Proposal Document on Implementation of PWUM to Xedone River Pilot Project
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Executive summary

A fundamental objective of the 1995 Mekong Agreement is cooperation among Lower Mekong Basin countries to achieve “the full potential of sustainable benefits to all riparian countries and the prevention of wasteful use of Mekong River Basin water”.

The implementation of procedure of water use monitoring to pilot project is being consider during a time of significant change where rapid, large-scale development of water use for irrigation, hydropower dam on Mekong mainstream and its tributaries are made change the Mekong flow regime. To minimize these accumulative impacts there should be monitoring station and enhance the implementation rules/procedures of water use.

To create monitoring station observes water use is probably more complicated than other facility, cause of there are many sectors use of water for difference purposes so the calculation/estimation method is the simple way can be appropriate way to carry this work through the various techniques and available tools includes exist data/information with the catchment area. In this connection, Lao PDR has choose one sub-basin area to be pilot project for study the water use in that catchment is Xedone river catchment. The Xedone River is one tributary directly flows to Mekong River. The method use for that study is Basin Water Resource Simulation Model called IQQM (Integrated Quantity and Quality Model) in parallel work with another modelling software eWater Source. The work will be responsible by National Information and Knowledge Management Programme (IKMP) Unit at Lao National Mekong Committee with technical line agencies including other relevance national institutions with financial and technical support from Mekong River Commission (MRC).

The pilot project study will take one year time period and provide a comprehensive report on the use of water by each sector while maintaining ecological flow in the stream whether assessment and evaluation method use to calculate /estimates suitable use to be adapted in basin-wide then rules/procedures water use can be applied. Beside the enhancement and implementation of rules/procedures the capacity building among national technical team (national IKMP unit and relevance technical line agencies) had been carrying on with new technology.
1 Introduction

1.1 General

The Water Use Monitoring (WUM) Start-Up Work (the Work) will help establish a procedure to support the management of water resources in the Mekong Basin in a manner consistent with the 1995 Mekong Agreement and the directives of the MRC. It is intended to help the MRC-member countries achieve “reasonable and equitable” water use among the riparian countries, while maintaining the ecological integrity of the Basin. It will also support the formulation and execution of the MRC’s Basin Development Plan (BDP).

The Work is expected to start in January 2014 for one year period and the work is funded by Mekong Integrated Water Resources Management Project (M-IWRMP) through the Information and Knowledge Management Programme (IKMP) within MRC Programmes.

The National IKMP Unit leads the work in association with national line agencies/other relevance national institutions such as list below with collaboration Information and Knowledge Management Programme under Technical Support Division at MRC:

1. Lao National Mekong Committee (IKMP Unit, GIS Working Group, National Modelling Team)
   - Lao National Mekong Committee Secretariat, MoNRE
   - Natural Resource and Environment Institute, MoNRE
   - Department of Water Resources, MoNRE
   - Department of Meteorology and Hydrology, MoNRE
   - Department of Energy Policy and Plan, MEM
   - Department of Irrigation, MoFA
   - National Agriculture and Forestry Research Institute (NAFRI), MoFA
   - National University of Lao
   - Line agencies at Champasack, Saravan and Xekong Provinces

2. Other relevance national institutions
The Water Use Monitoring Start-Up Work

The Overall Work

The Water Use Monitoring (WUM) Start-Up Work is intended to help the Mekong River Commission (MRC) member countries, Cambodia, Laos PDR, Thailand and Viet Nam, to implement key elements of the 1995 Mekong Agreement. It will provide the monitoring method required for longer-term co-operation for sustainable management of the basin's water and ecological resources.

The National IKMP Unit will directly work with National technical team on implementation of PWUM pilot project. The National Technical Team “NTT” should be established within National IKMP Unit, National GIS Working Group, National Modelling Team and other National Institution. The National IKMP coordinator should work on management and coordination of PWUM pilot project.

The NTT have day-to-day responsibility for co-ordination of national participation, to review and check available/existing spatial-temporal data/information on hydro-meteorology, water use/utilization and other relevant data/information, to ensure the data/information are completes and consistent were provided through the Procedure for Data and Information Exchange and Sharing (PDIES) both National IKMP Unit and NTT need a collaboration with MRCS in developing methods and other relevance technique for water use calculation.

Working Project Area

2.1 Work Objectives

The Procedure for Water Use Monitoring is not only the method or estimation technique as scientific definition on the water use calculation but the important is linkages and effects that changes or variations in water use, flow and water level have on the environment including important water related functions such as fisheries, wetlands or navigation as well as natural functions such as flow to and from the mainstream that requires strategic understanding of where best to monitor flow will emerge from the pilot project area and from where long term records are available. The specific objectives of the work component are to:
(a) To provide a comprehensive and adaptive framework and process to support effective implementation of the intra-basin water use monitoring and inter-basin diversion.

(b) “The calculation of water use could be an example case for operational implementation of the Mekong Agreement, providing the analytical basis to help formulate test and monitor the ‘Rules/Procedures’ that are to be developed under this task, and supporting decision making for basin planning and management through assessment of the environmental and socio-economic impacts of development options in use of water.

(c) Create a sustainable capability in technical aspect within the Lao National Mekong Committee (LNMCS) and line agencies/other relevance national institutions. The working process should be manageable by LNMCS and other active participation in the working process.

(d) Build a National Knowledge Base that is both physical and institutional in nature, integrating existing databases with the available data/information system.

The assignment will include the overall method calculation or tools, identification and selection of use, design of the associated data/information, and the establishment, verification and refinement of the selected method and data/information, ensuring that they meet the needs of the WUM.

2.2 Description of Pilot Project area

The work support water use monitoring was selected one of national river catchment to be the pilot project area through the national consultation meeting process on the selecting area. For Lao PDR the pilot project area had been choosing the Xedone River catchment. In order to address water resources management and development options related water use/ utilization the scientific data/information need to be precisely which could make management of the basin’s water and ecological resources or on formulating “rules/procedures” required for long-term development and cooperation. It is needed to assess the water use/utilization in the basin based on updated and extended: (i) water demands of irrigation and other purposes, (ii) river run-offs taking into account the dam development projects and (iii) assess the available water being used by existing and planned water resources facilities and irrigation systems in the catchment.

With MA 1995 in article 26 mention “The Join Committee……, inter alia, Rules for Water Utilization and Inter-Basin Diversions pursuant to Articles 5 and 6, including
but not limited to: 1) establishing the time frame for the wet and dry seasons; 2) establishing the location of hydrological stations, and determining and maintaining the flow level requirements at each station; 3) setting out criteria for determining surplus quantities of water during the dry season on the mainstream; 4) improving upon the mechanism to monitor intra-basin use; and, 5) setting up a mechanism to monitor inter-basin diversions from the mainstream.” The key words in this sentence are flow and mainstream, the pilot project area choose by Lao PDR is one tributary directly flows to the mainstream Mekong River. If there’s any change may cause of various use of water sectors within the Xedone catchment may affected the change in mainstream flow. Choose this catchment cause of data/information availability regards use of water for irrigation, the storage reservoir and its facilities and so on.

a) Pilot project area feature

The Xedone river basin is a tributary of Mekong River located in Southern Lao PDR, and covers an area of 5714.75 km2. The Xedone river basin drains part of Saravan, Champasack Provinces and a small proportion in Savannakhet and Xekong Provinces. The main river with a total length about 240.5 km has its origin in the north-eastern side of the Bolaven plateau near Thateng district at 800 m above mean sea level. The main tributaries of the Xedon namely Houay Namsai, Xeset, Houay Kapeu, Houay Palai and Houay Champi have their origins in the Bolaven Plateau with steep slopes. As the basin is situated between the latitudes 15°–16°N, the south-west monsoon reverses its maximum activity, especially on the windward side. The Xedone basin is occasionally inundated because of Typhoon during rainy season. Extreme heavy rainfalls have frequently been observed in the area.

Xedone basin is very fertile and rich in natural resources, with high potential for future economic growth and many potential for development in the river basin. It is one of the main agricultural production areas in Lao PDR. In the recent years, it is favorable for agriculture especially tea, coffee plantation, husbandry and forestry with many rare essence, tributaries of Xedon are convenient for farm rice and type of agriculture, the basin is experiencing economic development during the past decades and many are under plan; environmental and hydrological condition of the basin is highly concerned by Lao Government.

Major part of the Xedone Basin is plain area with few mountains in upper reaches of the basin. The elevation of the basin is approximately 183m (above sea level) at Saravan city, 140 m at Kong xedone town and 102 m at Parkse city. Elevation of Bolaven Plateau is higher and it is more than 1000m. According to elevation of Xedone basin, it is divided in three parts such as; upper part is having sources of water and large middle part is suitable for agriculture and last lower part is suitable for farm rice because of available of irrigation. But during the dry season water resources availability is less in some years and severe drought is seen in the region.
b) Existing and planned water resource development

The major challenge in the Xedone basin is the sustainable use of natural resources particularly water resources. With the increasing number of population and investments in the basin and therefore there are several issues and concerns that need to be addressed in the basin.

Water availability is essential component of welfare and productivity. A developing country like Lao PDR, where agriculture serves as a backbone of the economic, currently Xedone supplies water to irrigated area of approximately 14,000-15,000 ha in dry season with the capacity to increase in the future.

An approximately 423,000 of people living in the basin, most of them do not have access to adequate supplies of safe water yet although most of people live along the both sides of Xedone. So the water availability in this basin at present and future situation needs to be assessed to ensure the sustainable water resources management and planning.

Most of paddy rice and other agriculture land area of the Xedone basin are plain area and located along the Xedone from middle to downstream of the basin which during dry season water resources availability is less in some years and severe drought is seen in the region but during the wet season this area is under the water.

2.3 Available data

The calculation and related analytical tools are only as useful as the quality and completeness of the data on which they are based. A lot of effort and donor support has been given (both in the past and currently) to building and improving water and environmental related knowledge, including inventories, surveys and data collection, monitoring networks, GIS building, and mapping. Active areas with the most donor support include hydrology, water quality, wetlands, groundwater, fisheries, forestry and sedimentation. The Work of calculation Water Use Monitoring should use existing data or data likely to emerge from ongoing projects. Additional data collection would be carried out only if critical for method of calculation process, data are missing or outdated. It is important to note that the work needs of the WUM would also influence and shape some LNMC ongoing and planned monitoring and data collection activities. These data can be found in the four databases installed in the LNMCS and their line agencies:

- Meteorological and hydrological database
- Irrigation database
Basic data needed for the calculation include catchment features, meteorology, hydrology, social and economic, water use, and major infrastructure data. Primary sources of data include the hydro-meteorological network, project studies, remote sensing, GIS systems under development, maps and survey results (land resources, forest cover).

3 Methodology Use in Pilot Project

3.1 Related Work

There is several parallel co-financed works that have a direct influence on the WUM pilot project area. The most important ones are:

(a) Modelling activities on updating catchment feature, hydro-meteorological data, modelling application and improvement function of MRC Toolbox including review and check the capability of new introduce tool “eWater Source”

(b) Previous BDP2 working scenarios had done on data review by modelling team, ISH data /information also review by modelling team, Updated irrigation and hydropower data within master catalogue

(c) Activities of hydrology team on data/information collection, gap filling, new rating curve development and recent hydro-meteorological network information (Mekong-HYCOS)

Each of these has overlap, in their respective scopes of work, with the PWUM pilot project and could be used in PWUM activities.

3.2 Tools Use in Project area

The aim in calculating water use monitoring for current stage there is only done through modelling works which a review of available models will be the subject of a detailed in regional consultation meeting as mention in report “Working Paper on
Implementation of PWUM to Pilot Project”, which we have scheduled for early completion since October 2013. The selected tool should be compatible with existing function analytical tools with MRC Toolbox (previous called Decision Support Frame Work – DSF) and its capability must be fulfil the need of the Lower Mekong Basin.

### 3.3 Selection of the Basin Water Resources Simulation Model

In summary the Basin Water Resources Simulation Model is the main analysis tool for investigating the effects of changes in rules/procedures, development scenarios, etc, on the behaviour of the basin. The basin model will be run for a long period of time (decades). It will incorporate all features of the water resources of the basin, including diversions, water use, reservoir operation, etc, etc. Outputs from the basin model would be time series of variables throughout the basin, river flows usually being the most important, but also including irrigation demand, reliability of supply and hydropower production, etc.

The available Basin Simulation Models have been reviewed during the consultation meeting on the implementation of PWUM to pilot project area. Although many water resource system simulation models exist, there are few models that comply with the requirements for the Lower Mekong Basin Water Resources Model. All packages reviewed would need some form of development either to meet the countries requirements (Riparian countries Cambodia, Lao PDR, Thailand and Viet Nam) or to enable the software to be integrated into the overall modelling and knowledge base system (existing data types to store in database).
IQQM model has the added advantage that the existing both national and regional model applications could be used, with some extension and improvements on data input, to meet the needs of the Water Use calculation and other model candidate is less advantage in term of familiarity and experience use such as eWater Source proposed model use to be replace IQQM in future plan.

In other way the eWater Source model work could be done parallels IQQM model set up after training provided to be deeply understood conception and technical requirements. Moreover, step by step to start modelling work on eWater Source can be done to see its capability and requirement needs in Lower Mekong Basin. And then the assessment on technical review in detailed can be properly made before decided replacement even eWater Source model is capable conversion from IQQM model.

We therefore see less comparative advantage in adopting another model and IQQM was recommended to use by TACT meeting and approval by JC meeting to use this tool for the Mekong Water Resources Simulation Model in the Basin Development Planning (BDP) Programme.

For this PWUM pilot project these both models (Integrated Quantity and Quality Model, eWater Source Model) have to be used as calculation method to estimate the use of water in pilot project area.

4 Expect Output from the Pilot Project

Although the MRC and the former (Interim) Mekong Committee have collected hydrological/meteorological data for over four decades, there does not exist a shared understanding among the MRC-member countries of their respective use of water. Water use monitoring and discussing the “reasonable and equitable use” of water resources is not possible unless water uses are identified and quantified. Moreover, it may be necessary to monitor water use to ensure that water use estimates are accurate, and to provide a means of water use control during periods of drought or extremely low flow. Monitoring the release of water from reservoirs might also be important during severe flood events. By this mean the proposed pilot project area was submitted including the method use according the existing tools and data/information to estimate the water use as scientific evidence report what, when, where and how the water was used. And via this pilot project the expectation output is an example comprehensive report on overview of water use pilot project area which could be a typical prototype of basin-wide of Lower Mekong Basin. In other hand could be sustainable capacity in technical aspect and the mechanism to share and exchange data/information through the Procedure for Data and Information Exchange and Sharing (PDIES) within national level and regional level.