



FLOOD & DROUGHT MANAGEMENT TOOLS

Inception Phase Meeting Report

Bangkok, Thailand

23-24 November 2014



Executive Summary

Overview

The **Flood and Drought Management Tool (F&DMT) project** is funded by the Global Environment Facility (GEF) International Waters (IW) and implemented by UNEP, with IWA and DHI as the executing agencies. The project aims at developing methodologies and tools including decision support systems (DSS) to incorporate information about floods and droughts and likely climate scenarios into integrated water resource management (IWRM) planning, Water Safety Planning (WSP's) and Transboundary Diagnostic Analyses (TDAs). The project is being implemented from 2014 - 2018, and three pilot basins (Volta, Lake Victoria and Chao Phraya) have been identified for development and testing of the methodologies.

The F&DMT Project defines a need to develop a methodology that works both on a transboundary level and the local level. GEF International Waters projects have planning tools which focus at the transboundary level. However, decisions made at the regional level (basin) and the local level needs to be linked, the project looks to also address this aspect of inter-level communication. The methodology being developed will be based on an open platform solution, meaning basin authorities, national authorities, utilities, etc. can further develop the methodology and tools after the completion of the project to enhance their planning experience. The methodology will be flexible, i.e. stakeholders can develop their own indicators, and there will be linkage to different model types (MIKE models and WEAP as default). Usability is a key priority for the project and the main focus will be on a user friendly and flexible framework supporting planning activities.

The project will develop a DSS which will be tested and applied in 3 very different pilot basins; however the methodology will be available for all other basins. This also includes training modules available at the end of the project so that methods can be applied to other basins. The aim is to develop a methodology that is usable and interfaces with existing planning practices. The project will support planning activities related to TDA/SAP, IWRM or WSP, but will not embrace all activities within the planning methods. The focus will be on supporting key activities within the planning methods, by developing a usable and flexible framework, containing a few key tools of high value for the stakeholders in the project. The flexibility of the DSS will ensure that further development and extension of the DSS could be done outside of the project.

It is important to note that the F&DMT Project will not collect data or develop new models, but will focus on the development of a DSS for supporting planning, while the validation and testing of the methodology will be done using existing information and models. The project will not develop new plans within the pilot basins, but support the use of the DSS in ongoing planning processes. The main output from the project will be a DSS that will assist basin level organisation and end users (i.e. utilities) in their planning processes and support the individual activities with specific tools, where special attention will be given to flood and drought events.

Inception phase and meeting¹

The project started officially in June 2014 with a 6 month inception phase during which IWA and DHI had a series of stakeholder consultations in the Volta basin, Lake Victoria basin and Chao Phraya basin. The consultations aimed to improve the understanding of how the flood and drought management tools can improve the water planning in the three pilot basins, to be used in formulating a detailed project description for the inception phase meeting. The meetings were used to also determine which stakeholders were interested in actively engaging with the project.

The objectives of these consultations included:

- Key stakeholders understand and endorse the objective of the F&DMT project

¹ Pictures from the inception phase meeting can be downloaded here: <https://www.dropbox.com/sh/h5l2wd9ubebzqgt/AACPO1gaLHDKy6MbBA1NQrwza?dl=0>

- To understand issues the key stakeholders are facing during water planning, focusing on transboundary issues related to climate change, floods and droughts
- To understand the methods/processes which the basin organisations and utilities go through during planning, and tools they currently use in planning
- To identify other projects or initiatives that we can work with that could potentially fill issue of data collection and knowledge gaps of the basin
- To gather feedback on the proposed methodology for the F&DMT project

The stakeholder consultations also provided the F&DMT project team with a basis for revision of the project documents; activities, workplan, budget, etc. A list of stakeholders, which were consulted in the 3 pilot basins, and their main responsibilities, can be found in Annex 1.

Following the series of stakeholder consultations between August and October, the project held an inception phase meeting on November 23rd and 24th at the Trang Hotel in Bangkok, Thailand. The meeting included key representatives from the three pilot basins (Volta, Lake Victoria and Chao Phraya), as well as additional stakeholders from the Chao Phraya. The meeting provided an opportunity for all stakeholders and project partners to become familiar with the revisions to the project components, i.e. objectives, activities and deliverables, etc. It also enabled the representatives to contribute / comment on the relevant project components to help fine-tune the project.

Individual meetings were held with key stakeholders to get a common understanding the F&DMT project and discuss implementation and validation of the methodologies through pilot studies and establish cooperation arrangements with the key representatives, in particular for the coming year (2015).

The list of participants attending the inception phase meeting and the agenda, are in Annex 2 and 3 respectively.

Next steps

Based on inputs and feedback from the stakeholders during the inception phase meeting and the days following, amendments are being made to the project document for final review by the Steering Committee (made up of key representatives from the pilot basins) in February.

Using the outputs of the stakeholder consultations and inception phase meeting, DHI will coordinate with their internal research projects as well as outside projects, and further develop the methodology which consists of the flood and drought decision support system. There will be follow up meetings within each basin in the next 6-12 months (during the first half of 2015) to verify the methodology and start testing among basins and end users (utilities). In addition, there are plans to have awareness raising workshops to improve understanding from decision makers to basin officials of the functionality and applicability of the outputs of decision support systems.

Basin focal points (primarily IWA staff) will be used throughout the project, and will serve as a valuable local contact between the project team and the stakeholders. DHI will have direct contact with the key stakeholders, but keeping the focal points copied in any communication as they will be in a good position to further support continued cooperation.

Below is a set of definitions of what is meant by a DSS, approach, methodology and tool:

Decision Support Systems

- Piece of software containing various technical functionality in 'tools' for supporting decision making within planning.

Approach

- Approach for integrating the existing planning methods (TDA/SAP, WSP and IWRM) in one system.
- The planning approach describes the overall 4-stage planning cycle which forms the

linkage between the DSS and the existing planning methods.

Methodology

- Step by step description of applying the DSS on a planning application, an example could be a specific methodology for 'seasonal drought management at catchment level'.
- The methodologies together (at least 6, one for each pilot study) will cover a variety of flood and drought applications and a variety of temporal and spatial scales.
- For each pilot study, initially an idealised methodology for addressing the issue will be developed.
- With stakeholders, the methodology will be adjusted to be locally relevant based on the practical implementation limitations
- The developed methodologies will be closely linked with the adopted planning approach.

Tool

- Functionality within the DSS software
- Software tools will be developed to support the agreed methodology and the locally-adjusted methodology and tools will be tested, revised and implemented on a specific pilot study. This will serve as the validation of the DSS.

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About the project

The objective of the project is to improve the ability of land, water and urban area managers operating in transboundary river basins to recognise and address, as part of the Transboundary Diagnostic Analysis (TDA) / Strategic Action Plan (SAP), Integrated Water Resource Management (IWRM) plans and Water Safety Plan (WSP) processes, the implications of the increased frequency, magnitude and unpredictability of flood and drought (F&D) events.

The Flood & Drought Management Tools (F&DMT) project will develop methodologies, using tools and Decision Support Systems (DSS), to incorporate information about F&D and likely climatic scenarios (and using various channels of information and capacities) into IWRM planning, WSPs and TDAs. The methodology will be tested in 3 (pilot) basins (i.e. Volta Basin, Lake Victoria Basin and Chao Phraya Basin). The project will also engage with learning basins (e.g. Danube Basin, Nile River Basin) to feed the project with relevant information and best practices that we can use to further develop the methodology

The outcome will enable stakeholders to compile information, with models, indicators and existing planning methods, to develop future planning scenarios that are robust and resilient and pragmatic on both a regional basin scale and local scale for urban and industrial areas.

At the local scale, the WSP approach will complement wider basin planning as it provides risk assessment and management options within national boundaries as well as those in the wider river basin context.

It is important to note that the F&DMT Project will not collect data; however, tools will be put in place to assist stakeholders in monitoring the status of their basin. The project will utilise existing models such and not develop something new, we are not in a position to develop new models to facilitate data generation. What the project will produce is a tool that will assist basin level organisation and end users (i.e. utilities) in their planning processes in the likelihood of a flood and drought events.

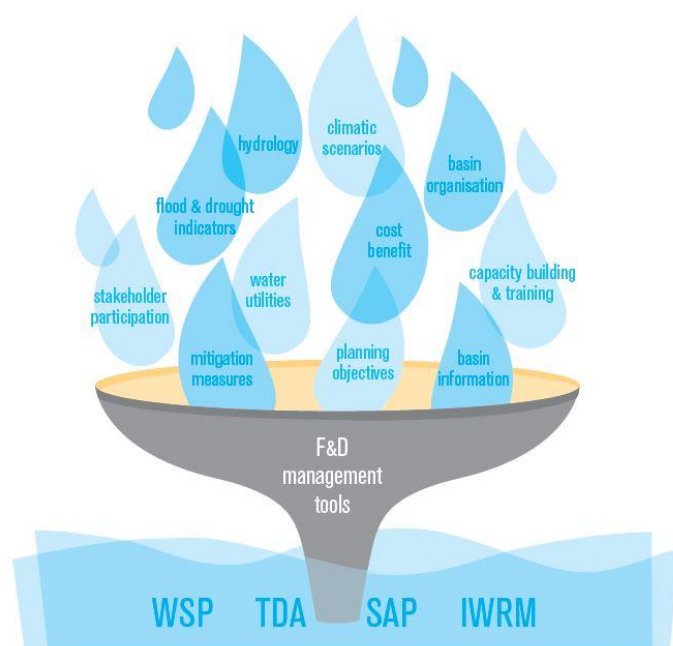


Figure 1. Infographic depicting the types of information and tools integrated into the decisions support system to support different types of planning

Project partners

The F&D Management Project is being implemented from 2014-2018, and is supported by the Global Environment Facility (GEF) trust fund with the United Nations Environment Programme (UNEP) as the implementing agency. DHI (technical coordinator – methodology, modelling, testing at basin level, guidelines) and the International Water Association (IWA) (outreach coordinator – stakeholder engagement, testing at local level, communication, capacity building) are the executing organisations.

Basin organisations are the key stakeholders in the project, and are the organisations relevant for the TDA/SAP approach as this is based on a transboundary planning context. Urban water utilities are involved as a main stakeholder and potential end-user in the project. One of the objectives will be to support their WSPs with technical tools enhancing the outcome of the WSP process.

The project has engaged with a large number of stakeholders during the inception phase, and other potential end-users for the project have been identified, e.g.: Electricity companies operating multipurpose reservoirs, Irrigation departments or managers operating large irrigation schemes and Environmental organisations or departments in need of tools for evaluating flood and drought issues and potential mitigation measures in the short- or long-term. It should be noted that not all stakeholders can be directly involved in testing of the methodologies, however, the aim will be to build the capacity and disseminate the outputs to interested parties.

	Volta Basin	Lake Victoria Basin	Chao Phraya Basin
Basin scale	Volta Basin Authority (VBA)	Lake Victoria Basin Commission (LVBC)	Hydro and Agro Informatics Institute (HAI)
Local scale	ONEA Ghana Water	National Water Uganda, Jinja KIWASCO MWAUWASA	Metropolitan Waterworks Authority Provincial Waterworks Authority
Other scale	Electricity companies, irrigation and environmental agencies or departments, catchment organisations and other interested parties		

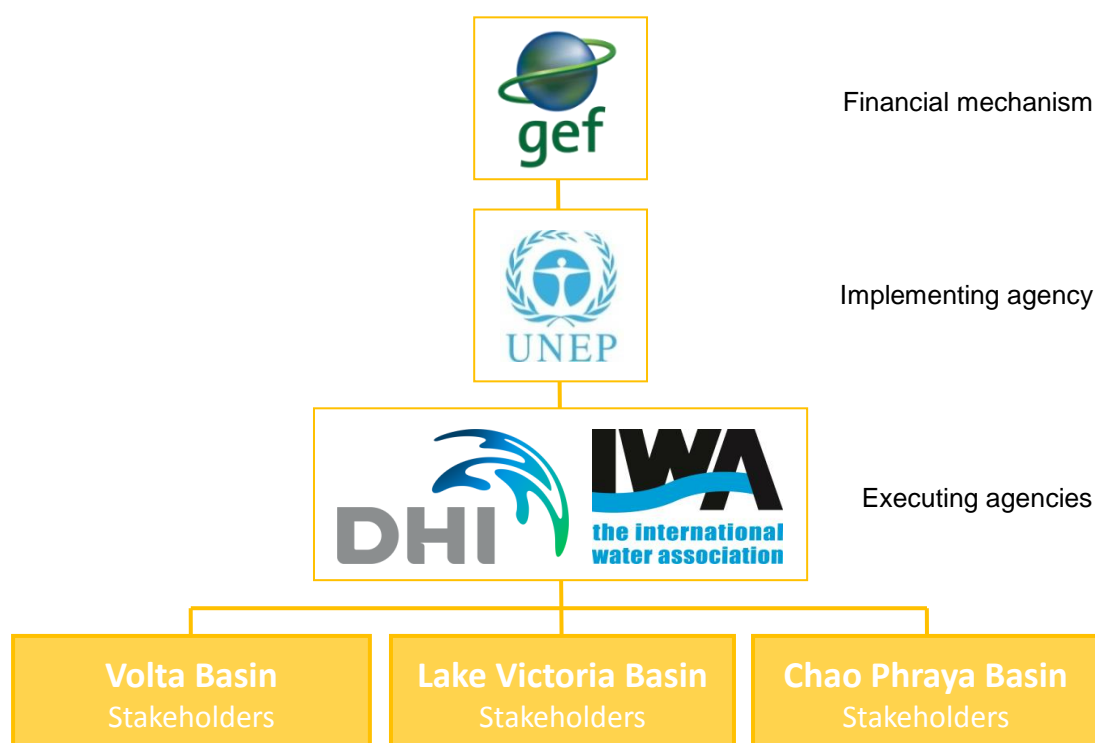


Figure 2. Partners involved in the F&DMT project

Site visit

The first day of the inception phase meeting was a field trip organised by HALL to Ayutthaya to learn about the impacts of the 2011 flood event in Thailand, and what measures worked and are being developed for future flood management.

Phra Nakhon Si Ayutthaya

Ayuttaya is one of the central provinces of Thailand, covering 2,556 km², is located in the flat river plain of the Chao Phraya river valley (see Figure 3).

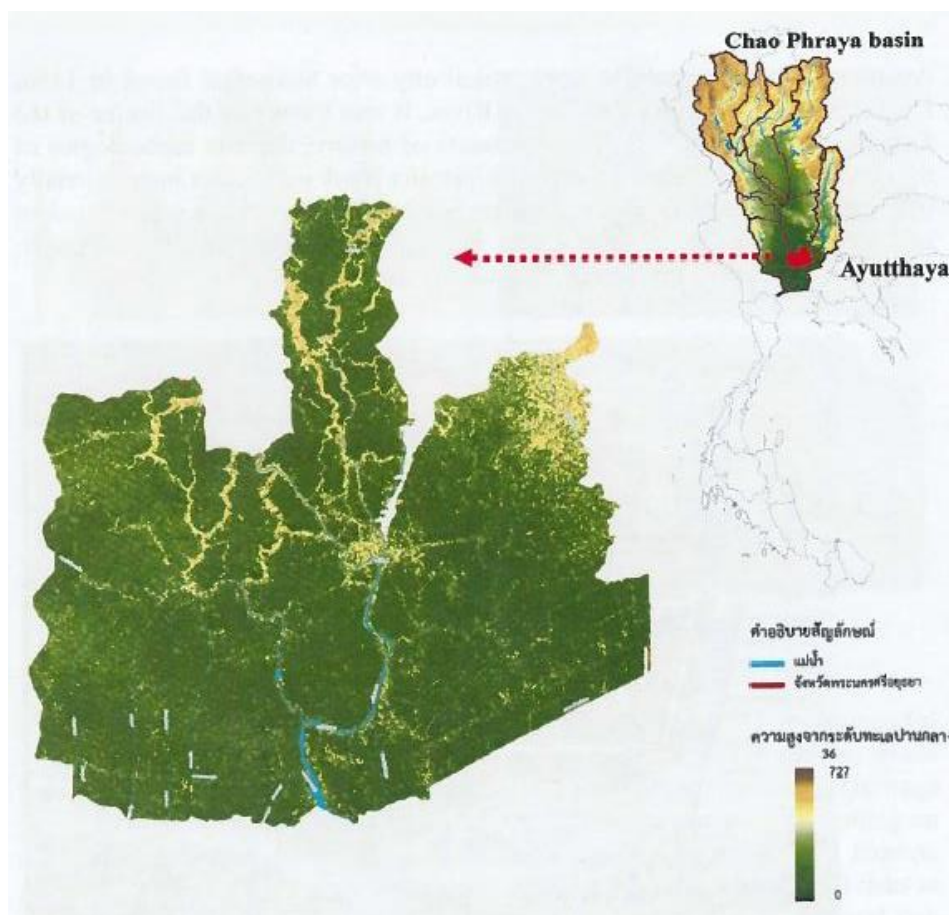


Figure 3. Topographic map of Ayutthaya

Ayuttaya is located on an island surrounded by three rivers, Chao Phraya, Pasak and Lopburi Rivers, connecting the city to the sea. In 2011, 5 tropical storms hit Thailand, causing the worst floods in Thailand's history, with Ayutthaya province experiencing most of the impact. Ayutthaya suffered from floodwaters up to 2 meters, inundating archaeological sites and the modern city for up to 4 weeks long, damaging an area over 50,500 km².



The site visit included a presentation by the Fine Arts department regional office and HAI, followed by a visit to the flood affected areas, historical canals and mitigation structures within Ayutthaya Historical Park. After lunch, the group visited more flood management and mitigation structures before travelling back to Bangkok (see Figure 4).

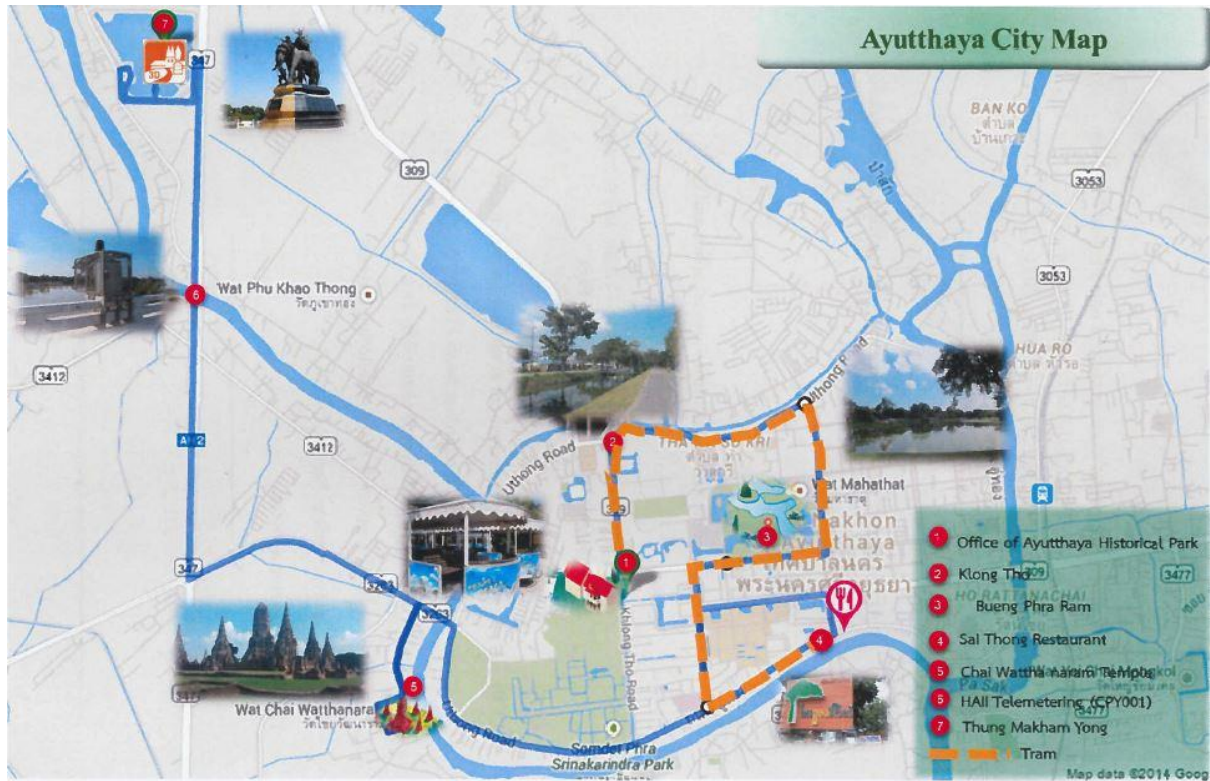


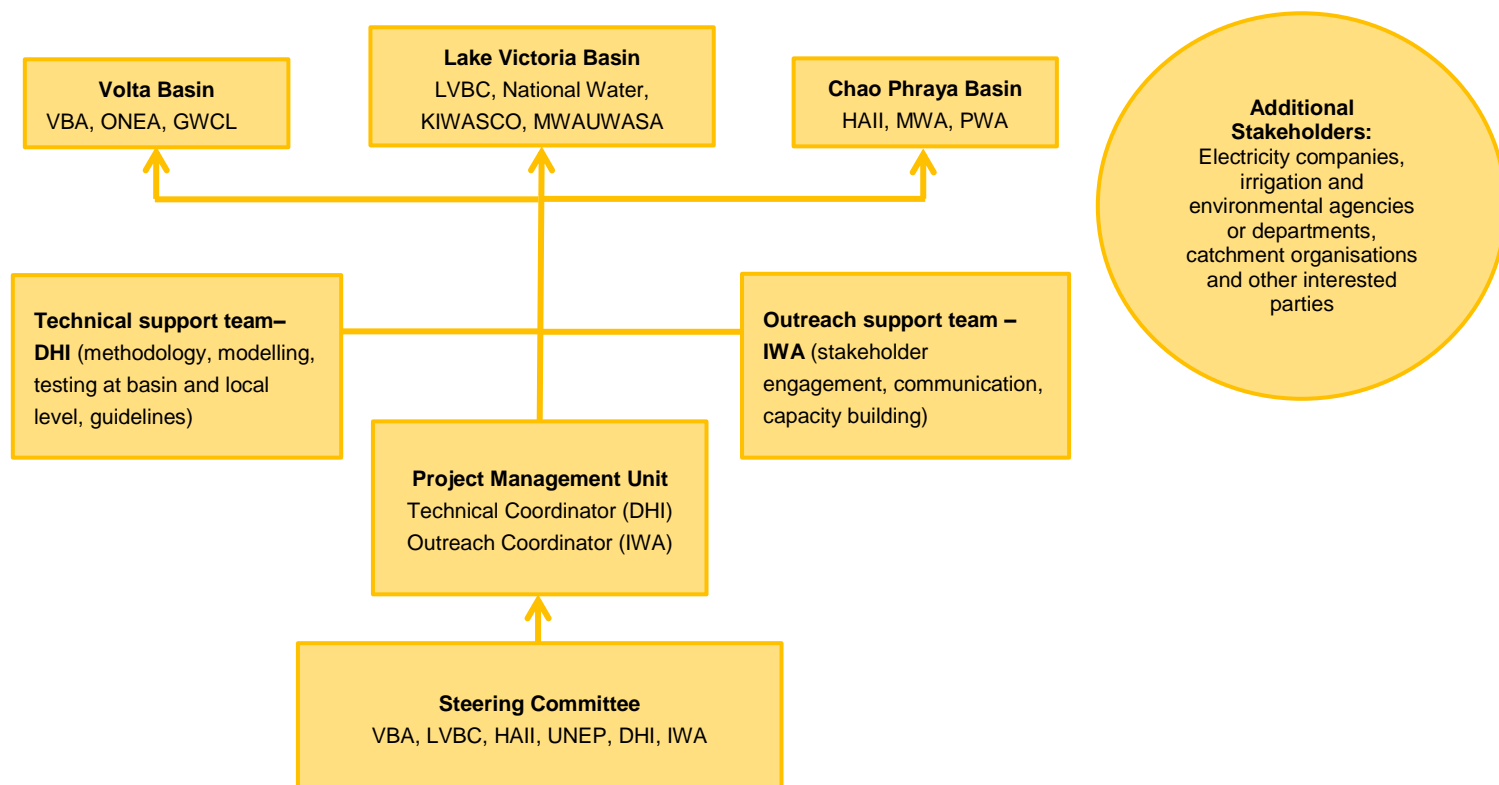
Figure 4. Map of tour

Inception phase meeting²

Overview of the project and governance structure

An overview of the project was given by Katharine Cross, IWA and a summary can be found in “About the Project”. The presentation is available [here](#).

As the project is a global initiative, the Project Management Unit consists of DHI and IWA staff (contacts are Oluf Jessen; ozj@dhigroup.com, and Katharine Cross; Katharine.Cross@iwahq.org)



Status and main issues in pilot basins

Representatives of each of the 3 pilot basins gave a short presentation providing an overview of the flood and drought management issues in each basin. This included the challenges at the local level, especially for water utilities; and how the basin organisations (or national institutions) are interacting with water utilities and other local stakeholders.

VBA and the Volta Basin

Jacob Tumbolto, Director of the VBA Observatory, Volta Basin Authority (VBA), gave an overview of the Volta Basin. For many years the Volta Basin, as a large transboundary river system, was without any formal legal and institutional arrangement among the riparian countries for managing its resources. In order to institute measures for sustainable transboundary management of the basin's resources, the Volta Basin Authority (VBA) came into forces in 2009 with the task of:

- Promoting permanent consultation tools among the basin's stakeholders
- Promoting the implementation of IWRM and the equitable distribution of benefits
- Evaluating planned infrastructure developments that impact the water resources of the basin

² To access all presentations, use the following link: <https://www.dropbox.com/s/08k8x8ilnhni8zm/Inception%20Phase%20Meeting%20Presentations.rar?dl=0>

- Developing and implementing joint projects and works and contribute to poverty reduction, sustainable development and socio-economic integration of the sub-region

Having concluded the first 5 year strategic plan, VBA are in the process of developing the next 5 year strategic plan (2015-2019), which will engage a more needs based approach; acknowledging the needs of the basin in order to sustainably management it. Jacob Tumbulto, Director of the VBA Observatory, pointed out that sustainable management of the Volta Basin, as a transboundary basin, hinges on joint action and better communication among member states, providing examples of transboundary issues resulting from flooding in parts of the Volta Basin:

- The operation of Lery dam needs effective management though better collaboration and communication between Burkina Faso and Mali on spills, etc.
- Bagre dam spills needs to be communicated by Burkina Faso (SONABEL) to Ghana, to allow Ghana to prepare and warn communities of possible flooding.
- Perceived flooding of Togo from Kompienga dam operation in Burkina Faso, requires joint action for better management of the water.

Some of the ongoing activities in the Volta Basin include:

- Volta-HYCOS project – number of telemetering stations being put in place to get information to help warn communities. There is also planned training in hydrological modeling and flood forecasting within the HYCOS project. AgriNet will be carrying out the training.
- VBA observatory – an tool providing a structure for information and communication to support decision making to ensure the sustainable use and management of the water resources (to include restoration and protection of the environment where required) in the Volta basin to improve the socio-economic well-being of the population.
- SONABEL and Ghana Volta River Authority on Bagre dam releases – flood information exchange.
- Joint flood management between Burkina Faso and Mali, Sourou River (HEC-RAS model).
- WASCAL – Africa is facing an urgent need to develop effective adaptation and mitigation measures for climate change and its impact. WASCAL, a German sponsored project, is a large-scale research-focused program designed to help tackle this challenge and thereby enhance the resilience of human and environmental systems to climate change and increased variability. It does so by strengthening the research infrastructure and capacity in West Africa related to climate change and by pooling the expertise of ten West African countries and Germany.

Despite the various ongoing projects, various constraints hinder the progress of the above activities and projects, namely:

- Obsolete data collection instruments
- National networks are weak – they require rehabilitation and extension
- Poor communication equipment for the transmission of data
- Inadequate tools and capacity

Way forward

- The F&DMT project is understood as a means of improving on VBA's ability to warn communities of imminent dangers of F&D events.
- MIKE CUSTOMISED functional components
 - 3 stages: Information Management System, Planning, and Real time – Currently VBA is still in the 1st stage but hope to transition into the 2nd and 3rd stages in due time.

Discussion

How are tensions between countries influencing the decisions of the VBA?³ The VBA plays a key role in mitigating conflict over shared resources. For example, the two countries which make up the majority of the basin; Ghana and Burkina Faso, have different priorities but need to share the resource. Burkina Faso is a dry area but engages in agricultural activities, while Ghana, which is downstream, has one of the largest man-made lakes providing water for their use. Any use of water upstream, for agricultural production, will impact the availability of water for power generation in

³ Question asked by KIWASCO

Ghana. The role of VBA is to sort out such tensions between stakeholders – i.e. during dry periods – observe the situation to contain potential conflicts between countries.

With regards to the HYCOS project, are there issues of data sharing between countries and issues with maintenance and operation (O&M)?⁴ There are signed MoUs with the hydrological departments of each country. VBA is supposed to assist countries in training; within the field of hydrology, in return the respective countries are supposed to provide data to the VBA, for specific high cost stations. However, data sharing can be limited. If the value and benefits of sharing information can be demonstrated, this will help in promoting data exchange. With regards to O&M, there are issues of vandalism (i.e. batteries are removed, solar panels are stolen, etc.). There are solutions to this, however, these involve costs, the countries need to be aware of this while maintaining a level of willingness to invest in their technologies.

LVBC and the Lake Victoria Basin

Omari R. Mwinjaka, Water Resources Management Officer, Lake Victoria Basin Commission (LVBC) provided an overview of the status in the Lake Victoria Basin. The Lake Victoria Basin is a transboundary resource with a common economic growth impact for the countries within the basin. The development of the region should be a joint effort by member states. The Lake Victoria Basin Commission (LVBC) was established by the East African Community (EAC) as a mechanism for coordination of various projects in the basin and serving as a centre for promotion of investments and information sharing among various stakeholders. LVBC would then be the driving force turning the basin into an economic growth zone, promoting partnership at both local and regional (national) levels around the lake.

LVBC's activities contribute to a shared vision and strategy grounded on 5 pillars for the sustainable development of the Lake Victoria Basin, providing a pool of potential domestic, industrial, agricultural, environmental activities:

- Environment, natural resources and ecosystems
- Production and income generation
- Living conditions and quality of life
- Population and demography
- Policy, governance and institutions

There are several (general) challenges that impact the basin and its resource potential:

- Stresses within the lake – over fishing, water hyacinth, pollution
- Stresses on littoral zones – construction and farming in shoreline, poor solid waste disposal
- Stress from basin – population
- Stress from outside basin – climate change
- Upstream degradation – contributing to increased flooding
- Transboundary issues
 - Pollution, climate change, poor land use, etc. – this leads to an increased likelihood of F&D events and consequent issues, which have severe economic, social and environmental consequences.

There are a number of ongoing projects and activities in the Lake Victoria Basin to address some of the challenges; e.g. Lake Victoria Environmental Management Project Phase II (LVEMP II), Maritime Communication for Safety on Lake Victoria (MCSLV) Project, Mount Elgon Regional Ecosystem Conservation Programme (MERECAP), Lake Victoria Water Supply and Sanitation Programme Phase II (LVWATSAN II), Planning for Resilience in East Africa through Policy Adaptation Research and Economic Development (PREPARED), etc.

Discussion

The question of involving Rwanda and Burundi in the project needs to be clarified. The project is developing a generic DSS which can be applied in different basins and at different scales. A combination of pilot cases from different contexts will be used to test different tools that are part of the

⁴ Question asked by SEI

overall DSS. Not all stakeholders can be involved in each tool; however the project will provide training and awareness raising to ensure a wider range of stakeholders in each basin (including country representatives, also from Rwanda and Burundi) are involved. The project needs support from the LVBC to ensure that the right organisations are contacted. It was emphasised that meetings should be organised via LVBC to ensure acceptance and legitimacy.

HAIL and the Chao Phraya

Thailand is a country that experience both flood and drought events. 2011 saw the worst flooding in modern Thai history. Flooding in Thailand is often a result of either:

- High river discharge
- Local heavy rainfall
- Topography and land use changes
- Disintegration of flood protection systems
- Land subsidence
- Global warming, extreme weather

2014 has seen an uncertain rainfall period in the Chao Phraya Basin. Consequently, the region is likely to face a drought period at the start of 2015. The drought period will be further worsened with insufficient water storage levels in the region.

HAIL do have a number of tools and data available that can support decision making with regards to flood management (or drought management). There are 777 telemetering stations taking rainfall and water levels. They are currently looking to develop their (7 day) flood forecasting system, integrating weather forecasting and river forecasting models, updating data with time-telemetering systems. HAIL also have a 3 month forecasting system, however this is not often used and primarily used for seasonal planning. HAIL is also contributing to the new flood plan – Master Plan addressing flood, drought and water quality –consisting of 5 working groups. HAIL is in charge of working group 3, developing a DSS. They have collected most of the data, however there are other important data requirements before the platform is cleared: e.g. linking with the economic plan, social plan, etc.

One of HAIL's targets is to put in place a drought forecasting system. So far not tool has been developed, however, in light of the recent climatic events, there is precedence to have something developed to support their drought planning.

Discussion

HAIL is in the process of upgrading it system. HAIL is currently using a 1 dimensional model, above threshold, running 2 dimensional to get flooded areas. It is important to consider updating the geometry to avoid any issues.⁵

Stakeholder consultations

As part of the inception phase, the project engaged in stakeholder consultations in the 3 pilot basins. The consultation meetings were aimed at gaining an understanding of how the project can help improve water planning in the pilot basins, in order to formulate a detailed project description for the inception phase meeting. The meetings were also organised to determine which stakeholders were interested in actively engaging with the project, identify other projects or initiatives that the project can work with and to gather feedback on the proposed planning approach for the flood and drought project.

The findings from the meetings are used to form the design of the methodologies and the development of the DSS.

The presentation can be viewed [here](#).

⁵ Question asked by VBA on updating

Discussion

The presentation by LVBC showed a need to engage with more people / stakeholders to get them to buy in (endorse) and have some sense of ownership in the project. This can be the difference between the success or failure of a project. The project addresses this concern through its collaboration with basin organisations. For example, LVBC is a transboundary organisation, so through collaboration with LVBC, the project can reach all the different countries and the relevant stakeholders. LVBC acknowledges the importance of stakeholder involvement. While floods and droughts occur at the basin level, the impacts also reach the local level. Ensuring that stakeholders at all levels are engaged from the beginning of the project is essential for the success of the project.

There are numerous relevant stakeholders within the 3 basins and the project wants to reach out to as many as possible and feasible. The inception phase consultations aimed to have extensive outreach. Furthermore, the project will have capacity building through workshops, or follow up meetings which involve relevant parties, depending on interest and funding. The project is also developing a communication strategy, which will clearly define how we interact with the various organisations and how to further develop such interactions and collaboration. LVBC pointed out that within the project communication strategy, how we communicate with various stakeholders should consider the specific organisation's procedures and communication channels to ensure that the relevant people are aware and informed of the various activities.

NBI have worked extensively in DSS development, for over 6-7 years within 9 countries, and therefore have vast experience that the project can gain from. Visibility is key to the success of a project. Furthermore, Mr. Abdulkarim mentioned 3 considerations from NBI's experience:

1. Have arrangement for continuous support, if the operating system changes, then software may have issues operating if not updated.
2. Continuous training.
3. Existing workflows and support is important, this is what they have learned. This helps countries relate the software with a particular planning process.

Also, a recurring issue during the stakeholder consultations was data availability, which tends to be lacking for most basins. Due to limited funding, the project is not in a position to engage in data collection. The project can only work with what data is available. This determines also the capacity to which the project can engage with various stakeholders and the areas in which the project can realistically support.

Project methodology

The DSS will be based on a general 4-stage planning approach (Analysis, Planning, Implementation and Monitoring), but the functionality will be designed and validated against specific flood and drought applications.

The exact applications are not yet defined and will be defined based on pilot studies which are being identified with the basin stakeholders. For each pilot study a detailed step by step description of the application will be made, this will be referred to as a methodology, and will be used to test and validate the DSS on specific applications. The methodologies will be specific step-by-step list of activities to address a specific flood or drought application within a defined pilot study.

The aim will be to have at least one methodology which combines both flood and drought issues and at least one methodology combining local and basin scales within the selection. However, it will be limited to a degree by the nature of the work being undertaken by the stakeholders. The selection of methodologies will also include both operational and strategic planning applications and methodologies linked to TDA/SAP and WSP activities. The developed methodologies will be closely linked with the adopted 4-stage planning approach.

The project will develop both an idealised methodology for each pilot study, and a locally-adjusted version based on a practical implementation in the pilot basins. The idealised methodology could be used as a global template for applying the DSS on a specific case, while the implemented version will serve as a validation of an actual use of the DSS on a specific case.

Key components of the DSS are:

- Data availability
- Data management and visualisation
- Optimisation
- Planning for future changes (how to include climate change, land use changes, water demand changes)
- Decision-making (evaluating and comparing plans)
- Monitoring (indicators) – visually showing the status of the basin
- Stakeholder interaction – how we can support communication and dissemination via the DSS

The presentation can be viewed [here](#).

Discussion

It is difficult to develop tools that are specific for all basins especially as the idea of the project is for the tools to be applied globally. The DSS is developed as such that tools can be added to the DSS to enrich the user's experience. Tools that are identified for the basins can be used in another basin, but these are not validated. Essentially the project will provide global tools, but develop templates to be more specific for each of the basins and their conditions and needs. For example, water utilities within the urban areas are integrated in the basin, as they abstract water from the basin to supply cities. These stakeholders, among other end users, are a key part of this project, so it is important to acknowledge their participation in the project, and develop templates that can meet their needs as well as the needs of other stakeholders.

The project will enable data to be incorporated as it is, so the stakeholders do not need to convert them in a specific format, this should support the usability of the DSS. Furthermore, the DSS will not require all stakeholders to be able to run models. Some stakeholders need just visualised information, indicators for some, others may need detailed models. This will vary depending on capacities and needs. Therefore, for some stakeholders, the project will be specific on certain activities, while for other stakeholders, it will be open.

The DSS will be open architecture, at the same time it linked to specific methodologies. It is important in such a tool to find the balance between flexibility and usability. It is important not to restrict the work flow (analysis, planning, implementation, monitoring). The project will test the flexibility and usability balance during the testing of the methodology. Introducing the template concept can help diversify the usability or flexibility based on the needs of the specific stakeholder.

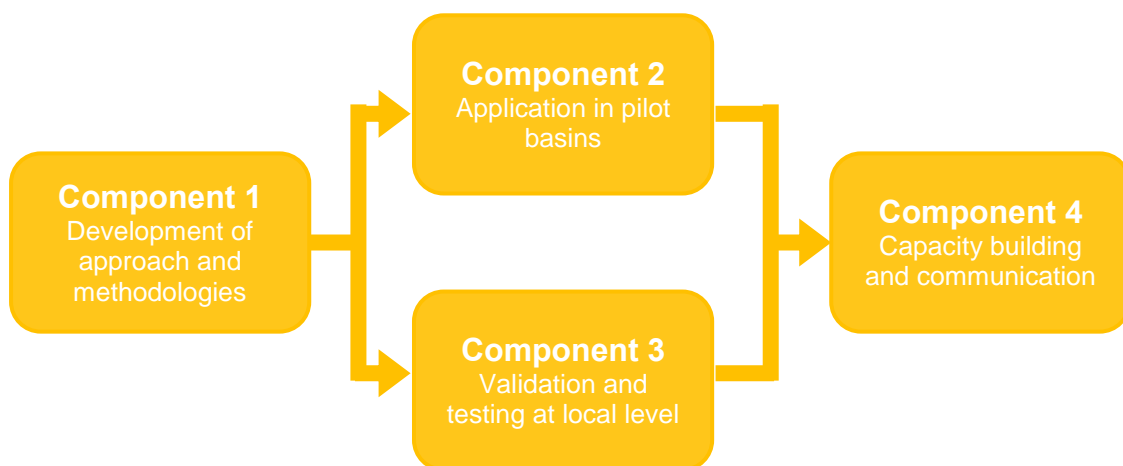
It is important to identify the critical stakeholders whose acceptance will be key; it will provide verification on the extent to which the DSS will be used.

While the Steering Committee exists with the responsibility of making key decisions, this does not imply that the project will not take into consideration the views of the other stakeholders, as they have the local knowledge and experience needed for the project and its development. The Steering Committee will provide direction for the project as they are most aware of all activities within the basin.

Project components and budget

The project framework is divided into 5 components each describing a phase in the project. The project components are:

- Component 0 – Inception phase
- Component 1 – Development of methodologies
- Component 2 – Validation and testing at basin-wide level
- Component 3 – Validation and testing at local level
- Component 4 – Capacity building and dissemination



Each component has a number of activities that contribute to several outputs; all which contribute to the overall objective of developing methodologies and tools within a DSS to facilitate the inclusion of information about floods, droughts and future scenarios into integrated water resources management (IWRM) planning, Water Safety Planning (WSP), Transboundary Diagnostic Analyses (TDA) and Strategic Action Plans (SAP).

The budget allocations support the activities needed to be undertaken in order to achieve the targeted outputs. The main budget components and costs are summarized in the following table:

UNEP Budget Components	COSTS (US\$)		
	Original budget (GEF)	Revised budget (GEF)	Co-finance
Personnel Component	3,739,753	3,731,668	14,774,367
Project personnel, including PMU cost, Consultants for developing training material, missions travels			
Subcontractor Component			
Supporting agencies/institutions			
Training Component	208,810	208,212	2,533,611
National and regional training courses			
Equipment and Premises	10,640	10,640	396,055
Expendable equipment, Non-expandable equipment, Premises costs			
Miscellaneous Component	138,882	131,396	4,760,809
Operation and maintenance of equipment, Reporting costs (printing and publishing), Communication costs, Project evaluation			
Total Budget	4090000	4,090,000	22,464,842

The presentation can be viewed [here](#).

Discussion

Trainings will need to be tailored for each of the basins, which can also accommodate all relevant stakeholders. An example, is the addition of flood and drought modules in existing WSP trainings, where water utilities would be trained in groups in regional centres. For example, in Lake Victoria basin, the utilities would be brought together for training, where they can also benefit from peer to peer learning.

The project does not have the funds for utilities or other stakeholders to carry implement specific activities (e.g. flood prevention infrastructure). The project will build on the existing activities of utilities (and basin organisations) and support them in their planning processes through the tools developed in the DSS. The pilot studies that will be carried in each basin will be tested with existing activities that stakeholders are engaged. However, within the budget, stakeholders are embedded, for example travel for meetings.

The DSS platform with the developed tools will be freely available to all GEF basins and stakeholders in the project. Further development of the tools, support and models are beyond the scope of the GEF agreement. In regards to continued support beyond the project, there are possibilities through GEF as they are likely to take up the tools produced into their own plan of work. Alternatively, contracts could be established between the project and stakeholders, within which 3-4 year support could be agreed post-project; non-financial support, but as a leading software developer [DHI], they can provide some support.

Stakeholder roles and responsibilities

Throughout the inception phase, stakeholders have received information on the project and its proposed outputs. The involvement of each stakeholder has been critical in receiving feedback. The aim is to involve the stakeholders based on their individual needs and resources.

Essentially, the expectation from stakeholders is:

- Attendance at training courses (this could include both production and application of training) – this will incorporate end user experiences and recommendations based on practical application of the DSS. It is important to engage in a culture of exchange and sharing of experience and knowledge. Training events are one such way, and the project will provide detailed training material.
- Communicating and disseminating project information – the dissemination will be undertaken in partnership with “champions” within the basin, for example, through presentations at international and regional events.
- Willingness to give feedback

For those who will be pilot study stakeholders, the expectations are:

- Willing to share available data and models (MoU before we make a request) – consolidation of methodologies.
- Time and resources to apply the DSS software to the pilot study (supported by us) and give us feedback – testing and validation of methodology.

The presentation can be viewed [here](#).

Discussion

Who will be using the DSS? Identification of stakeholders and their needs will help in the development of the DSS. There is no point developing a methodology that will not be accepted or used. Therefore, it is important to know who the DSS is for and what activities stakeholders require support in, to meet their defined objectives within their respective basins. This will help facilitate stakeholder commitment to the DSS development and use.

The project should ensure close collaboration with basin organisations (or end users), who understand best and can advise on what can work and what not. The Steering Committee, which is made up of representatives from VBA, LVBC and HALL, provides the project with well-informed advice and direction, as this acknowledges that views of other end users in the basin.

Within the project document, it would be useful to clearly identify and define the roles and responsibilities of relevant stakeholders. Furthermore, the activities need to be more detailed to indicate the role of each stakeholder in relation to the various activities within the project components. There are a number of stakeholders (e.g. SEI) who will not necessarily be the direct end users of the DSS, however, they will be engaged by the project as they have knowledge and expertise that can be of great value. For example the WEAP models from SEI will be integrated in the DSS, making them relevant and interesting for the project. This will be clearly defined within the project document, to ensure all stakeholders are well informed on their roles as well as the roles of others.

Discussion and Q&A

Participants in the meeting were divided into 3 working groups, to get a better sense of the needs at the different levels. Below are the summarised notes (the complete notes are available in Annex 4):

Group 1. Basin organisations (VBA, LVBC, NBI)

- Continuity concerns, this can potentially be addressed through learning networks already in existence such as the national DSS networks formed by NBI
- Communications to decision makers – have awareness raising workshops to improve understanding from decision makers to basin officials of the functionality and applicability of the outputs of decision support systems
- Need to put it in context – picking a context or case that people can relate to (e.g. 2011 floods in Thailand)

Group 2. Thai organisations

- Concerns about compatibility. In Thailand, characters do not follow the standard Alphabet, this may have implications on inputting data in the DSS
- Utility concern (MWA) on water quality
- Using the key stakeholders to ensure that the DSS satisfies their needs before disseminating this to other stakeholders
- There should not be a commercial profit of one stakeholder by selling the models to another basin – this DSS can be accessible to other basins, but restrictions are needed to avoid this from happening
- One of the outcomes where a suggestion from HALL to have a meeting only with the Thai stakeholders. This meeting will be arranged in March. Further details on the meeting with the Thai stakeholders will follow.

Group 3. Water utilities from Volta and Lake Victoria

- Pilot studies and activities should be in line with daily tasks (workflow) and not an extra task
- Need for tools to assess and monitor water quality. In the basins, water quality is related to flood and drought issues and represents a key area within Water Safety Planning.
- Overview of flood risk areas in order to design water treatment plants in low risk areas
- Water budget tools for communication to the public and in order to locate areas for construction of water treatment plants and reservoirs
- For stakeholder involvement it is important to express clear guidelines of the activities, staff involvement and time lines
- For the sustainability of the Planning DSS it would be important to provide support after the end of the project.

Side meetings

The project aim is to support decisions or planning in relation to floods and droughts by developing technical software tools; DSS, which can be applied to address these challenges. The DSS will contain a number of tools with different functionality; tools, defined by the needs of the stakeholders.

The DSS software will contain a number of technical tools. The exact tools to be developed cannot be defined at this stage as the functionality will be defined through collaboration with the stakeholders through the identification of pilot studies.

The pilot studies will be used to develop and validate the DSS and included tools, ensuring it is capable of supporting stakeholder on specific planning activities. 1-2 specific pilot studies will be developed, for each basin, based on the stakeholder feedback during the stakeholder side meetings. These pilot studies will form the basis for developing specific methodologies – step by step description of how the DSS should be applied on a specific application – describing how the planning approach (4-stage approach; Analysis, Planning, Implementation and Monitoring) should be applied in more detail. These methodologies together will cover a variety of flood and drought applications and different temporal and spatial scales.

The side meeting were an opportunity, as such, to get a common understanding of the F&DMT project, understanding where the project could be of value to the stakeholder; through the identification of 1-2 pilot studies within each basin, and establishing an initial workplan for the year 2015. The following table is a list of stakeholders that were met during the inception phase meetings in Bangkok:

Name	Position Organisation	Basin
Jonas Jabulo	Chief Manager (Water Quality Assurance) Ghana Water Company Limited	Volta
Moumouni Sawadogo	Technical Adviser in charge of Operation Office National de l'Eau et de l'Assainissement (ONEA)	Volta
Meck Manyama	Commercial Manager And WSP Team Leader Mwanza Urban Water Supply and Sanitation Authority (MWAUWASA)	Lake Victoria
David Onyango	Managing Director Kisumu Water and Sewerage Company Limited (KIWASCO)	Lake Victoria
Alex Gisagara	Director of Engineering Services National Water & Sewerage Corporation (NWSC)	Lake Victoria
Jacob Tumbultu	Director of VBA observatory Volta Basin Authority (VBA)	Volta
Omari R. Mwinjaka	Water Resources Management Officer Lake Victoria Basin Commission	Lake Victoria

	(LVBC)	
Piyamarn Sisomphon	Head of Hydro Modeling Section Hydro and Agro Informatics Institute Bangkok Thailand	Chao Phraya
Abdulkarim H Seid	Head - Water Resources Management Nile Basin Initiative (NBI)	Nile
Woramongkon	Provincial Waterworks Authority (PWA)	Chao Phraya
Manoon Tanasang	Director Water Resources Development Division Provincial Waterworks Authority (PWA)	Chao Phraya
Siwilai Kitpitak	MWA Expert level 8 Metropolitan Waterworks Authority (MWA)	Chao Phraya
Chaweeapan Suangkiattikun	Scientist Level 7 Metropolitan Waterworks Authority (MWA)	Chao Phraya
Jakrawan Srilung	Engineer Level 5 Metropolitan Waterworks Authority (MWA)	Chao Phraya
Anchalee Natikool	Chief of Environmental Information Section Electricity Generating Authority of Thailand (EGAT)	Chao Phraya
Maitree Foitong	Survey Division Engineer Level 10 Electricity Generating Authority of Thailand (EGAT)	Chao Phraya

Concluding remarks



The F&DMT Project defines a need to develop a methodology that works both on a transboundary level and the local level. GEF projects tend to look just at the transboundary level. Lately there has been a push to put emphasis on end users, such as utilities (this is also why IWA is involved). Decision made at the regional level (basin) and the local level needs to be linked, the project looks to also address this aspect of inter-level communication. The methodology being developed will be an open system, meaning basin authorities, national authorities, utilities, etc. can take up the methodology and further develop to enhance their planning experience. The methodology will be flexible, i.e. stakeholders can develop their own indicators, are free to decide which models to use, pull experiences from other basins, etc.

Therefore, the intention of the project is to develop a DSS which will be tested and applied in 3 very different pilot basins; however the methodology will be available for all other basins. This also includes training modules available at the end of the project so that methods can be applied to other basins. Learning basins are not basins in which this methodology exists and is taking place. They are used to feed the project with relevant information and best practices that we can use to further develop the methodology.

The inception phase meeting was an opportunity to get representatives from the 3 pilot basins (Volta, Lake Victoria and Chao Phraya) in one room. The meeting provided an opportunity for all stakeholders and project partners to interact and become familiar with revisions to the project components, i.e. objectives, activities and deliverables, etc. The meeting will enable the representatives to contribute / comment on the relevant project components to help fine-tune the F&DMT project. Information such as more emphasis on communications and awareness raising will be integrated into the inception report and workplan, and reflected in the budget.

Using the outputs of the stakeholder consultations and inception phase meeting, DHI will coordinate with their internal research projects as well as outside projects, and further develop the methodology which consists of the flood and drought decision support system. There will be follow up

meetings within each basin in the next 6-12 months to verify the methodology and start testing among basins and end users (e.g. utilities).

Basin focal points (primarily IWA staff) will be used throughout the project, and will serve as a valuable local contact between the project team and the stakeholders. DHI will have direct contact with the key stakeholders, but keeping the focal points copied in any communication as they will be in a good position to further support continued cooperation.

Annex 1 – Stakeholders

Volta Basin

Organisation	Country	Main responsibility
Volta Basin Authority (VBA) http://www.abv-volta.org:10000/abv2/	Basin organisation (Burkina Faso)	Coordinates the various interventions in the basin to promote sustainable management of the basin's resources.
West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) http://www.wascal.org/	Burkina Faso	Help build the resilience of human and environmental systems to climate change and increased variability. WASCAL is mandated to provide VBA with reliable data.
Economic Community of West African States (ECOWAS) http://www.wrcu.ecowas.int/	Basin organisation (Burkina Faso)	WRCC is the technical department within the ECOWAS framework of coordination and monitoring of water resources within West Africa. The objective of WRCC is implementation of regional policy on water resources.
National Office for Water and Sanitation (ONEA) http://www.oneabf.com/	Burkina Faso	State company responsible for drinking water and sanitation services and implementation of the National Procurement Programme Drinking Water and Sanitation (PN-AEPA) in urban areas.
International Union for the Conservation of Nature (IUCN) http://www.iucn.org/	Burkina Faso	International organisation dedicated to finding pragmatic solution to our most pressing environment and development challenges through the support of scientific research, global field projects globally and collaborating with governments, non-government organisations, United Nations agencies, companies and local communities to develop and implement policy.
Global Water Partnership http://www.gwp.org/	Burkina Faso	International network open to all organisations working for better water security. Was created to promote the Integrated Water Resources Management (IWRM) approach.
National Committee for Emergency Assistance and Rehabilitation (CONASUR) http://www.conasur.bf/	Burkina Faso	A public institution set up in order to adopt a strategy for prevention and reduction of the disastrous effects of natural disasters in Burkina Faso.

		They implement rehabilitation programmes following periods of crisis (including flood and drought). They are also mandated to inform, sensitise and educate communities in the culture of prevention of natural hazards.
Ghana Water Company http://www.gwcl.com.gh/	Ghana	State-owned water utility engaged in the production and distribution of potable water and customer management in urban areas of Ghana.
National Disaster and Management Organisation (NADMO) http://www.nadmo.gov.gh/	Ghana	Government agency that is responsible for the management of disasters as well as other emergencies in Ghana.
Hydrological Services Department (HSD) http://www.mwrwh.gov.gh/index.php/89-dept-agencies/158-hydrological-services-department-hsd	Ghana	National institution, under the Ministry of Water Resources, Works and Housing, responsible for monitoring all rivers and surface water bodies in Ghana, providing engineering consultancy services in hydrology, water resources, drainage engineering, sewerage engineering, coastal engineering and related fields.
Water Resources Commission (WRC) http://wrc-gh.org/en/	Ghana	Commission to regulate and manage the sustainable utilisation of water resources in Ghana.
Ghana Irrigation Development Authority (IDA) http://mofa.gov.gh/site/?page_id=2976	Ghana	Authority to formulate, develop and implement irrigation and drainage plans for all year round agriculture production in Ghana.
Environmental Protection Agency (EPA) http://www.epa.gov.gh/web/	Ghana	Agency responsible of regulating the environment and ensuring the implementation of Government policies on the environment. EPA is the leading public body for protecting and improving the environment in Ghana.

Lake Victoria Basin

Organisation	Country	Main responsibility
Lake Victoria Basin Commission (LVBC) www.lvbcom.org/	Basin organisation	Coordinates the various interventions on the Lake and its Basin; and serving as a centre for promotion of investments and information sharing among the various

		stakeholders.
Nile Basin Initiative (NBI) www.nilebasin.org	Basin organisation	A regional intergovernmental partnership that seeks to develop the River Nile in a cooperative manner, share substantial socio-economic benefits and promote regional peace and security.
Directorate of Water Resources Management, Ministry of Water and Environment, Uganda http://www.mwe.go.ug	Uganda	Set national policies and standards, managing and regulating water resources and determining priorities for water development and management.
National Environment Management Authority, Kenya www.nema.go.ke	Kenya	A government parastatal established to regulate environment issues.
Lake Victoria Basin Water Board http://www.maji.go.tz/basins/nine.php	Tanzania (Basin organisation)	There are nine (9) water basins for the purposes of water resources administration and management.
Mwanza Urban Water & Sewerage Authority http://www.mwauwasa.org/	Tanzania	Autonomous -government owned- operating authority providing reliable and safe drinking water to Mwanza City, and disposal of wastewater.
National Water & Sewerage Corporation http://www.nwsc.co.ug/	Uganda	A public utility company 100% owned by the Government of Uganda, providing water and sanitation services in urban areas.
Ministry of Water, Tanzania http://maji.go.tz/	Tanzania	Ministry responsible for sustainable management and development of water resources for social and economic development in Tanzania.
WHO www.who.int	Tanzania	Related to F&DMT project – Developing guidance on Climate-resilience water safety planning.
Water Resource Management Authority http://www.wrma.or.ke/	Kenya	The Water Resource Management Authority (WRMA) is a state corporation leading on water resources management. It has regional offices based on drainage basins (catchment areas) and Water Resource User Associations (WRUAs) at the local level.
Kisumu Water and Sewerage Company Limited http://www.kiwasco.co.ke/	Kenya	KIWASCO is a subsidiary company of the Municipal Council of Kisumu with the objective of providing water and

		sewerage services which generates sufficient revenue to sustain operations.
Water Action Group	Kenya	WAG is a community based entity; affording the consumers a voice on matters pertaining to water access, quality/safety, affordability, etc.
Lake Victoria Water Services Board http://www.lvswaterboard.go.ke/	Kenya	Lake Victoria South Water Services Board is a State Corporation which provides water and sanitation services in their area of jurisdiction.

Chao Phraya Basin

Organisation	Main responsibility
Hydro and Agro Informatics Institute (HAI)	Advisor for agricultural and water resources management
Royal Irrigation department (RID)	Irrigation planning and management within Thailand
Electricity Generating Authority Thailand (EGAT)	Hydropower generation and water allocation from the main reservoirs.
Thailand Water Resources Association (TWRA)	
Department of Water Resources (DWR)	Responsible for basin commissions
K water	Korean consultancy company involved in water projects in Thailand
Metropolitan Waterworks Authority (MWA)	Water supply for Bangkok
Geo-informatics and space technology development Agency (GISTDA)	Data supplier to Thai government institutions for remote sensing data
Asian Disaster Preparedness Centre (ADPC)	Non-government consultancy and research institute
Thai Metrological Department (TMD)	Meteorological data, forecast and climate projections
Stockholm Environmental Institute (SEI)	Non-government consultancy and research institute
King Mongkut's university of Technology (CWEIR)	
International Union for Conservation of Nature (IUCN)	
Provincial Water Authority (PWA)	Water supply for provinces outside of Bangkok

Annex 2 – Participant list

Inception phase meeting

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Annex 3 – Agenda

23 November 2014 – Site visit (technical tour in Ayutthaya)

8.00	Pick up at hotel
9.30	Arrive at the Fine arts department regional office, Ayutthaya <ul style="list-style-type: none"> • Welcome message by F&DMT Project Team • Presentation “Ayutthaya after the Flood” by Dr. Surajate Boonya-aroonnate (HAI)
10:30	BREAK
10.45	Visiting flood affected area, historical canals and mitigation structures within Ayutthaya Historical Park
12:00	LUNCH
13.30	Visiting flood management & mitigation structures <ul style="list-style-type: none"> • Historical flood retarding basin (Tung Makhamyong) • Proposed flood bypass channel by Jica • HAI weather & flood monitoring stations
16.00	Travel back to Bangkok
17:30	Arrive at hotel

24 November 2014 – Inception phase meeting

09:00 - 09:15	Opening and Welcoming Address	HAI, UNEP
09:15 - 09:30	Introductions	All
09:30 - 09:45	Review of agenda Overview of project and governance structure	IWA
09:45 - 10:00	Presentation by VBA on status and main issues within the Volta basin	VBA
10:00 - 10:15	Presentation by LVBC on status and main issues within the Lake Victoria basin	LVBC
10:15 - 10:30	Presentation by HAI on status and main issues within the Chao Phraya basin	HAI
10:30 - 10:45	Q&A	UNEP
10:45 - 11:00	BREAK	
11:00 - 11:15	Summary of findings from stakeholder consultations	IWA
11:15 - 11:45	Project methodology <ul style="list-style-type: none"> • Project goals and objectives • Presentation of proposed design and development of DSS 	DHI
11:45 - 12:00	Q&A	UNEP
12:00 - 14:00	LUNCH	
14:00 - 14:30	Component 1 and 2 – Overview of project components and deliverables <ul style="list-style-type: none"> • Includes review of full project work plan 	DHI

- Annual work plan and budget

14:30 - 15:00	Component 3 and 4 – Overview of project components and deliverables <ul style="list-style-type: none">• Includes review of full project work plan• Annual work plan and budget	IWA
15:00 - 15:30	Stakeholder roles and responsibilities	DHI
15:30 - 15:45	Q&A	UNEP
15:45 - 16:00	BREAK	
16:00 - 16:45	Discussion and Q&A	IWA, DHI
16:45 - 17:00	Final wrap up and closing remarks	UNEP

Annex 4 – Group work

Group 1. Basin organisations (VBA, LVBC, NBI)

- The discussions with the basin organizations emphasized the need to use the right channels to communicate about the project in each basin. This means workshops and trainings should be announced through the basin organizations in order to ensure ownership and involvement.
- In order to address issues of continuity, a recommendation from NBI experience was to tap into the national DSS networks that have been created during the NBI DSS development. More information can be obtained from Abdulkarim Seid. The national DSS networks consist of 12 people which include a core team of 4 persons.
- The inclusion of technical staff in the PSC was highlighted also in order to ensure continuity between meetings (i.e. inception phase meeting and first PSC)
- In order to have decision maker buy-in communication products need to be tailored accordingly. For example, NBI had valuable experience of holding awareness workshops on DSS with decision makers. The recommendation was to have these type of workshops at the beginning of the project, which involve participants such as Commissioners and Senior Advisors in developing a better understanding of the usefulness of DSS and how the outputs can be applied effectively. Sufficient budget needs to be provided for these activities.
- Suggestions need to be provided by LVBC, VBA and HALL on who should be involved in meetings and trainings
- It was also suggested that in order to develop better understanding of the importance and need for the information from the project, it should be put in local context. For example, in the case of Thailand, the 2011 flood is an event that everyone understands and can see how scientifically sound, verified information can be useful in future flood (and drought) planning.
- In the case of Lake Victoria, this would be when lake levels changes, And in the case of the Volta it would be drought in the northern part of the basin as well as unexpected flooding.

Group 2. Thai organisations

Discussion areas

Technical solutions
Definition of tools
Stakeholder involvement
Planning process in your area

- The tool is used for a preliminary analysis
- MIC models and WEAP model are supported in the DSS, but there is a clear description to add new models in the DSS (adapters that enable this)
- All the index that are listed in the annex, these are potential, but only the relevant ones will be added based on the needs of the stakeholders. Indicators are good to identify the status of the basin, if things are good or bad.
- After the project ends, is this the product that we give to the stakeholders? Its free for all to access, no license needed.
- There are many relevant index for their context, a discussion is needed with regards to indicators.
- How will the final product be located? It will be a software package that can be downloaded (details still need to be determined), but perhaps the idea would be to get the software from UNEP.
- Disaster department, what kind of information can we benefit from them? First we work with the basin organisation and the utilities, see their needs and this helps identify the role that they can play in the project. Our focus will be on the stakeholders that do planning, with which we would do pilot studies with.
- MWA: what will they benefit from the project like this? For utilities it will support their WSP process
- Management of water is not based on MWA, this belongs to RID...
- A lot of concern about water quality, this is more relevant for them... perhaps this could be an index included in the DSS (need to consider this)

- MoU, this is between who? This is between the stakeholder and the project, then I covers all the project partners
- Who is the end user? All those that do water planning, this could be basin organization, utilities, electrical companies, industry, agriculture sector
- How is the visualisation of the end product? It will be a GIS approach, not 3D, so it will be visualised in 2D
- Can the DSS handle all types of data? It is a database, but the idea is not to provide a data base for sharing, it could be that but this is not the intention of the project.
- Database system is PROCESS SQL
- Windows based programme, but also limited web functionality (the borderline is yet to be defined) – it does get complicated when you go to web
- The output could be an optimised model based on various scenarios and based on specific objectives (optimize power production while increasing crop yield). This could result in a table with data, or for managers, this could be tables or a report, while for technical staff this could be more of a model. The output can also be analysis of the data; can be multi criteria analysis, robust decision making, so this can help indicate which option is the best.
- Many organisation dealing with water have their own systems. If they can use that system as well... data from HAIL and data form this project can be a good test to see what work best, if it doesn't then they can go back to the old system.
- There is no maintenance after the project ends, the progress of the DSS depends on the use by stakeholders.
- Using the key stakeholders to ensure that the DSS satisfies their needs before disseminating this to other stakeholders.
- HAIL will decide which process is best with regards to determining the pilot study. The Pilot can involve more than one stakeholders, but testing can only happen with limited stakeholders (who have clear objectives and know what they want to do), then others can use it if the pilot studies are successful.
- There should not be a commercial profit of one stakeholder by selling the models to another basin – this DSS can be accessible to other basins, but restrictions are needed to avoid this from happening
- Provide tools that can link up to available GSM data (and other data) – there will be a downscaling model available.
- Templates in the DSS are configured to specific users, but all tools are there in the DSS, but the more relevant tools are there for the particular stakeholder and its needs.
- Pilot studies are used to identify what functionalities are needs, how we can do this, if not, what alternatives are there...
- Will it support Thai characters? This needs to be looked into
- Training course, when will that occur? This depends on when we have something concrete, probably end 2016 start of the next year.
- University participation for research? DHI are incorporating research related activities into the project, to use that research to evaluate if certain methods make sense or not.
- Next time if there is a visit to Thailand, it would be good to have a group meeting with all stakeholders – DHI will provide the week they are around and then HAIL can facilitate the internal discussion on when is should be.
- Disaster prevention, they may have their own index, this could be added to the DSS? Yes, but they can also add this (Python Script) into the DSS themselves
- Water demand is this included in the DSS? There will be tools for crop water requirements

Group 3. Water utilities from Volta and Lake Victoria

Water utilities (Volta Basin and Lake Victoria Basin)

- Some confusion was expressed with respect to the name Planning DSS mainly because the name DSS is used in many different contexts.
- Drought management for water utilities would be an essential area of the Planning DSS
- All water utilities expressed the need for tools to assess and monitor water quality. Water quality is related to flood and drought issues and represents a key area within Water Safety Planning.

- It is important the Planning DSS covers the scales from catchment to the end-user as expressed in Water Safety Planning
- Early-warning systems for floods would be very important for all water utilities
- For stakeholder involvement it is important to express clear guidelines of the activities, staff involvement and time lines
- For the sustainability of the Planning DSS it would be important to provide support after the end of the project.

Stakeholder expectations:

- Prediction of flood occurrence and duration
- Prediction of drought occurrence and duration
- Overview of flood risk areas in order to design water treatment plants in low risk areas
- Water budget tools for communication to the public and in order to locate areas for construction of water treatment plants and reservoirs
- The project should provide a clear and concrete description of the output in order to enhance stakeholder involvement

Flood and drought indicators, a water budget tool, flood risk area assessment and water quality monitoring could be elements of pilot studies for the water utilities. These areas fit well into the planning process of the water utilities and are aligned with the project objective

Annex 5 – Side meetings

The meeting notes of the side meetings during the week of November 24th are attached as a separate file.