its sources in Tibet through China, Myanmar, Lao PDR, Thailand, Cambodia and Viet Nam forms the Delta which is abundant with natural resources but very sensitive with the impact of upstream changes caused by the development, comprises a large part of Mekong Delta in Viet Nam and remaining area of Cambodia. The Mekong river basin with a total area of 795,000 km² has a mean annual discharge of approximately 475 km³ with a very large difference in wet and dry season flow caused by the Southwest monsoon. In almost of area of the Mekong Basin the mean flow in three of dry months accounts for less than 10% of the total annual volume of flow while the flow in three months of wet season occupies more than 50%. The large annual changes of national conditions such as river discharge, flooded areas, the start and end of wet and dry season occurs. In wet season, depending on the fluctuation of water level at Phnom Penh a large 'reversal flow' into Great Lake via Tonle Sap river is created in order to release water to the Mekong Delta in dry season. The large change of hydrology cycle between wet and dry season together with the effect of Tonle Sap river brings a rich ecology for the Delta. In almost flood plain, inundation and drought also frequently occurs. The Mekong is the second most bio-diverse river in the world after the Amazon and supports the world's largest fresh water capture fishery of about 2.3 million tons per year.

Socioeconomic condition

The population of LMB is estimated at 60 million (2007), of which about 90% of the population of Cambodia (13 million) and 97% of the population of Lao PDR (5.2 million) are living in the basin. The population of Thailand in the basin accounts for 39% (23 million) of the total in the country (23 million), and 20% of the population of Viet Nam (17 million in the Delta and 3 million in the Central Highland). Population growth in the basin is 1-2% in Thailand, Viet Nam and Cambodia, and 2-3% in Lao PDR. Although urbanization is occurring in all LMB countries, about 85% of the basin's population lives in rural areas. The livelihoods and food security of most of the rural population are closely linked to the water resources in LMB. The rich ecosystem in LMB has a very significant position for the livelihoods of people, especially for poor people who are vulnerable if the river and its ecosystems are degraded. While all LMB countries are making good progress towards achieving MDGs, about 35% of the population of Cambodia and Lao PDR has incomes below the poverty line, with much higher percentages in many rural areas. The LMB is also facing the great challenges of food security and malnutrition. About half of all households has no safe water supply and half all villages are not accessible in bad-weather conditions and isolated in serious flood and storm. Throughout the LMB, inequalities are generally increasing between urban and rural groups.

Water Resources Development and Management

The average annual withdrawals for agricultural, industrial and other consumptive uses in the LMB are about 60 billion m³ or 12 % of the Mekong's average annual discharge, in which almost is for agricultural production and salinity intrusion's prevention.

At present, there have not been yet any large projects to divert water from the main stream upstream of the Mekong Delta in Viet Nam. Existing reservoir storage of water is less than 5% of the mean annual flow insufficient to redistribute water significantly between seasons. Groundwater use in the Basin is modest except in Northeast Thailand and Viet Nam where surface water is scarce during the dry season.

The flood management projects and programs have just concentrated in the mitigate vulnerability to major flood by non-structural measures such as flood proofing and living with flood etc. Water resources have been developed on a small scale for the improvement of wetlands and aquaculture and this development is normally combined with other uses such as irrigation and flood management. The river's annual flood pulse continues to support a rich fishery; although there are reports of declining catches.

Navigation is important for goods transportation from the countries and zones in the basin. There are two zones with different characteristics that are the Mekong Delta between Viet Nam and Cambodia and upstream serving for China, Myanmar, Lao PDR and Thailand. However, navigation program in the basin is undeveloped as an integrated transport sector in order to link road transport system with navigation to support economic and cultural and tourism development.

The monitoring of river systems in the Mekong Basin indicates the flow regime of the mainstream is mostly in its natural state due to no large projects intervened in the mainstream. Water quality is generally good, except in the Delta and other areas with extensive development, where high nutrient levels are a cause for concern. With increasing demand for timber and land for agricultural cultivation and livelihood, deforestation and soil degradation have occurred in many areas of the basin. The un-sustainability of water and related resources use and exploitation in the basin need to adequately be studied and assessed in future.

Water resources management in LMB in the context of international river basin: In the LMB, water resources management at regional level is implemented through the coordination by the MRC with its legal and technical assistance and on the base of the riparian countries' cooperation. In MRC countries, the models of water resources management at national level is controlled by individual sovereignty, custom and administrative systems as well as depending on their own economic development. The MRC with its mandate as stipulated in the Mekong Agreement 1995 acts as a focal point for cooperation, assisting in achieving basin-wide aims through provision of shared information, technical guidance and mediation. At present there is positive change in all countries of water resources management, especially in the establishment of policy and strategy of water resources. Institutional and regulatory frameworks are improved and strengthened towards modernization of water resources management in order to increasingly support the implementation of policy and strategy and then help the line agency who assumes responsibilities of water resources management fulfill its functions and tasks. In all LMB countries, river basin organization/committees are being considered and established to

become a body mainly responsible for integrated water resources management with participation of Government authorities/agencies, communities, private investment sectors etc at basin, provincial and local level.

Development trends and emerging issues

The Mekong region is rapidly growing and integrating into the world's economy. High demand of energy and the availability of private finance are making renewable hydropower increasingly attractive and accelerating its development in the LMB. Global food shortages due to high population and rising prices pertains the development of hydraulic infrastructure systems to serve for agricultural production attracting foreign investments. Climate change can affect to the availability of water resources and water requirements. The Mekong Delta is predicted highly vulnerable to sea level rise. The above issues need to be taken into account, as compulsory condition of the water related development planning in response to global tendency and climate change.

Integration is a significant trend in the Greater Mekong Sub-region (GMS) and LMB countries – members of the Association of South East Asian Nations (ASEAN). The MRC countries have signed some agreements within ASEAN for economic integration and promotion of regional approaches to sector development and building trust in implementing priority programs. The GMS cooperation framework also concentrates in promoting regional power trade to develop the sub-region's energy potential, the facilitation of the development grid interconnection, and private sector investment. The GMS Core Environment Program is improving environmental planning and management capacities for strategic environmental assessment of sector strategies and plans, promotion of pro-poor biodiversity conservation corridor and environmental management.

In upper Lan Cang – Mekong basin, China is completing its hydropower cascade on the Lan Cang river: the Manwan, Dachaoshan and Jinghong dams are currently operational; Xiaowan will be soon operational and Nuozhadu will complete in 2014. The Xiaowan and Nuozhadu dams with 9,8 and 12,4 billion m³ of active storage, may cause significant seasonal redistribution of flow from the wet season to the dry season and further reduce sediment transport in the Mekong mainstream, providing both opportunities and risks to downstream countries. The cooperation with China based on the GMS economic integration and other initiatives to ensure dry season flow security and predict long term water resources planning should be a strategic priority the LMB countries.

Table 1. *Hydropower Cascade Planning in Lan Cang river*

No	Dams	Head (m)	W_{total} ($10^6 \cdot m^3$)	N_{inst} (MW)	Planned for operation
1	Gongguoqiao	77	510	750	
2	Xiaowan	248	15,130	4,200	2013
3	Manwan	89	920	1,550	1995
4	Dachaoshan	80	933	1,350	2003
5	Nuozhadu	205	24,670	5,850	2013 – 2016

6	Jinghong	67	1,040	1,750	2010
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In the LMB, economic growth across the LMB is expected to rapidly continue, supported by economic diversification, regional economic integration, and investments in infrastructure and human resources development. Lao PDR and Cambodia make efforts to graduate from least developed country status, while Viet Nam strives to achieve middle-income status by 2030. Increasing populations and living standards and growing economics will accelerate food and electricity demand. Besides it, the LMB countries are still facing persistent rural poverty, challenges of regular and devastating effects of severe flood and droughts which claims lives and property and cause substantial economic losses. To be able to address these issues, all LMB countries have requirements of the intensive use of river potential for irrigation, fisheries, hydropower generation, navigation and flood management and other uses. All countries currently make efforts to integrate poverty reduction strategy into the national and sector socio-economic plans that are closely related to water resources for purposes of irrigated agriculture development and flood management; hydropower development; water supply and other uses with taking into account of climate change issues.

At present, 26 hydropower projects with capacity higher than 10 MW are under construction on tributaries, together with the dams in China, creating 36 billion m³ of additional active storage. Over the next 20 years, further LMB dams are planned, including 12 mainstream dams and 30 tributary dams to add 21 billion m³ of active storage to the Mekong river system. This is a factor need to be cautiously considered in the assessment of development scenarios in future.

In the LMB, there are 12 mainstream dams under consideration and all are run-of- river dams, with limited active storage and regulation potential. The projects could get very high revenues as compared with tributary dams, new jobs in the period of construction and operation is created. However, the environmental and socio-economic impacts caused by the mainstream dams is substantial , about 60% of the biodiversity-rich river channel is lost due to river disconnection, many hotspots are highly impacted, a near-total barrier to fish migration along most of the mainstream could be happened if there is new technology of fish-passage facilities is to be provided, in addition, serious risks to some flagship species such as giant catfish and Irrawaddy dolphin are at risk of extinction. The further impact is to reduction of capture fisheries by 15%. The mainstream dams also cause the trap of sediment and nutrient, and this become more serious in combination with the upper Lan Cang and tributary dams.

There are plans to increase dry season irrigation by 50% (1.2-1.8 million ha) in the next 20 years, with Lao PDR planning to expand irrigation from 100,000 to over 300,000 hectares. Major irrigation expansion is being studied in Cambodia, linked to investments in flood control in the undeveloped Cambodian Delta, and elsewhere linked to hydropower development. Mainstream water diversion has long been considered by Thailand, to complement national approaches to alleviate droughts in the Northeast. LMB countries also plan to further develop aquaculture and improve fisheries management, navigation, flood and drought management and tourism development. Aquaculture growth is forecasted to double to 4 million tons in the next 20 years.

Development on this scale will bring both great opportunities and high risks which are not the same across basin and for each population group. Besides it, while promoting private investments in water resources development, strong Government's legal and regulation frameworks are required to manage sustainable development.

Table 2 Mainstream hydropower dams planned in Lao PDR

Name of Project	F_{basin} (km ²)	$F_{\text{reservoir}}$ (km ²)	Normal high WL (m)	Dead WL (m)	W_{active} (10 ⁶ .m ³)	N_{inst} (MW)
Pak Beng	218,000	110	345	340	442.4	1,230
Luang Prabang	230,000	110	320	310	936.7	1,410
Sayaboury	272,000	30	275	270	224.7	1,260
Pak Lay	283,000	110	240	235	383.5	1,320
DonSahong			74.5	72	115	360

Source: Basin Development Program (MRC. 2009)

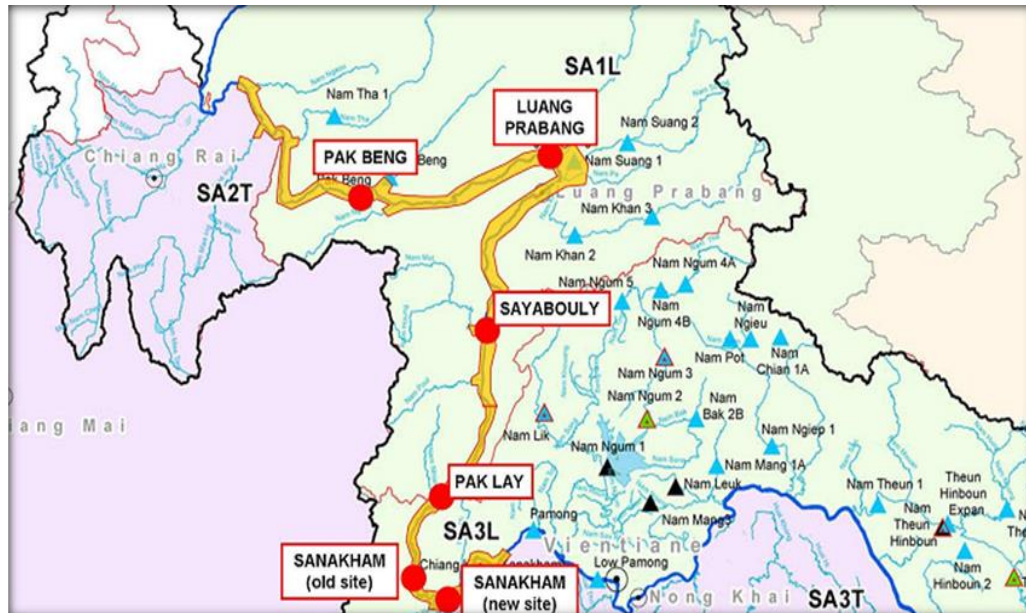


Figure 1 Location of mainstream hydropower dams in Northern Lao PDR

Climate change issue

Climate change is considered as a urgent issue, an important factor affecting to all aspects of sustainable development in the world. Due to climate change, natural disaster at global scale has occurred and will be continued with more complexity, high intensity and frequency resulted in more serious effects.

Viet Nam with about 3,300 km of beach and too low Delta is one of five countries to be most seriously impacted by climate change. Several of million hectares may be inundated, tens of millions people lost houses by the rise of sea water level; poverty situation may be increased by 21-35 %, and around 27% of salinity-inundated forestry and 20% swampy/marshy forestry will be completely inundated. The increase of extreme weather phenomena causes redistribution of rainfall in respect to time and space, short time of rainfall concentration, sudden increase of flood peak to hydraulic works that negatively affect to dam safety; flood and drought are significantly increased; flash flood and land slide occurs more frequently and unusually.

According to ADB assessment, up to year 2070, the highest flow in flood season in the Mekong River is predicted with an increase of 41% in the upstream and 19% in the Delta, while in the dry months, flow is decreased by 24% in the upstream and 29% in the Delta. In case of sea water rise by 1m, around of 1.5 to 2.0 million hectares of the Mekong Delta (in Viet Nam) will be inundated; and in the years of big flood around of 90% of the Delta is flooded for 4-5 months, almost rice field impacted by flood and salinity can not be cultivated. Two areas having risks of serious inundation by tidal water and salinity intrusion are Ben Tre and Ca Mau. Due to sea water rise, the hydraulic regime of streams will be adversely changed; hydraulic works have to be operated in condition different from design and with low efficiency. When sea water level rises about 1m, in Viet Nam there will be about 22 million people lost house and damages of 10% GDP.

It is obvious that climate change impacts to rainfall and temperature will impact to water resources in the whole basin. Its consequences make the operation of both mainstream and tributary hydropower dams less efficient, and then influence to the regulation of water downstream which is an important factor for making the most of development opportunities of water and related resources.

b. Background of Mekong Delta, Viet Nam

Mekong river is main fresh water source for the Mekong Delta, after the cross of Phnom Penh, the river is divided into two branches flowing to Viet Nam that is called as Tien (Mekong) and Hau (Bassac), and then enters to the sea through 9 estuaries, namely Tieu, Dai, Ba Lai, Ham Luong, Co Chien, Cung Hau, Dinh An, Tran De and Bat That. However, because of siltation in the area of estuaries, Bat That in Hau river is disappeared and at Ba Lai in Tien river, a sluice for salinity control has been constructed. Besides Cuu Long (Mekong) river system, in the Delta there are several following systems:

Vam Co system includes two branches of Vam Co Tay (West Vam Co) and Vam Co Dong (East Vam Co), West Vam Co stems from the plain of Prey Veng, flows toward the direction of Northwest – Southeast into Viet Nam at Long An province. Basin area of 1,720 km² and the length in Viet Nam territory is of about 110 km. The river has been degraded after the dam of Svay Rieng is constructed, and it can't be connected to the tidal source from East Sea. In dry season, base flow is very small due to no water source, but in flood season this basin area becomes flood retention and diversion from the Mekong River to Viet Nam; East Vam Co originates from the low hill area of Prey Vieng, running in a Northwest-Southeast direction to Tay Ninh province of Viet Nam. The length of the main river in Cambodia territory is about 54 km and respective basin area of 1,380 km². The reach of river near Viet Nam has rather deep channel and it is affected by East Sea tidal.

The group of river So Thuong, So Ha, Cai Co - Long Khot run along the border of Viet Nam and Cambodia through the provinces of Dong Thap and Long An.

The system of Cai Lon-Cai Be rivers is completely tidal rivers originating from the center of Ca Mau Peninsular and entering the Sea through Cai Lon-Cai Be river. The reach near estuary has a very wide channel but not deep. Because of its connection to Hau river by many big man-made canals, the hydraulic regime of Cai Lon-Cai Be is also controlled by the regime of Hau river.

The system of My Thanh river consists of main river of My Thanh and its tributaries of Co Co, Nhu Gia that are main route of water drainage, saline water diversion at the same time is important navigation route for Ca Mau Peninsular.

The Ganh Hao river system with its tributaries namely Tac Thu, Dam Doi and Dam Chim is water drainage route, water saline diversion and also used for navigation.

The Doc river system comprising Doc river and its tributaries, namely Cai Tau, Bien Nhi - Can Gao is main drainage route for U Minh area.

The system of man-made canals in the Mekong Delta is developed within this century with the main purpose to serve for agricultural production and navigation development. Until now, the system of man-made canals in the Mekong Delta has been constructed with a high density, around 3 – 5 km/main route and 1.5 – 2km/secondary level. However, the canals of tertiary and in-field level are still in low development. The main route of canal in the Mekong Delta includes:

The system connects Hau river with West Sea (Long Xuyen Quadrangle, Ca Mau Peninsular), Tien river with West Vam Co, and Tien river with Hau river. In the Plain of Reed, there are some routes along Tien river, from the border Viet Nam and Cambodia.

Mekong Delta is flat and low land area, elevation normally from 0.7-1.2m (datum Mui Nai), except that some hills and mountains in the Northern area of An Giang. Along the border between Viet Nam and Cambodia has higher elevation from 2.0-4.0m and then gradually decreases towards the center of Delta with elevation of 1.0-1.5m and about 0.3-0.7m in the tidal and coastal areas.

Located in the tropical and monsoon area, the Mekong Delta weather is sunny and hot all year round with a dry and a rainy season. Dry season is also little rain season and controlled by North East monsoon often lasting from November to April of next year characterized by dry, hot and very little rain climate condition. Rainy and humid season is a period controlled by South West monsoon from May to October characterized by hot, humid and more rain climate.

Hydrology of the Mekong Delta is strongly influenced by the flow regime of Mekong River, East Sea tide, Thailand bay and rain fall regime in the region itself. Because the Mekong Delta is bordered with sea from two directions, its coastal areas are affected by salinity intrusion, especially in dry season salinity can be intruded towards far in-land.

Mekong River strongly affects to the flow regime of Mekong Delta. Annually, in flood season about 2 million hectares are inundated with long time of 4-5 months and causes difficulty for cultivation and livelihood of people; and in the year with serious flood it claims many lives and damage of properties. Flood is also an important element to form the Mekong Delta and its marine morphology. Together with the situation of salinity intrusion and acid sulphat soil, flood is one of three constraints to the agricultural production in the Mekong Delta. However, flood is a source of supplying sediment, nutrient for land and also rich fish source for the Mekong Delta.

The situation of flooding and inundation depend on the flood in the mainstream of Mekong river, local rainfall and tidal regime in the East Sea and Thailand Bay as well as systems of streams and canals in the Delta, in which, the decisive role is flood in the mainstream of Mekong.

Dry flow regime in Tien and Hau river is influenced by many factors but the upstream flow and East Sea tide are the factors to play significant role in fully controlling the dry flow regime.

Due to relatively flat geography of the Delta, small slope of Tien and Hau river, in dry season, especially in the driest month (April), tide strongly affects to the in-land canal systems. This situation creates chance for salinity intrusion further to the tributaries and in-land. The regime of dry flow in the Mekong Delta is tidal flow regime.

The recent situation of salinity intrusion in the Mekong Delta

The salinity intrusion in the Mekong Delta occurs complicatedly and depends on the extent of flood in previous year, capacity to supply fresh water from the upstream, cultivation of Summer-Autumn rice crop and rainfall. In the years with late rain, irrigation water requirement for rice cultivation is high while the inflow from upstream is about 70% as compared with the average, the salinity will be intruded far in-land as happened in the years of 1977, 1993, 1998 and 2004 – 2005.

Annually, salinity is intruded most seriously around the end of dry season, April or sometime in the early May as late rainfall. With salinity strength of 1g/l, the length of intrusion is about 40-50 km that may be shorter in the branches of Tien and Hau rivers and towards far in-land in the systems of Vam Co. In flood season, salinity is pushed back estuaries and in the mid of flood season (September – October), the salinity with strength of 1g/l is seen at the vicinity of estuary. In the Plain of Reed, salinity intrusion is observed along Tien and Vam Co rivers; in the Long Xuyen Quadrangle, salinity intrusion is caused by the West Sea.

As tide rises, salinity intrusion can be occurred far in-land with a higher strength, for example in Tien river at Giao Hoa, a high strength of 10,6 g/l was seen on 21/4/2009; in Ham Luong river at My Hoa, Ben Tre, strength of 4,0 g/l occurred on 25/4/2009.

Agricultural Development, important mission for socio-economic development of the Mekong Delta

The Mekong Delta in Viet Nam has an natural area of 3.9 million ha, accounted for 12% the total area of the country. At the national scale, currently there is about 9.4 million ha of agricultural cultivated land, in which the Mekong Delta occupies 2.6 million ha, where rice cultivation takes place all round year. This is advantage to be made the most of exploitation for the market-oriented commercial rice production economic and for national food security. Besides it, maize, sweet potato, and short term cash crops such as soybeen, sugarcane, sesame,

sedge; perennial cash crops included coconut, pepper, cashew nut and cacao-tree. Until now, almost of land in the Mekong Delta has been used for agricultural production (75%), aquaculture, reforestation and other purposes.

Land for rice cultivation in 2000 is 2,066,761 ha, in year 2007 this area was reduced to 1,887,396.9 ha (decreased by 179,364.100 ha). Nevertheless, by applying the advanced technology of intensive cultivation, rice yields and products are continually increased. In 2008, with a cultivated area of 3.859 million ha, yield of 5.34 tons per ha, the rice production got a high amount of 20.61 million tons.

Mekong Delta is also area with a highest potential for aquaculture in Viet Nam; area of aquaculture occupies 71%, product of 72% and export of 75% of the total national figure. The year 2008, as compared with the year 2000, the economic growth was at a high level to support a trigger stage in changing economic values between the aquaculture and capture and significantly contribute to the economic growth in the Delta. The area for aquaculture increases, in average of 8 years (2000-2008) up to about 10.11% per year. The province having a largest area of aquaculture in the Mekong Delta is Ca Mau with 291,665 ha, in which 27,348 ha for fish raising, shrimp with 262,554 ha; followed by Bac Lieu with total area of 125,602 ha, Kien Giang with 125,080 ha, Soc Trang 64,958,0 ha, and Ben Tre with 42,226 ha.

The achievements obtained in the aquaculture development in Mekong Delta for the period of year 2000 - 2008 are very significant in the history of aquaculture in both brackish ecosystem (tiger shrimp) for coastal provinces and fresh water ecosystem (catfish) for provinces located between Tien and Hau rivers (8 provinces and city).

Since more than two decades, in order for agricultural development in the Mekong Delta, the State and people have constructed hydraulic works; many canal systems at all classes have been completed and improved with a density of 6-12 km per ha to provide sufficient capacity to serve for agricultural development, especially irrigation, salinity prevention and management of early flood. There are systems of pump station with medium and large scale to efficiently supply irrigation water for about 24,000 ha. A system of embankment of 7,000 km has been constructed to help control August early flood and protect Summer-Autumn rice crop. The typical systems of hydraulic works has been constructed and efficiently operated, including Plain of Reed, Long Xuyen Quadrangle, South Mang Thit, Quan Lo - Phung Hiep, O Mon - Xa No and Ba Lai significantly contributing to the socio-economic development of the Mekong Delta.

Although the purposes of key water infrastructures in the main agricultural programs are comprehensive, but their efficiency is not high due to the operation, management and maintenance are not yet given attention; irrigation technology is backward; and the systems are not met flexibly with the requirements of production changes, the combination of water infrastructure development with other purposes is not closed and clear, for example between the water infrastructures, agriculture and fishery; the budget for investment is allocated too widely without coordination; and lack of mechanism for river basin management and water infrastructures management as well.

As clearly specified in the Strategy for Agricultural Development that the Mekong Delta has potential for diversification of rice production, fisheries, fruit trees, cashcrop to provide raw materials for processing industry and life-stock and poultry. Although the natural resources in the Mekong Delta are diversified but limited; it is therefore required that any action plans for

diversifying agriculture production, food security, improvement of living standard to be based on the reasonable use and exploitation of these resources together with environmental protection. With the pressure of population growth, the increase of agricultural production, especially for rice and other crop is pertaining to the acceleration of fresh water use, much more in the dry season. That requires the Strategy for Agriculture Development in the Mekong Delta need to be taken into consideration of the upper development options, considerably hydropower and irrigation including inter- basin and intra-basin water diversion.

c. Background of Se San and Srepok river basin, Central Highland, Viet Nam

Se San river is one of the main tributaries to the Mekong river and its upstream originated from Viet Nam with the catchment area of 11,450 km² (60% of total basin area), while the catchment area in Cambodia is 6,960 km² accounting for 40% of total. The length of river is about 462 km, of which 210 km in Viet Nam. The river flows in a Southwestern direction through the Kontum and Gia Lai provinces of Viet Nam. It joins with Srepok river in Cambodia, 20 km upstream of the confluence with Mekong river at Stung Treng.

Se San river has about 27 tributaries but its main sources are Đak Bla, Krong Poko and Sa Thay. Đak Bla is first tributary with its basin area of 3,507 km² and length of 152 km originating from the Ngoc Co Ring with peak at the elevation 2,025 m, The Dak Bla flows in Northeast – Southwest direction and joins the mainstream of Se San at Sa Binh, far from Yaly Fall about 16 km downstream.

The Krong Poko river has catchment of 3,530 km², its length of 121 km. The river originates from the Ngoc Linh mountain with peak at the elevation of 2,598m. The upper reach of Krong Poko is 21.5 km and has characters of river in the mountain areas which runs within a narrow valley, slope of 3.3%. The middle of basin has a length of 144 km with its slope of 1.8%, width of channel is about 20-30 m in dry season and 50-70 m in flood season.

The Sa Thay river with its catchment of 1,570 km² and length of 91km stems from the high mountain of Co Lung, Co Lui with elevation of 1,511m and runs in North-southern direction and joins with the main river Se San near the border Viet Nam and Cambodia.

Srepok river is one of the main tributaries to the Mekong river. It originates from the Central Highland in Viet Nam and flows in Cambodia. It joins with Mekong river at Stung Treng, 45 km south of the border between Cambodia and Lao PDR. The total basin area is about 30,000 km², of which the area in Viet Nam is 18,265 km².

The Srepok basin is divided into two separate zones, namely the upper Srepok with an area of 12,527 km² and catchment of Ea Đrang- Ea Lop- Ea Hleo streams of 5,738 km². The average elevation of the Basin is 570 m, river slope of about 2.3%, the density of river is 0,55km/km², the upper Srepok has two tributaries, namely Krong Ana and Krong Kno.

The Krong Kno originates from the highest mountain of Central Highland, namely Chu Jang Sin with elevation of 2,442m. The river runs in Southeast-Northwest direction along the southern border of Dac Lac province and changes the direction toward to the North and then joins with Krong Ana river downstream village Dray. The total catchment area is 3,920 km² and its length

of 143 km, river average slope is 6.8% and river density is 0.86 km/km², the average elevation in the area is at 917 m.

Being located in the tropical and monsoon region with a clear distinction between the rainy and dry season, in Central Highland the dry season starts from December to April, next year; rainy season starts from May to November.

The Central Highland is region where rainfall amount is at average level as compared in the whole country. Rainfall is sources of water supply for surface runoff and recharge for groundwater. Due to the affect of geography and complicated spatial distribution of rain, in some areas there is a big amount of rainfall that may be twofold or threefold as compared with the area to have small rainfall amount. In the upper Srepok river area, where there is a smallest amount of rainfall about 1,176.4 mm measured at the Krong Pach gauging station, and in the upper Se San at the Kon Plong station, amount of rainfall is measured of 1,355.9 mm. In the mountain of Ngoc Linh and valley of Poko river, Pleiku and M'Drak plateau an average amount of rainfall is measured from 2,000 – 2,500mm. In the plateau Buon Ma Thuot, Dak Nong, Dak Mil, annual amount of rainfall is measured from 1,600 – 1,800 mm.

The rainfall occurs monthly in combination with other natural elements makes the distribution of river flow complicated in terms of season and runoff between the months. In some years, there are 2-3 months in rainy season, and other year there are 5-6 months in rainy season which show unsteady in the basin. In the years with strong southwest monsoon from early rainy season (May), flood will come soon and last longer if it combines with storm and typhoon from East Sea. Because of high amount of rainfall, the runoff in Srepok basin is rather abundant (about 30 l.s/km²) as compared with national average figure (25-30 l.s/km²).

In the Se San basin, the dry season often lasts from 6 - 7 months, starts in January and ends in June (or July). In the tributaries, time to start flood season is different; for example at the Trung Nghia station (Krong Poko), the flood season starts in July, at the Dak Bla station (Dak Bla river) starts in August, but in the mainstream of Se San at the Sa Binh station, the flood season comes earlier from June and ends in December.

In the Krong Ana tributary catchment of Srepok river basin, the flood season often lasts for 4-5 months (from August to December) and dry season around 7 months starting from January and ends in July. But in the Krong Kno, the flood season starts earlier one month from July to November. and the dry season lasts from December to June next year. In the mainstream of Srepok river, at Ban Don station, the flood season occurs from August to November, in some year the flood lasts until December.

In the recent years, flood occurs in the both of Se San and Srepok basins more often and suddenly. In the years 1992, 1993, 1994, 1996, 1998, 2000, the increasingly severe floods had caused serious consequences in the basins.

For ten years recently, in the Se San basin, the largest flood occurred on the 3rd November 1996 with Q_{max} of 3,620 m³ /s measured at the Dak BLa gauging station. However, the historical flood measured in October 1972 at the Dak Bla station is 4,320m³/s.

For the Srepok, the rainfall regime and geography is one of the basic regions caused flood in Lak Buon Trap located in the downstream of Krong Kno and Krong Ana. In the Krong Kno, a

severe flood occurred in 2000 with peak discharge of 4,020 m³/s measured at the Duc Xuyen gauging station.

Because watershed forestry is strongly destroyed, the flash flood frequently occurs in the high mountainous and remote areas, where almost peoples living are ethnic groups to claim lives and damage of properties.

The dry season lasts from December to June of next year and the flow occupies only 20-30% of the annual flow. The timing of driest flow normally occurs in March and April with its monthly module of only 10-15 l/s/km², and daily module is about 3-5 l/s/km², some where the figure is only 1 l/s/km² for example at Bridge 42, Ban Don, Giang Son, Dak Nong ...

The small dry flow causes the decrease of water level in the streams leading to serious drought, especially in the years of 1994, 1996, 1998 and 2003.

The situation of water resources development to support socio-economic development in the Se San and Srepok basins

Existing flood control infrastructures

Currently, in the basins there is no flood infrastructures that could considerably decrease flood for the downstream.

Irrigated agriculture water supply

There are 984 hydraulic infrastructures constructed including 507 reservoirs, 455 weirs and 22 pumping stations; irrigation command area is about 93,321 ha, but in practice the irrigated area achieves only 57,793 ha.

There is a lack of operation guidelines or regulations for all most of the water infrastructures which lead to the low irrigation efficiency and loose of water. All most of the hydraulic works have not yet met the designed requirements with water efficiency of only 55-62%.

Domestic water supply

Recently, in some urban areas such as provincial town of Kon Tum, city of Plei Ku and districts of Dak To, Kon Ray... have been supplied with water from the treatment plants with the sources from reservoir or river; the capacity to meet requirements is about of 40,000m³/day (Kon Tum water treatment plant with capacity of 10.000 m³/day, Bien Ho Plant with capacity of 20.000 m³/day; for the districts such as Dak To, Kon Ray... plants with the total capacity of 10,000m³/day)

Ground water exploitation

The exploitation of ground water as clean water source for domestic and drinking use for the local people in the provinces of Central Highland has been given attention and developed by all levels of the provincial authorities and communities.

The total demand required for meeting the above purposes is about 60,000m³/day, of which water supplied for Ban Me Thuot city is more than 49,000m³/day, and Krong Pach 1,500 m³/day. In the district Krong Buk, a water treatment plant with capacity of 2,500m³/day is under construction.

The processing industry such as rubber, sugar and paper production etc in Dak Lac has been recently developed. The statistics shows that there have been more than 10 drilling holes with the depth from 100-150m supplying for the processing industry, their capacity obtains 2,000-3,000 m³/day. Ground water is important source for irrigating cash crops, mainly for coffee which cultivated area amounts 260,000 ha. At present, the total number of 2,500 drilling holes, lakes, ponds is used for irrigation by farming household.

Hydropower Development

Theoretical hydropower potential of the Se San and Srepok is estimated about 35 billion KWh (13% of the national potential). The hydropower cascade planning for the Se San comprises 6 hydropower plants with total installation capacity of 1,843 MW, annual electrical generation is 8.23 billion KWh. The cascades in the Srepok river includes 6 hydropower plants with total installation capacity of 694 MW, annual electrical generation is 3.33 billion KWh.

In addition, in the small stream systems there are many small hydropower plants as follows:

- In the Se San basin, there 8 small hydropower plants with total installation capacity of 1,410KW, two of which are connected to the national grid through transmission line 22 KV, namely Kon Dao plant (Dak To) and Dak Poko (Dak Glei)
- In the Srepok basin, 22 small hydropower plants with total installation capacity 5,600 KW separately operated from the national grid.

The acceleration of hydropower development in the Central Highland in order to maximize the exploitation of hydropower potential have caused the challenges in watershed management, water resources management for agricultural and fishery production, flood management and environment protection. The uncoordinated development of hydropower in two basins also causes trans-boundary impacts to Cambodia which needs to address by the both of countries based on the framework of Mekong Agreement and implementation of the IWRM-based Basin Development Strategy.

Table 3 *Hydropower Cascade Planning in the Se San and Srepok*

No	Plants	Flv (Km2)	Nlm (MW)	Eo (GMH)	Note
I	Se San basin		1743	8226	
1	Upper Kon Tum	350	220	945	
2	Plei Krong	3224	100	675	
3	YaLy	7455	720	3.650	
4	Sesan 3	7795	273	1.127	
5	Sesan 3A	8084	100	481	
6	Sesan 4	9326	330	1.348	

II	Srepok basin		694	3.329
1	Duc Xuyen	1100	58	196
2	Buon Tua Srah	2930	85	335
3	Buon Kuop	7980	280	1.372
4	Dray HLin	8880	28	194
5	Srepok 3	9410	180	931
6	Srepok 4	10700	40	213

In conclusion, the character of geography, hydrology and other natural conditions as well as socio-economic development in the Mekong Delta and Central Highland shows that there is a closed inter-relationship between the sub-basins and Mekong basin, especially the development affects to the flow change and its consequences to the environment and socio-economics. Therefore, the sustainable development in compliance with the IWRM principles is to be regarded as essential for the whole basin. These principles have been specified in the articles of the Mekong Agreement 1995. However, for an international river basin like Mekong river with the different characters in terms of socio-economics, institutional arrangement, and benefits at the basin level, although the riparian countries have made a lot efforts in other initiative mechanisms of cooperation such as GMS and ASEAN, the cooperation of Mekong river water utilization is still facing many challenges.

With the above understanding, under the framework of the Basin Development Plan (BDP), MRC has formulated the IWRM-based Basin Development Strategy (hereafter called Strategy). The Strategy will provide guidance for water resources development and management forwards to the sustainability, equitable and reasonable use of the Mekong river water resources precious for more than 60 million people living in the Basin. With such an importance of the implementation of Mekong Agreement, all MRC countries have agreed to raise their cooperation to a new level through a MRC Summit which first meeting organized in Hua Hin, Thai Lan on the 5th of April 2010.

At the first Summit, all the heads of the MRC countries' Government had reaffirmed their continued commitment to the cooperation and promotion of the sustainable development, utilization, conservation and management of water and related resources to achieve "meeting the needs, keeping the balance toward Sustainable Development of the Mekong Basin". The Summit has emphasized the further cooperation for addressing the important challenges emerging in the Basin, including flood and drought risks management; consideration of hydropower sustainability, mitigation of the deterioration of water quality, loss of wetland and deforestation causing risks to the biodiversity and livelihoods of the people; better management of the source of natural fisheries, and carrying out researches in order to put forward measures to mitigate the threat to livelihoods caused by climate change.

1.2 Purpose of the National Indicative Plan

In January 2010, after approving the IWRM-based Basin Development Strategy, the MRC Council had requested the NMCs to prepare their respective National Indicative Plan (NIP) for the implementation of the priorities mentioned in the Strategy in coordination with the prioritized activities at the regional level.

Overall Goal of Viet Nam National Indicative Plan

Strengthen the integrated water resources management in the Mekong Delta and Central Highland aimed at promoting economic and social development and environmental protection, at the same time to create scientific and legal bases for the cooperation in the Mekong River Commission to successfully implement the IWRM-based Basin Development Strategy.

Immediate Objectives

Define crucial issues Viet Nam needs to address through the formulation of projects, programs to coordinate and support the implementation of national strategies, policies and MRC strategic actions, and supplement knowledge for updating of basin development scenarios and revising the IWRM-based Basin Development Strategy.

1.3 Approach and Methodology

While preparing the NIP, the below requirements are to be followed

- Need to be closely linked to the strategic priorities and referred to the defined actions at regional level to create an interconnection between national and regional levels.
- Reflect and harmonize national strategy, policy and plans.
- Inherit the achievements resulted from the practice of sustainable water resources management at national level as well as in the Mekong Delta and Central Highland.
- Under an active way, to carry out researches and studies and make recommendations on measures to mitigate negative impacts and promote cooperation.
- Involve wide participation of line agencies at national and provincial levels, NGOs, academics, investors and other in the NIP formulation process.
- Need to apply method of comparative analysis in identifying projects in order to avoid duplication, but still ensure integration, multi-sector coordination in striving to achieve national objectives of cooperation to use and exploit the Mekong water and related resources under a sustainable manner.

1.4 Structure of this report

The report on NIP needs to describe an interrelationship from defining economic, social and environmental issues of the country and basin to defining the requirements of development in front of the individual MRC country and at scope of basin. The report has to justify the bases for formulation of the NIP that are basin priorities for successfully implementing the Mekong Agreement 1995. The national projects and programs will be then developed in combination with the regional ones, with such the both are able to solve strategic issues as specified by the Strategy.

The report is required to have a structure illustrating the process of defining, addressing and solving the issues. The projects that includes in the NIP have to be elaborated at a certain extent and compiled in Annex convenient for consideration and seeking fund for implementation.

2. Interpretation of IWRM-based Basin Development Strategy

2.1 Bases for the formulation of the Strategy

The IWRM-based Basin Development Strategy is the outcome of the MRC long term aspiration in the process to formulate Mekong basin development planning (BDP). The Strategy, if well implemented will provide valuable guidance for the construction of water infrastructures and management of development under a sustainable manner, and ensure reasonable and equitable share of benefits brought about from the use and exploitation water and related resources.

The Strategy also aims to produce basic principles and necessary actions to support accelerating developments, but toward the sustainability of the basin. At the same times, the formulation is based on the prediction of development scenarios and their impacts to environment, social and economic conditions in order to set forth effective measures of immediate and long term management with national and basin scope. With thus, the Strategy contributes to achieve the basin vision that is “economically prosperous, socially just and environmentally sound”.

The Strategy is therefore developed on the base of the assessment of development scenarios impacts with regard to negative and positive perspectives.

2.1.1 Basin Development Scenarios

The scenarios understood in this Strategy are the combination and integration of development options of mainly hydropower, irrigation and flood management infrastructures which had been constructed and have potential in the basin for a certain period. The scenarios’ impacts to the other economic sectors such as fisheries, navigation and biodiversity of the basin ecosystems is pertaining their implications to the society in general and easily vulnerable communities living on these ecosystems.

With such understanding, the MRC in their meeting at different levels has agreed the following development scenarios need to be considered in the assessment process. Although there is still some constraints due to shortage of data and information, the scenarios can be accepted for strategic analysis.

Table 4: Scenarios considered

No.	Short Title	Full Title	Development Period	Interventions/Projects
Baseline situation				
1	BS	Baseline Scenario		Year 2000 infrastructure including existing HEP dams
Definite future situation				
2	2015-UMD	Upper Mekong Dam Scenario	2000 - 2015	Baseline extended to include the full HEP cascade on the Lancang
3	2015-DF	Definite Future Scenario	2000 - 2015	2015-UMD plus 26 additional HEP dams in LMB and 2008 irrigation and flood measures
Foreseeable future situation				

4.0	2030-20Y	LMB 20-Year Plan Scenario	2010 - 2030	2015 DF plus 11 LMB mainstream dams and 30 planned tributary dams, 0.5 Mha of new dry season irrigation, and water supply
4.1	2030-20Y+CC	LMB 20-Year Plan Scenario Climate change	2010 - 2030	As above plus climate change for average year between 2010-30 and 17cm sea level rise
5	2030-20Y-w/o MD	LMB 20-Year Plan Scenario without mainstream dams	2010 - 2030	As above, excluding 11 LMB mainstream dams
6.1	2030-20Y-w/o LMD	LMB 20-Year Plan Scenario with 6 mainstream dams in Northern Lao PDR	2010 - 2030	As above plus 6 LMB mainstream dams in upper LMB
6.2	2030-20Y-w/o TMD	LMB 20-Year Plan Scenario with 9 mainstream dams, excl. Thailand	2010 - 2030	2030-20Y, excluding the two Thai mainstream dams
6.3	2030-20Y-w/o CMD	LMB 20-Year Plan Scenario with 9 mainstream dams, excl. Cambodia	2010-2030	2030-20Y, excluding the two Cambodian mainstream dams
7	2030 - 20Y Flood	Mekong Delta Flood Management Scenario	2010 - 2030	Baseline plus 3 options for flood control in Cambodia and Viet Nam delta
Long term future situation				
8.0	2060-LTD	LMB Long-term Development Scenario	2030-2060	2030-20Y plus all feasible further infrastructure developments in LMB
8.1	2060-LTD+CC2	LMB Long-term Development Scenario Climate change	2030-2060	As above plus climate change for average year between 2030-50 and 30cm sea level rise
9	2060-VHD	LMB Very High Development Scenario	2030-2060	As 2060-LTD, extended to full potential infrastructure developments

The results of scenarios assessments have specified the main impacts which are bases to set forth strategic priorities for the mitigation of negative impacts and make the most of development opportunities for the time being and future. The priorities include institutional capacity building with the application of the IWRM principles. *The organizational structure of the MRC and its activities could be reviewed in line with this IWRM-based Basin Development Strategy.*

Due to shortage of data, the assumptions applied for the assessment of development scenarios have resulted in uncertainties at some extents. The assessment of the development scenarios are therefore to be reviewed after 5 years.

2.1.2 Main Impacts of Scenarios Assessment

The Strategy has been formulated on the base of development scenarios' analysis, for example the definite future scenario with the upper Lan Cang dams together the existing tributaries hydropower and irrigation development; foreseeable future situation consisting of definite scenario and the hydropower dams on mainstream, irrigation development and tributaries hydropower for next 20 years; and other long term future scenarios. In the scenarios analysis, the both of negative and positive impacts have been assessed. Besides the positive impacts of revenues brought from the electric generation, the increase of dry season flow because of the proper operation of reservoirs is also opportunity for expansion of irrigation to contribute increase of agricultural productivity and food security. The negative impacts possibly includes prevention of fish migration and breeding, reduction of capture fisheries, sediment and associated nutrient discharge and erosion of river bank and channel. In addition, the mainstream

dams cause the disconnection of ecosystem and reduction of biodiversity etc. Although, there is lack of data, the assessment of development scenarios has created scientific bases to support the formulation and acceptance of the IWRM-based Basin Development Strategy.

2.2 Opportunities

The scenario analysis has indicated that the development plans at national and regional level can create many opportunities for socio-economic development due to:

- Increase of electricity supply for industrial development, urbanization, improvement of living standards of peoples depending on the basin natural resources. Especially in the circumstance of current economic integration where energy is used for commercial purposes.
- Operation of main dams and tributaries dams in accordance with the design guidelines and operation regulations can provide opportunities to expand irrigated agricultural production resulted from the increase of dry season flow. At present, Viet Nam and Thailand are countries, at first rank to export rice in the world. For Viet Nam, the Mekong Delta annually contributes more than 90% of rice export of the country that is not only significant for national food security but also food security in the world.
- Energy and agricultural production if promoted will lead to the development of other economic sectors such as industry, services which therefore contributes to the socio-economic security.

For an international river to have high potential like Mekong river, and supported by the Mekong Agreement 1995 with the establishment of the Mekong River Commission, the strong commitment of the MRC countries to the implementation of the Strategy have an important significance for the sustainable use of basin opportunities. In year 2010, the MRC had agreed about the mechanism of MRC Summit with its first meeting organized in Hua Hin, Thailand which *has marked a new advance of the MRC's commitment to the basin sustainable development*. A good implementation of the procedures, technical guidelines for monitoring water use and managing trans-boundary environmental impacts will increase development opportunity resulted from the sufficient provision of water quantity and quality, integrated use of land, forestry and ecosystems.

2.3 Issues

The assessment of development scenarios has shown that the development of hydropower dams in the LMB, especially on mainstream prevents fish migration and reduction of capture fishery, sediment and nutrient, potential increase of salinity intrusion to the Mekong Delta due to the decrease of dry season flow if the upstream dams or water infrastructures are not well managed meeting downstream requirements etc. While the assessment has a considerable significance in reminding of the caution in the increasingly development of water infrastructures such as hydropower and irrigation etc, it needs to be improved to overcome its limitations with following respects:

- The scenarios are formulated with assumption of the upper hydropower dams operation; data for calculation of the change of flow is not enough detailed; extreme regime of operation is not taken into consideration.
- A lack of economic and social data leading to the inadequate analysis of the implications to the livelihoods of people; data is not synchronous in timing, extent of details.
- Cost and benefit sharing has not yet become a tool for encouraging the cooperation and monitoring the sustainability in the basin.
- The commitment to the implementation of the Mekong Agreement through the signed procedures and technical guidelines in order to overcome the above limitations is not high enough. It has therefore caused an obstacle to the creation of momentum for the integration of national strategies, policies and plans into the MRC strategies.
- Capacity in integrated water resources management and in development and application of supporting tools is still not at high qualified level and not synchronous among the MRC countries, especially knowledge in IWRM in the context of climate change.

These constraints need to be addressed and overcome together by the MRC countries to move towards a Basin Action Plan aimed to successfully implement the IWRM-based Basin Development Strategy.

2.4 Strategic Priorities and Actions

2.4.1 Strategic Priorities

The IWRM-based Basin Development Strategy was approved by the MRC Council at its Seventeenth Meeting on 26 January 2011 organized in Ho Chi Minh City. Following the Council instruction, National Indicative Plans and Regional Action Plan are to be developed for implementing strategic priorities.

2.4.1.1 Strategic Priorities for Basin Development

- **Address the opportunities and consequences of the ongoing developments including development in the Lan Cang-Upper Mekong Basin**

Strengthen cooperation with China for coordinated operations of Lan Cang hydropower dams to secure benefits of increased dry season flows, address the issues of sediment transport and provide early warning. Annual and multi-year information on the releases of hydropower cascades as well as long-term Lan Cang development plans and dam operating rules are essential inputs to LMB planning.

Enhance coordination among the LMB countries on the operation of tributary dams through improved implementation of MRC procedures to ensure reliable annual dry season for downstream.

Reach agreement to protect the baseline dry season flows on the Mekong mainstream. The baseline flow regime of 1986-2000, as presented in the MRC Decision Support Framework, is considered to be close to its natural state. Protection of this flow regime is necessary to meet essential social and environmental needs. The PMFM provides both mechanisms to ensure that baseline flows are maintained at 12 key points along the mainstems and foundation to agree on further to use of water. Together with maintaining water quality standards through PWQ, the PMFM will assist in maintaining the natural functions of the river.

Manage the risks of committed projects. National agencies, RBOs, communities and project developers need to work together on the design and operation of tributary dams, to minimize sediment and nutrient trapping and blocking of fish migration and on reaching agreement on management measures for valuable wetlands. Opportunities will be explored to address the social implications of ongoing water resources development.

- Expand and intensify irrigated agriculture for food security and poverty alleviation

The expansion of irrigation, currently under consideration, and its intensification will significantly increase agricultural production, food security, farm income and employment. Sound project identification will be essential to attract investments, increase agricultural yields and generate higher farm incomes through improved varieties and farming practices. Drought management strategies and solutions for use of ground water are needed for some important areas. Guidelines will be prepared for fish-friendly development of irrigation schemes for promoting integrated pest management to reduce risks to water quality, and for improved irrigation management.

- Improve the sustainability of hydropower development

The strategy emphasizes the need for evaluating options for development of sustainable hydropower on tributaries, addressing the risks of mainstream hydropower, and assessing alternative energy options to mainstream hydropower.

Move towards sustainable development of hydropower on tributaries need:

- Identifying sub-basins with high ecological value to be protected and those where hydropower can be developed with limited social and environmental impacts;
- Evaluating hydropower projects from a multi-purpose perspective to increase overall economic benefits and decrease adverse effects on other water use;
- Mitigating negative impacts of hydropower, such as through: re-regulation reservoirs downstream of peaking projects; multi-level water intakes or aeration facilities to manage water quality/temperature; fish passage and minimizing sediment entrapment;
- Developing management plans for environmental hotspots impacted by changed flow regimes; and
- Evaluating benefit sharing options, such as watershed development and management benefiting hydropower generation and funded from hydropower revenues.

Address the uncertainty and risk of possible mainstream dams through acquiring essential knowledge to minimize uncertainty; identifying risk mitigation options; strengthen the PNPCA

process; applying the Design Guidance for Mainstream Dams; and developing specific guidance for existing and new wetlands, river flow variations and related erosion impacts; and improvement of social conditions, all to complement project-specific studies such as feasibility studies, EIAs and SIAs.

Assess power options, including alternatives to mainstream hydropower. Promote evaluation of the benefits and impacts of mainstream hydropower dams, within the broader context of power options assessments and national and regional power strategies.

- **Acquire essential knowledge to address uncertainty and minimize risk of the identified development opportunities**

The uncertainties and risks, including uncertainty of climate change will affect to the less use of development opportunities, for example, less understanding of mechanism to trap sediment and nutrient etc require early implementation of a range of studies of strategic importance to feel knowledge gaps and to develop risks mitigation measures. Immediate analysis as presented in the Strategy is below:

Predict changes in sediment transport arising from both ongoing and planned water resources development. Analyze the impacts of these changes on river incision; bank erosion; water quality floodplain sedimentation; productivity of fisheries, agriculture land and wetlands; Delta-shaping processes; and sediment movement to marine water. Identify avoidance, mitigation and enhancement measures.

Reduction of capture fisheries and its social implication need to be assessed through identification of fish migration routes; the impact of existing natural and man-made barriers; fish productivity and health under development stresses and associated social implications; fish passage technology options; and the potential role of fisheries production in paddy field, ponds, reservoirs, aquaculture in offsetting loss of capture fisheries due to water development.

Regarding biodiversity changes, need to identify the biodiversity consequences of development, and suitable indicators and their baseline for monitoring biodiversity loss; protection of flagship species that are an integrated part of wetland functions and services requires the mapping of ecosystem units and habitats and identification of the roles of water, sediment and nutrient flows; and

Social and livelihood impacts in the mainstream corridor, Tonle Sap and system of Se San, Se Kong and Srepok; and measures for mitigating these impacts.

- **Seek options for sharing the potential benefits and risks of development opportunities**

The potential benefits from identified development opportunities (e.g from additional dry season flow for water supply, navigation, irrigation and other beneficial uses and from hydropower development) could be shared to provide compensation for risks to environment, other water related sectors and people's livelihoods. Options will be identified and the MRCS will support and facilitate negotiated solutions for sharing benefits and risks that are sensitive to the region, in compliance with MRC Procedures, and respectful of the development strategies and aspirations for regional cooperation of the parties.

- **Adapt to climate change**

Climate change impacts that are projected to modify the water and related resources of the Mekong Basin in the medium to long term will be addressed as an integral part of the assessment carried out for the basin development opportunities referenced in this Strategy. The results will be used to prepare and negotiate a Climate Change Adaptation Strategy for the LMB. This strategy will be mainstreamed into long term and 5-year basin and national planning systems. Selected adaptation measures will be piloted to seek successes worth of scaling up. Priority will be given to adaptation actions addressing increased floods and drought including improved forecasting and early warning and damage mitigation; sustainable hydropower development; food security; wetlands and biodiversity; livelihoods of vulnerable groups; and sea level rise in the Mekong Delta.

- **Integrate basin development planning considerations into national systems**

This Strategy will be successful if it is mainstreamed in national planning and decision-making processes, with each country developing country-specific principles, processes and actions. Rapidly growing private investments in water related sectors underscore the importance of the role of the national water resources management agencies in coordinating an integrated approach to sector planning, both across national sectors and between national and regional planning. The integration requires the following actions:

Align national water resources development planning and project identification with identified development opportunities (hydropower, irrigation...) to ensure the move toward sustainable development.

Addressing identified risks early in project identification and preparation, will provide an opportunity for the project to be more responsive to national regulations and to the requirements of transboundary assessment through the PNPCA, as applicable; and

Maintain a register of existing, on going and planned water resources development and water-related projects at NMCSs and MRCS to facilitate national and regional monitoring of LMB water resources development and to provide early advice on addressing transboundary risks. This will enable the development and promotion of the Project Portfolio to support coordinated basin management.

2.4.1.2 Strategic Priorities for Basin Management

- **Establish basin objectives and management strategies for water-related sectors**

Integrating management strategies for fisheries, navigation, flood and drought risk management, ecosystem, wetland and watershed management is critical for basin planning. Initial priority will be given to:

Fisheries management This requires studies to improve fisheries knowledge and development of a comprehensive, basin-wide fisheries management strategy that builds on national strategies and plans, recent MRC studies.

Navigation, The MRC Navigation Programme will prepare a master plan for regional waterborne transport and development of rural water transport, a master plan for navigation in Cambodia and a navigation improvement plan, which will further define the development

opportunity for navigation. These plans will also identify strategies to manage the risks of increased navigation, such as accidents and environmental damage.

Flood and drought risk management. The flow regime of the mainstream and many tributaries is changing and climate change is predicted to increase the frequency and intensity of flood events. Detailed analysis will be undertaken of flow and flood changes along the mainstream from northern Thailand to the Delta, as an input to integrated planning; and

Wetland management Changes in the flow regime will result in profound changes in wetlands, especially increasing their fragmentation. Priority will be given to those wetlands with ecologically important areas and where people are depending on their services, like the Tonle Sap. Actions will include monitoring biodiversity loss, promoting integrated wetland management, and supporting implementation of the Ramsar Convention.

- Strengthen national level water resources management processes

The Strategy depends on the effective implementation in all countries of the basic process of surface water and ground water monitoring, water use permitting (of withdrawals and pollution discharges) , establishment and maintaining water information system etc. This successful implementation at national level will provide a strong foundation for managing and developing water resources in the Basin.

- Strengthen basin management processes

Implementation of MRC Procedures The signed MRC Procedures and associated guidelines play an important role in integrated water resources management in the Basin. Therefore, reinforcement of their implementation and effectiveness is considered as enabling conditions for sustainable basin development.

MRC Procedures and associated guidelines

Procedures/Technical Guidelines	Status
Procedures for Data and Information Exchange and Sharing (PDIES)	Approved by MRC Council on 1 November 2001
Technical Guidelines for the implementation of the procedures for data and information exchange and sharing (PDIES)	Adopted by MRC Joint Committee on July 2002
Procedures for Notification, Prior Consultation and Agreement (PNPCA)	Approved by Council on 13 November 2003
Technical Guidelines for the implementation of the procedures for notification, prior consultation and agreement (PNPCA)	Adopted by Joint Committee on 31 August 2005
Procedures for Water Use Monitoring (PWUM)	Approved by Council on 13 November 2003
Technical Guidelines for the implementation of procedures for water use monitoring (PWUM)	Adopted by Joint Committee on 5 April 2006
Procedures for the Maintenance of Flows on the Mainstream (PMFM)	Approved by Council on 22 June 2006
Technical Guidelines for the	In preparation

implementation of the procedures for maintenance of flows on the mainstream (PMFM)	
Procedures for Water Quality (PWQ)	Draft submitted for MRC Council approval at its 17 th Meeting on 25 January 2011
Technical Guidelines for the implementation of the procedures for water quality (PWQ)	In preparation

Harmonized methods and tools. The Strategy emphasizes strengthening and harmonization of methods, standards, tools and quality assurance systems relating to water resources management among MRC countries. If there are large differences between LMB countries, then it is difficult to exchange reliable data and information, negotiate rational agreements, and sustain effective cooperation.

State of Basin monitoring and reporting. Strengthen the national to basin scale monitoring systems, extended to include different aspects of water and related resources and the monitoring of climate change impacts a body to be established by the MRC. The results of monitoring will include in “State of the Basin” reporting every five years.

Project cycle monitoring to support basin planning. Develop and implement a system of comprehensive monitoring of project development in the basin, using MRC Procedures (such as Procedures for Data, Information Exchange and Sharing – PDIES and PWUM) and other tools. This will allow early registration of nationally-identified projects with transboundary implications in the Project Master Database to conduct basin-wide cumulative assessments; initiate dialogues on controversial projects; and add projects that are approved at the national and transboundary regional levels to the Project Portfolio for seeking fund for their implementation.

A network of national WRM agencies and RBOs. The focal points for Strategy implementation are the national WRM agency, the primary authority for water resources in each country, together with the four NMC’s and emerging RBOs. These bodies will interact regularly through a network, facilitated by MRCS, with the aims of strengthening their IWRM planning, coordination and monitoring role and developing basin wide synergies.

Enhanced stakeholder participation. Enhanced regional and national stakeholder participation in the Strategy implementation, respecting community and wider popular participation approaches in each country. Increased stakeholder access to information is assured through implementation of the MRC Communication Strategy and Information Disclosure Policy.

Managing differences. Addressing disputes and conflicts relating to basin development, such as accelerating hydropower development, in first step has to comply with the provisions of Mekong Agreement 1995. Consideration will be given to the development of guidelines or mechanisms that will help the parties to discuss and negotiate at various technical levels, and as needed, at higher policy levels.

- **Develop environmental and social objectives and “baseline indicators”**

The Strategy places importance on the development of agreed basin-wide objectives or “baseline indicators” that will cover economic, environmental and social factors, reflecting and respecting national sovereignty, policies and processes. This is needed to guide Strategy implementation and updating and provide a basic upon which to assess the impacts of development options. Some objectives are being developed as part of the Technical Guidelines for implementation of MRC procedures, such as the flow thresholds framework on the mainstream (PMFM), and the water quality parameters for human health, aquatic life and water quality emergency situations (PWQ) or other indicators are committed to achieve the Millennium Development Goal 7 on environmental resources sustainability aimed at reducing biodiversity loss.

- Implement a target IWRM capacity building programme

The successful implementation of Strategy will require the improvement of institutional arrangement with sufficient riparian professionals in all water related fields; sound basin and national planning and decision making processes; and effective communications and participation to ensure inputs from all basin stakeholder groups. The Strategy includes the implementation of a targeted capacity building programme, linked to the MRC’s overall initiatives and complementary to national capacity building activities.

- Implement a target IWRM capacity building programme

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2.4.1.3 Studies and Guidelines

Studies: The Strategy outlines the urgent studies to provide the information required for decision making on planned water resources development, and fill the current knowledge gap to an acceptable level aimed at supporting implementation of the Strategic Priorities and updating the development scenarios.

List of other prioritized studies

No.	Study
1	Identification of priority habitat areas and environmental hotspots and development of management plans for those that would be highly or moderately impacted by potential changes in flow conditions and the proposed LMB mainstream dams
2	Mitigation of the impacts of converting much of the mainstream to a series of slow moving waters between proposed LMB mainstream dams
3	Assessment of mainstream and tributary hydropower potential and alternative power options, including innovative hydropower schemes that do not affect connectivity in the lower basin
4	Detailed modelling of flood-related impacts upstream of Kratie to understand the impacts of flow changes on different river reaches, and how mainstream dams will affect these
5	Basin-wide and multi-sector study of long-term flood management options for the Mekong Delta to respond to growing pressures from land development, sea level rise, climate change, and

No.	Study
	upstream development plans
6	Climate change adaptation studies of sub-basins, to define climate change trends, including extreme events, to incorporate in water-related sector plans, including hydropower
7	Monitoring and assessment programme to analyze the implications of climate change on: the basin's long-term hydrology: on agriculture and food security: and on ecological conditions and bio-diversity
8	Updating of groundwater inventories throughout the Basin to set priorities for development and management

Water Resources Management and Sector Guidelines

Essential basin-wide water resources management guidelines needed for addressing basin-wide issues in sector development and management have been identified. Some of the guidelines have been or are being prepared by MRC, such as the TbEIA framework, Preliminary Design Guidance for Mainstream Hydropower, and Guidelines for Integrated Flood Risk Management. The concerned national line agencies need to cooperate with MRC sector programmes in considering the list of guidelines and making them prioritized so as to meet immediate needs in the broader water and related resources development context in the basin.

2.4.2 Strategic Actions

Strategic actions are the actions to implement the strategic priorities as specified in the IWRM-based Basin Development Strategy. The MRC Secretariat, based on the priorities, MRC capacity and situation of the implementation of MRC programmes have set forth 64 actions as seen in Annex B. The MRCS will use these actions for preparing Regional Action Plan (RAP).

Having taken 64 strategic actions into account, the National Mekong Committee will prepare National Action Plan reflecting national strategies, policies and plans and their linkages with RAP under a manner how to support each other and avoid duplications in the formulation of projects.

3. Proposed Projects in the National Indicative Plan

One of requirements for the development of NIP is the NIP has to reflect national strategies and policies in water and related resources development in the basin. Therefore, in the below part there are reviews of the main related legal documents and strategies.

3.1 Related Strategies and Policies in the Country

In the process to prepare the NIP for Viet Nam aimed to implement the IWRM-based Basin Development Strategy, a review of some key strategies and policies related to the integrated water resources management is very necessary. The results of reviews are scientific bases for putting forward appropriate actions and coordination to ensure the water resources management in the Mekong Delta and Central Highland meeting the requirements to promote the cooperation in the basin for its sustainability and mutual benefits for the people of the riparian countries. Besides it, one of the important priorities of the MRC Strategy is integration and harmonization of the national strategy, policy and plan into and with the regional strategy and plan. In the

process of negotiation to prepare procedures, technical guidelines of the MRC, the integration and harmonization issues are always factors affecting to the consensus between the MRC countries.

In the above connection, the followings are the legal documents and strategies have been reviewed with the aim to reflect appropriately the national strategies and policies in the NIP as well to use them in harmonizing the national issues with the regional ones.

Law on Water Resources (Law No 17/2012/QH13) was passed by the National Assembly on the date 21, June 2012 has stipulated comprehensively Strategy, Water resources planning (Item 2, Chapter II); Protection of water resources (Chapter III); Water use efficiency (Item 1, Chapter IV); Water resources use and exploitation (Item 2, Chapter IV); Water resources regulation and allocation (Item 3, Chapter IV); Prevention, Control and Mitigation of harmful effects caused by water (Chapter V); International Cooperation in water resources development (Chapter VII); Responsibility for water resources management (Chapter VIII). When preparing the Indicative Plan (NIP), the above Chapters need to be studied and applied to reflect the interlink between the MRC IWRM-based Basin Development Strategy and national strategies and policies; the impact of upstream development should be also studied in order to able to set forth measures which aim to mitigate impacts for meeting the requirements specified in the Law on Water Resources. Regarding the international cooperation in water resources development and management, Article 66 (Principles to be applied in international cooperation), Article 67 (Responsibility for protection of national rights and interests in the use of inter-state water source) and Article 69 (Resolution for dispute and conflict in the use of inter-state water source) is one of the important bases for Vietnam National Mekong Committee to define focus areas and formulate projects belonging to the respective focus areas for implementing the IWRM-based Basin Development Strategy of the MRC. In the Chapter on the responsibility for water resources management, Article 72 (Coordination and monitor of the exploitation and use and protection of water resources; prevention, control and mitigation of harmful effects caused by water) specifies the activities of coordination and monitoring to be applied for the Mekong Delta and Central Highland. For the responsibility for river basin management organization, the Ministry of Natural Resources and Environment is designated to provide unique and whole guidance for coordinating the activities of river basin management organization; of the Provincial Peoples' Committee, related organs and organizations in water resources regulation and allocation; in monitoring water use, exploitation and protection; in the prevention, control and mitigation of harmful effects caused by water in the river basin (Article 72, 2c). The item 3 of Article 72 stipulates that the Government will determine the establishment and operation of river basin organizations.

A thorough understanding and mastering of the Law on Water Resources is needed to support for the development of projects which aims to integrate the national legal issues into the related strategies of the MRC, for example planning, plans and legal documents for implementing the Mekong Agreement.

Environmental Protection Law and documents related to strategic environmental assessment (SEA) for planning and plan, environmental impact assessment (EIA) for projects, and trans-boundary impact assessment will be applied in the MRC cooperation in order to put forward measures for natural resources management and solution for the conflict and dispute between the sectors, provinces and local communities, and upstream and downstream countries.

Government Decree No 120/2008/NĐ-CP dated 1/12/2008 on River Basin Management: it is necessary to concentrate on Article 2 on Object to be regulated (Item 2.2 In the case of Convention Viet Nam participated if there is stipulation different from what in this Decree, It must follow the signed Convention); Article 4, Principles for river basin management (Item 4.1. Water resources in the river basin shall be put under a unified management without division by administrative border, between upstream and downstream; ensuring equitability, reasonability on the responsibility and interest among organizations, individuals in the river basin); Article 5, River basin management (5.4 Regulation, allocation of water resources, maintenance of minimum flow on the main stream; diversion of water between sub-basin and inter-basin diversion; 5.5 Addressing differences and disputes..); Article 30 on River Basin Committee; Article 33. Responsibilities of MONRE in river basin management; Article 34 Stipulates responsibilities of Ministries and equivalent organizations in river basin management; Article 36 about responsibilities of Provincial People's Committee; Article 37 Stipulates responsibilities of National Council of Water Resources; and Article 38 on responsibilities of River Basin Committee in river basin management, comprises 38.1 To organize appraisal for river basin planning, plan for pollution prevention and response, plan for regulation and allocation of water resources, thresholds of minimum flow maintenance, water diversion projects; 38.2 Coordination of activities in the implementation of planning and plan ..; Article 38.3 To recommend tax for water utilization; 38.4 Monitoring the implementation of river basin planning..and recommend measures to manage, protect and use water resources..; 38.6 International cooperation; 38.7 To recommend measures for resolving disputes.

The above articles need to be considered and applied when the establishment of RBO as an important element for the success in bringing the regional strategic priorities in the countries' reality.

Government Decree No 112/2008/NĐ-CP dated 20/10/2008 on Management, protection, integrated exploitation of resources and environment of hydropower and water resources reservoirs; Article 4, Principles for management, protection, integrated exploitation of resources and environment of reservoirs; Article 9 on Reservoir regulation; Article 10 Financial Obligation for exploitation, use of resources and environment of reservoirs; Article 12, Responsibilities of MONRE (12.2 Chair, Coordinate Ministries, Sectors and Provinces concerned in developing guideline for minimum flow downstream reservoirs and implementation; 12.5 stipulates responsibilities of MONRE in chairing, coordinating with the Ministry of Industry and Commercial, MARD in making plan for water regulation of network of reservoirs having national importance for the Government Decision in the event of serious drought and water deficiency and pollution or environmental accident and disaster in the river basin); Article 13 - Responsibilities of Ministry of Industry and Commercial, Ministry of Agriculture and Rural development (13.2 Provide guidance in cooperation and coordination with MONRE and Provinces in development and appraisal of reservoir operation regulation, 13.3 Provide guidance for preparing plan for water regulation of reservoirs) ; Article 15- Responsibilities of Peoples' Committees at all levels (15.1.b At provincial level: Provide guidance, in cooperation and coordination with related Ministries, of establishment and appraisal of reservoirs operation procedure and its approval in the capacity of designated authority; 15.1.c Provide guidance and instruction for the operation of reservoirs in the capacity of designated authority in the event of drought, water deficiency, serious pollution or environmental accident and disaster in the province.

Ordinance on the operation and protection of hydraulic work system (No 32/2001/PL-UBTVQH10) aims to strengthen enforcement of state management, increase responsibilities of government agencies, economic institutions, political and social organizations, professional associations, units of people army and individuals in the operation and protection of hydraulic work systems to serve for production, socio-economic development, ensure social safety and national security. According to Item 3.1 of the Ordinance, the operation and protection of hydraulic work system shall ensure systematic characteristics without administrative division; Item 3.5 stipulates that the hydraulic work shall be operated under an integrated manner to serve for the national economic sectors; Item 3.6 of operation and protection of hydraulic work ensuring the requirements of prevention, control of degradation, exhaustion, pollution and other harmful effects caused by water, safety of structure. Article 5 stipulates the responsibilities of the peoples' Committees at all levels in implementing measures of use and protection for hydraulic work; monitoring, inspection to abide regulation on use and protection of hydraulic work at respective administrative areas. Article 17 stipulates the responsibility of state enterprises in hydraulic works operation for reasonable water allocation and harmonization for all sectors to serve for production and domestic supply; and responsible for contracting with organizations, individuals of water use from the hydraulic works; implementation of compensation according to regulations issued...Article 20 stipulates the establishment of Board for Management and Operation of Hydraulic Works Systems related to many provinces.

The above articles will be one of important legal bases for need to be studied and applied for the analysis and assessment of accidents happened in the operation and protection of hydraulic works. Regarding the Mekong cooperation is trans-boundary impacts caused by the development of border hydraulic works systems.

On the twelfth of October 2009, MARD had issued its Circulation No 65/2009/TT-BNNPTNT on Guidance for operation and decentralization of hydraulic works management Article 4 of the Circulation specifies the regulations of contents, requirements for management, exploitation of hydraulic works, including a) water management: water equitable and reasonable allocation and drainage within the hydraulic works system to meet requirement for agricultural production, living condition, environment and other national economic sectors; b) Management of hydraulic works: Check and inspection, monitoring, identification and repair timely of break-down, at the same time ensuring maintenance, repair and upgrade of infrastructures, machine and facilities; protection and operation of hydraulic system under a manner of security, efficiency and sustainability; and c) organization of economic management: Establishment of appropriate model for management, effective use of funds, properties and all resources given to successfully implement the exploitation, protection of hydraulic works, integrated business in line with stipulated by law and regulation. The Circular also specifies the decentralization of water infrastructures' management and exploitation to provincial authorities. This important point shows that the provincial authorities are also responsible for solving any dispute in water utilization and hydraulic works operation.

This Circular should be practically applied for each provinces aimed to set forth a reasonable model of hydraulic works system's management under an effective manner and minimization of the conflicts between water users.

National Water Resources Strategy towards year 2020, Part 2 (Viewpoint, Guiding Principles and Objectives of the Strategy), 2.Objectives and item 2.2 Specific Objectives focuses on a) Protection of water resources, b) Exploitation and use of water resources, c) Water resources development, d) Mitigation of adverse impacts caused by water, and e) Enhancing regulatory and institutional capacity in water resources management. Taking the above Specific Objectives into account when preparing the NIP shows that, the specific objectives specified in the NWR Strategy will control, affect to and guide the preparation of the NIP under a matter how to integrate of NIP into the national Strategy.

One of the major missions of the NWR Strategy, the mission 1.2.a is establishment of river basin plans and water resources plans for all regions and management of the implementation of the plans; the implementation of water allocation in the river basins to ensure regional and equitable water use, exploitation among sectors, provinces and localities; development of salinity control projects for the Cuu Long (Mekong) river delta (1.3.d); Establishment and implementation of plans for the prevention, control and mitigation of adverse impacts caused by water for major river basins,... (1.4.c); Establishment and completion of water quality monitoring networks, establishment of communication network on water quality and water resources accidents for all river basins, focusing on the Red-Thai Binh, Vu Gia-Thu Bon, Dong Nai-Sai Gon and Cuu Long (Mekong) river basins (1.4.g); and one important requirement is enhancing administration reform in the field of water resources with a focus on managements and supplementation of functions and duties of state water resources management agencies from the central government to local levels, and ensuring clear assignment of duties and powers to the concerned ministries and sectors and improving the decentralization of water resources management to provincial and local levels.

One of the main implementation measures, the NWR Strategy requests the communication, education, public awareness improvement and encouragement of community participation (measure 2.1); improving effectiveness in the enforcement of laws on water resources (measures 2.2); implementation of benefit and financial burden sharing among the organizations and individuals who exploit and use water resources in major and important river basins on the basis of integrated socio-economic and environmental benefits generating from integrated and multipurpose water exploitation and use projects (measures 2.3); diversifying international cooperation and enhancing regional and international integration on water resources management through multi-lateral and bilateral cooperation programs and projects in compliance with international conventions to which Viet Nam is a party or signatory; enhancing international cooperation with the member countries of the Mekong River Commission in the framework of the Mekong Agreement 1995 (measures 2.5).

The Viet Nam National Mekong Committee needs to cooperate with the Ministry of Agriculture and Rural Development, Provinces in making recommendations on institutional strengthening for hydraulic works system's management and transboundary flood risk management; making recommendations to the Ministry of Natural Resources and Environment on enhancing effectiveness of water use and quality monitoring stations at Tan Chau and Chau Doc, in the Se San and Srepok river basins and within the systems to support the preparation of legal bases and technical guidelines for control and solving the conflicts between the water users.

Direction Strategy for the development hydraulic works systems 2020 and vision for the year 2050 was approved by the Prime Minister in the Decision 1590/QD-TTg dated the 9th, October

2009 in which it has emphasized the reasonable exploitation of water, multi-purpose use, unified management through out the river basin and hydraulic work systems without dividing by administration border; the exploitation in parallel with protection; prevention of degradation and exhaustion of water resources, restoration of water sources by structure measures and non-structure measures; paying attention to water environment protection, especially in the hydraulic work systems; water use, development and management need to be placed in the condition that the water resources of Viet Nam is increasingly dried and deteriorated in quality, water requirement is increased, impact of climate change is obviously stronger. The Direction emphasizes that to be able to bring the short and long term socio-economic benefit from the investment in water infrastructures, besides the state investment, it is necessary to ensure and increase the role and the responsibility of community in operation, management and protection of the systems.

The Direction specifies five specific objectives which are (1) water supply, (2) Drainage and water environment protection, (3) Active in prevention, control and mitigation of natural disaster (4) Enhancement of the effectiveness of hydraulic works' management and exploitation to ensure an efficiency of 90% their designed capacity, and (5) Improvement of technology to achieve the average level of advanced technology of Asia in 2020, and of the World in 2050.

The Direction is also dealing with one of measures to comprehensively upgrade the organization of hydraulic work systems' management which is: strengthening capacity for the existing River Basin Planning Committee (RBPC)s of Red -Thai Binh, Dong Nai, Cuu Long, Ca, Srepok, Vu Gia – Thu Bồn and new establishment of RBPC for Ma, Huong (Perfume river), Tra Khuc, Ba rivers... According to the Action Plan, the improvement and strengthening of the organization of state management for water infrastructure development and mechanism for the operation and management of hydraulic works must be implemented.

The Direction has an important significance in the river basin management and effective exploitation of hydraulic works systems which is one of the bases for solving the conflicts in water use between the zones, provinces and economic sectors. The Direction is however facing some risks for its successful implementation unless a close coordination between the MARD and MONRE is secured, especially in the river basin management.

National Strategy for prevention, control and mitigation of natural disaster (SPCMD) towards year 2020 (got approval by the Prime Minister by the Decision No 172/2007/QĐ-TTg dated 16, November 2007) has emphasized the following point of views:

- The tasks of natural disaster prevention consists of preparedness, response, and overcome consequences aimed to mitigate damages caused by the natural disaster, ensure the sustainable development to contribute to the stability of society, national security and defence.
- The content of the prevention, control and mitigation of natural disaster must integrate into the planning and plan of socio-economic development for each zones, provinces, sectors and nation.

- The prevention, control and mitigation of natural disaster mainly bases on the preparedness and continued study of the impact of climate change and sea water rise and other un-regular weather phenomena for protection...

Among the specific objectives mentioned in the Strategy, the objectives of capacity building in flood, drought and salinity intrusion forecasting; earthquake and tsunami and dangerous hydrological phenomena warning; dam safety; of the integration of national and sectors' socio-economic with the Strategy (SPCMD) are crucial and need to be carefully considered and integrated into the NIP for successfully implementing the MRC IWRM-based Basin Development Strategy. In the missions and measures for each area in the country, the request for the Mekong Delta is that flood control planning, active preparedness for flood proofing, reasonable use of land and forest resources and good conditions in the region; active exploitation of flood benefits such as sedimentation supply, salinity and acidity leaching, aquaculture and fish capture in flood season and promotion of navigation..depending on specific conditions of permanently inundated area; prevention of salinity intrusion and drought; promotion of cooperation with the MRC aimed to develop and protect water resources under a sustainable and reasonable manner; in cooperation with the upstream countries to study measures for flood prevention and management, maintenance of dry flow to prevent salinity and retain fresh water, and measures to response to sea water level rise.

For the Central Highland, the approach is to actively prevent natural disaster together with concentrating in the implementation of missions and measures, including the preparation of highly risks areas, land use planning, crop diversification, management of mining avoiding negative impacts to environment and land slide, reforestation and reasonable forest exploitation; establishment of warning systems, communication; international cooperation in warning, forecasting of natural disaster, evacuation and rescue activities with the countries have joint border.

National Strategy for Climate Change (issued by the QĐ No 2139/QĐ-TTg, 05 December, 2011 of the Prime Minister)

Regarding to the IWRM, the National Strategy for Climate Change has emphasized that “Due to the impact of climate change, the water resources is suffering serious degradation because of increasingly drought in some regions, seasons and then it directly impacts agricultural production, rural and urban domestic supply and hydropower production. The change of rainfall regime causes serious flood in the rainfall season and drought in the dry season that may increase conflict in the water use and exploitation” and “being one of the countries seriously impacted by climate change, Việt Nam considers the mission to response to climate change is a vital matter”

The first specific objective indicated in the Strategy is to provide food, energy and water security, poverty eradication, gender equity, security of social livelihoods, health of community, improvement of living standard and protection of natural resources in the circumstance of climate change.

In the strategic tasks set up in the Strategy, there are many tasks need to be carefully considered in order to integrate into and harmonize with the IWRM-based Basin Development Strategy of the MRC, including:

- Actively response to the natural disaster and monitor climate change.
- Ensure food and water resources security in which water security is implemented through series of measures such as establishment of database on change of water resources, and water use related to the climate change, increase of studies, surveys, assessment, forecasting, monitoring water quantity and quality in the water resources exploitation; promotion of international cooperation in study, assessment, control of water quantity and quality, and transboundary water benefit sharing; integrated water resources planning for the regions, major river basins in which there are Se San and Srepok basins and Mekong Delta; new establishment or improvement of technical guidelines and standards for effective exploitation of water, water saving, multipurpose and integrated use of water to response to climate change and sea water rise; improvement and upgrade, or new construction of water infrastructures, hydropower plant, river and sea dyke systems to meet sufficiently all requirements for flood protection, drought management, sea water rise, salinity intrusion prevention in the circumstance of climate change; strengthening capacity in integrated water resource management, in the implementation of planning, and measures of sustainable development in the response to climate change.
- Actively respond to seawater rise for the areas easily vulnerable through the activities of study, assessment, prediction of impact extent to the economic sectors, regions and community; formulation of master socio-economic development planning taking into account the factors of climate change, especially paying attention to the situation of flood, storm and acceleration of salinity intrusion, drought, loss of land, environmental deterioration in the key regions such as Mekong Delta, Red river delta, central coastal areas, and marine bio-diversity conservation areas.
- Enhancement of the key role of the State in responding to climate change through the measures to adjust and integrate the climate change issues into the strategies, planning, plans (until 2015 the strategies, socio-economic development planning and plans of the Ministries, sectors, provinces will have been reviewed, revised); and institutional strengthening (synergy in building mechanism, policy, law on climate change in line with the period of development; improvement of the coordination between the sectors in responding to climate change; study in order to upgrade function, duty, organizational structures and human resources aimed to effectively respond to climate change) etc.

Having considered the inter-relationship of the IWRM-based Basin Development Strategy of the MRC and National Strategy for Climate Change shows that the efficient water use and exploitation as well as water conservation need to be undertaken in the circumstance of climate change and the both must be integrated into the national strategy, policy, plan and institutional issues. The National Strategy for Climate Change which has been newly approved will provide necessary guidance and it has to be referred in the process to prepare and implement the Action Plans of the MRC, especially in formulating the projects of cooperation to mitigate the impacts of the upper development and climate change.

The analysis of the main laws, strategies and policies as mentioned above has indicated an set-off point that *the issue of integrated water resources management has been included in these documents expressing an essential coordination between the Ministries, sectors and provinces. But there is still need to institutionalize this coordination through the allocation of clear responsibilities for them. This is critical important requirement needs to be considered while developing the NIP.*

The analysis of national strategies shows that the overlaps of project preparation need to be avoided to support the effective use of budget through the inheritance of previous studies' results to create common understanding and actions in the processes of MRC cooperation. At the same time, there are opportunities to make the most of MRC studies' results supplementary to the in-country actions to ensure sustainable development in the Mekong Delta and Central Highland.

3.2 Principles to formulate the National Indicative Plan (NIP)

The ultimate success of the IWRM-based Basin Development Strategy will depend on how Viet Nam and other countries can reflect the strategic priorities in their national planning and policies. Each country has a different administrative, policy, and legal system and each will implement the contents of the IWRM Strategy in a way most appropriate to its customs and practices. For Viet Nam, the success of the IWRM Strategy implementation also very much depends a close coordination, provision of the information of development tendency and sector management; and the integration of policies and plans into the preparation of projects that includes in the NIP. Therefore, the development of projects for Viet Nam must be based on its determination in addressing the issues stipulated in the Strategy and overcoming the constraints the Strategy faces for next strategic period.

The process of NIP preparation varies from countries, but the most importance is that it has to be fully integrated into national and sector planning process. This also requires Viet Nam's high commitment.

At first step, the preparation of NIP is requested to proceed in parallel with the process of Regional Action Plan (RAP) aimed at expressing a close interaction between the NIP and RAP. The national activities, and then are continued for a longer period in order to ensure an approach based on sustainable water use originated from local level (sub-basin). This approach allows the national BDP working group to mobilize necessary supports from the line agencies and their participation in the whole process of NIP.

The BDP working group assumes responsibilities to coordinate and facilitate in-country activities as well as to cooperate with the regional BDP team. Each country will determine the process for approval for the National Indicative Plan by appropriate body.

The National Indicative Plan in combination with the Regional Action Plan forms the Basin Action Plan (BAP). These Plans will guide the preparation of MRC Annual Work Program in future through the formulation of Programmes and preparation of State of Basin Report which is base for monitoring the Basin sustainable development (see figure 2. Functions and relevance of Action Plans, Project Portfolio and State of Basin Report in context of MRC programme).

3.3 Focus areas for Viet Nam and proposed projects

To be able to successfully implement the IWRM- based Basin Development Strategy resulting development opportunity space and mitigate negative impacts to protect natural resources in the Mekong Delta and Central Highland, at first step it is necessary for Viet Nam to define its focus areas or issues to be addressed in this strategic period through projects, programs or activities to

achieve set out objectives. There are many issues while being resolved which needs cooperation between the MRC countries, some issues need to be studied by individual country in order to have scientific bases for negotiating for national benefits and mutual ones. When defining the focus areas, one of importance is that the focus areas have to reflect or link closely to the national policies, strategies and plans as well as national priorities in water resources development and management. Many focus areas may be selected but they should be concrete so that the identification of project to address the issues of attended areas can be conveniently proceeded and meet the national requirements. The focus areas have to cover the following target groups:

- Strengthening national institutions for integrated water resources management through the improvement of coordination between the sectors, harmonization of the national planning process with regional ones. Besides it, the human resources development to meet the requirements of institutional strengthening;
- Reviewing and strengthening legal and regulatory processes in support of IWRM and addressing the issues resulted from development for example the involvement of private sector may affect to planning process in the country;
- Updating or developing new national sectors plans and sub-basin plans for interests of water and related resources taking into account the opportunities and consequences of the basin development; and support the national policy of poverty alleviation and environmental protection;
- Addressing knowledge gaps to aim at improving development scenarios assessment through the implementation of studies which results are useful in solving uncertainties and risks and support for basin wide monitoring.

In Viet Nam territory there are two sub-basins identified in the BDP program, namely 10 V (Mekong Delta) and 7 V (Se San, Srepok river basins). Both sub-basins play a very important strategic role in social and economic development, political security of the country and promotion of the cooperation with the MRC other countries. Each sub-basin has specific characteristics of geography, hydrology and social economic development (see Chapter 1).

To be able to study and select focus areas, Vietnam National Mekong Committee has assessed the above conditions of the both sub-basins and defined their issues to be addressed on the base of cooperation in the MRC for successfully implementing the IWRM-based Basin Development Strategy.

When projects are formulated and entered into the NIP, one challenge facing to VNMC is how to mobilize qualified staff and set up tools effective for the implementation and management of the NIP. In order to achieve this objective, a capacity building program should be recommended as one component within the NIP, but it can be combined with the existing training activities in the line agencies or other related initiatives. It is obvious that this is a regular and permanent task and it should be also considered as one of the focus areas based on which projects of capacity building will be prepared and included in the NIP.

3.3.1 Focus Areas and Proposed Projects in the Mekong Delta

Mekong Delta belonging to Viet Nam is located in the most downstream of the Mekong basin. Although it has many good conditions for social and economic development, but the Mekong Delta is also suffering the impacts caused by natural disasters and may be suffered the potential negative impacts caused by the upstream development if there is no proper management. These impacts comprise changes of flow pertaining to bank erosion, shortage of water for irrigation and domestic supply in dry season, risks in flood season, fish migration and breeding and loss of fish capture, reduction of sedimentation and nutrient, salinity intrusion and water pollution. These issues need to be taken into account when national and sector development plans are formulated for meeting the requirements of social economic development while still ensuring environmental objectives for the Mekong Delta.

Focus Area 1. Address the integration and harmonization of national planning process into/with the IWRM-based Basin Development Strategy and Strengthen national water resources management process

Overall Objectives

To assess national water resources management in the Mekong Delta and its relationship with the water and related resources management in the Mekong Basin aimed to strengthen and institutionalize national process contributing to the sustainable water resources development at both national and regional levels.

Proposed Projects and Programs

1.1 Establishment process and procedures for integration of national and sector planning into the IWRM-based Basin Development Strategy of MRC

Main Outputs

Report on analysis and assessment of the coordination and linkage between sector plans and national plans;

Analysis of the relationship between the IWRM-based Basin Development Strategy and related national strategies, planning processes;

Procedure formulated for integration of sector and national planning into the MRC Strategy together the requirements for implementation including the analysis of responsibilities of Ministries, economic sectors and Vietnam National Mekong Committee.

1.2 Study of the solutions for strengthening water resources management in the Mekong Delta

Main Outputs

Report on the establishment of River Basin Planning Committee for the Mekong Delta and Evaluation on Effectiveness of its Operation in integrated water resources management;

Overall Analysis on achievements and constraint, causes and responsibilities of stakeholders in integrated water resources management in the Mekong Delta;

Recommendations on the improvement of existing RBPC or new establishment of River Basin Organization in accordance with the Government Decree on River Basin Management.

1.3 Preparation of procedure for notification of water resources infrastructure projects' development and operation in the Mekong Delta

Main Outputs

Report on the execution of Government instructions of the implementation of the Mekong Agreement in general and Procedure for Notification, Prior-consultation and Agreement of the Mekong River Commission;

Assessment of situation of water resources and transport infrastructure construction in the Mekong Delta controlled by Article 5 and Article 26 and others of the Agreement and may cause transboundary impacts;

Report on Assessment of Conflict in water use and utilization among the sectors caused by lack of the integrated water resources management in the development and operation of water resources, navigation infrastructure and other water related projects;

Procedure for Notification of the construction and operation of water resources projects prepared and approved by appropriate authority.

1.4 Preparation of Guidelines for data and information sharing for the Mekong Delta in accordance with the requirements of the MRC and in the country

Main Outputs

Report on assessment of data and information exchange and sharing with the MRC, situation of data and information management related to water and water related resources according to the Government Decrees and Ministries' Circulars;

Review legal documents on data and information sharing and role of information sharing in effective management of water and related resources and cooperation in the MRC;

Guidelines updated or newly developed to serve for the sustainable water resources development in the Mekong Delta and support for the Mekong cooperation.

1.5 Preparation of Guidelines for water use, water quality management and prevention of water pollution in the Mekong Delta

Main Outputs

Analysis and assessment of conflict in water utilization caused by a lack of legal documents for control and solving conflicts; Identification of priority areas for protection and solving conflicts;

Review existing related legal documents and tools (monitoring stations, analytical models...) and Recommendation of additional effective and realistic measures;

Related Guidelines established and approved by appropriate authorities.

Focus Area 2. Development of vision for the Mekong Delta in the context of integrated water resources management; Updating sector management strategies (irrigation, agriculture, navigation etc); Development of environmental, economic and social objectives to be considered as base line for monitoring water resources development in the Mekong Delta

Overall Outputs

To develop vision and economic, social and environment objectives based on which the base line conditions are established to serve for monitoring the impacts of development projects in the Mekong Delta and from upstream development to the Mekong Delta.

Proposed projects and programs

2.1 Development of vision for the Mekong Delta in the context of IWRM and environmental, economic and social objectives to support the monitoring development projects.

Main Outputs

Report on analysis of the requirements for environmental protection related to the economic development objectives in general and water resources development in particular to be used as the bases for the establishment of vision to ensure sustainable development;

Analysis of environmental factors (shortage of water, flood, water pollution, degradation of ecosystem and wetland...) and social implications and existing control standards;

Environmental, economic and social objectives are developed as the bases for establishing base line conditions to support for monitoring development projects including the upstream Mekong Basin development.

2.2 Updating the water resources development scenarios for the Mekong Delta to be used for reviewing and improving the basin development scenarios

Main Outputs

Report on the assessment of methodology applied for setting up the water resources development scenarios in the Mekong Delta and its level of integration and harmonization with the assessment of basin development scenarios;

The water resources development scenarios for the Mekong Delta are updated to be used for integrated water resources management (IWRM);

Recommendations on the use of the update water resources development scenarios in the Mekong Delta for the improvement of the MRC basin development scenarios.

2.3 Preparation of state of environment report for the Mekong Delta

Main Outputs

Report on analysis of the process to assess state of environment in the Mekong Delta and wide dissemination of environmental information aimed to improve the coordination and cooperation between sectors, levels of administration and authorities in the mitigation of environmental adverse impacts;

Report on emergent environmental issues, environmental protection criterion affecting to the economic and social issues;

State of environment report prepared in consultation with the concerned Ministries, Provinces and communities will be accepted for publication.

2.4 Upgrading and Expansion of monitoring system for water resources and environmental management in the Mekong Delta and upstream development

Main Outputs

Assessment of the scope and quality of monitoring system to satisfy requirements monitoring the impacts of developments to environment and water resources in the Mekong Delta;

Recommendation on upgrade and expand the monitoring system to support water resources and environmental management in the Mekong Delta and monitor the impacts of upstream development.

2.5 Improve Knowledge Base in the VNMC Secretariat and concerned line agencies

Main Outputs

Review and assessment existing knowledge base at the VNMC Secretariat and line agencies which have been provided with the DSF of the MRC and the effectiveness of knowledge base in water resources management and support for cooperation in the implementation of the Mekong Agreement and related Procedures, Guidelines;

Scope of knowledge base, type of data, tools to be reviewed and defined in order to support for integration between the sectors in the country and MRC;

Knowledge Bases are improved or newly set up at the VNMC Secretariat and in some line agencies for use by different management levels, science researches, assessment and monitoring water use in the sub-basins belonging to Viet Nam as well as in the whole Mekong Basin.

Focus Area 3. Address the opportunities and consequences of the on-going development including development in the Upper Mekong Basin aimed at enhancing the sustainability of development projects in the Basin

Overall Objective

To advise and support the Government, Line Ministries and Vietnam National Mekong Committee in working out measures to use development opportunities and protect dry season flow and in preparing a mechanism for cost/benefit sharing amongst Sectors aimed to create momentum and ensure sustainable development in the Mekong Delta and scientific bases for negotiation and promoting the cooperation in the MRC in order to successfully implement the MRC IWRM-based Basin Development Strategy.

Proposed Projects and Programs

3.1 Assessment of the impacts of the operation of upstream dams, especially in extremely uncertainty operation in combination with the inter-basin and intra water diversion projects to the Mekong Delta including Cambodia territory and recommendation on mitigation measures

Main Outputs

Report on the review and defining of options for upstream development such as hydropower, irrigation together with water diversion;

Report on the update of potential issues (salinity intrusion, shortage of water, flood, loss of fish capture, fish migration, degradation of wetland...) in the Mekong Delta in connection to the development in the Delta and Upstream;

The scenarios of the construction and operation of hydropower dams, irrigation infrastructures, water diversion projects developed and impacts assessed for the Mekong Delta and Cambodia;

Recommendations on mitigation measures made and publicized to support for the promotion of bilateral cooperation and MRC cooperation.

3.2 To set forth measures to use new development opportunities for the Mekong Delta under the circumstance of increased dry season flow resulted from reasonable operation of the upstream dams as scientific bases to support for VNMC's negotiation in protecting dry season flow for the Mekong Delta.

Main Outputs

Identification of development opportunities (irrigated agriculture, integrated development of flood plain, increase of aquaculture production, improvement of navigation..) for the Mekong Delta resulted from the operation of upstream dams and water infrastructures; and make prioritized these opportunities together with the respective conditions;

Recommendation on immediate and long term requirements for the developments in the Mekong Delta related to water resources, thresholds of dry season flow as the bases for the promotion of cooperation of VNMC and MRC other countries in successfully implementing the MRC Procedures and technical guidelines for mutual benefits of the Basin.

3.3 Effective implementation of the Navigation Agreement between Viet Nam and Cambodia in the context of upstream development and climate change.

Main Outputs

Report on the additional survey and investigation of navigation conditions and prediction of potential impacts of flow changes to these conditions and the provisions of the Agreement between the two countries;

Assessment of the impacts caused by increase of navigation and its combination with natural condition and other developments (natural disaster, water pollution, bank erosion, waterway infrastructures etc)

Recommendation on mitigation measures (river trainings, monitoring station network, navigation aids...) and measures for the promotion of cooperation between the two countries and within the MRC.

3.4 Based upon the scientific and realistic justifications to establish principles for defining the potential of agricultural development and preliminary principles for cost/benefit sharing amongst the water use sectors in the Mekong Delta.

Main Outputs

Reports on survey, study, analysis and assessment of information and factors related to agriculture development (strategies, policies, socio-economics, natural conditions, scientific justifications, infrastructure for agricultural production, economic obligation of the Mekong Delta, advantages, challenges, opportunities, constraints...);

Report on direction for arrangement of agriculture production objectives of ecosystem zones as well as for the whole Mekong Delta;

Recommendation of Principles to define agricultural development opportunities and Preliminary Principles for cost/benefit sharing amongst the water use sectors (principles for natural resources use, land use in ecosystem and administration zones, principles for agriculture land use, principles for national food security, cost/benefit sharing...);

Development of main solutions, steps to elaborate principles that can be applied for other areas in the Basin.

3.5 Mekong Delta study on the impacts of upstream hydropower and water infrastructure development

Main Outputs

Study partnerships, scope and database established;

Critical knowledge gaps in understanding of the delta system and the implications of upstream hydropower and water infrastructure development are filled;

Trends in key Delta development concerns without additional upstream development are defined;

Impact of Chinese, tributary and Mekong mainstream dams and mega-irrigation diversions on the delta and its development trends are understood;

A framework for avoidances and mitigation of negative impacts, and enhancement of any positive impacts are developed

Focus Area 4. Improvement of water use efficiency for irrigated agriculture to serve for national food security and poverty alleviation policy.

Overall Objectives

To make strategic recommendations on effective and wise use of water resources as crucial elements for the integrated development of the Mekong Delta.

Proposed Projects and Programs

4.1 Improvement of water use efficiency for irrigated agriculture and fishery development in the Mekong Delta.

Main Outputs

Report on survey and assessment of the efficiency of water supply by water project systems to ensure sustainable agriculture and fishery development;

Review of legal documents and existing standards for the management of water project systems and improvement of water supply efficiency;

Update of existing guidelines and preparation of new guidelines aimed to improve efficiency of water use to facilitate new development opportunities of the irrigated agriculture and fishery.

4.2 Development of Strategy for drought management and water supply.

Main Outputs

Assessment of drought situation in the Mekong Delta and identification of its causes; review of existing policies to overcome water shortage for agricultural production and water supply;

Recommendations on supplementary measures to assess risks and to solve issues of water shortage taking into account the cooperation in the Basin (joint regulation project, enhancement

of agriculture production, cost/benefit sharing...) based on which and in cooperation with the MRC to develop and implement the Strategy for Drought Management.

4.3 Diversification of agriculture production and rural development in the situation of upstream development, climate change and sea water rise.

Main Outputs

Report on survey, investigation and additional collection of data and information and analysis on the state of agriculture and rural development, policies, technological and material bases for diversification of agricultural production;

Prediction and identification of capability for agriculture diversification and rural development in the region (food requirements for the region, advantage of market, competition capacity, socio-economic development in the Mekong Delta, technological advance and achievements, investment capacity, water resources availability, impacts of climate change...);

Recommendation on the options of agriculture diversification and measures of the implementation of the options

4.4 Integrated flood plain management for Viet Nam and Cambodia.

Main Outputs

Report on rapid assessment of the development of flood plain Viet Nam – Cambodia related to water resources management and its implication to the upstream development;

A realistic management plan for the flood plain developed in order to promote the cooperation between the two countries in successfully implementing the IWRM-based basin development Strategy at the same time to meet the requirements of two most downstream countries;

A set of reliable data collected; capacity building for two countries strengthened to contribute to the effective solutions for trans-boundary issues of water utilization.

4.5 Preliminary study for water allocation at the main canal intake to main stream of Mekong river and environmental flow for the Mekong Delta.

Main Outputs

Report on survey and rapid assessment of the water allocation at some main intakes in Tien and Hau rivers; Assessment of potential conflicts between the downstream and upstream provinces and related issues;

Preliminary principles prepared, agreeable to be bases for developing technical guidelines for the application in the Mekong Delta in order to harmonize water utilization between the sectors and environmental protection objective. The principles and information of their application are

also useful for VNMC's cooperation with the MRC countries in maintaining flow on the Mekong mainstream.

Focus Area 5. Assessment of uncertainties and risks caused by developments and climate change

Overall Objective

To clearly define the issues of uncertainties and risks in the establishment of development scenarios and integrated water resources management in the Mekong Delta to serve for water resources planning and recommending the measures for improvement of integrated water resources management.

Proposed Projects and Programs

5.1 Identification of uncertainties and risks related to mechanism of sediment transport and nutrient; and assessment of the impacts of upstream development to sediment and nutrient entering into the Mekong Delta.

Main Outputs

Additional collection of data and information, analysis and processing of data and information for the establishment of reliable database of the mechanism of sediment and nutrient transport;

Appropriate methodology of the assessment of impacts to sediment and nutrient is made in order to improve the quality of assessment of the impacts of basin development scenarios to the Mekong Delta.

5.2 Study of flood impacts to the quality and efficiency of fluvial land use in the Mekong Delta, Viet Nam.

Main Outputs

Report on the analysis of space allocation tendency, quality of fluvial land in Tien and Hau riverside which is formed by flooding;

Assessment of the quality of sediment and nutrient in the different types of cultivation land with respect to the different conditions of production and investment and assessment of the change of land quality caused by the change of flood impacts;

Recommendations on measures to sustainably use and protect land for irrigated agricultural production, including measures for the mitigation of the upstream development impacts to sediment, nutrient in the Mekong Delta.

5.3 Define the issues and analyze uncertainties and risks affecting to the fishery resources in the context of emerging development in the basin and its implication to the livelihood of people living in the Mekong Delta.

Main Outputs

A set of reliable data and tendency of the change of fishery resources (level of diversification, abundant; exploitation and product relationship with hydro-meteorology...) established; databases of local communities and livelihood depending on fish; monitoring system;

Methodology to assess impacts to fishery resources by the development and climate change established and applied for the assessment of impacts including impact to local people's livelihoods from which results the recommendations of mitigation measures made to support the review and improvement of the basin development scenarios.

5.4 Assessment of tendency and change of biodiversity, environmental hotspots in the Mekong Delta and their impacts to the vulnerable communities.

Main Outputs

A set of reliable data and tendency of the change of biodiversity, ecosystem and hotspots in the Mekong Delta and causes for change is analyzed;

Methodology to assess impacts is developed and applied for predicting the changes of biodiversity, ecosystem and environmental hotspots caused by the development in the Delta itself and upstream and their implication to the livelihood of local communities which is bases for the recommendations of integrated management for the Mekong Delta and inputs for the basin development scenarios assessment.

5.5 Assessment and prediction of the immediate and long-term impact of climate change to the Mekong Delta under the condition and tendency of emerging development in the basin.

Main Outputs

Overview report on the studies in the countries and abroad of the impacts of climate change in combination with development to the downstream of large rivers; Overview report on the climate change events and sea water rise in the Mekong Delta and in the basin; Methodology for integrating climate change issues into the upstream development scenarios;

Assessment of impacts of the risks of climate change to the hydrology, sea water rise in the Mekong Delta and then to the agricultural production, ecosystem and biodiversity and integrated impacts of these risks are integrated into the upstream development scenarios;

Immediate and long-term measures worked out to response to the potential impacts of climate change for the Mekong Delta.

3.3.2 Focus Areas and Proposed Projects in the Central Highland

Se San and Srepok River Basins

The Se San and Srepok basins in the Central Highland accounted for 11% of the total flow volume of the whole Mekong Basin have potentials for the hydropower development. With a rapid hydropower development the Se San and Srepok are facing the environmental challenges caused by the lack of integrated water resources management. These sub-basins with important watershed if not managed in an integrated manner will affect to the whole basin, especially potentials for trans-boundary impacts.

Focus area 6. Integration and harmonization of the national planning process in the sub-basins of Se San and Srepok rivers with the MRC Strategy and strengthening water resources management process in these sub-basins

Overall Objectives

Strengthening the national water resources management process through the improvement of coordination and cooperation in the economic sectors and the MRC countries; the integration of national planning process into the regional strategies.

Proposed Projects and Programs

6.1 Development a vision for the sub-basins of Se San and Srepok in the context of IWRM together with environmental, economic and social objectives and State of sub-basins report to support the monitoring of developments and environmental impacts.

Main Outputs

Analysis of the requirements for environmental protection closely linked to the socio-economic development objectives in general and water and related resources development in particular based on which the vision on integrated water resources management is established to ensure the sustainability for the Se San and Srepok river basins;

Analysis of the environmental elements (water shortage, flood, water pollution, degradation of ecosystem and watershed biodiversity, national conservation zones...) and standards for monitoring and control; social elements;

Environmental, economic and social objectives are developed as the bases for establishing base line conditions to support for monitoring development projects, especially hydropower and irrigation projects.

6.2 Preparation of the formulation of Integrated Water Resources Management Strategy taking into account of trans-boundary impacts.

Main Outputs

Report on the assessment of IWRM situation for both rivers and application of related legal documents;

Preliminary studies for the preparation to formulate the Strategy of IWRM for the Se San and Srepok river such as trans-boundary issues, cooperation with Cambodia, improvement

of the coordination between the economic sectors and environment protection authorities etc; recommendation on the next steps to formulate the IWRM Strategy for the two rivers in line with the Government Decree on river basin management and to be integrated into the IWRM-based basin development Strategy of the MRC.

6.3 Development of the procedures for integration and harmonization of sectors management strategies with the regional strategies with respective to the specific conditions of the two rivers.

Main Outputs

Report on the analysis and assessment of the coordination and integration of sector planning into national planning in the two rivers;

Analysis of the relationship between the IWRM-based basin development Strategy and related strategies and planning processes in the Central Highland;

Procedures (steps, contents...) prepared for integrating sector and national planning into the MRC strategy and requirements for the implementation of Procedures such as the institutional arrangement, responsibilities of the concerned ministries, VNMC and local provinces.

6.4 Development of Procedures for notification of water and related resources infrastructure projects for VNMC aimed to support VNMC in solving trans-boundary impact issues and implementing the IWRM-based basin development Strategy.

Main Outputs

Assessment of the results of the implementation of Government Instructions of the Mekong Agreement and Procedure for Notification, Prior Consultation and Specific Agreement, Government Decree on management, protection and integrated exploitation of resources, environment of the irrigation, flood control and hydropower reservoirs;

Analysis of the situation of the construction of water resources infrastructures and navigation projects in the Se San, Srepok basin according to the Article 5 and Article 26 and other articles which control trans-boundary impacts to Cambodia territory;

Assessment of the relationship or potential for conflict in water utilization amongst the economic sectors caused by a lack of integrated management in the construction and operation of the water infrastructures, especially hydropower;

Procedures for Notification of the construction and operation of water resources project prepared and approved by the appropriate authorities.

6.5 Strengthening the operation of existing Srepok River Basin Council.

Main Outputs

Report on Assessment of the operation effectiveness of Srepok River Basin Council and its achievements and constraints following the provisions of the Government Decree on River Basin Management and requirements for strengthening capacity in river basin management as mentioned in the MRC Strategies and Government Strategic Direction for water resources development projects toward 2020;

Recommendations on strengthening the capacity of the Srepok Council submitted to the Authorities concerned such as MONRE, MARD for consideration, approval and providing support for successful implementation.

6.6 Initial Preparations for the establishment of Se San River Basin Organization.

Main Outputs

Report on the assessment of IWRM in the Se San river basin and responsibilities of the concerned authorities and stakeholders in the sustainable development and management of the basin;

The results of studies on the applicability of the Government Decree on river basin management, Mekong Agreement, other river organizations, and the cooperation with Cambodia in order to make recommendations on suitable types for river basin management in the Se San basin and next steps.

6.7 Development a suitable mechanism for cooperation with Cambodia to successfully implement the IWRM-based Basin Development Strategy.

Main Outputs

Report on studies, survey, investigation and assessment of the cooperation with Cambodia in solving the impacts of hydropower and irrigated agriculture development to downstream in the sub-basins of Se San and Srepok and other economic cooperation; assessment of the situation of water utilization in the Delta's border provinces;

Report on studies of the application of the MRC procedures, legal documents in the country to be able to solve the issues of trans-boundary impacts;

Recommendation on the mechanism aimed to promote the cooperation with Cambodia in the field of water resources management at the border areas and in the implementation of the IWRM-based Basin Development Strategy.

6.8 Development of technical guidelines for management of water quantity and quality, and prevention of water pollution for the two river sub-basins.

Main Outputs

Analysis and assessment of the conflict in water utilization and causes such as lack of legal bases for control and solving of conflicts; identification of prioritized zones for protection, prevention of pollution and to solve conflicts;

Report on the review of existing legal documents and tools (monitoring and hydrological systems, analytical tools...), recommendation on realistic and effective solutions;

Related Guidelines established and submitted to the concerned authorities' consideration and approval.

6.9 Upgrade and expand the network for monitoring water use, especially at the border areas and study to establish network for biodiversity and ecological monitoring for the sub-basins of Se San and Srepok.

Main Outputs

Assessment of scope and quality of the existing monitoring network to meet requirements for monitoring impacts to environment and water resources in the sub-basins of Se San and Srepok, especially the stations at the border;

Recommendations on upgrade and expand the monitoring network to serve for water resources and biodiversity, ecological management for the Se San and Srepok river basins, including stations at the border.

Focus Area 7. Enhancement of the sustainability of tributaries' hydropower development through mitigation of negative impacts of the construction and operation of hydropower dams in the Se San and Srepok river basins to downstream, including Cambodia territory and mainstream flow change and address the issues of cost and benefit sharing between the sectors and sub-basin's countries

Overall Objectives

To support VNMC and concerned Ministries in sustainable development and management of the Se San and Srepok river basins aimed to contribute to successfully implement the IWRM-based Basin Development Strategy and promote the cooperation between Viet Nam and Cambodia.

Proposed Projects and Programs

7.1 Assess the impacts of flow change caused by the development and operation of upstream hydropower dams to downstream and Cambodia territory; recommendations on mitigation measures.

Main Outputs

Report on the collection and processing of additional data and information of flow, natural environment, land, water, forest use, social and economic data and information;

Development scenarios formulated focusing on hydropower, irrigation, watershed management; tools accepted for impacts assessment;

Report on the assessment of impacts of the construction and operation of infrastructures, dams to the change of flow, and its consequences to economic, social and environment conditions downstream and Cambodia territory and measures for mitigation and for promoting the cooperation between two countries.

7.2 Defining the potential of flow contribution and its impacts to the change of flow in the main stream of Mekong river.

Main Outputs

Report on survey, investigation, collection and processing of meteorology and hydrological data reliable and can be used as scientific bases for analyzing the tendency of flow changes and flow volume;

Report together with a set of the data of annual flow of the Se San and Srepok river, on the potential contribution to the mainstream of the Mekong river; causes for flow changes or supplementary flow to the mainstream; recommendations on solutions for updating the development scenarios in the sub-basins of Se San and Srepok as well as for the whole Mekong basin.

7.3 Conservation of ecological and environmental hotspots through solutions forward the sustainability for the Se San and Srepok sub-basins.

Main Outputs

Review and selection of the environmental hotspots and assessment of the baseline conditions, collection of additional data and information on the biodiversity of ecosystems and livelihoods of local people in these areas;

Methodology for impacts assessment of the development projects recommended and applied for prediction of impacts to the selected environmental hotspots and their social implications. Based on the results of assessment, recommendations on the integrated management for the hotspots including the criterion for the limitation of development of hydropower, mining and industries etc the selected areas.

7.4 Upgrade and preparation of the standards for sustainable hydropower development for the Se San and Srepok basin rivers.

Main Outputs

Review and assessment of the application of the existing standards of sustainable hydropower development in the country and abroad for the Se San and Srepok river; their appropriateness and safeguards to support for solutions in sustainable development;

National existing standards upgraded and harmonized with regional or international standards to be able to solve trans-boundary impact issues.

7.5 Preparation of basic principles and options for cost and benefit sharing as one of important solutions for sustainable development and bases for promoting cooperation in the MRC.

Main Outputs

Database of water use for different economic sectors and database of livelihoods, economic and social aspects set-up;

Basic analysis of the cost and benefit of the economic sectors in the areas and conflicts in the use of water and natural resources;

Basic principles recommended for the concerned authorities' consideration and use, for example principle on strategic priority, transparent data and information, principle on the monitoring by community, principle on compensation and ensure livelihoods security etc; Options for cost/benefit sharing defined between the regions, countries, economic optimization of water allocation, benefit sharing from hydropower to create additional benefits by a mechanism of cooperation/ coordination or supervision, tax, fund for environmental protection and forest restoration, fund contributed from hydropower and agriculture revenue for ensuring people livelihoods.

Focus Area 8. Assessment of potential impacts of climate change to water and related resources and socio-economic conditions in the sub-basin of the Se San and Srepok, Central Highland of Viet Nam

Overall Objective

To support formulation of water and related resources management strategies through the identification of climate change issues, their potential impacts and implementation of mitigation measures.

8.1 Identification of the issues of climate change, build up approach and database to support the studies of measures to response to climate change in immediate and long term period.

Main Outputs

Analysis of the phenomenon of climate change in the area and identification of the related key issues aimed to serve for preparing of development planning;

Methodology for collection, processing and systemizing data and information; methodology for defining and analyzing the climate change scenarios for the Se San and Srepok river;

A set of tools set-up with database to support for the assessment of impacts caused by the development projects and climate change in the Se San and Srepok river basin to downstream in Vietnam and Cambodia territory and recommendation for integrating the results into the basin development scenarios.

8.2 Assess the potential impacts of climate change combined with the construction and operation of projects to the environment, socio-economics of the sub-basin of Se San and Srepok river, including Cambodia territory and integrate the issues of climate change in the sub-basin into the basin scenarios.

Main Outputs

Modeling tools selected and accepted for application in impact assessment; development and climate change scenarios defined;

The potential impacts of climate change to water resources availability and supply, hydropower development, flood and inundation, drought pertaining to the trans-boundary impacts assessed; solutions for the integration of the sub-basins scenarios into the basin scenarios recommended through which the capacity of the two countries are strengthened.

3.3.3 Capacity building projects

Focus area 9. Improvement of knowledge and raising of awareness to meet requirements of the implementation of the IWRM-based Basin Development Strategy

Overall Objective

To build institutional and human resources capacity supplementary to the existing national/sector capacity building programs in order to meet the national and basin requirements of IWRM.

Proposed Projects and Programs

9.1 Formulate a Program for raising awareness of the IWRM-based Basin Development Strategy and how to implement it.

Main Outputs

Report on the analysis and assessment of community awareness of the Mekong Agreement and MRC programs as well as the IWRM-based Basin Development Strategy prepared and shared with the stakeholders;

A Program of community awareness and elaborated activities developed and submitted to the concerned authorities' consideration and approval for seeking fund for implementation.

9.2 Prepare a strategy of VNMC for involving the participation of stakeholders and community in implementing the IWRM-based Basin Development Strategy and Mekong Agreement.

Main Outputs

Report on the analysis and assessment of the participation of community in the Mekong Cooperation's activities prepared and shared with stakeholders;

A Strategy of the participation of community in the Mekong cooperation's activities developed and submitted to the concerned authorities' consideration and approval for seeking fund for implementation.

9.3 Improvement and upgrade of modeling tools for application in the assessment and monitoring of water utilization and support the application of DSF and implementing the MRC procedures.

Main Outputs

Review and analysis of the application of modeling tools in assessment and monitoring water utilization in the country and MRC; recommendations on the improvement and upgrade the MRC DSF and additional data collection;

A set of tools and DSF improved and well applied to effectively support the impacts assessment of development scenarios and in developing technical guidelines to implement the MRC Procedures.

9.4 Development of methodology and approach to study measures to response to climate change.

Main Outputs

Overview of methodology and approach in the study of climate change applied in the country and abroad;

Methodology of the assessment of development opportunities and risks related to climate change documented; methodology and approach to study measures to response to climate change for the Mekong Delta and Central Highland prepared, disseminated and a training program formulated for application of this methodology and approach.

The total of 9 focus areas with 45 proposed projects entered into the NIP will be able to contribute together with other MRC countries, to successfully implement the IWRM-based Basin Development Strategy. However, with a limitation of timing and budget, it is difficult to implement all proposed projects within the strategic period of five years. Therefore, a list of prioritized projects must be made and time table for their implementation beyond the next period need to be clearly specified in PINs and Timetable (see item 4.3 Implementation Plan)

4. Implementation of the National Indicative Plan

The success of the NIP implementation has to be based on an effective mechanism of steering and coordination. This mechanism is established on the bases of national process and system of water resources management. The followings are main features of the water resources management situation in Viet Nam.

4.1 General in water resources management process

The water resources management process in Viet Nam, although at national level is assigned to the MONRE, there is still an overlap between the MONRE and related other Ministries. To be able to set forth a reasonable mechanism for directing and providing with guidance the implementation of NIP, it needs to concentrate review of the mandate of the main agencies who assume responsibility of state management of water resources and related resources.

Structures for water resources management and functions, missions of the main agencies

The Ministry of Natural Resources and Environment is designated by the Government for state unique management of water resources at national level and in this connection, the Department of Water Resources Management is responsible to the Minister of MONRE for water resources management.

Department of Water Resources Management (decision No 1035/QĐ-BTNMT dated 19 May 2008): Regarding the integrated water resources management together with resolving the conflict in water utilization, the Department has following missions and competence need to be attended:

- Submit to the Minister's consideration of legal regulation and guidelines, policies in the field of water resources management within the Ministries' authorization of management; provide guidance and inspection of the implementation after the documents are issued.
- Submit to the Minister's consideration of strategy, development planning, long term plan, 5 years plan and annual plan in the field of water resources management; provide guidance of inspection and organization for implementation after these documents are approved.
- Submit to the Minister's consideration of the measures of water utilization to ensure for sustainable development, multi-purposes; active measures for prevention, control and restoration of water sources that are degraded, exhaustive; response to the impact of climate change to water resources; provide guidance of inspection and implementation organization after these documents are approved.
- Be responsible for chairmanship of the formulation of basic standards, national standards, national technical guidelines, norm of technical-economics, unit product cost related to the field of water resources management ...
- Submit to the Minister's consideration of the line, policy of cooperation with other countries in the region which have common sources of water with Viet Nam; provide with the regulation of information related to international water sources; recommend measures for implementation after the regulation is issued.
- Submit to the Minister's consideration of the process, procedures to solve the dispute of water resources; assume chairmanship, coordination and collaboration with the related agencies in solving the dispute of water resources.
- Submit to the Minister's consideration of the regulations of monitoring water resources exploitation and utilization; define and issue the thresholds of exploitation of the river water resources and aquifer, reserve and conservation zones, limitation zones for underground water; provide guidance for the inspection of implementation organization after the regulation is issued...

- Submit to the Minister's consideration of the plan for harmonization and allocation of water between the sectors, provinces in line with administrative areas and at national level; Organize implementation after the plans are approved;
- Appraise the sector planning of water exploitation and utilization, inter-basin water diversion projects prepared and recommended by the sectors and provinces.
- Provide guidance of professional skill management in the field of water resources for provinces; organize inspection to organs, individuals of the implementation of the legal regulations and guidelines of water resources management.

Viet Nam National Mekong Committee (*Decision by the Prime Minister No 114/QĐ-TTg dated 15/1/2010*):

Position and function (Article 1) specifies that Vietnam National Mekong Committee is an organ coordinating inter-ministries Mekong cooperation activities to support the Government in providing guidance and direction, management of the activities cooperative with the MRC aimed to develop, utilize and protect water and related resources in the Mekong Basin in general and Mekong Delta and Central Highland belonging to the Basin in particular.

Mission and Authorization (Article 2) stipulates main points related to the integrated water resources management in the Mekong Basin:

- Submit to the Prime Minister's consideration of the Strategic Plan of Vietnam National Mekong Committee; preparation of decisions, instructions of the Prime Minister for the activities to cooperate with the MRC; formulation of programs, projects of sustainable development, utilization, management and protection of water and related water resources in the Mekong Basin (item 1).
- Focal point for the cooperation with MRC countries in order to elaborate and organize the implementation of the Mekong Agreement (item 2).
- Coordination of the monitoring of activities related to utilization, protection and sustainable development of water and related resources in the Mekong Basin; protect of benefits of Viet Nam through the development of master plan and basin-wide projects, especially mainstream projects; organization of activities aimed to disseminate information and propagate the issues of sustainable development, utilization, management and protection of water and related water resources of the Mekong Basin (item 3).
- Focal point for the cooperation with Mekong Basin's countries, other countries, NGOs, international organizations and in cooperation with the line ministries, sectors and Provincial People Committees, Cities belonging to the management at central level in order to set forth and develop international cooperation projects in the Mekong Basin aimed at protection and sustainable development of the Mekong Delta and Central Highland (item 4).
- Participation in the meetings of MRC and preparation of the report to the Government on the results and conclusions of the meetings (item 5).
- Undertake the organization and implementation of studies aimed to make recommendation on measures to mitigate the impacts of upper economic and social development to the Mekong basin areas belong to Viet Nam territories; studies assigned by the Government of the trans-boundary impacts caused by the economic and social development in Viet Nam.

- Take part in support of the Mekong provinces in IWRM through the establishment and strengthening of river basin organizations.
- In coordination with MPI, MOFIN and Line Agencies concerned to allocate national budget in the implementation of Mekong projects of Viet Nam and other basin wide projects that Viet Nam participates in; take part in the appraisal of planning and related other sector and provincial projects located in the Mekong Delta and Central Highland.
- Allowed to request the Sectors, Provinces to provide with reports of the results of GMS meeting related to the VNMC works; participate in the works of GMS as assigned by the Government.

Directorate of Water Resources, MARD (established by the Decision of Prime Minister, QĐ No 03/2010/QĐ-TTg). Main tasks of the Directorate related to integrated water resources management as follows:

Submit to the Minister of MARD's consideration to issue the following documents or report them to higher levels of state competence to consider:

- Law Projects, Draft Resolution of National Assembly, Draft Resolution of Permanent Committee of Assembly; Government Decree; Draft Decision of Prime Minister on Development of Water Resources Infrastructure;
- Strategies, Planning, long term, 5 year and annual plans, programmes, projects, proposals/de an, and national important water structures;

Organize implementation of legal documents, laws, strategies, planning, plans, programmes and projects of water infrastructures development after being approved or publicized for use.

Publicize guidance, guidelines on technology, professional knowledge and skills, internal regulation and standards and specific documents under the Directorate's management; appraisal and approve for publishing sector standards.

Approval of survey and investigation projects, planning, revision of region water infrastructure planning, inter-provinces water infrastructure planning, irrigation systems to serve for agricultural production, multipurpose projects linked to socio-economic sectors.

Regarding to the exploitation, use and protection of hydraulic works, water supply and drainage, and rural domestic water supply:

- Submit to the Minister's consideration of procedures for regulating water from reservoirs which are under the Ministry state management; options for dam safety; integrated and efficient water use of hydraulic works; addressing water conflict in compliance with legislative regulations;

For prevention and control of negative impacts caused by water:

- Provide direction, guidance and check of the implementation of prevention, control and overcoming of consequences caused by drought, inundation, salinity intrusion; remedy water structures' accident to ensure production; mitigate water pollution in the hydraulic systems.

For prevention, control and mitigation of natural disaster:

- Organize the implementation of the Strategy for Prevention, Control and Mitigation of Natural Disaster as specified by Laws and make recommendations for review as necessary;
- Monitor and update the situation of storm and typhoon, whirlwind and cyclone, earthquake and tsunami; in coordination with provinces and sectors to timely set forth measures to overcome structures' accident and solutions for critically worst situation caused by disaster;
- Organize the implementation of prevention, control and mitigation of flood and natural disaster as decentralized by the Minister.

Besides the above functions and mandates, the capacity of agencies responsible for state management of water resources and hydraulic works at all levels, capacity of hydraulic works system management boards/organizations play an important role in integrated water and related resources management.

The human resources of Provincial Departments are necessary condition for implementing the NIP. The assessment and analysis of capacity on the bases of the Department's function, responsibility and organizational structure aims to develop a capacity building programme oriented to the success in implementing the IWRM-based Basin Development Strategy. The followings are focusing the assessment of main Provincial Departments' capacity:

Provincial Department of Natural Resources and Environment (DONRE) in the Mekong Delta has main tasks in water resources management as follows:

- Play leading role in cooperation with other related agencies in formulating planning, plans for management, use, protection of water resources, prevention and control of degradation of water sources; organize implementation upon their approval;
- Organize the appraisal for proposals, projects of water resources exploitation and use, inter-basin diversion under the Provincial Peoples Committees' competence;
- Organize the definition of threshold for river water and aquifer exploitation, water store areas, areas where water uses limited; plan for harmonization of water allocation at local level;
- Organize the appraisal of extension, change of expiration, revision of contents and effectiveness and withdraw license of explore, water use and exploitation, wastewater discharge, and license for drilling ground water; issue license and collection of fee and levy on water resources as defined by laws or related legal documents; inspection of activities as required in the license;
- Carry out basic investigation and survey, inventory, archives of water resources data; organize management, use of monitoring stations funded and constructed by provinces;
- Synthesize the reports on water resources exploitation and use, points of wastewater discharge; establish the list of polluted, deteriorated and exhausted water sources;
- Provide guidance for filling up unused drilling wells in accordance with legislative regulations;

- Take part in the inter-sector organizations established by the central government organs; assumes permanent responsibility of the provincial inter-sector organizations related to water resources management, exploitation and protection in the river basins.

In general, in the DONRE there is one Unit of Water Resources and Hydro-meteorology mainly responsible for water resources management. Other Units such as Sub-Department for Environmental Protection, Technical Center for Natural resources and Environment participate in associated activities in the field of water resources management.

Provincial Department of Agriculture and Rural Development (DARD) has following responsibilities:

- Provide guidance and undertake inspection of the implementation of regulations promulgated by Provincial Peoples Committee on the decentralization of management for hydraulic works with medium and small scale and target programmes of rural domestic water supply in provinces; Provide guidance and undertake inspection of construction, use and protection of medium and small water infrastructures; Organize the implementation of target programmes of rural domestic water supply approved;
- Following the regulations of river, canal systems' management; exploitation and development of river and canal systems according to approved plans;
- Provide guidance and undertake inspection of construction, use and protection for dyke systems, structures for flood and storm control; develop options and measures for prevention, control of flood, typhoon, drought, inundation, acidity, salinity intrusion, bank erosion in the province;
- Provide guidance for development of land use planning for purpose of water resources; organize demarcation and prepare planning and measures for moving structures and houses located within the protected areas of dyke systems and river corridor as defined;
- Provide guidance and inspect the implementation of state regulations of exploitation and protection of hydraulic works; protected areas for dyke in IV and V category; flood diversion, retention and retardation for dyke protection as defined in province.

In DARD, there are Sub Department of Hydraulic Works Management and Center for exploitation and management of hydraulic work systems responsible for tasks related to hydraulic works management to serve for agricultural production, people's material and moral welfares and preventing natural disaster in province. For inter-province systems, the involvement of these agencies will be designated and guided by People's Committee and MARD.

The role of RBOs, River Basin Planning Committee and Management Council for Hydraulic Works Systems in the implementation of NIP needs to be elaborated.

Achievements and constraints and requirements considered when implementing the IWRM-based Basin Development Strategy of the MRC.

Achievements, at present there are many legal documents developed such as Government Decree on River Basin Management, revision of Law on Water Resources; implementation of Environmental Protection Law and its guidelines on environmental impact assessment etc.

The unique management of water resources at national level has been designated to the Ministry of Natural Resources and Environment. Other Ministries have been developed legal documents and laws in relation to the state management in the sectors under the respective ministries' competency and linked to water resources utilization.

There have been many hydraulic works, hydropower plants constructed to create infrastructural bases to be able to serve for production, people's welfares and integrated water and related resources.

An improved coordination among the Sectors in water management has been formed.

Regarding the constraints, basically the integration of sectoral policies and strategies into the water and related resources management has not yet fully reflected IWRM principles. In addition, the integration of national policies and strategies into the regional ones has not really been strong and highly effective.

The environment in many areas of the Mekong Delta and Central Highland has potential deterioration and pollution due to lack of good management and development unsatisfied with the requirements of sustainability.

For the cooperation with the MRC countries and other countries in the basin, a lot of achievements have gained, especially in the negotiation of the Mekong Agreement 1995 and its Procedures and programmes to implement Agreement's provisions, promotion of the dialogue with the upper countries, China and Myanmar; and establishment of knowledge base for monitoring water use at the basin level. Nevertheless, a strong and continued commitment of the MRC countries in implementing the IWRM-based Basin Development Strategy in particular and Mekong Agreement in general are still below the requirements.

Originating from the above remarks and evaluations of opportunities as well as limitations in water resources management in the Mekong Delta and Central Highland, the requirement for setting up an active and effective mechanism for the implementation of NIP needs to be defined.

4.2 Implementation Arrangement

In order to successfully implement the Strategy in general and National Indicative Plan in particular it is necessary to define clearly link between the agencies which are responsible for implement NIP, in supporting and management, in monitoring at all levels. Figure 3 describes the structure for implementing the NIP.

Steering Committee

Vietnam National Mekong Committee will establish a Steering Committee to guide all tasks at national level for implementing the NIP. The Committee will be chaired by Vice-Minister of Ministry of Natural Resources and Environment cum Vice Chairman of VNMC and two Deputies of the Steering Committee will be designated to Director General of VNMC Secretariat and Director of Water Resources Department. Members of the Steering Committee are the representatives of Departments of the Ministry Members of VNMC such as MARD,

MONRE, MOT, MOFA, MPI, Ministry of Industry and Trade (MOIT), Ministry of Construction (MOC).

Responsibilities of the Steering Committee

The Steering Committee assumes responsibility to guide addressing the issues related to the preparation of implementation plans, mobilization of resources and funds, advice of resolving the issues related to policies in integrated water and related resources management and monitoring.

The members of SC participate in the meeting to evaluate NIP progress and discussion and making decision of the solutions for improvement of the coordination in the implementation of the NIP.

Provide advice to the VNMC of activities in the cooperation with the MRC to together set forth measures to mitigate adverse impacts and protect Mekong resources and facilitate in implementing projects to bring in the benefits for the country to serve for the policies of the socio-economic development.

Provide assistance in mobilization of resources of the respective Sectors for successfully implementing the NIP.

Working Group

There will be two working groups established to support the NIP implementation in the Mekong Delta and Central Highland. The working group's members are representatives of the line agencies who are implementing projects, representatives of the related Provincial Departments, Private Sectors responsible for investment in the provinces. The management of the VNMC Secretariat assumes the chairmanship of the working group.

The responsibilities of National Working Group

The Working Group has to provide comments in technical issues in the process of implementation of the NIP, provide with necessary information to support for direction and guidance of the studies and researches for the projects in line with the functions, responsibilities of the respective line agencies.

Take part in the meeting to review and evaluation of the progress of projects, quality of products as well as to mobilize resources for implementing projects.

Make recommendations to the Steering Committee on the measures to overcome difficulties and constraints in the project process in order to have improvements in time.

At any time when projects faced with the sensitive problems and needs to be reported to the Government, the Ministry of Natural Resources and Environment on behalf of the Steering Committee has to report to the National Council for Water Resources for any guidance before reporting to the Government.

4.3 Work Plan and Timetable

Projects will be implemented according to priority order and depends on the fund availability secured for the projects. The NIP will be implemented for the period from 2012-2015 as seen in Table 2, Annex C.

Through the analysis of the projects' necessity, the consideration of priority should concentrate in institutionalizing the integration and development of the in-country procedures into the MRC procedures and strategies as well as regional policies; in studies to assess the impacts caused by the upstream development and water utilization; addressing the risks because of a lack of data and information; and monitoring activities. There are several studies and researches related to the NIP that had been undertaken by the VNMC at the request of the Government in year 2011, for example the project of the assessment of impacts caused by the hydropower development in combination with the upstream water diversion. This project remains some activities in year 2012 and these activities can be linked to the projects proposed in the NIP. Therefore, when elaborating PIN into the project proposal, VNMC will discuss with the line agencies concerned of the on-going activities to avoid any overlaps. The followings are projects which will be implemented in 2012:

- Focus Area 1 consists of projects FA1.1, FA1.2, FA1.3 and FA1.4;
- Focus Area 2 consists of FA2.2, FA 2.3 and FA2.5;
- Focus Area 3 consists of FA3.1 and FA3.2;
- Focus Area 4 consists of FA4.3 and FA 4.4;
- Focus Area 5 consists of FA5.1, FA5.3, FA5.4 and FA5.5;
- Focus Area 6 consists of FA6.3, FA6.5, FA6.6, FA6.7 and FA6.9;
- Focus Area 7 consists of FA7.2, FA7.3 and FA7.4;
- Focus Areas 9 consists of FA9.1, FA9.2 and FA9.3.

The total of 26 projects could be implemented in year 2012 and the remaining is recommended for 2013 and may be beyond the strategic period.

The projects of NIP that are approved and financed for implementation must be put in the annual plan of the respective line agencies when they are assigned as implementing and involved agencies. The evaluation of the project's implementation will be followed by the regulation and guidelines of the VNMC and line agencies concerned.

4.4 Additional Funding Requirements

The fund provided for the projects of NIP will be born from the national budget for the Ministries' Programs, of the VNMC, and MRC programs funded by the development partners and other international initiatives. Annually, Line Agencies are requested to work with the VNMC in preparing the budget estimation for the NIP projects assigned for seeking fund from the Government to provide for the respective Ministries, from VNMC budget and from the MRC. The consideration and approval of budget for the NIP year 2012-2015 need to connect with the decentralization policy of some core function activities of river basin management of the MRC for the period 2011-2015 and next one as committed by the MRC countries.

When reviewing the important strategies and policies shows that the Government of Viet Nam has given attentions to the prevention, control and mitigation of the natural disaster; national strategy for adaptation and response to the climate change; strategic direction of water resources and hydraulic works; national target water program etc. These strategies and policies are interact with each other and required a close coordination and cooperation amongst the Ministries and Sectors concerned for effective implementation and management.

With such, the provision of national budget as well as seeking fund from external source of fund for implementing the national strategies and NIP is issue needs to be carefully considered in order to avoid any overlaps and even leading to different points of view or recommendations. The cost estimation for the implementation of the NIP as indicated in the PIN which is based on the analysis of inheritance of related studies/projects is very complicated and is not made exactly from the beginning. Therefore, the fund requirement needs to be reconsidered and revised during the preparation of the project proposals.

To be able to avoid the delay of project implementation, VNMC Secretariat should review the activities that are implemented by national budget in its plan for 2012-2013 in accordance with the tasks assigned by the Government in order to integrate some of these activities in the NIP. Besides it, the review of bilateral international cooperation projects (WB funded Mekong-IWRM project) and MRC other programs is to seek supports in time at a certain extent for the activities included in the NIP. By doing so, the implementation of the NIP will be smoothly started and effectively continued and at the same time to mitigate financial risks as described in the Chapter 5 below.

5. Uncertainties and Risks

a. General Concept of Uncertainties and Risks

The uncertainties that may lead to the ineffective implementation of the NIP in general and projects in particular are lack of data and information, tools and methodology, lack of collaboration and coordination. The risks because of uncertainties may cause poor quality products of projects resulted the recommendations or conclusions which are not useful and helpful for the linkages of the line agencies' activities with the Mekong cooperation. Furthermore, the related line agencies may not have scientific outputs aimed at providing advice for the VNMC of technical and institutional aspects in the implementation of the Strategy meeting the requirements of the MRC and its mandate as designated by the Government.

b. Risks of Commitments to implement the National Indicative Plan

The fact has given evidences that there are many reasons leading the fail of the activities/projects in the MRC, their delay or not high quality. The first is that the MRC Secretariat does not mobilize sufficient qualified staff for coordinating the programs' implementation. Secondly, some time, some MRC countries have views that the MRC projects or programs does not bring about the real benefits for them, so their attention and support are not strong. Thirdly, the commitment of line agencies in the implementation of projects is not high because that the line agencies do not consider the Mekong projects as the one of main tasks in their mandate or agenda. Therefore, the implementation of project is not considered compulsory in the line agencies' annual plan. With the reasons as mentioned above, when the

NIP gets approval for implementation, it is necessary for VNMC to report to the Government to timely instruct the Ministries and Sectors and Provinces members to provide necessary support for VNMC in coordinating the NIP implementation. At the same time, the Ministry of Planning and Investment and Ministry of Finance are requested by the Government to consider and provide national budget for the NIP successful implementation.

c. Institutional Risks

The risks of the lack of Circulars, Decrees and Instructions related to the NIP may lead the delay of its projects of institutional development, for example the project of Strengthening Srepok River Council Operation, Strengthening IWRM in the Mekong Delta or project of Improvement of Water Use Efficiency etc. In order to mitigate these risks, when preparing the project proposals, it is necessary to clearly define the objectives and steps in the whole process of implementation. The preparation of guidance and guidelines of IWRM is in the mandate of the Department of Water Resources Management who is responsible to MONRE in state management of water resources. If there is any projects related to the MRC cooperation, the Department needs to cooperate with the VNMC in terms of technical and international legal supports. The similarity can be happened to the projects of Institutional Strengthening in the Hydraulic Works System Management implemented by MARD or Projects related to Institutional Issues of the MOT.

The constraints of institutional aspects will bring about potential risks to the establishment of strategies, procedures and projects of institutionalization of the integration of national planning and policy into regional strategy and policy such as the IWRM-based Basin Development Strategy of MRC.

d. Technical Risks

The technical risks may be caused by a lack of information, data and limitations of data quality and not at the same level or timing between the sectors and counties in MRC. Secondly, the tools applied for the sectors in the MRC countries may be different, although for the time being, the MRC has accepted to use DSF for assessment and monitoring the basin development scenarios. The third is that the line agencies mobilize insufficient staff for meeting the requirements of the implementation of the MRC and VNMC projects. The lack of data and information with high quality as well as capacity to use tools and modeling may lead to the inaccuracy of studies' results or recommendations which are not based on the scientific bases. These factors can be affecting to the results of negotiation in the MRC, justification for planning, formulation of policies related to the cooperation in solving the trans-boundary issues.

e. Financial Risks

At present, the Government of Viet Nam has given high attention to the impact of the upstream development to Viet Nam. The Government has provided directions and guidance for the Ministry of Natural Resources and Environment responsible for state unique management of the water to develop the National Strategy for Response to Climate Change (NSCC) which has been approved in 2011. And then, on the bases of the NSCC, the Ministries and Provinces has also prepared the Action Plan for its implementation. At the request of the Government, VNMC has been active in the discussion with other countries to develop the National Indicative Plan to

implement the IWRM-based Basin Development Plan and other researches to obtain scientific results to support for the cooperation in the MRC.

However, due to the national budget limitation, not all projects or research programs are funded for implementation. Therefore, the Ministries involving in the implementation of the Action Plan are also active in contact with the donors for seeking fund for the projects and programs at the same time to coordinate with the related other ministries programs as necessary measures the effective use of budget and avoidance of the overlaps as well.

The preparation of the NIP to implement the IWRM-based Basin Development Strategy with 44 projects may face financial difficulty that does not meet all requirements, even in the case the project priority is defined as indicated in the item 4.3 above. Such affects the successful implementation of the Strategy.

The above financial risks can be overcome with the help of the close coordination and cooperation between the ministries and sectors in providing data and information and reasonable allocation of projects' implementation. With such, the results of previous studies and researches could be inherited and then the budget would be efficiently used.

6. Monitoring and Evaluation

a. General

The monitoring of Strategy is made in two aspects. The first is the monitoring of NIP performance by the line agencies and coordination and management by the VNMC, including the activities of RAP. The second is to monitor the impacts of water utilization and exploitation on the bases of IWRM principles applied in country.

The monitoring will result in setting forth measures to promote the successful implementation of the Strategy and making recommendations for the MRC to mitigate the impacts through structure measures, non-structure and enabling measures.

b. Implementation Monitoring

The monitoring the Strategy implementation can be done for the following aspects:

- Project progress in accordance with the deliverables and milestones identified;
- Evaluation of achievement of the project objectives;
- Coordination between the leading agencies and involved agencies with the assistance of the VNMC;
- Project output, outcome and quality of product (contribution to the related national strategies, policies, planning and IWRM process);
- Assessment of technical and financial support and its efficiency.

The monitoring is implemented by the Steering Committee in a regular manner and with the help of inspection missions consisting of the representatives of the SC and National Working Group (NWG) established by the SC.

c. Impact Monitoring

The Mekong Delta of Viet Nam is located at the most downstream of the Basin where suffers all impacts of the upstream development. The monitoring of the impacts aimed to obtain scientific data and information to support for the cooperation with other MRC countries as well other upstream countries in developing the measures to mitigate negative impacts to the environment, socio-economy and their implication to the people livelihood.

The Se San and Srepok, Central Highland of Viet Nam are facing with many challenges caused by hot developments, especially hydropower and irrigated agriculture right in these basins. The monitoring serves for putting forward measures to mitigate impacts to the environment and livelihood of the people living in the basins. In addition, the monitoring of trans-boundary impacts will provide bases for the promotion of discussion, collaboration and cooperation between Viet Nam and Cambodia in solving any trans-boundary problems which may occur in the development of these important basins of the both countries. The following aspects are to be monitored:

- Elements reflected flow changes include timing, discharges in dry and wet season and special inspection and assessment when there is a sudden change.
- Water quality based on parameters specified by the MRC and also referred to the national standards.
- Salinity intrusion (distance, salinity content, impacts to agriculture cultivation and livelihood...).
- Impact to wetland and biodiversity.
- Fish migration, capture and aquaculture.
- Sediment and nutrient trapping and its impact to bank erosion and agriculture production etc.

The monitoring should be linked to the analysis of causes in order to have accurate assessments and right recommendations. The monitoring is undertaken through the coordination of the VNMC, MONRE, MARD and provinces.

Annex C. Proposed Projects in the National Indicative Plan (NIP)

Table 1 - Proposed Projects in NIP and LAs responsible for the implementation of projects

No	Project	Suggested objectives	Outputs	LAs responsible for implementation
<p>A. Mekong Delta Focus Area 1. Address the integration and harmonization of national planning process into/with the IWRM-based Basin Development Strategy and Strengthen national water resources management process.</p> <p><i>Overall Objectives</i></p> <p><i>To assess national water resources management in the Mekong Delta and its relationship with the water and related resources management in the Mekong Basin aimed to strengthen and institutionalize national process contributing to the sustainable water resources development at both national and regional levels.</i></p>				
1.1	Establishment process and procedures for integration of national and sector planning into the IWRM-based Basin Development Strategy of MRC.	Strengthen national water management process aimed to support successful implementation the IWRM-based Basin Development Strategy	-Report on assessment of coordination among LAs; -Analysis of relationship between regional strategies and national strategy/policy; -Procedures for integration	Lead agency: VNMC; Involved: Department of WRM, Institutes and Provinces in Mekong Delta
1.2	Study of the solutions for strengthening water resources management in the Mekong Delta	Assess the effectiveness of WRM at river basin level and recommend measures for strengthening	-Report on Operation of Cuu Long RBO; -Analysis of WRM conditions, -Measures for improvement, may include new establishment	Lead agency: Department of WRM (MONRE); Involved: VNMC, Provincial Departments
1.3	Preparation of procedure for	Assess the application of	-Report on the compliance	Lead agency: VNMC;

	notification of water resources infrastructure projects development and operation in the Mekong Delta	MRC procedure and recommend establishment of Procedure for Mekong Delta to improve coordination for sustainable development of Mekong Delta	with the Government instruction and implementation of MRC procedures; -Analysis of situation of infrast. Construction, conflict potential; -Procedure established and endorsed.	Involved: Department of WRM, Directorate of Water Resources and Hydraulic Work (MARD), Provincial Departments
1.4	Preparation of Guidelines for data and information sharing for the Mekong Delta	Analysise applicability of MRC procedure in Mekong Delta as bases for for establishment of Procedure for data and information sharing for Mekong Delta in order to support for VNMC to negotiate the implantation of MRC procedures	-Assessment report on data and information sharing; -Related Legal documents reviewed; -Procedure established for data and information sharing and exchange for Mekong Delta	Lead Agency: VNMC; Involved: Department of WRM, Directorate of WR and Hydraulic Work, Directorate of Environment, Provincial Departments
1.5	Preparation of Guidelines for water use, water quality management and prevention of water pollution in the Mekong Delta	Enhance the Efectiveness of IWRM in Mekong Delta to support measures to response to the impacts of upstream development	-Report on conflict in water utilization; -Review of related legal documents and tools; -Guidelines developed	Lead agency: Department of WRM; Involved: VNMC, Directorate of Environment, Directorate of WR and Hydraulic Work, Provincial Departments
<p>Focus Area 2. Development of vision for the Mekong Delta in the context of integrated water resources management; Updating sector management strategies (irrigation, agriculture, navigation etc); Development of environmental, economic and social objectives to be considered as base line for monitoring water resources development in the Mekong Delta.</p> <p><i>Overall Objectives</i></p>				

To develop vision and economic, social and environment objectives based on which the base line conditions are established to serve for monitoring the impacts of development projects in the Mekong Delta and from upstream development to the Mekong Delta.

2.1	Development of vision for the Mekong Delta in the context of IWRM and environmental, economic and social objectives to support the monitoring development projects.	Improve the effectiveness to monitor development projects through the development of vision, environmental, economic and social objectives for the Mekong Delta	-Report on analysis of requirements for environmental protection; -Analysis of environmental elements and standards for monitoring; -Vision and Objectives developed	Lead agency: Department of WRM; Involved: VNMC, Directorate of Environment, related Institutes and Provincial Departments
2.2	Updating the water resources development scenarios for the Mekong Delta to be used for reviewing and improving the basin development scenarios	Improve the formulation of basin development scenarios for harmonization of water utilization amongst the MRC countries	-Report on review of methodology to formulate scenarios, analysis of harmonization with basin scenario; -Scenarios of water resources and hydraulic work updated; Recommendation on application of updated scenarios of Mekong Delta for basin scenarios	Lead Agency: Southern Water Resources Planning Institute; Involved: Provincial Departments
2.3	Preparation of state of environment report for the Mekong Delta	To support for measures to monitor and protect environment for Mekong Delta in the context of upstream development and climate change	-Report on Analysis of environmental impacts and related information widely publicized; -Identification of emergent environmental issues and criterion related to socio-economics; -State of Environment	Lead agency: Scientific Institute of Meteorology, Hydrology and Environment; Involved: Directorate of Environment, Southern WRI, Southern Center for

			Report prepared	M-Hydrology, Provincial DONRE
2.4	Upgrading and Expansion of monitoring system to monitor water resources and environmental management in the Mekong Delta and upstream development.	Enhance the effectiveness of monitoring impacts in order to timely response changes caused by utilization and exploitation of water resources	-Report on assessment of scope, quality to meet current requirements; -Recommendation on upgrade and expansion of monitoring systems and implementation	Lead Agency: Southern Regional Center for Meteorology and Hydrology ; Involved: Provincial DONRE
2.5	Improve Knowledge Base in the VNMC Secretariat and concerned line agencies	Provide timely reliable data and information and apply analytic tools to serve for advisory work of VNMC	-Report on review and assessment of Knowledge Base at VNMC Secretariat and related Institutes; -Knowledge Base Improved	Lead Agency: VNMC; Involved: Related Institutes

Focus Area 3: Address opportunities and consequences of on-going development including development in Upper Mekong Basin aimed at enhancing the sustainability of development projects in the Basin

Overall Objective

To advise and support the Government, Line Ministries and Vietnam National Mekong Committee in working out measures to use development opportunities and protect dry season flow and in preparing a mechanism for cost/benefit sharing amongst Sectors aimed to create momentum and ensure sustainable development in the Mekong Delta and scientific bases for negotiation and promoting the cooperation in the MRC in order to successfully implement the MRC IWRM-based Basin Development Strategy.

3.1	Assessment of the impacts of the operation of upstream dams, especially in extremely uncertainty operation in combination with the inter-basin and intra water diversion projects to the Mekong Delta including Cambodia territory and recommendation on mitigation measures.	Improve the outcomes of the regional studies aimed to put forward reasonable solutions for protecting Mekong Delta and promoting the cooperation with Cambodia	-Report on the review and defining of options for upstream development together with water diversion -Report on the update of potential issues in the MKD; -Scenarios developed and assessed; Mitigations recommended	Leading: Southern IWRP, MARD; Involved: Provincial Departments; Sub-NIAPP
3.2	To set forth measures to use new development opportunities for the Mekong Delta under the circumstance of increased dry season flow resulted from reasonable operation of the upstream dams as scientific bases to support for VNMC's negotiation in protecting dry season flow for the Mekong Delta.	Enhance the application of the MRC PMFM and technical guidelines to define development opportunities	-Identification of development opportunities for the MD; -Recommendations to support VNMC in negotiating to protect dry season flow as bases for the promotion of MRC cooperation	Leading: Southern Hydraulic Research Institute, MARD; Involved: Southern IWRP, Sub-NIAPP; Provincial Related Departments
3.3	Effective implementation of the Navigation Agreement between Viet Nam and Cambodia in the context of upstream development and climate change.	Enhance the cooperation effectiveness through the successful implementation of the Navigation Agreement between the two countries	-Report on additional survey and investigation; -Report on impact assessment caused by navigation increase; -Recommendations on mitigation measures	Leading: Inland Waterway Administration, MOT; Involved: VNMC, MONRE, MOFinance, related transport and fisheries agencies
3.4	Based upon the scientific and realistic justifications to establish principles for defining the potential of agricultural development and preliminary principles for cost/benefit	Promote the coordination amongst Sectors in the sustainable use of water resources for the development of the Mekong	-Report on survey, studies...related to agricultural development; -Report on direction for arrangement of	Lead: Sub-NIAPP ; Involved: VNMC, Southern IWRP, Sub-Scientific Institute for Hydro-meteorology

	sharing amongst the water use sectors in the Mekong Delta.	Delta and contribute to the negotiation in the MRC for its mutual benefits	agricultural production objectives; -Recommendation on Principles to define agr.opportunities and preliminary principles for cost/benefit sharing; -Development of steps to elaborate principles	and Environment, sub-Institute for Fishery Economics and Planning, Provincial Department for Agriculture and Rural Development.
3.5	Mekong Delta study on the impacts of upstream hydropower and water infrastructure development	Develop a rigorous evidence base on the implications of upstream development on the natural, social, economic and institutional systems of the Mekong Delta, including Chinese, tributary and Mekong mainstream hydropower and mega-irrigation diversion; Facilitate a consultative process to identify and integrate avoidance and mitigation options for adverse impacts of upstream development on the Delta	-Study partnerships, scope and database established; -Critical knowledge gaps in understanding of the delta system and the implications of upstream hydropower and water infrastructure development are filled; -Trends in key delta development concerns without additional upstream are defined; -Impacts of Chinese, tributary and mega-irrigation diversions on the delta and its development trends are understood; -A framework for (i) avoidances and mitigation of negative impacts, and (ii) enhancement of any positive impacts are	VNMC; International Consulting Company (successful in bidding); National associated consulting company/agencies.

			developed	
<p>Focus Area 4. Improvement of water use efficiency for irrigated agriculture to serve for national food security and poverty alleviation policy.</p> <p><i>Overall Objectives</i> <i>To make strategic recommendations on effective and wise use of water resources as crucial elements for the integrated development of the Mekong Delta.</i></p>				
4.1	Improvement of water use efficiency for irrigated agriculture and fishery development in the Mekong Delta.	Enhance responsibilities in the effective use of the limited water resources in the MKD to serve for the socio-economic development	-Report on survey and assessment of the water use; -Review related legal documents and guidelines; -Existing guidelines updated, new guidelines prepared	Leading: Directorate of Hydraulic Work; Involved: Sub-NIAPP, Southern IWRP and Provincial Department for Agriculture and Rural Development
4.2	Development of Strategy for drought management and water supply.	Set-up strategic measures and action plans to supply water for economic development and mitigate damages caused by drought	-Assessment of drought situation; -Recommendations on supplementary measures to solve issues of water shortage taking into account the MRC cooperation in formulating the Basin Strategy for Drought Management	Leading: Southern Institute for Water Resources Planning; Involved: Provincial DARD, Sub-NIAPP, Sub-Scientific Institute for HM &E
4.3	Diversification of agriculture production and rural development in the situation of upstream development, climate change and sea water rise.	Propose measures to change agricultural production mechanism in the socio-economic development aimed to meet new situation in the basin and implementation of the	-Report on survey, investigation and additional collection of data and analysis; -Prediction and identification of capability for agr. diversification and	Leading: Sub-NIAPP; Involved: VNMC, Southern IWRP, Sub-Academic Institute for HM&E, Sub-Institute for Fishery Economic and Planning.

		IWRM Strategy	rural development; -Recommendation on the options for diversification.	Provincial DARDs
4.4	Integrated flood plain management for Viet Nam and Cambodia.	Ensure sustainable development in the flood plain VN-CBD and promote the cooperation in implementing the IWRM Strategy	-Report on rapid assessment of the development in the flood plain; -A realistic management developed; -A set of reliable data collected and capacity strengthened	Leading: Southern IWRP, Involved: DARDs, Sub-NIAPP, Sub-Academic Institute for HM&E
4.5	Preliminary study for water allocation at the main canal intake to main stream of Mekong river and environmental flow for the Mekong Delta.	Support the negotiation on the protection of dry season flow on the mainstream and harmonization of water use amongst the Sectors	-Report on assessment of water allocation at some main intakes in Tien and Hau rivers; -Preliminary principles prepared, agreeable to be bases for development of technical guidelines	Leading: Department of WRM, MONRE; Involved: VNMC, Southern IWRP, Southern Hydraulic Research Institute,
<p>Focus Area 5. Assessment of uncertainties and risks caused by developments and climate change.</p> <p><i>Overall Objective</i> <i>To clearly define the issues of uncertainties and risks in the establishment of development scenarios and integrated water resources management in the Mekong Delta to serve for water resources planning and recommending the measures for improvement of integrated water resources management.</i></p>				
5.1	Identification of uncertainties and risks related to mechanism of sediment transport and nutrient; and assessment of the impacts of upstream development to sediment and nutrient entering into the Mekong Delta.	Build up a reliable database and assess impacts to support for assessment of basin wide development scenarios	-A set of database and methodology; -Report on impact assessment; -Recommendation for the improvement of basin wide scenarios	Leading: Southern Hydraulic Research Institute; Involved: Southern IWRP, VNMC, Southern Regional Center for HM.

5.2	Study of flood impacts to the quality and efficiency of fluvial land use in the Mekong Delta, Viet Nam.	Analyze flood and sediment component impacts to land quality and effectiveness of its use and make recommendations on solutions for protection and sustainable use	-Report on the analysis of allocation, tendency and quality of fluvial land in riverside; -Assessment of the quality in the different types of cultivation land; -Recommendation of measures for protection ...	Leading: Sub-NIAPP; Involved: Southern IWRP, VNMC, DARDs of An Giang, Dong Thap, Tien Giang and Can Tho
5.3	Define the issues and analyze uncertainties and risks affecting to the fishery resources in the context of emerging development in the basin and its implication to the livelihood of people living in the Mekong Delta.	Build up a reliable database and assess impacts to support for assessment of basin wide development scenarios	-A set of database and methodology; -Report on impact assessment; -Recommendation for the improvement of basin wide scenarios	Leading: Research Institute for Aquaculture No 2; Involved: VNMC, Sub-Institute for fishery economic and planning, Southern Institute for WRP
5.4	Assessment of tendency and change of biodiversity, environmental hotspots in the Mekong Delta and their impacts to the vulnerable communities.	Build up a reliable database and assess impacts and tendency to support for assessment of basin wide development scenarios	A set of database and methodology; -Report on impact assessment and tendency; -Recommendation for the improvement of basin wide scenarios	Leading: Department of Natural Conservation, MONRE; Involved: Institute for Forestry Inventory and Planning, VNMC and DONREs
5.5	Assessment and prediction of the immediate and longterm impact of climate change to the Mekong Delta under the condition and tendency of emerging development in the basin.	Support for solutions on adaptation and response to climate change in country and integration into the basinwide development scenarios	-Overview report on the studies of the impacts of climate change in combination with development; -Assessment of risks of	Leading: Academic Institute for HM &Environment; Involved: VNMC, Southern Institute for WRP,

			climate change and their integration into basinwide scenarios; -Immediate and longterm measures developed.	Southern Regional Center for HM, DONREs in the Mekong Delta
B. Se San and Srepok River Basins, Central Highland of Viet Nam				
Focus area 6. Integration and harmonization of the national planning process in the Se San, Srepok sub-basins with the MRC Strategy and strengthening water resources management process in these sub-basins.				
<i>Overall Objectives</i> <i>Strengthening the water resources management through the improvement of coordination amongst the economic sectors and MRC countries by the integration of national planning process into the regional strategies.</i>				
6.1	Development a vision for the sub-basins of Se San and Srepok in the context of IWRM together with environmental, economic and social objectives and State of sub-basins report to support the monitoring of developments and environmental impacts.	Enhance the effectiveness to monitor development in the river basins of Se San and Srepok	-Analysis of the requirements for environment protection; -Analysis of the environment elements and standards to monitor; -Environmental, economic and social objectives developed	Leading: Ha Noi Water Resources University; Involved: Directorate of Environment, VNMC, DARD and DONRE in the Central Highland, Central Highland Regional Center for HM
6.2	Preparation of the formulation of Integrated Water Resources Management Strategy taking into account of trans-boundary impacts.	Strengthen institutional capacity aimed to sustainably develop the Se San, Srepok river basins and solve issues of trans-boundary impact	-Report on the situation of IWRM; -Results of Preliminary studies for the preparation to formulate the IWRM strategy; -Capacity of IWRM strengthened in the related line agencies.	Leading: Department of Water Resources Management; Involved: VNMC, Southern IWRP, Directorate of Hydraulic Works, DARD and DONRE

6.3	Development of the procedures for integration and harmonization of sectors management strategies with the regional strategies with respective to the specific conditions of the two rivers.	Strengthen national water management process aimed to support successful implementation the IWRM-based Basin Development Strategy	-Report on assessment of coordination among LAs; -Analysis of relationship between regional strategies and national strategy/policy; -Procedures for integration developed taking into account two river basins characteristics.	Leading: VNMC; Involved: Department of WRM, Institutes and Provinces in Mekong Delta
6.4	Development of Procedures for notification of water and related resources infrastructure projects for VNMC aimed to support VNMC in solving trans-boundary impact issues and implementing the IWRM-based basin development Strategy.	Assess the application of MRC procedure and recommend establishment of Procedure for Se San and Srepok basins to improve coordination for sustainable development	-Report on the compliance with the Government instruction and implementation of MRC procedures; -Analysis of situation of infrast. Construction, conflict potential; -Procedure established and endorsed	Leading: VNMC; Involved: Department of WRM, Directorate of Water Resources and Hydraulic Work (MARD), Provincial Departments
6.5	Strengthening the operation of existing Srepok River Basin Organization.	Strengthen institutional and organizational capacity to support for river basin integrated management	-Report on assessment of the operation effectiveness of existing Srepok River Basin Organization, achievements and constraints -Recommendations on capacity strengthening	Leading: Office of Srepok Council (Dak Lac); Involved: VNMC, DWRM, Directorate of Hydraulic Works, DARD and DONRE, Department of Finance
6.6	Initial Preparations for the establishment of Se San River Basin Organization.	Improve IWRM for the Se San basin to promote cooperation in solving trans-boundary impact issues and implementing the MRC	-Report on assessment of the IWRM in Se San basin and responsibilities of concerned authorities; -Results of studies on the	Leading: VNMC; Involved: Department of WRM, Directorate of WR and Hydraulic Works, DARD and

		IWRM Strategy	applicability of the Government Decree on RBM, MKA and other RBOs for suitable types of RBO for Se San, recommendation for next steps	DONRE
6.7	Development a suitable mechanism for cooperation with Cambodia to successfully implement the IWRM-based Basin Development Strategy.	Raise awareness, capacity and roles of border provinces in order for promoting the cooperation with CBD in the implementation of the IWRM Strategy of MRC and in-country policies	-Report on survey, investigation and assessment of the cooperation in solving impacts to downstream; -Report on the application of MRC procedures in solving trans-boundary impacts issues; -Mechanism to cooperate between two countries	Leading: VNMC Involved: Department of WRM, Directorate of WR and Hydraulic Works, Border Provincial Authorities
6.8	Development of technical guidelines for management of water quantity and quality, and prevention of water pollution for the two river sub-basins.	Strengthen water resources management process for the two river basins through the development and implementation of technical guidelines	-Report on the assessment of conflict in water utilization and causes; - Review of related legal documents and tools; -Guidelines developed	Lead agency: Department of WRM; Involved: VNMC, Directorate of Environment, Directorate of WR and Hydraulic Works, Provincial Departments
6.9	Upgrade and expand the network for monitoring water use, especially at the border areas and study to establish network for biodiversity and ecological monitoring for the sub-basins of Se San and Srepok.	Enhance the effectiveness of monitoring impacts in order to timely response changes caused by utilization and exploitation of water resources	-Assessment of scope and quality of the existing monitoring network; - Recommendation on the upgrade and expand and implementation of these	Leading Agency: Southern Regional Center for Meteorology and Hydrology ; Involved: Provincial

			recommendations.	DONRE
<p>Focus Area 7: Enhancement of the sustainability of tributaries' hydropower development through mitigation of negative impacts of the construction and operation of hydropower dams in the Se San and Srepok river basins to downstream, including Cambodia territory and mainstream flow change and address the issues of cost and benefit sharing between the sectors and sub-basin's countries.</p> <p><i>Overall Objectives</i></p> <p><i>To support VNMC and concerned Ministries in sustainable development and management of the Se San and Srepok river basins aimed to contribute to successfully implement the IWRM-based Basin Development Strategy and promote the cooperation between Viet Nam and Cambodia.</i></p>				
7.1	Assess the impacts of flow change caused by the development and operation of upstream hydropower dams to downstream and Cambodia territory; recommendations on mitigation measures.	Put forward solutions to mitigate impacts downstream and promote the cooperation with Cambodia based on the scientific assessments of flow changes.	-Collection and processing of additional related data; -Development scenarios developed; Report on assessment of impacts of the construction and operation of infrastructures, dams to flow change and its consequences to socio-economics, environments	Leading: Ha Noi Water Resources University; Involved: Institute for Water Resources Planning, National Center for HM, EVN, DONREs
7.2	Defining the potential of flow contribution and its impacts to the change of flow in the main stream of Mekong river.	Assess flow contribution of Se San and Srepok rivers and their significance to the main stream	-Report on survey, investigation, collection and processing data reliable for analyzing flow; -Report on analysis of the potential contribution of flow to the main stream and development opportunities and recommendation on	Leading: Institute for WR Planning; Involved: EVN, Directorate of Water Resources and Hydraulic Works, National Center for MH and related Provincial Departments

			updating basin wide scenarios	
7.3	Conservation of ecological and environmental hotspots through solutions forwards the sustainability for the Se San and Srepok sub-basins.	Put forward appropriate solutions for sustainable hydropower development on the tributaries in order to protect environmental hospots	-Review and selection of environmental hotspots; -Methodology for impact assessment and its social implications developed and applied as bases for the environmental management, including the limitation to hydropower, mining etc	Leading: Department of Natural Resources Conservation; Involved: VNMC, EVN, Directorate of Water Resources and Hydraulic Works, Provincial DARD and DONRE
7.4	Upgrade and preparation of the standards for sustainable hydropower development for the Se San and Srepok basin rivers.	Strengthen professional, institutional and legal capacity for hydropower development management	-Report on assessment of the application of existing standards for the Se San and Srepok sustainable hydropower development; -National existing standards upgraded and harmonized with the MRC ones.	Leading: PECC1, EVN Involved: VNMC, Institute for Water Resources Planning, Department of Water Resources Management
7.5	Preparation of basic principles and options for cost and benefit sharing as one of important solutions for sustainable development and bases for promoting cooperation in the MRC.	Enhance the sustainability in use, exploitation of water and related resources in the Se San, Srepok river basins through the develop and implement basic principles for cost/benefit sharings	-Database of water use for different economic sectors; -Basic analysis of cost and benefit and conflicts in water use; -Basic Principles and Options for cost and benefits sharing defined for preliminary application and referred for regional level	Leading: Institute for Water Resources Planning; Involved: VNMC, Department of Water Resources Management, EVN, Directorate of Water Resources and Hydraulic Works. Provincial Related Departments

Focus Area 8. Assessment of potential impacts of climate change to water and related resources and socio-economic conditions in the sub-basin of the Se San and Srepok, Central Highland of Viet Nam

Overall Objective

To support formulation of water and related resources management strategies through the identification of climate change issues, their potential impacts and implementation of mitigation measures.

8.1	Identification of the issues of climate change, build up approach and database to support the studies of measures to response to climate change in immediate and long term period.	Build up reliable database and methodology to support for measures to responding Climate Change	-Analysis of climate change phenomenon in the areas and identification of main issues; -Methodology developed for data collection and analysis and scenarios for assessment selected; -Tools for analysis and assessment recommended	Leading: Academic Institute for Meteorology and Hydrology and Environment; Involved: VNMC, Central Highland Regional Center for MH, Ha Noi Water Resources University, Department of Climate Change, MONRE
8.2	Assess the potential impacts of climate change combined with the construction and operation of projects to the environment, socio-economics of the sub-basin of Se San and Srepok river, including Cambodia territory and integrate the issues of climate change in the sub-basin into the basin scenarios.	Support for the coordination and cooperation in formulating and assessment of basin development scenarios with the integration of climate change defined for two river basins	-Modelling tool selected and accepted for impact assessment; -Potential impacts of climate change to water availability, hydropower development, flood and inundation etc assessed; -Solutions for the integration of sub-basin scenarios into the basin scenarios recommended.	Leading: Academic Institute for Meteorology and Hydrology and Environment; Involved: VNMC, Central Highland Regional Center for MH, Ha Noi Water Resources University, Department of Climate Change, MONRE

C. Capacity Building

Focus Area 9: *Improvement of knowledge and raise awareness to meet requirements on the implementation of the IWRM-based Basin Development Strategy*

Overall Objective: To build institutional and human resources capacity supplementary to the national/sector capacity building program in order to meet requirements of IWRM in the country and Basin.

9.1	Formulate a Program for raising awareness of the IWRM-based Basin Development Strategy and how to implement it.	Raise awareness for all stakeholders and communities of the Strategy	-Report on the analysis and assessment of awareness of the Mekong Agreement and MRC Program and IWRM Strategy prepared and shared with stakeholders; -Action Plan developed and implemented for raising awareness	Leading: Can Tho University; Involved: VNMC, and related provincial departments in the Mekong Delta and Central Highland.
9.2	Prepare a strategy of VNMC for involving the participation of stakeholders and community in implementing the IWRM-based Basin Development Strategy and Mekong Agreement.	Enhance the participation of stakeholders and communities in the Mekong cooperation activities as effective solution for the successful implementation of Mekong Agreement and Staregy	-Analysis and assessment of the participation made and shared with stakeholders; -A VNMC's Strategy for stakeholders participation in implementing the IWRM Strategy developed and considered for approval and implementation	Leading: Can Tho University; Involved: VNMC, and related provincial departments in the Mekong Delta and Central Highland.
9.3	Improvement and upgrade of modeling tools for application in the assessment and monitoring of water utilization and support the application of DSF and implementing the MRC procedures.	Evaluate the application of tools developed in country and of the MRC and recommend measures to improve and upgrade	-Review and analysis of the application of modeling tools and recommendations for improvement; -A set of tools and DSF improved and well applied	Leading: Southern Water Resources Planning; Involved: VNMC, Academic Institute for MH and Environment, related Universities

			to effectively support the impact assessment and develop guidelines	and Provinces
9.4	Development of methodology and approach to study measures to response to climate change.	Strengthen capacity in applying the methodology and approach for studies of measures to response to climate change in the Mekong Delta and Central Highland	-Overview of methodology and approach; -Methodology of the assessment of development opportunities and risks related to climate change; methodology to study measures for responding climate change, training program for application of methodologies.	Academic Institute for Meteorology and Hydrology and Environment; Involved: VNMC, related Universities and Provincial Departments

Note: For the details of projects, please see the PINs attached to this table. The table aims to help quickly compare the contents of PINs and identify line agencies mainly responsible for implementation and ones involved in the projects' implementation.

Annex C. Proposed Projects in the National Indicative Plan (NIP)

Table 2 – Budget and Timetable for Projects Implementation, 2011 – 2015

A. Mekong Delta							
Focus Area 1. Address the integration and harmonization of national planning process into/with the IWRM-based Basin Development Strategy and Strengthen national water resources management process.							
<i>Overall Objectives: To assess national water resources management in the Mekong Delta and its relationship with the water and related resources management in the Mekong Basin aimed to strengthen and institutionalize national process contributing to the sustainable water resources development at both national and regional levels.</i>							
Project		Budget USD	Timetable				
			2011	2012	2013	2014	2015
FA.1.1	Establishment process and procedures for integration of national and sector planning into the IWRM-based Basin Development Strategy of MRC.	70,000		■	■	■	
FA.1.2	Study of the solutions for strengthening water resources management in the Mekong Delta	100,000		■			
FA.1.3	Preparation of procedure for notification of water resources infrastructure projects development and operation in the Mekong Delta	50,000			■		
FA.1.4	Preparation of Guidelines for data and information sharing for the Mekong Delta	50,000			■		
FA.1.5	Preparation of Guidelines for water use, water quality management and prevention of water pollution in the Mekong Delta	200,000			■	■	

Focus Area 2. Development of vision for the Mekong Delta in the context of integrated water resources management; Updating sector management strategies (irrigation, agriculture, navigation etc); Development of environmental, economic and social objectives to be considered as base line for monitoring water resources development in the Mekong Delta.

Overall Outputs:

To develop vision and economic, social and environment objectives based on which the base line conditions are established to serve for monitoring the impacts of development projects in the Mekong Delta and from upstream development to the Mekong Delta.

FA.2.1	Development of vision for the Mekong Delta in the context of IWRM and environmental, economic and social objectives to support the monitoring development projects.	150,000					
FA.2.2	Updating the water resources development scenarios for the Mekong Delta to be used for reviewing and improving the basin development scenarios	90,000					
FA.2.3	Preparation of state of environment report for the Mekong Delta	150,000					
FA.2.4	Upgrading and Expansion of monitoring system to monitor water resources and environmental management in the Mekong Delta and upstream development.	500,000					
FA.2.5	Improve Knowledge Base in the VNMC Secretariat and concerned line agencies	150,000					

Focus Area 3: Address opportunities and consequences of on-going development including development in Upper Mekong Basin aimed at enhancing the sustainability of development projects in the Basin

Overall Objective:

To advise and support the Government, Line Ministries and Vietnam National Mekong Committee in working out measures to use development opportunities and protect dry season flow and in preparing a mechanism for cost/benefit sharing amongst Sectors aimed to create momentum and ensure sustainable development in the Mekong Delta and scientific bases for negotiation and promoting the cooperation in the MRC in order to successfully implement the MRC IWRM-based Basin Development Strategy.

FA.3.1	Assessment of the impacts of the operation of upstream dams, especially in extremely uncertainty operation in combination with the inter-basin and intra water diversion projects to the Mekong Delta including Cambodia territory and recommendation on mitigation measures.	75,000					
FA.3.2	To set forth measures to use new development opportunities for the Mekong Delta under the circumstance of increased dry season flow resulted from reasonable operation of the upstream dams as scientific bases to support for VNMC's negotiation in protecting dry season flow for the Mekong Delta.	75,000					
FA.3.3	Effective implementation of the Navigation Agreement between Viet Nam and Cambodia in the context of upstream development and climate change.	150,000					
FA.3.4	Based upon the scientific and realistic justifications to establish principles for defining the potential of agricultural development and preliminary principles for cost/benefit sharing amongst the water use sectors in the Mekong Delta.	150,000					
FA.3.5	Mekong Delta Study on the impacts of upstream hydropower and water infrastructure development	2,933,000					
<p>Focus Area 4. Improvement of water use efficiency for irrigated agriculture to serve for national food security and poverty alleviation policy.</p> <p><i>Overall Objectives: To make strategic recommendations on effective and wise use of water resources as crucial elements for the integrated development of the Mekong Delta.</i></p>							
FA.4.1	Improvement of water use efficiency for irrigated	200,000					

	agriculture and fishery development in the Mekong Delta.						
FA.4.2	Development of Strategy for drought management and water supply.	150,000					
FA.4.3	Diversification of agriculture production and rural development in the situation of upstream development, climate change and sea water rise.	130,000					
FA.4.4	Integrated flood plain management for Viet Nam and Cambodia.	70,000					
FA.4.5	Preliminary study for water allocation at the main canal intake to main stream of Mekong river and environmental flow for the Mekong Delta.	150,000					
Focus Area 5. Assessment of uncertainties and risks caused by developments and climate change.							
<i>Overall Objective</i>							
<i>To clearly define the issues of uncertainties and risks in the establishment of development scenarios and integrated water resources management in the Mekong Delta to serve for water resources planning and recommending the measures for improvement of integrated water resources management.</i>							
FA.5.1	Identification of uncertainties and risks related to mechanism of sediment transport and nutrient; and assessment of the impacts of upstream development to sediment and nutrient entering into the Mekong Delta.	75,000					
FA.5.2	Study of flood impacts to the quality and efficiency of fluvial land use in the Mekong Delta, Viet Nam.	80,000					
FA.5.3	Define the issues and analyze uncertainties and risks affecting to the fishery resources in the context of emerging development in the basin and its implication to the livelihood of people living in the Mekong	300,000					
FA.5.4	Assessment of tendency and change of biodiversity, environmental hotspots in the Mekong Delta and their	300,000					

	impacts to the vulnerable communities.						
FA.5.5	Assessment and prediction of the immediate and longterm impact of climate change to the Mekong Delta under the condition and tendency of emerging development in the basin.	250,000					
<p>B. Se San and Srepok River Basins, Central Highland of Viet Nam</p> <p>Focus area 6. Integration and harmonization of the national planning process in the Se San, Srepok sub-basins with the MRC Strategy and strengthening water resources management process in these sub-basins.</p> <p><i>Overall Objectives</i> <i>Strengthening the water resources management through the improvement of coordination amongst the economic sectors and MRC countries by the integration of national planning process into the regional strategies.</i></p>							
FA.6.1	Development a vision for the sub-basins of Se San and Srepok in the context of IWRM together with environmental, economic and social objectives and State of sub-basins report to support the monitoring of developments and environmental impacts.	150,000					
FA.6.2	Preparation of the formulation of Integrated Water Resources Management Strategy taking into account of trans-boundary impacts.	150,000					
FA.6.3	Development of the procedures for integration and harmonization of sectors management strategies with the regional strategies with respective to the specific conditions of the two rivers.	50,000					
FA 6.4	Development of Procedures for notification of water and related resources infrastructure projects for VNMC aimed to support VNMC in solving trans-boundary impact issues and implementing the IWRM-based basin development Strategy.	30,000					
	Strengthening the operation of existing Srepok River	100,000					

FA.6.5.	Basin Organization.						
FA.6.6	Initial Preparations for the establishment of Se San River Basin Organization.	50,000					
FA.6.7	Development a suitable mechanism for cooperation with Cambodia to successfully implement the IWRM-based Basin Development Strategy.	150,000					
FA.6.8	Development of technical guidelines for management of water quantity and quality, and prevention of water pollution for the two river sub-basins.	200,000					
FA.6.9	Upgrade and expand the network for monitoring water use, especially at the border areas and study to establish network for biodiversity and ecological monitoring for the sub-basins of Se San and Srepok.	500,000					

Focus Area 7: Enhancement of the sustainability of tributaries' hydropower development through mitigation of negative impacts of the construction and operation of hydropower dams in the Se San and Srepok river basins to downstream, including Cambodia territory and mainstream flow change and address the issues of cost and benefit sharing between the sectors and sub-basin's countries.

Overall Objectives

To support VNMC and concerned Ministries in sustainable development and management of the Se San and Srepok river basins aimed to contribute to successfully implement the IWRM-based Basin Development Strategy and promote the cooperation between Viet Nam and Cambodia.

FA. 7.1	Assess the impacts of flow change caused by the development and operation of upstream hydropower dams to downstream and Cambodia territory; recommendations on mitigation measures.	100,000					
FA.7.2	Defining the potential of flow contribution and its impacts to the change of flow in the main stream of Mekong riv	100,000					
FA.7.3	Conservation of ecological and environmental hotspots through solutions forwards the sustainability for the Se San and Srepok sub-basins.	300,000					
FA.7.4	Upgrade and preparation of the standards for						

	sustainable hydropower development for the Se San and Srepok basin rivers.	30,000					
FA.7.5	Preparation of basic principles and options for cost and benefit sharing as one of important solutions for sustainable development and bases for promoting cooperation in the MRC.	200,000					
<p>Focus Area 8. Assessment of potential impacts of climate change to water and related resources and socio-economic conditions in the sub-basin of the Se San and Srepok, Central Highland of Viet Nam</p> <p><i>Overall Objective:</i> <i>To support formulation of water and related resources management strategies through the identification of climate change issues, their potential impacts and implementation of mitigation measures.</i></p>							
FA.8.1	Identification of the issues of climate change, build up approach and database to support the studies of measures to response to climate change in immediate and long term period.	100,000					
FA.8.2	Assess the potential impacts of climate change combined with the construction and operation of projects to the environment, socio-economics of the sub-basin of Se San and Srepok river, including Cambodia territory and integrate the issues of climate change in the sub-basin into the basin scenarios.	175,000					
<p>C. Capacity Building</p> <p>Focus Area 9: Improvement of knowledge and raise awareness to meet requirements on the implementation of the IWRM-based Basin Development Strategy</p> <p><i>Overall Objective: To build institutional and human resources capacity supplementary to the national/sector capacity building program in order to meet requirements of IWRM in the country and Basin.</i></p>							
FA.9.1	Formulate a Program for raising awareness of the IWRM-based Basin Development Strategy and how to implement it.	200,000					

FA.9.2	Prepare a strategy of VNMC for involving the participation of stakeholders and community in implementing the IWRM-based Basin Development Strategy and Mekong Agreement.	100,000					
FA.9.3	Improvement and upgrade of modeling tools for application in the assessment and monitoring of water utilization and support the application of DSF and implementing the MRC procedures.	60,000					
FA.9.4	Development of methodology and approach to study measures to response to climate change.	150,000					

Total required budget: *Approx 9,710,000 USD (approx. 195 billion VND)*

Note: The above budget is estimated on the bases of the priority of projects at the national requirements aimed to implement the IWRM-based basin development Strategy of the MRC in combination with the on-going or implemented projects at regional level, and related other projects of the Ministries and Sectors.