



## FLOOD & DROUGHT MANAGEMENT TOOLS

### Lake Victoria Basin Stakeholder Summary Report



## Executive Summary

### Overview

The **Flood and Drought Management Tools (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 an open access, 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.

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.

It is important to note that the F&DMT Project will not collect data or develop new models, 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. What the project will produce is 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, special attention will be given to flood and drought events.

### Stakeholder meetings

The project started officially in June 2014 and had a 6 month inception phase during which the executing agencies had a series of stakeholder consultations in each basin. The consultations aimed to improve understanding of how the F&DMT project can improve the water planning in the three basins, to be used in formulating a detailed project description for the inception meeting. The meeting was also convened to 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
- 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&D project

In the Lake Victoria Basin, the project brought a variety of stakeholders together for a 3 day meeting in Kisumu from 15-17 September 2014. A summary of the meeting structure is below:

## Summary of meetings

Day	Monday September 15 <sup>th</sup>	Tuesday September 16 <sup>th</sup>	Wednesday September 17 <sup>th</sup>	Thursday September 18 <sup>th</sup>	Friday September 19 <sup>th</sup>
Location	<i>Kisumu</i>	<i>Kisumu</i>	<i>Kisumu</i>	<i>Jinja/ Entebbe</i>	<i>Entebbe</i>
09:00-12:30	Water Safety Planning Stakeholder meeting for Kisumu	Introduction to F&D Management Tools Project	Meeting with LVBC and focal points	Travel to Jinja – meet with NSWC (DHI)	Meet with: <ul style="list-style-type: none"> <li>Department of Water Resources, Ministry of Environment, Uganda</li> </ul>
14:00-17:00	Meeting with Lake Victoria Basin Utilities	Discussion between utilities and catchment	Meeting with LVBC and focal points	Arrive in Entebbe (DHI)	<ul style="list-style-type: none"> <li>Nile Basin Initiative</li> </ul>

Additional consultations were also held in Jinja and Entebbe with National Water Sewerage Company – Uganda (Jinja), Nile Basin Initiative, and the Department of Water Resources, Ministry of Water and Environment, Uganda.

The project will work with the Lake Victoria Basin Commission at the transboundary level. However, close collaboration with NBI, at the basin level, and the catchment organisation at the country level is needed as many of the planning events need collaboration at both basin and catchment scale. (with some input from the Nile Basin Initiative (NBI) who have valuable experience and insight into the process of developing a DSS for the Nile River Basin). However, much of the information that will be needed in the decision support system to be developed by the project will need to come from national level organisations. The project will also work with LVBC to disseminate information to their members countries within the basin, as the institutions is the relevant connection between the countries.

Although the Lake Victoria basin spans over 5 countries, the project will concentrate on Kenya, Uganda and Tanzania. This is mainly due to the limited resources in the project, and the fact that these three countries make up roughly 80% of the catchment area. The remaining countries – Rwanda and Burundi which collectively contribute to about 33% of the inflow to Lake Victoria – will indirectly be included through LVBC as they hold a coordinating role across countries basin.

At the country level, the project will engage with a variety of water resources management agencies to gather information and develop capacity. In Kenya, this includes the Water Resource Management Authority, specifically the Lake Victoria South Regional office; the National Environment Management Authority. In Tanzania, agencies that the project will engage with include the Lake Victoria Basin Water Board and potentially the National Environment Management Committee. In Uganda, agencies include the Directorate of Water Resources Management, Ministry of Water and Environment, and potentially the National Environment Management Authority. These agencies can provide the project with relevant historical data on floods and drought events, which can help develop an understanding of how the DSS can contribute to improved long term planning to prepare for floods and droughts.

The project will also test the DSS with end users focusing on urban water utilities in Jinja, Kisumu and Mwanza. The utilities in Kenya, Uganda and Tanzania are Kisumu Water and Sewerage Company (KIWASCO), National Water and Sewerage Corporation (NWSC) and Mwanza Urban Water Supply & Sewage Authority (MWAUWASA), respectively. The Water Services Boards in Kenya are responsible for management of water supply and sanitation across a region, thus the Lake Victoria Services Boards (North and South) will be consulted. The Water Action Group (Kisumu) also expressed interest in the project and can provide a link to local consumers.

There are regional areas within the basin with flood and drought events, but these are mainly local issues. One of the key issues is water quality, where especially the spread of water hyacinth and continued pollution of the water is of concern to the water utilities.

There is a great need for improved communication between various institutions (across borders as well), in particular with the sharing of data and access to data. Data in itself is also lacking, and what data is available should be viewed with reservation, as this is not often reliable or validated.

There is the opportunity for the project to support the integration of information from different organisations and work with the various stakeholders to improve on their capacity to plan better for F&D events at their respective levels. The project also provides a unique opportunity to ensure collaboration and knowledge sharing between institutions and across scales (catchment to water utility)

Organisation	Country	Main responsibility
Lake Victoria Basin Commission (LVBC) <a href="http://www.lvbcom.org/">www.lvbcom.org/</a>	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) <a href="http://www.nilebasin.org">www.nilebasin.org</a>	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 <a href="http://www.mwe.go.ug">http://www.mwe.go.ug</a>	Uganda	Set national policies and standards, managing and regulating water resources and determining priorities for water development and management.
National Environment Management Authority, Kenya <a href="http://www.nema.go.ke">www.nema.go.ke</a>	Kenya	A government parastatal established to regulate environment issues.
Lake Victoria Basin Water Board <a href="http://www.maji.go.tz/basins/nine.php">http://www.maji.go.tz/basins/nine.php</a>	Tanzania (Basin organisation)	There are nine (9) water basins for the purposes of water resources administration and management.
Mwanza Urban Water & Sewerage Authority <a href="http://www.mwauwasa.org/">http://www.mwauwasa.org/</a>	Tanzania	Autonomous -government owned- operating authority providing reliable and safe drinking water to Mwanza City, and disposal of wastewater.
National Water & Sewerage Corporation <a href="http://www.nwsc.co.ug/">http://www.nwsc.co.ug/</a>	Uganda	A public utility company 100% owned by the Government of Uganda, providing water and sanitation services in urban areas.
Ministry of Water, Tanzania <a href="http://maji.go.tz/">http://maji.go.tz/</a>	Tanzania	Ministry responsible for sustainable management and development of water

		resources for social and economic development in Tanzania.
WHO <a href="http://www.who.int">www.who.int</a>	Tanzania	Related to F&DMT project – Developing guidance on Climate-resilience water safety planning.
Water Resource Management Authority <a href="http://www.wrma.or.ke/">http://www.wrma.or.ke/</a>	Kenya	The Water Resource Management Authority (WRMA) is a state corporation and leads 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 <a href="http://www.kiwasco.co.ke/">http://www.kiwasco.co.ke/</a>	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 <a href="http://www.lvswaterboard.go.ke/">http://www.lvswaterboard.go.ke/</a>	Kenya	Lake Victoria South Water Services Board is a State Corporation which provides water and sanitation services in their area of jurisdiction.

## Next steps

Following the stakeholder visit in Lake Victoria, the project team undertook consultations in the Chao Phraya Basin, Thailand (October 6-10<sup>th</sup>, 2014). This is being followed by an inception meeting with representatives from the three basins in November, in which the revisions to the project components (i.e. objectives, activities and deliverables, etc.) will be addressed and shared among all stakeholders.

Using the outputs of the stakeholder consultations and inception 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).

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.

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## About the project

“Flood and Drought Management Tools” project, Katharine Cross, IWA  
 Project methodology and proposed deliverables, Oluf Jessen, DHI

Climate change is altering weather and water patterns around the world, causing increased floods in some areas and shortages and droughts in others. These floods and droughts have become increasingly common, more severe, and at the same time, less predictable than they used to be. There is a growing sense of urgency around the need to improve resilience within river basins, and for this to become a critical part of water management plans.

The objective of the Flood and Drought Management Tools (F&DMT) 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 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.

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 project will target a number of key stakeholders ranging from the regional–(transboundary) basin level to the local–utility level; i.e. transboundary river basin organisations, local authorities, water utilities, local and indigenous communities, urban and (agro) industrial water users and civil society groups.

The project 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.

**Table 1. Involvement and Benefits to project stakeholders**

Project activity	Involvement	Benefits
Development of DSS	<ul style="list-style-type: none"> <li>• Provide information sources</li> <li>• Indicate what outputs are needed</li> </ul>	<ul style="list-style-type: none"> <li>• DSS is designed to be applied by a variety of users</li> </ul>
Testing DSS <ul style="list-style-type: none"> <li>• Basin level</li> <li>• End user (utility level)</li> </ul>	<ul style="list-style-type: none"> <li>• Use test cases to tailor DSS</li> <li>• Use of DSS with available data to consolidate information on floods and droughts</li> </ul>	<ul style="list-style-type: none"> <li>• Generic DSS is tailored for specific user in each basin</li> <li>• Recommendations developed to use information in flood and drought management planning</li> </ul>

Capacity building and training

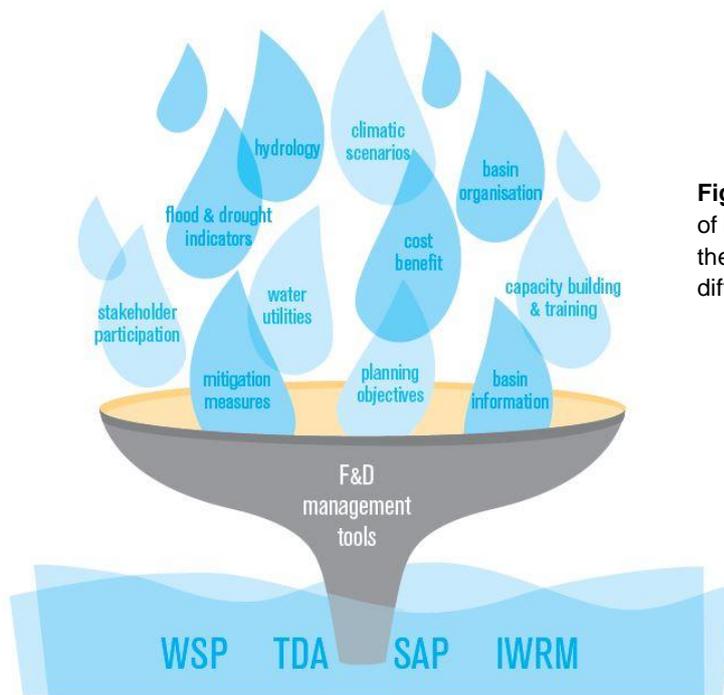
- Training materials provided and use cases for future application

- Ability to train other users – future business case?

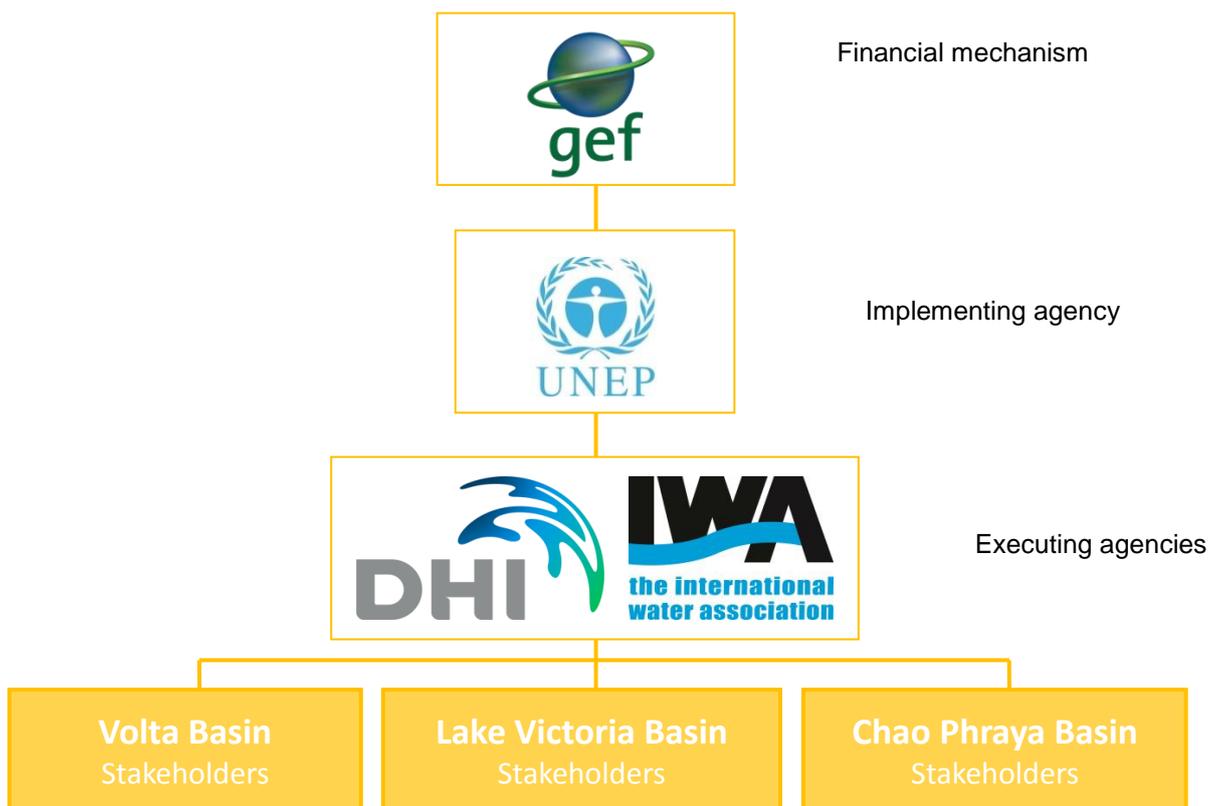
Communication and dissemination

- Networking with other users across basins to understand how to overcome gaps and challenges
- Presentation of DSS application at key events

- Gain experiences and learning from other users and basins
- Showcasing of basins and utilities



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



**Figure 2.** Partners involved in the F&DMT project

## Stakeholder meetings

The F&DMT project is in the inception phase, and a series of stakeholder meetings in the Volta Basin, Lake Victoria Basing and Chao Phraya Basin in Thailand were carried out by DHI and IWA between August and October 2014. For the Lake Victoria Basin stakeholder meetings, the project brought a variety of stakeholders together for a 3 day meeting in Kisumu from 15-17 September 2014 followed by additional consultations were also held in Jinja and Entebbe with National Water Sewerage Company – Uganda (Jinja), Nile Basin Initiative, and the Department of Water Resources, Ministry of Water and Environment, Uganda. A summary of the meeting structure is below:

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14:00-17:00	Meeting with Lake Victoria Basin Utilities	Discussion between utilities and catchment	Meeting with LVBC and focal points	Arrive in Entebbe (DHI)	

The goal of the meetings was to improve understanding of how the F&D project can improve the water planning in the three basins, to be used in formulating a detailed project description for the inception meeting. A detailed agenda of the 3 day meeting is available in Annex 1.

## Day 1 - Engaging with utilities



The first part of the meeting started off with an overview of the project followed by a presentation from KIWASCO about the process of undertaking Water Safety Planning (WSP).

## Overview of Water Safety Planning

Presentation on WSP, Kizito Masinde

Kizito Masinde from IWA gave an overview of the water safety planning process and approaches. A Water safety plan is a plan to ensure the safety of drinking water through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer.

- WSP helps utilities improve the customer experience by providing quality water and an adequate supply of water.
- WSP is preventative; you look at what you want to produce, and what process is needed to reach the required production.
- WSP should go as far as addressing household level issues; e.g. how at the household level the water supplied by the utility can be kept clean etc. Often is the case that if quality of water is not good at the consumer level, the blame falls on the utility. There are various aspects that are beyond the scope of the utility. Utilities, therefore, need to engage with other stakeholders, addressing issues beyond the meter.

## Application of Water Safety Planning – Kisumu

Kisumu Water and Sewerage Company's (KIWASCO) experience with WSP, George Odero

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. KIWASCO are aware of the impact climatic changes can have on Lake Victoria. They understand the need to take into consideration flood control and mitigation, if no measures are put in place to address the impact of the changing environment, Lake Victoria could dry out. Solutions start with those that use it (i.e. KIWASCO).

There are two water treatment plants; one on the lake and one on a river upstream. The water quality in the lake is poor with fluctuating pH levels and is very expensive to treat it. KIWASCO is moving some of the water production to the river station instead. Now around 95% of the water comes from the river station at 'Kajungu'.

### Major issues for KIWASCO

- Water hyacinth
- Contamination of clean water at the household level
- Breakdown of treatment process, burst of transmission pipes
- Recognition of need to understand and engage with wider catchment, rather than simply focusing on the distribution of water. This is especially important in terms of the causes and impacts on water levels of the lake and pollution impacting water quality.

### Floods and Drought

- Water turbidity changes quite suddenly, causing problems for the treatment plant extracting water from the river
- Lake levels dropped in 2006 causing major problems
- With an increase in drought events, the river which they use now will be affected
- Flooding leads to leaks and bursts, pipes can be washed away – this happened, and they replaced them and it happened again, therefore there is a need for better planning
- Flooding leads to outbreak of water borne diseases, to which consumers blame KIWASCO
- During drought events, people turn to other non-safe water sources and also blame utilities when water is of poor quality

### KIWASCO's Experience with WSP

- KIWASCO have water safety plans, however they are not fully implemented.

- Long term planning of water management for the utilities is primarily the job of the Lake Victoria Water Services Boards.
- Political support is needed for the success of WSP. The new Kenyan constitution and water act of 2002 provide a legal framework to support such a planning process.
- WSP provided an in-depth understanding of the water supply system, meaning there is less reaction and more preparedness. Issues are anticipated and dealt with before they reach the end users.
- Hazards exist beyond the scope of the utility (e.g. at the catchment or at the household level). These issues need to be addressed, therefore there is a strong need for KIWASCO to go beyond treatment and distribution, reach the catchment level and end users by engaging with various stakeholders; e.g. the water hyacinth, they can only deal with the issue at the extraction point, but this is not a long term solution.
- Harmonizing the issues of various stakeholders is a challenge as their needs are diverse, and priorities different.
- Utility performance evaluation should be revised. It should look beyond just the quality of water produced. Including WSP in the general evaluation of utilities will push people to allocate money and time on implementation of WSP in their own utility.

#### Future plan

- Open and more focused dialogue with stakeholders.
- Involve political will / support; build a better relationship with the political environment, but also with various stakeholders who should have a particular role at their respective level.
- There is an interest in using flood information to plan where to build infrastructure.

#### Discussion

- KIWASCO holds individual meetings with the stakeholders, but the step now is to bring them all together, this is the process that KIWASCO is in now. Through such a process, KIWASCO interacts with stakeholders at the local level but also the catchment level.

KIWASCO is monitored on their water abstraction and charged on the amount they withdraw. The charge should also reflect the quality of water available for KIWASCO to withdraw (so there needs to be discussion with upstream users; looking at the feeder rivers of Lake Victoria). A large contribution of the pollution of the lake is unaccounted, and it is easiest to put the blame on the industries around the lake, but this needs to be better addressed. Kenya Marine has a project to map out areas of contamination.

A roadmap to manage water resource in the catchment is needed. Strong collaboration with stakeholders in the area is important in this regard, and utilities as a major user of water are very important stakeholders. Through their management strategy, their engagement is well defined. Water Resource Users Associations exist to manage water resources at the local level, and utilities can become a member by registering with the Attorney General. As a member, water users come together to manage the water sources. This enables close collaboration, direction and guidance on how best to use the water resource.

### **Utilities and Flood and Drought Management Tools Project**

For the second part of Day 1, an overview of the project and the methodology was provided by IWA and DHI, followed feedback from the utilities and other stakeholders.

Utility	Is F(&D) important in the planning process?
KIWASCO	<ul style="list-style-type: none"> <li>• Information is essential for water supply management, for example, the flow of water during the dry season, and how this will impact their ability to supply water, while meeting ecological flow. There is great value in incorporating information on F(&amp;D) in the planning processes of KIWASCO.</li> <li>• In the WSP, KIWASCO have stressed the need to go beyond their own mandate, understand the process from catchment level to the end users, a tool, as could be developed by the F&amp;DMT project is</li> </ul>

useful in helping KIWASCO better understand this process. Flooding and droughts occur at a level higher than what utilities are put in place for. However, leaks and bursts can occur during flooding events. The availability of information on a potential flood event can help KIWASCO better prepare for such an event.

- Drainage is another issue in Kisumu. F&D events have a big impact on the infrastructure in Kisumu; i.e. pipes wash away, or pipes get damaged and need to be fixed). The result is often a decrease in the quality of water due to contamination, and often all fingers point to the utility. If KIWASCO has a means of better planning for flood events, they can avoid such circumstances and ensure customer satisfaction.
- During droughts, people turn to other (non-safe) water resources, but regardless the utility is blamed if the water quality is poor.

National Water and Sewerage Corporation (NWSC)

- NWSC's operations are affected by events that occur at the basin level. Information is needed for the design of infrastructure; for example information on flood levels is useful when designing the intake. Water Works of Aba is based on highest level of the lake based on figures from 1962, this can have negative impacts during a drought event.
- A data base with best practices is beneficial as basins and utilities can gain useful insights for their planning processes. In addition, an online forum would be valuable in enabling discussion between users of the same water on various issues.
- The project tool can provide access to useful and relevant information for which a planner needs for decision making. The tools should assist and not direct the way in which planning should be done.
- Utilities need to take into consideration F&D events in their planning, most utilities do not think about such events, but they are important to consider as they impact the utilities operation greatly when they occur.

Mwanza Urban Water and Sewerage Authority (MWAUWASA)

- There is no platform at which discussions take place between the various levels and with various stakeholders (i.e. environmental stakeholders, regulators with regards to management of flood and droughts). Such a platform can assist MWAUWASA to profit from external knowledge

National Environment Management Authority (NEMA) - Kenya

- Other stakeholders look at the advisory level when there are issues with F&D and how to move forward. For utilities, addressing F&D is key for their planning.

### Use case presentation and workshop

Water and sanitation services have to prepare for the consequences of a changing climate and specifically floods and droughts. The impacts of floods and droughts could have significant impacts on the water availability and increases the risk of chemical and biological contamination of water for human consumption.

Participants engaged in a small workshop to focus on how water utilities are planning for extreme climate events, and how the project could be most beneficial for current planning. The workshop is developed as a number of separate cases, each focusing on a particular topic with respect to how extreme climate events could affect water utilities, and how planning and adaptation measures could be used to reduce the risk. The focus during this session was on Information needs.

Integration of available information is a key when planning for extreme climate events, as it provides a baseline for the current situation, and creates an opportunity for comparison against future situations.

Participants identified the following information that might be needed for evaluating the availability of water:

Parameter	Information needed
Water availability - Water quantity	<ul style="list-style-type: none"> <li>• Water level of the lake (depth of lake)</li> <li>• Shape of the lake</li> <li>• River level and flow rate from different sources (into the lake)</li> <li>• Precipitation, evaporation (water balance)</li> <li>• Water abstraction (also at the catchment level)</li> <li>• Catchment information upstream</li> <li>• Seasonal forecasting</li> <li>• Alternative water sources</li> <li>• Water users and water use</li> <li>• Water permits</li> <li>• Topography</li> <li>• Household data (e.g. size)</li> </ul>
Water availability - Water quality	<ul style="list-style-type: none"> <li>• Nutrients (e.g. Chlorophyll level)</li> <li>• Turbidity, suspended solid, sediment levels</li> <li>• Colour</li> <li>• E.coli</li> <li>• pH</li> <li>• Dissolved oxygen</li> <li>• Turbidity levels</li> <li>• Atmospheric deposition</li> <li>• Heavy metals</li> <li>• Bacteriological levels</li> <li>• Origin of pollutants (water users)</li> </ul>
Water demand	<ul style="list-style-type: none"> <li>• Population</li> <li>• Map of alternative sources – as this may reduce demand on municipal water</li> <li>• Accessibility</li> <li>• Socio-economic factors               <ul style="list-style-type: none"> <li>- Economic activities</li> <li>- Economic growth projections</li> <li>- Industrial production</li> </ul> </li> <li>• Household data               <ul style="list-style-type: none"> <li>- Household size</li> <li>- Water consumption</li> </ul> </li> <li>• Pricing/tariffs</li> <li>• Infrastructure development</li> <li>• Land use</li> </ul>

The following tables go into more depth addressing where information can be sourced and how it can be used by the utilities.

**Table 1: Water availability**

Parameter	Source of information / data	Use of information / data
Catchment information	<ul style="list-style-type: none"> <li>Water resources management authority regional office</li> </ul>	
Water levels	<ul style="list-style-type: none"> <li>Directorate of water resources</li> </ul>	<ul style="list-style-type: none"> <li>Design of water plant/schemes</li> </ul>
Flow rate water balance	<ul style="list-style-type: none"> <li>Directorate of water resources</li> <li>WRMA (Kenya) and Basin Offices (Tanzania) provide flow rates</li> <li>KMFRI/WRMA/Kenya Maritime Authority (Kenya) and Basin Water Offices (Tanzania) provide lake levels</li> </ul>	<ul style="list-style-type: none"> <li>Design of water plant/schemes, trends</li> <li>Helps plan if there is a need to increase productions</li> <li>Abstraction purposes</li> <li>Abstraction permits</li> <li>Water allocation</li> <li></li> </ul>
Water quality (nutrients)	<ul style="list-style-type: none"> <li>Water quality department</li> <li>Water utilities (they have real time data at 30 minute intervals)</li> <li>Laboratory analysis</li> <li>Inter-laboratory analysis</li> <li>Annual reports from                             <ul style="list-style-type: none"> <li>WRMA (Kenya)</li> <li>Other utilities</li> <li>NEMA (Kenya)</li> <li>KEBS (Kenya)</li> <li>KMFRI (Kenya)</li> <li>WASREB (Kenya)</li> <li>EWURA (Tanzania)</li> <li>NEMC (Tanzania)</li> <li>TBS (Tanzania)</li> <li>Industries</li> </ul> </li> <li>Research reports from universities</li> </ul>	<ul style="list-style-type: none"> <li>Planning and operational purposes (i.e. assist in decision making for water treatment and use)</li> <li>Quality checks and analysis from other labs verifies internal information on water quality – for operations</li> <li>Ensure good quality water</li> <li>Calculate statistics of the data and trends</li> <li>Enforcement – information on water quality is used by regulatory agencies (for discharge permits)</li> <li>Calculation of pollutions loads (BOD, COD)</li> </ul>
Suspended solids	<ul style="list-style-type: none"> <li>Water quality department</li> <li>Water utilities</li> </ul>	<ul style="list-style-type: none"> <li>Planning and operational purposes</li> </ul>
Chlorophyll levels	<ul style="list-style-type: none"> <li>KMFRI</li> <li>Department of Surveying and Remote Sensing</li> </ul>	<ul style="list-style-type: none"> <li>Decision to extent barrier (intake point)</li> <li>Know magnitude/intensity of water hyacinth</li> <li>Predictions</li> <li>Monitoring of water hyacinth</li> </ul>

**Table 2: Water demand**

Parameter	Source of information / data	Use of information / data
Population	<ul style="list-style-type: none"> <li>Tanzania/Kenya National Bureau of Statistics</li> </ul>	<ul style="list-style-type: none"> <li>Planning for design</li> <li>Forecasting</li> </ul>
Socio-economic factors	<ul style="list-style-type: none"> <li>Tanzania/Kenya National Bureau of Statistics</li> <li>County government</li> </ul>	<ul style="list-style-type: none"> <li>Lanning and allocation</li> <li>Water resource use</li> <li>Forecasting</li> </ul>

- Land use
- KNBS/TBS
  - Ministry of Agriculture
  - DSRS, Ministry of Devolution
  - Ministry of Lands/Housing and Urban Planning (Kenya and Tanzania)
  - Councils and Regional Authorities (Kenya and Tanzania)
  - Planning
  - Projection
  - Allocation
  - Equitable distribution

## Day 2 - Connecting stakeholders



Presentations were given by LVBC and the utilities – KIWASCO, MWAUWASA and NWSC. This included: Successes and challenges in the planning; Identified gaps and where the current process could be improved by flood and drought information; Linkages between basin, national (IWRM) and utility planning (water safety planning) (currently and suggestions for improvements); and Interaction between catchment authorities (including LVBC) and utilities to share information for improved water resource management.

### KIWASCO

The Water Act of 2002 helped shift the responsibility of the government from implementer to facilitator within the water supply and sewerage sector.

KIWASCO needs to work with catchment organisation (KIWASCO acknowledges that hazards that were hard to manage are those at the catchment level) and end users to deal with activities before and after the treatment of water. Addressing the processes and activities before and after their utility is important in order to provide clean good quality water to end users. This is especially important as end users are a mirror of how KIWASCO performs. As such, KIWASCO works in close relation to Water Service Boards at the regional level. At the local level they work with the Water Services Providers.

Consumer voice is important at all levels. To meet the satisfaction of the consumer, KIWASCO has established customer satisfaction platforms in which complaints or suggestions can be provided. They also employ call cards, hotlines can be sued to provide feedback; in such a way their customers

concerns can be addressed. KIWASCO also does a survey to get the level of satisfaction of those they supply water to. They also carry out various stakeholder meetings to get feedback from those that they supply and need to engage with.

Pollution is increasing due to various activities in the catchment. To monitor the quality of water from the catchment area, KIWASCO is engaged in Water Resource Management with environmental agencies to see what the sources of pollution are and how they can best address this. People are taken to court for polluting the water, including those who do not treat their waste before they discharge it back into the lake. Conservation of the catchment goes beyond just the utility, and involves all stakeholders who make use of the water source (e.g. those using wood for firewood, they take down trees that have an environmental benefit).

The lake can dry up if climate change issues are not addressed or even considered in planning processes and activities. If the lake dries up, then as a utility, KIWASCO does not have a reliable alternative source to supply the people with water. Therefore, taking into consideration F&D in their day to day activities and long term plans is important. Furthermore, engaging with Lake Victoria Basin Commission (LVBC) is important since the water is a transboundary resource; the activities in Uganda and Tanzania affect the quality of the water KIWASCO needs abstract to supply to their consumers.

### **MWAUWASA**

MWAUWASA has installed 44,000 connections. They supply water up till the meter; however, water supply issues need to be addressed beyond the meter; i.e. looking at the household level if there is contamination. If this is the case, often MWAUWASA will be blamed regardless, giving them added incentives to look past their current operational boundaries.

F&D events are well known due to past experience. MWAUWASA needs to be alerted and prepared because it can happen again. Currently the issue is also addressed in the national agenda – highlighted in the national policy framework tools and legal frameworks.

There are several challenges, these are:

- Political will
- Limited financial resources
- Diverse stakeholders with diverse needs (it is important to identify and get those stakeholders that are important on board and understand their issues and priorities)

There is no platform to share information between utilities; this is an obstacle in their day to day work as some information is lacking.

F&D impact more than just the utilities, it is therefore essential for all stakeholders to work together do deal with these concerns collectively. There are various authorities to address the multiple concerns in the area of F&D management. The issue is to get involved and work closely with these stakeholders. Furthermore, no one owns land in Mwanza. Land belongs to the government, as the sole owner. As such there is more government intervention, encouraging people to practice good environmental activities. Through the Lake Victoria Basin Water Board, communities within the basin can be educated in the area of good practices, awareness raising can take place and water user associations established. This can help simplify the treatment of water if people are aware that their activities are increasing pollution and therefore engage in less pollutive activities and engage in practices which are beneficial to the lake and the water source needed by MWAUWASA.

### **NWSC**

Floods contribute to pollution of the lake which affects the quality of water. Declining lake levels impacts the potential of hydropower production in Uganda. Siltation is an issue as well in rivers due to agricultural activities. All these concerns place a number of constraints and challenges for the NWSC and their operation; i.e. poor water quality would require more effort to produce good quality water.

There are efforts to protect the lake through the construction of infrastructure (e.g. WATSAN project of 100 million EUR for wastewater infrastructure). Furthermore, there are project concerned with swamp

restoration. However, despite these efforts, there is a need to look beyond just service. There is a need to look at factors which can affect the ability of the utility to provide this service.

NWSC has a desire to share information with LVBC that can be shared beyond (although the issue of free access to information and data remains an issue). A framework that can support collaboration between countries and with stakeholders needs to be established. Planning needs to include issues of F&D and identify the implications of its impact on the utilities functionality.

## LVBC

LVBC is a coordinating entity (they do not implement), which serves as a means of collaboration between East Africa. The institution coordinates all development activities in the basin; activities should contribute to 1 of the 5 pillars (policy areas) of the strategic framework established by the LVBC:

1. Ecosystems, Natural Resources and Environment
2. Production and Income Generation
3. Living Conditions and Quality of Life
4. Population and Demography
5. Governance, Institutions and Policies

The catchment in Kenya is larger than in Uganda, but they have just 6% of the lake area. Rwanda and Burundi are important sources to the Lake Victoria and their involvement in the Basin is quite important. Climate change impacts rainfall and evaporation, so it is important to consider this in the management of the basin (and lake).

There is a need to understand where the water comes from and how infrastructure will deal with the water, or impact the availability of water, etc.

EAC/LVBC has also established a financing mechanism to coordinate and steer investment. The mechanism established has an aspect focusing on F&D.

## Nile Basin initiative (NBI)

The presentation from NBI focused on the experience of developing and using a decision support system.

The Nile Basin is one catchment with finite and interconnected water resources and various stakeholders with different priorities. There are 3 levels of resource management:

- Water resource management and allocation
- Water infrastructure
- Policies, treaties, etc.

The Nile Basin serves roughly 400 million people, therefore sound decisions on the management of water resources is essential. However, to sustainably manage the water resources, the right decisions need to be sold to the politicians. For example, the technicians know what the ecological flow is, but for politicians the approach needs to be different. To get politicians on boards, indicating the impact of maintaining the ecological flow on increasing job opportunities or increasing human capacity index, etc. is more appealing to them.

The F&DMT project is very relevant, but it is important to explore and understand the needs of all those who are involved, otherwise the system may be scientifically sound, but will not meet the needs of all the stakeholders; some will not use it. The challenge is how to integrate the needs of all stakeholders in one system. A DSS should be based on a needs assessment; identify the needs at the various levels, for the various stakeholders and identify agreed common priorities for focus. To address this while establishing a generic system is a very big challenge.

A DSS requires a policy and strategy level supported by a planning and management level. And often water quality and climate change tend to be overlooked. These should not be forgotten in the planning. Some provided some of the following comments:

- Make your system open and live to consider the needs of today and the future, make the system adaptable
- In the end, NBI is looking for a Multi-Criteria Decision, which provides various options to see what is most ideal for your situation (combining various aspects that suite your needs).
- (Periodic) 5 year assessment of the DSS (to make it more responsive to the needs of the users)
- Different levels (Politicians, end users, etc.) require different information to express the same thing. The way in which information is presented is important and something that should be considered.
- Stakeholder integration was quite a process relying on a lot of trial and error to find the ideal means to facilitate the interaction between stakeholders:
  - Coaching and capacity building.
  - Interactive user community management (people can submit a question via the platform and they can get a response from anyone from the community) NBI only monitors and interferes when necessary, but they rely on the users to engage with each other.

### Group discussions

A carousel group exercise was convened focusing on specific understanding of planning processes and management of floods and droughts. Each station has a set of questions to which input is provided. After a set amount of time, the groups rotate and build on the input provided by the previous group.

- Station 1 – Information sharing
- Station 2 – Future changes
- Station 3 – Is the plan working?
- Station 4 – Reducing the impact of F&D events

The groups comprised of the following:

- Group A – Transboundary (NBI, LVBC)
- Group B – National catchment authorities and regulators (NEMA – Kenya, etc.)
- Group C – Utilities (Uganda and Kenya)
- Group D – Utilities (Tanzania) and other organisations (e.g. Ministry of Water, Lake Victoria Water Services Board, Water Action Group, WHO, etc.)

Please refer to Annex 2 for findings

### Day 3 - Meeting with LVBC and focal points



## Feedback and discussion – Basin organisations

Day 3 focused primarily on discussions with the basin organisations; this included: LVBC, NBI and LVBWB. The Ministry of Water and Environment (Uganda) and KIWASCO's Managing Director were also present.

The involvement of utilities from the implementation stage is of great importance as utilities are a key local level stakeholder. Utilities are the main abstracter of water from Lake Victoria, the Lake Victoria Basin Water Board (LVBWB) are responsible for the conservation of the water resources, and therefore they must have coordination with water resource management plans and the utility plans to make the projects more sustainable.

In Uganda, pollution has pushed the Ministry to identify sustainable solutions; such as water resources protection guidelines. Utilities are at the forefront of testing these guidelines. In Mbarara, there is a river under threat due to poor catchment management, but now there is some funding to improve this management. Utilities are becoming increasingly aware that they have to be part of the agenda, committing funds even for catchment management.

Also, in Uganda, the Water Management zones still need to transfer their data. A request needs to be sent out and then the information can be provided. Consultants and private companies need to pay for information, but a government body, like National Water, are not required to pay. The DWRM have digital information on a central database. LVBC does not yet have access to this; however it is through the WRIS that they can provide the information. As data is a source of revenue in Uganda, it is therefore hard to give that data away for free to anyone. Within the F&DMT project, we can access this data so long as we are not making a profit from the use of the data.

On paper there is interaction with the basin authorities at both the regional and national level. However, in practice, access to information is not always a reality. At the national level the information is available to the end users, the issue is that there is a gap in sharing information (a platform may not be sufficient). There is a continued need to bring stakeholders together to address these issues. It is the hope that through this project this can be achieved.

In Tanzania, utilities are the customer of the LVBWB, so they should provide the necessary information. All information LVBWB have is available on a basin database. The Basin Board coordinates with the Ministry of Water by sending their information to the national database. LVBWB is in the process of providing the information to the ministry who have already in a place a website which consists of a local database, and a central one at the Ministry. The LVBC can request for this information.

The LVBC WRIS involves all stakeholders and LVBC has indicated that they require the various countries and relevant stakeholders to upload information into the central system information. Data in the Lake Victoria Basin, at the moment, is based on request, but there are discussions going on to see how they can provide the data freely to all. Data from publications are easily accessible (in Uganda, for example), but the generated data that is stored, this is completely different, requiring the need for a request in order to obtain this information / data.

In the case of the Nile Basin, the issue around data and access to data has been a major hindrance in their activities. There needs to be a more structured process. A number of NBI projects failed to conclude well because they did not have access to data. NBI have done the following:

- Published their information disclosure and data policy – all data accessible, but for commercial reasons, private sector, people making profit, a payment is required)
- Finalised the integrated knowledge quota – provides anyone using the portal (free for all partners) with information (comprehensive list of meta data, with description of what kind of data it is, if its confidential or not)
- Collected all data (from studies, other organisation), under water environment culture, etc. within the Nile Basin and put it under the Nile IS (with the source available).

If data is required, you can go to the portal created by NBI and put in a request with an explanation as to why the data is required. The information or request is sent to the people with the right information (at which ever level) connecting the person requesting information with those who have the

information. NBI encourages the stakeholders to populate all data on the DSS, as a data storage, processing and sharing portal.

### Inputs into the project

What are the gaps, what is needed, what is missing? Participants indicated a need to support the daily work at the local level but also the basin level; to development a tool to help in their planning processes. At this phase, it is hard to be precise, we need to know what is needed, and use this to formulate what will be done, but this should be based on the needs of the clients. In Uganda, catchment based water resource management should consider the impact of climate change, in particular F&D. The management plan should be very clear on how these impacts will be addressed. That is where they see the importance of the F&DMT tool. If the tool can provide some intervention measure (i.e. water management zone (Karamoja), drought prone or flood prone areas) this tool can help.

Rather than have two separate tools, it would be useful to find a way to integrate the NBI DSS and the tool developed in this project. NBI also has a number of regional training events, which are a good area for collaboration and means of engaging further with stakeholders.

How is climate change being included in planning now and how are plans being linked to one another?

- Uganda
  - Whatever is done in water resource management seems to be targeting climate change activities, especially when you are building data that can be used to predict what will happen. There are certain aspects of catchment plans that address climate change impacts like floods, drought and drought adaptation activities (e.g. rainwater harvesting, development valley dams/ tanks, reservoirs, etc.). Furthermore, need for awareness raising in the communities are all climate change related activities. Therefore climate change is addressed but may not be explicitly defined on paper.
  - The main source of energy in the area is firewood, so unless there is an alternative, people will not sleep without eating. To improve this situation, the government has come with a program of rural electrification. Communities are encouraged to use energy saving stoves and when it comes to crops, they encourage people to grow short term crops. A lot has to be targeted to improve the livelihoods of people.
- Tanzania
  - At the sub-catchment level, climate change is indirectly addressed in IWR plans. For example, an issue the community has is the decreasing level of water level due to poor practice in the area (e.g. cutting trees, deforestation, etc.), so in one way or another they address issues of water scarcity.
- Transboundary, LVBC
  - Projects through community driven management projects address aspect of climate change – use of energy (biogas as they have a lot of livestock); having dairy cattle that are productive (benefits them).
  - Through LIVEM2 projects for the conservation of the catchment, at community level addressing environmental sustainability take place. For example in the Mara river, various activities to conserve the catchment are carried out.

How do you link the plans between countries at the regional, national level and local level?

- Tanzania
  - River Basin Management, MoU's are being signed, bilateral agreements (e.g. the Mara River between Kenya and Tanzania), transboundary water forum – water associations from countries come together to discuss challenges and issues regarding WRM. Even through the sub-catchment management plans, e.g. Kagera catchment, in which cooperation exists between the countries in the region.

- Uganda
  - In a transboundary context, implementation belongs to the countries. Coordination is done by a designated body like NBI. 3 sub-catchment management plans exist: Lwakhakha, middle Malaba, and Lower Sio (Kenya to Lake Victoria) – these are transboundary catchments (between Uganda and Kenya) which have been developed by communities on both sides of the border.
  - Policy and legal frameworks are different, so when it comes to implementation, it follows the legal framework of the specific countries involved, but by and large, most of the policies and regulations are similar.

There is a project for IWRM plan for transboundary basin, how is this linked to the plans of Tanzania, Uganda (and Kenya)?

- LVBC
  - LVBC helps link the countries, both for national plans and plans that are transboundary. National plans, the country does this individually, but they make sure to link them up in one place (to ensure that people are aware of what the other country is doing).
- NBI
  - This is obviously at a larger level. A strategic plan at the basin level is established, then they conclude what the national, sub-national and other actor's plans are and what measure should be implemented and when then they give it to the countries.
    - Their role is more up level
    - They provide technical tools/support to the countries, so they can provide the expertise
    - If they are called by a specific project, NBI can establish a short term project, to go in depth and provide long term plans that include infrastructure measures, environmental measure, including transformation of facts from the ground, moving people, introducing clean technology, assisting local level to implement the activities, etc. However they do not engage much in such details, they work at the intra-country level, more strategic scale.

### Status and use of WRIS

- Remote sensing data – link between source and the ability to effectively use this data is what will be produced in the F&DMT project system
- Next month, following the meetings, LVBC will be concluding on the WRIS and then they will identify where the gaps are, or where they see the need to improve their information system. NBI are invited to the session of the meetings LVBC will organise.
- NBI are providing retrievable data but nothing analysed to enable the user to use the data in the way they wish
- It is important that in such systems data is stored in the same way. This facilitates the transfer of data when needed.

### LVBC and NBI coordination

Is there an existing structure for coordination between LVBC and NBI?

- Coordination is done primarily on an ad hoc basis. There is an existing MoU. When they ask for information from the countries, NBI and LVBC do this separately. The countries subscribe to both the structure of LVBC and NBI. If there is better coordination then it might be more cost effective and save time, but at the moment they have not had any issues.
- There is also an issue at the national level, because there are two separate bodies (Nile Tech and Focal Points) that subscribe to the NBI and LVBC, but there is some coordination, but nothing well defined. The LVBC focal points and the NBI focal points (Nile Tech) are situated in the same ministry so they do coordinate on issues. They are in the same permanent secretary.

## Integrated Catchment Management Plans (ICMP)

Where is information missing, how can the F&DMT project support this and how is this linked with the basin organisation and with the utilities?

- Tanzania
  - An institutional framework is in place that has identifies a number of relevant institutions
    1. Ministry of Water
    2. Director of Water Resource
    3. National Water Boards (coordination among sectors, ministerial issues regarding water issues) and Basin Water Boards
    4. Catchment and Sub-catchment Committees
    5. Water User Association (community based association, private sectors, NGO, stakeholders)
  - The framework helps establish a forum in which issues from the community level can be brought to the attention at the national level. There are is still some top-down concerns brought to the communities.
  - There is a 5-year business plan, within which there are 1-2-3 year plans, in which activities and indicators are mentioned. They have an annual review so that they can evaluate what has been done, what has been achieved, what have the challenges been and what needs to be done to push forward, etc. The plan is then revised, improved. A baseline assessment is made available to help identify the issues. The plan comes after (driven by the community through their facilitation to help narrow down an effective and sustainable plan). Such a participatory approach is done as it supports sustainability (IWRM for sub-catchment plan).
  - There is similar approach in Kenya, and soon in Uganda, but they have detailed manuals that explain how to undertake the consultation process with all the stakeholders. They develop management plans that are implemented in the larger catchment plan.
- Uganda
  - There are catchment planning guidelines – key to this is stakeholder involvement and ownership.
  - The process started rather late; there is a need for political backing and because of this, politicians are involved in catchment panning activities as key stakeholders.
  - They are still piloting the guidelines (in one catchment) to strengthen the guidelines. The Catchment Management Planning is based on these guidelines, The pilot catchment plan is almost complete what remains is identification of intervention sites.
  - Indicators are selected based on an agreement with the relevant stakeholders. Targets are also based on an agreement with stakeholders given the timeframe that they have. This is the same in Tanzania. At the local level they develop both the indicators and targets based on the problems or challenges they face.
- Kenya
  - There are very specific guidelines, and those are available,
  - Rangeland Users Association (RUA) development cycle are in place for sustainable management of natural resources.
  - At the local level, there is no access to the same information as it is available at the higher level. However, they make use of what local knowledge is available.

## National catchment organisations

Catchment Management Plans are different for each country; below are summaries of the process.

In Tanzania, data recording is done on a daily basis. For the water status report, this is done on a quarterly basis, they summarise status of all water sources. For the basin they include the lake, river, boreholes, but for the catchment they give the status of the catchment. The reason this is done on a quarterly basis is because they cannot tell the exact changes within a short-term period. Water resource assessment is done with some of the stakeholders; this information is also communicated to the local level. In Tanzania this is known as the water status report

Can the project help with processing the collected data in a visual way? What Tanzania expects is for us to help process their data that can be easily interpreted. This is the same with Uganda. People are not interested in the level, they want to know the outcomes, what does the water level drop or rise mean, how does it affect them, in terms of their socio-economic activities, etc. Data needs to be translated into their language, tools to simplify the data in order for the user to understand and identify solutions.

Communities make indicators based on their situation. Could those indicators be based on the data and calculate them every 3 months? The data cannot tell you what to do but it provides the status of the area, the people have to decide what actions to take. For example the challenges of water pollution, the community decides what to do (e.g. education, bi-laws, plant as many trees as possible), then you identify who are responsible, at the end they prepare the indicators (e.g. water is improved, that can also be as simple as a visual appearance). These are simple indicators they come up with, other indicators can be water sources are now covered with trees (number of hectares covered), or maybe there is a document which has bi-laws that are implemented. So if some people are cutting trees, they can be punished as a result of the bi-laws. These are also the type of indicators used in Uganda and Kenya

Indicators are primarily based on the perception of the local people. However, if a tool is in place that can provide more information that is still simplified, that is useful (e.g. when addressing water quality, the local community bases water quality on sight, but this can be supplemented by a tool that can check the quality of water and provide a visual representation (red = bad, green = good) to inform the local community of the quality of water.

In what time scale would something like this be done and communicated? Quarterly (this works also because of the seasons; dry, dry-rainy, rainy-dry and rainy season. If a forum is also in place or platform in which such information can be shared and easily accessible, then there are great benefits for the communities. Communicating needs to be simple, because the local community are farmers, etc., therefore, the information should not be technical.

When a community decides on what their main problems are, how do they know which action to take (which will work best and which will be least effective, etc.)?

- Tanzania
  - This is based on a discussion, e.g. deforestation causes erosion, siltation increases in the catchment, the result is afforestation. All solution could be to grow plants. Based on local knowledge, the community knows which plants to grow and which not. The communities are provided with information of who best to approach, such as which NGO to approach to deal with issues of afforestation.
  
- Kenya
  - During the development of the plan, a time is also spent on capacity building. This is done so that community representatives go through training to gain useful knowledge. This helps in identifying the ideal intervention for the observed issue. In the Catchment Management strategy, they use the sub- Catchment Management Plan. However, the livelihood approach is not incorporated. As such, the Catchment Management strategy is being reviewed to include the livelihood component. Also concerns such as climate change are being incorporated.
  - There remain 2 stages for the strategy to become complete. Experts have also been consulted to provide support in determining which the best solution to take is. Therefore, solutions are not always solely based on local knowledge
  - A yearly report is put together that is provided to all stakeholders. It reviews what progress has been done. This report need to be brought at a level that can be consumed at the local level for it to become more effective.
  - Information should be simplified such as water quality (various parameters can be used), water levels, discharge (collected daily), number of water users (socio-economic data) in a specific catchment or sub-catchment (as this is primarily available at the basin level). Thematic maps are an easy way to present information (e.g. level of degradation, where there is plantation, pollution areas due to mining activities is greatest here, etc.). These are made at the basin level in the TDA.

## Additional stakeholders

DHI took the opportunity of traveling to Uganda to meet NWSC in Jinja, NBI for a follow up meeting in Entebbe and an unscheduled meeting with the Directorate of Water Resources.

### NWSC - Jinja

NWSC - Jinja might be one of the water utilities that the project will work with, and as such we need to evaluate their engagement in the project and if a planning DSS would be useful for them.

NWSC - Jinja have 12 members in the WSO team. They are working together with KIWASCO and MWAUWASA on the WSP planning process

DHI presented the project, and briefly described the meetings in Kisumu from Day 1 to Day 3, in particular about the talks with MWAUWASA, KIWASCO and NWSC in Kisumu. The following were addressed:

- The use of simple overlay maps showing the baseline situation
- Simple indicators that are easy to present
- GIS overlay maps (at current Jinja is not using GIS, but it's used at the HQ in Kampala)
- Reporting tools for automated annex generation (overview maps, baseline situation etc.)

### Comments from NWSC - Jinja

- Need for GIS or maps in the process of communicating issues, plans or changes to the stakeholders.
- Need for GIS tools to identify and present hot spots; hot spots are defined as areas where the water quality deteriorates. Jinja would initiate monitoring at the hot spot areas. Furthermore, there was a need for tools for projection of hot spot areas and the changes to water quality.
- At current GIS at NWSC - Jinja are mainly used for customer service and locations and not for environmental issues such as water quality.
- Need to convince people that the water quality will get worse if they do not act and this will affect the product.
- In next 15 years water quality will changes and they will need to modify treatment units.
- Tools for climate change as Jinja at the moment does not include climate change in their work.
- They believe they can use WSP to address floods and droughts.
- If they had a GIS system they would make the collection of data more methodical.

### Data

- NWSC - Jinja are monitoring flow and water quality at different locations. Data is stored in Kampala in a web based system. To access the system would help as there are no restrictions on them using it apart from how difficult it is to get hold of. Jinja could request the data but the data is not easily assessable for Jinja.
- Other organisations are also collecting water quality data but they do not have access to it.
- They need to monitor depth of the lake.

### Data sharing issues

- Problems associated with sharing of data between the different organisations in Uganda, there is a need for improved data sharing within Uganda.

### Stakeholder

Involvement of stakeholders is crucial for all the work in Jinja. Some of the key stakeholders are:

- Industry
- Manufactures
- Urban authorities
- Farmers
- NGO's

### Planning

- Changes to water quality mainly influences the treatment process at the plant. Water quality is the main focus during their planning and WSP process.

- They look ahead for availability and demand, they use projections based on the census for population. They need water distribution models.
- Flood events
  - Mainly an issue connected to destruction of installation and equipment
  - They are indirectly dealing with flood and drought issues through water quality.
  - They use no climate information.

#### Water availability

NWSC - Jinja is “passively” involved in the catchment planning. They do not have any authority or power in the catchments. NEMA is the main organisation when it comes to permits for waste water, location of industry, settlements, etc.

#### Coordination with other organisations

There is a need for better coordination with other organisations, for example with:

- NEMA (understaffed)
- Directorate of Water Resource
- Ministry of Water and Environment
- Ministry of Housing and Urban Planning (they have a similar project)
- Ministry of agriculture
- Research institutes
- Lake Victoria fishery organisations

NEMA is the key stakeholder influencing the catchment management; therefore it is important that they have a good relationship with NEMA.

#### Data system

NWSC - Jinja has developed a water quality system containing all the monitoring data. The software is developed by an external consultant and it is not directly accessible from Jinja. However, the system is not very useful as you cannot search. Seems it has not much functionality.

There is a strong interest in getting the WRIS system implemented with the water quality data.

#### NBI – follow up

##### E-learning materials for the DSS

- TOR is in place (only individual consultants).
- Training materials for each DSS manager will be developed.
- NBI will be sharing the final results.

##### Adapters

- WEAP adapter – The source code for the WEAP adapter can be provided through a formal arrangement.
- AquaCrop – An adapter exist but for an earlier version of the DSS. The source code and specifications for the tool area available. Aquacrop was developed very quickly so there are some issues.
- Magnite – economic module currently integrated into the DSS. Magnet is a commercial program, and needs further evaluation before NBI is to decide if it should be used.

##### Usability

- NBI is rolling the DSS out in the countries but it is not being used by the individual countries.
- NBI is very interested in getting a more useable DSS. There is strong interest to collaborate with the F&DMT project on this.
- Data management and dissemination – especially for stakeholders and community. Simple ways of visualising data are important.

##### Directorate of Water Resources

This was a unscheduled meeting in which a general overview of the project was provided and discussion thereafter on the project

#### Knowledge centre / Information centre

- A knowledge centre will be developed for publishing information, data, forecast, etc. As part of the knowledge centre a modelling hub in Kampala will be established.
- The Directorate plans to get instruments to read satellite data to feed into forecast models. This equipment will be purchased as part of the LVEMP project as well as other hardware. It will then be used together with the design of the system once it is completed. Design of this system is starting now. It will work with the Mike Customised because of the Nile DSS.
- They currently work with 4 separate databases for groundwater, forecasting etc. and need to have a system which matches this current way of working.
- They might use SOBAC flood model.

#### Uganda environmental data portal

- Water resource information data portal
- Data dissemination and analysis of data
- Interactive maps
- Web based

## 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. 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 source programme, 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.

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.

The stakeholder meetings help identify other projects or initiatives that we can work with that could potentially fill issue of data collection and knowledge gaps of the basin. This project/tool provides the framework to bring such data together and make it accessible. However, a one-size-fits-all concept does not work due to varying capacities and resource. DHI will look to use remote sensing and available data on the ground, to tailor to the situation of the country.

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.

In the case of the Lake Victoria Basin the project's concentrates on the 3 main countries (Kenya, Uganda and Tanzania). Rwanda and Burundi will be engaged through LVBC. The project resources are limited and therefore we focus on the major urban centres. We will work with the various utilities but in different capacities or depths. For example the project's collaboration with NWSC might be different to that of KIWASCO or MWAUWASA. Each have their specific needs, therefore our

interaction will be dependent on those needs and their capacities. However, as the methodology will be generic, it will be applicable for other utilities and basins. For the sake of sustainability, it is best to communicate with all those who are in the basin.

Much of the discussion with the stakeholders was around data, its availability and accessibility. This is a major issue and one that will need to be addressed. Furthermore, a large focus of the discussion was around flood events. A lot of effort is being put by utilities and national organisations on flood management and how to take advantage of the extra water. More discussion on drought related activities will need to be carried out to get a better idea and understanding of the challenges the Lake Victoria Basin faces with regards to drought events. After identifying and filling these gaps and taking into consideration the needs of the stakeholders, DHI will coordinate with their internal research projects as well as outside projects, and see how they can integrate this into the methodology.

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.

Prior to the meeting in Kisumu, meetings were held in the Volta Basin. Another meeting was held in Chao Phraya after Kisumu. This will be followed by an Inception meeting with representatives from the basin in November, in which the revisions to the project components (i.e. objectives, activities and deliverables, etc.) are addressed and shared among all stakeholders.

The project hopes to address the need for more integration of F&D elements in planning processes at a transboundary and local level. It is the intention of the project to facilitate the day to day activities of key stakeholders in order to improve their planning process that can help solve the issues they may face tomorrow.

## Annex 1. Agenda - Lake Victoria Basin meetings for the Flood and Drought (F&D) Management Tools Project

**September 15-17, 2014 - Lake Vic Hotel, Kisumu, Kenya**

The “Flood and Drought Management Tools” project is funded by the Global Environment Facility (GEF) and implemented by UNEP, with the International Water Association (IWA) and DHI as the executing agencies. The project aims at developing methodologies and tools including 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 website is <http://fdmt.iwlearn.org/>.

The project is in the inception phase, and the meeting is part of a series of stakeholder meetings around the project taking place in Kisumu from September 15<sup>th</sup>-17<sup>th</sup>.

The goal of the meetings are to improve understanding of how the F&D project can improve the water planning in the three basins, to be used in formulating a detailed project description for the inception meeting.

### Summary of meetings

Day	Monday September 15 <sup>th</sup>	Tuesday September 16 <sup>th</sup>	Wednesday September 17 <sup>th</sup>
Location	<i>Kisumu</i>	<i>Kisumu</i>	<i>Kisumu</i>
09:00-12:30	Water Safety Planning Stakeholder meeting for Kisumu	Introduction to F&D Management Tools Project	Meeting with LVBC and focal points
14:00-17:00	Meeting with Lake Victoria Basin Utilities	Discussion between utilities and catchment	Meeting with LVBC and focal points

### Detailed agenda

#### Monday, September 15<sup>th</sup> AM – Water Safety Planning stakeholder meeting – Kisumu

09:00-12:30pm                      Input from a variety of stakeholders in Kisumu area to further develop KIWASCO Water Safety Plan  
12:30-14:00                              Lunch

#### Monday, September 15<sup>th</sup> PM – Meeting with Utilities to gain inputs into F&D management

14:00-14:30  
Presentation by F&D project team                      Overview of project

14:30-15:00  
Discussion on project and review of questionnaires                      Overview of responses from questionnaires. to guide discussion

15:00-16:45 Use case presentation and workshop	Presentation of use case and objective with work shop <i>Output:</i> <ul style="list-style-type: none"> <li>• Issues and gaps in the current planning process</li> <li>• Agreement on data sharing</li> </ul>
16:45 – 17:00 Final discussion and wrap up	Planned activities for the coming year

## Tuesday, September 16<sup>th</sup> AM – Connecting stakeholders

09:00-09:20 Presentation by F&D project team (20 min)	Overview of project <ul style="list-style-type: none"> <li>• Project objective</li> <li>• Inception phase</li> <li>• Activities and time table</li> <li>• Deliverables</li> </ul>
09:20-09:35 Discussion (15 min)	<i>Output:</i> <ul style="list-style-type: none"> <li>• Feedback on project, including clarifications</li> </ul>
09:35-09:50 Presentation – LVBC (15 mins and 5 mins questions)	Presentation on: <ul style="list-style-type: none"> <li>• Status of the planning (TDA/SAP , WSP and/or IWRM)</li> <li>• Successes and challenges in the planning</li> </ul>
09:50-10:10 Presentation – Kisumu Water Company (15 mins and 5 mins questions)	<ul style="list-style-type: none"> <li>• Identified gaps and where the current process could be improved by flood and drought information</li> <li>• Linkages between basin (TDA/SAP), national (IWRM) and utility planning (water safety planning) (currently and suggestions for improvements)</li> </ul>
10:10-10:30 Presentation – Mwanza Water Company (15 mins and 5 mins questions)	<ul style="list-style-type: none"> <li>• Interaction between catchment authorities (including LVBC) and utilities to share information for improved water resource management</li> </ul>
<b>10:30-11:00</b>	<b>BREAK</b>
11:00-11:20 Presentation – National Water Company (15 mins and 5 mins questions)	As above
11:20-11:40 Presentation by NBI (15 mins and 5 mins questions)	DSS development in the Nile Basin – current status, experience and current gaps in the methodology
11:40-12:00 Presentation of proposed project deliverables by the F&D team (20 min)	Technical <ul style="list-style-type: none"> <li>• Planning process</li> <li>• DSS components in the planning process</li> <li>• Examples of workflow and use cases</li> </ul>
12:00-12:30 Discussion (1 hour)	<i>Output:</i> <ul style="list-style-type: none"> <li>• Comments on the proposed solution</li> <li>• Inputs on type of information needed for improving flood and drought management</li> <li>• Connecting identified gaps in the current planning process with the proposed tool</li> </ul>

12:30-14:00

LUNCH

**Tuesday, September 16<sup>th</sup>**  
PM – Connecting stakeholders

14:00-15:30

Group discussions focusing on specific understanding of planning processes and management of floods and droughts

Stakeholders will be divided into two groups (1) basin organisations and regulators and 2) utilities) and will be asked to address a number of questions:

**Current planning tools and identified gaps. Status of the current tools and identification of missing tools.**

- What are the tools/model/DSS used at the moment and during the different steps of the planning process (development, implementation, monitoring)?
- What are the identified gaps in the currently used planning methodology (identify gaps in the current methodology that the project could address)

**Climate change – how to approach climate change in the planning**

- Is climate change included in the current planning?
- What references are available to support this?

**Drought and flood issues in the planning – is it needed and if so how is it done and what gaps exist**

- How are flood and drought issues included in planning?
- What are the gaps? How are they being addressed?

**Linkage between local, national and basin level. Status, how to improve**

- Is transboundary basin planning (for Lake Victoria) linked to national or local planning?
- How has the linkage been implemented?
- Is information shared at national and catchment level?
- How is the information processed?
- What information is missing?
- What are some suggestions for technical tools/methods improving the linkage between basin scale planning and local planning (water utility or industry level)?
- How are catchment organisations collaborating with utilities and vice versa?

15:30-16:00

BREAK

16:00-17:00

Plenary discussion

Report back from each group, followed by a plenary discussion

17:00-17:30

Wrap up and identification of next steps

**Wednesday, September 17<sup>th</sup>**  
Meeting with LVBC and catchment organisations  
09:00-17:00

09:00-09:15

Introduction

9:15-10:00

Overview and feedback from the discussion on Tuesday

*Output:*

- Comments on project objective and deliverables

	<ul style="list-style-type: none"> <li>• Comments on linkage between utilities and basin organisations</li> </ul>
10:00-11:00 Invite focal points to provide some highlights for their countries – 7 minutes each	<p>Challenges around floods and droughts in their countries:</p> <ul style="list-style-type: none"> <li>• What approaches are they taking?</li> <li>• What are the main transboundary issues?</li> </ul>
11:00-12:00 Questionnaire – go through the questionnaire to LVBC followed by discussion	<p><i>Output:</i></p> <ul style="list-style-type: none"> <li>• Elaboration of responses in questionnaire with inputs from the focal points</li> </ul>
<b>12:00-13:00</b>	<b>LUNCH</b>
13:00-13:15 Introduction to workshop	Presentation of use case and objective with workshop (only LVBC)
13:15-15:15 Workshop identifying the gaps in the current planning using a simplified use case	<p>Workshop identifying the gaps in the current planning using a simplified use case</p> <p><i>Output:</i></p> <ul style="list-style-type: none"> <li>• Issues and gaps in the current planning process</li> <li>• Agreement on data sharing</li> </ul>
15:15-15:45 Discussion	<ul style="list-style-type: none"> <li>• Comments on the project</li> <li>• Comments on the proposed solution</li> </ul>
15:45-16:00 Final discussion and wrap up	Planned activities for the coming year

## Annex 2

### Carousel group exercise, page 12

Question	Summary			
	Group A	Group B	Group C	Group D

#### Station 1 – Information sharing

*What information do catchment organisations/utilities (and others) have which you could use? Do you have access to this information?*

- |   |  |   |   |
|---|--|---|---|
| <ul style="list-style-type: none"> <li>• NBI and LVBC would like to collect additional climate data which they must pay relevant agencies for, however there is no budget item in order to purchase this information</li> <li>• Additional data that would be useful are:             <ul style="list-style-type: none"> <li>- Water quality</li> <li>- Water flows</li> <li>- Abstractions</li> <li>- Meteorological data</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Kenya             <ul style="list-style-type: none"> <li>- Effluent discharge and abstraction via utilities self-assessment data</li> <li>- Utility measuring devices to get information at specific intervals</li> </ul> </li> <li>• Tanzania             <ul style="list-style-type: none"> <li>- Information on industries connected to sewerage system to identify sources of pollution</li> <li>- Water quality from MWAUWASA</li> <li>- Information on the status of the lake</li> <li>- Abstraction rates from utilities (part of permit conditions)</li> <li>- How many people are supplied (area coverage)</li> </ul> </li> <li>• Uganda             <ul style="list-style-type: none"> <li>- Abstraction rates from utilities (part of permit conditions)</li> <li>- However, there is limited</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• LVWSB needs information from WRMA for abstraction volumes, number of pumps that are abstracting water</li> <li>• Water quality and quantity from utilities</li> <li>• Water demand – provides information for investments</li> <li>• Surface coverage</li> <li>• Socio-economic information</li> <li>• Exchange of planning information needed – basin with utility and vice versa</li> <li>• In Uganda, when water infrastructure is being developed, a catchment plan is needed that scopes all actors, and 3% of the budget must be allocated towards implementation</li> </ul> | <ul style="list-style-type: none"> <li>• Information on basin customers who have water permits</li> <li>• Other water users and their sources (e.g. MWAUWASA supplies water to Mwanza and wants to know who is using other water sources, so if there is a health issue, they can clearly clarify whether it is because of municipal water supply or not)</li> <li>• Health information to know the frequency of waterborne diseases</li> <li>• Climate information for the basins – for planning purposes (i.e. design)</li> </ul> |
|---|--|---|---|

Question	Summary			
	Group A	Group B	Group C	Group D
		<p>collection of information from utilities. What information is available is provided by self-assessments (this is monitored and verified by the Ministry of Water and Environment)</p> <p>- DRWM has their own water monitoring network and there is no common platform to share information</p>		
<p><i>Is transboundary basin planning linked to nation and / or local planning?</i></p>	<ul style="list-style-type: none"> <li>• LVBC, transboundary planning involves partner states</li> <li>• LVBC have divided their IWRM planning into 2 stages               <ol style="list-style-type: none"> <li>1. Assessment</li> <li>2. Development of more detailed plan</li> </ol> </li> <li>• NBI engage the countries at different levels               <ol style="list-style-type: none"> <li>3. Politicians</li> <li>4. Technical</li> <li>5. Operations</li> </ol> </li> <li>• NBI have also systematically reviewed all national (water) plans</li> <li>• Provide technical support to countries to comply with planning approaches</li> </ul>	<ul style="list-style-type: none"> <li>• Different networks across scales               <ol style="list-style-type: none"> <li>1. NBI hydrometric network</li> <li>2. LVBC</li> <li>3. National network</li> </ol> </li> <li>• Kenya</li> <li>• Catchment area advisory committee have utility representatives</li> <li>• Catchment management strategy covers water infrastructure (includes inputs from Water Service Boards/Utilities)</li> <li>• Tanzania</li> <li>• Sustainability of water sources is decided by the basin</li> <li>• The boards has a utility representative</li> </ul>	<ul style="list-style-type: none"> <li>• In Kenya, the Ministry has a 3 year strategic plan, the Water Services Boards also have a 3 year strategic plan; there is a similar approach in Uganda</li> <li>• Water Action groups use information from Water Service Boards and KIWASCO</li> <li>• In Uganda, the strategic plans developed at the ministerial level have inputs from all state enterprises. This feeds into vision 2040, which also links with the protocols of the East African Community. In Kenya, the plans are consolidated in vision 2030, which has various project which include water infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• The utility is not actively included in planning at the basin level, although there is a representative of the utility on the basin water board</li> <li>• MWUAWASA would like to have better access to basin planning information</li> <li>• Even though the basin is giving water permits to the utilities, there is the impression that there is little interaction</li> </ul>

Question	Summary			
	Group A	Group B	Group C	Group D
		<ul style="list-style-type: none"> <li>• IWRM plans need to incorporate catchment and sub-catchment plans</li> <li>• LVBWB IWRM plan includes transboundary issues (financed by LVBC)</li> <li>• Uganda</li> <li>• Planning approaches tend to be a combination of top down and bottom up</li> <li>• The catchment management organisation plans need to fit into national planning processes</li> </ul>		
<p><i>What are some suggestions to improve the linkages between catchment and local planning?</i></p>	<ul style="list-style-type: none"> <li>• NBI suggests: <ul style="list-style-type: none"> <li>- Iteration – start bottom up, but review and make sure that plan meets needs at the grassroots level</li> <li>- Expand plans to include existing institutional frameworks</li> <li>- Enhance data sharing</li> </ul> </li> <li>• LVBC suggests: <ul style="list-style-type: none"> <li>- Include local government</li> </ul> </li> <li>• Through demonstration of benefits (i.e. water reliability) and ensuring there is feedback when data is provided by an organisation can contribute to improved data sharing</li> <li>• Explain the importance of data sharing (why accurate gauge measuring is needed, what are the implications)</li> </ul>		<ul style="list-style-type: none"> <li>• LVBC need to make information available to institutions through their website</li> <li>• Data is shared (from LVBC) but it tends to be only through projects</li> <li>• Basin organisation's role is to consolidate information and be a central repository</li> <li>• In Tanzania, there is a database management information system with the Ministry of Water</li> </ul>	
<p><b>Station 2 – Future changes</b></p> <p><i>Which factors are most critical for the future water availability?</i></p>	<ul style="list-style-type: none"> <li>• NBI does regional planning evaluating the impact on all relevant sectors.</li> </ul>	<ul style="list-style-type: none"> <li>• In Kenya, the water board does the planning and the impact assessment for water</li> </ul>	<ul style="list-style-type: none"> <li>• Demand forecast is one of the critical parameters in planning <ul style="list-style-type: none"> <li>- Domestic</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The main factors for long term planning are: <ul style="list-style-type: none"> <li>- Sustainable land use</li> </ul> </li> </ul>

Question	Summary			
	Group A	Group B	Group C	Group D
<p><i>What is your experience working with future changes?</i></p> <p><i>Which actions could you take to reduce the impact of future changes?</i></p>	<p>Recommendations for adaptation measures are then forwarded to the countries and the relevant organisations</p> <ul style="list-style-type: none"> <li>• NBI uses the DSS; it is not used at the country level at the moment</li> <li>• Land use practices and water demand are some of the key criteria to evaluate</li> <li>• Climate change are incorporated in the regional planning, mostly using the extreme scenarios to get the outlier of the plan</li> <li>• Land use information is retrieved from remote sensing data, where the changes in the land cover is analysed using the historic trend</li> <li>• NBI uses Mike Basin / Mike Hydro to evaluate hydrological changes</li> <li>• NBI normally focus on the regional scale, but in some instances they do more detailed planning for certain areas</li> <li>• LVBC does not use modelling at the moment, but are interested in using this to support the basin planning</li> <li>• Climate change has not been incorporated into the LVBC</li> </ul>	<p>utilities. The water utilities are only operators.</p> <ul style="list-style-type: none"> <li>• In Uganda, NWSC is both an asset owner and operator – they also do the design assessment</li> <li>• In Tanzania, MWAUWASA is normally government owned and is both an asset owner and operator</li> <li>• There are 8 water boards in Kenya and 3 around Lake Victoria (Lake Victoria South, Lake Victoria North, Rift Valley Water service board)</li> <li>• In Tanzania there are 3 departments responsible for planning <ul style="list-style-type: none"> <li>- Rural</li> <li>- Urban</li> <li>- Catchment basin</li> </ul> </li> <li>• The design of long term planning for water utilities is normally based on historical events. Future projections of climate is normally not used – main reason is lack of tools and capacity</li> <li>• For climate change projections the general issues are: <ul style="list-style-type: none"> <li>- Awareness of climate change is there</li> <li>- Tools for implementing</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Industrial</li> <li>• Socio-economic changes are of importance for forecasting water pricing, and thereby the revenue and budget</li> <li>• There is no or little coordination between the different countries with respect to planning or design of water utilities</li> <li>• In Kenya the catchment authority is responsible for the planning and the water utility is only an operator</li> <li>• Water service boards performs demand forecast and availability forecast</li> </ul>	<p>planning</p> <ul style="list-style-type: none"> <li>- Integrated catchment planning <ul style="list-style-type: none"> <li>▪ Climate change</li> <li>▪ Socio economic changes</li> <li>▪ Flood and drought risk</li> <li>▪ Restoration of natural areas</li> </ul> </li> <li>- The long term planning visions differs between the countries <ul style="list-style-type: none"> <li>▪ Uganda (25 years)</li> <li>▪ Kenya (15 years)</li> <li>▪ Tanzania (10 years)</li> </ul> </li> <li>- In Kenya, a water balance approach for evaluating the impacts of long term planning could be used</li> <li>- Environmental flows are considered as an important parameter for environmental sustainability</li> <li>- The water user groups has quarterly meetings, and there is a transboundary user group that meets on regular intervals to coordinate between the countries</li> </ul>

Question	Summary			
	Group A	Group B	Group C	Group D
	planning process yet	climate change into the planning is missing - Knowledge is missing and capacity building is required		

### Station 3 – Is the plan working?

*What is the aim of your plan?*

No specific objectives were identified by the groups

- Improved water availability
- Enhance infrastructure
- Reverse land degradation

- Stakeholder engagement
- Pollution control
- Knowledge of current and future water demands
- Meet water quality objectives
- Conflict resolution
- Address multi-sectoral needs
- Cleaner production in industry

- Reduce water loss
- Efficient operation of infrastructure
- Efficient investments
- Capacity development
- Identify risks from catchment distribution and consumers
- Improve water quality
- Protect product
- Increase coverage of water and sanitation services

- Step by step management approach
- Guarantee safe and clean water
- Reduce risks
- Reduce water loss
- Integrated water resource management
- Fair allocation of water and conservation of sources
- Sustainability
- Water security

*How do you determine the effectiveness of your plan?*

- Though performance indicators
- Reduction in water borne disease or water related disease- measured by incidence
- Reduced costs
- Reduced complaints
- Reduced non-revenue water
- Compliance with water quality standards
- Amount of water produced
- No presence of faecal coliform in water
- Financial indicators (i.e. revenue, reduced losses)
- Reduced losses (non-financial)

- Indicators
- No conflict
- Reduced impact of droughts and climate change
- Increased availability of water
- Increased availability of data
- Economic growth
- Improved water quality (can be monitored just by eye at local level)
- Reduced effluent discharge
- Operational institutions
- Level of stakeholder engagement

Question	Summary			
	Group A	Group B	Group C	Group D
			<ul style="list-style-type: none"> <li>• Number of water sources protected and conserved</li> <li>• Increase in forest cover/ vegetation cover</li> <li>• Understanding of IWRM principles in basin</li> <li>• Number of water permits</li> <li>• Number of industries with cleaner production</li> <li>• Number of hectares of land with sustainable land management practices</li> <li>• Controlled environmental impact</li> <li>• Improved species for grazing</li> <li>• Better preparedness for extreme events – measured by damages</li> </ul>	
<i>If the plan is not working, what do you do?</i>	<ul style="list-style-type: none"> <li>• Evaluate and review the plan; find the gaps and amend</li> <li>• Reinforce strategies</li> </ul>		<ul style="list-style-type: none"> <li>• List the challenges and gaps</li> <li>• Review plan</li> <li>• Diagnostic analysis</li> <li>• Review strategy</li> <li>• Review indicators</li> <li>• Identify if there are human resource constraints and strengthen capacity building if needed</li> </ul>	

#### Station 4 – Reducing the impact of F&D events

*What are the overall impacts of F&D?*

- |  |  |  |  |
|--|--|--|--|
| <ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Increase in water insecurity and food insecurity</li> <li>- Increase in human-wildlife conflict</li> <li>- Increase in diseases (waterborne) and treatment</li> <li>- Migration of populations <ul style="list-style-type: none"> <li>▪ Decrease in one area and increase in another for water</li> <li>▪ Decrease economic</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Slower economic growth, government intervention (investment) would be needed</li> <li>- Water availability affected</li> <li>- Soil deterioration (more agriculture issues)</li> <li>- Disruption in ecological services</li> </ul> </li> <li>• Drought</li> </ul> | <ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Loss of livelihoods</li> <li>- Loss of settlements, loss of properties after floods, disruption of community life, increased poverty</li> <li>- Increase in diseases (waterborne) (e.g. cholera)</li> <li>- Death</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Interference with infrastructure and destruction (at both local and basin level). Staff find it difficult to access infrastructure needed to operate necessary equipment</li> <li>- Raw water quality changes (this can be both positive and negative) do to, for</li> </ul> </li> </ul> |
|--|--|--|--|

Question	Summary			
	Group A	Group B	Group C	Group D
	<p>production</p> <ul style="list-style-type: none"> <li>• Drought <ul style="list-style-type: none"> <li>- Increased water washed diseases</li> <li>- Water related conflicts</li> <li>- Loss of biodiversity</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Loss of yields (giving rise to food insecurity)</li> <li>- Disruption in trade (not enough product to export), this could also mean a need to increase imports to meet needs in the country</li> <li>- Hydro-power energy disruption (alternative sources cost increase)</li> <li>- Environmentally sensitive areas impacted more (they become too sensitive)</li> </ul>		<p>example, microbial contamination</p> <ul style="list-style-type: none"> <li>- Siltation (e.g. in volume of water)</li> <li>- Cost of treatment (chemicals) increases</li> <li>- Customer confidence in the utility drops</li> </ul> <ul style="list-style-type: none"> <li>• Drought <ul style="list-style-type: none"> <li>- Water quality is affected</li> <li>- Water supply is interruption or becomes unreliable</li> <li>- Treatment cost increase</li> <li>- Customer confidence affected</li> <li>- Loss of revenue due to lack of supply</li> <li>- Energy costs increase</li> </ul> </li> </ul>
<p><i>Are F&amp;D incorporated into planning?</i></p>	<ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- IWRM plans include climate change strategies</li> <li>- At local level floods management is implied in WSP</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Selected catchments (micro scale)</li> <li>- Plans are not 100%, they are unpredictable</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Catchment management plan in Uganda, e.g. rainwater harvesting, drip irrigation</li> <li>- In Kenya, flood management is integrated in their planning; e.g. early warning provision of water, infrastructure (e.g. dikes, bridges, culverts, etc.)</li> <li>- Climate change mainstream guidelines <ul style="list-style-type: none"> <li>▪ Climate proof</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Design of water treatment infrastructure takes into consideration flooding in Uganda</li> <li>- Adopt technology that is flexible enough to respond to varying water quality</li> <li>- New designs / systems do incorporate, but not the old systems</li> </ul> </li> <li>• Drought <ul style="list-style-type: none"> <li>- Water storage through</li> </ul> </li> </ul>

Question	Summary			
	Group A	Group B	Group C	Group D
<i>How can your organisation support adaptation to F&amp;D events?</i>	<ul style="list-style-type: none"> <li>• Flood and drought <ul style="list-style-type: none"> <li>- Food security issues addressed</li> <li>- NBI addresses 5 points: <ol style="list-style-type: none"> <li>1. Wide dissemination of information</li> <li>2. Awareness and capacity building on how to cope</li> <li>3. Hydro meteorological network provides good indicators of floods and drought events (early warning)</li> <li>4. Assist in water storage, harvesting and retention</li> <li>5. Integrate floods and drought in</li> </ol> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Disaster preparedness and response programmes (also for outbreaks of diseases).</li> <li>- Construction of flood resistant infrastructure (largely at the local level)</li> </ul> </li> <li>• Drought <ul style="list-style-type: none"> <li>- Advocacy on floods and drought related interventions / awareness – this can be tied with water rationing</li> </ul> </li> </ul>	<p>assurance</p> <ul style="list-style-type: none"> <li>- Tanzania has a climate change adaptation strategy</li> <li>• Drought <ul style="list-style-type: none"> <li>- Alternative energy sources (e.g. energy saving stoves – less wood use)</li> </ul> </li> </ul> <ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Disaster preparedness and response programmes at the local level</li> <li>- F&amp;D is incorporated into IWRM plans</li> <li>- Capacity building (of institutional and community Level)</li> <li>- In Kenya, there are floods control units</li> <li>- Strengthening of monitoring mechanisms</li> </ul> </li> <li>• Drought <ul style="list-style-type: none"> <li>- Storage (water retention)</li> <li>- Development and encouragement of drought resistant crops and stock</li> <li>- Introduction of horticulture</li> <li>- Move away from rain fed agriculture, turn to</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- damming (reservoirs)</li> <li>- Floating intakes that fluctuate with changing water levels</li> <li>- Alternative water sources (e.g. boreholes)</li> <li>- Demand management <ul style="list-style-type: none"> <li>▪ Coping mechanism</li> <li>▪ Rationing</li> </ul> </li> <li>- Alternative energy sources (solar systems)</li> </ul> <ul style="list-style-type: none"> <li>• Flood <ul style="list-style-type: none"> <li>- Finances</li> <li>- Engage more in catchment protection activities (CPA) (e.g. clean development mechanisms) – especially as a utility</li> <li>- Better exploitation of available data and sharing information</li> <li>- Human resource and capacity development</li> <li>- Contributing to afforestation activities</li> </ul> </li> <li>• Drought <ul style="list-style-type: none"> <li>- Construction of multi-purpose dams (also at the basin level)</li> <li>- Maintenance of information and data on floods and drought</li> </ul> </li> </ul>

Question	Summary			
	Group A	Group B	Group C	Group D
	annual, short and long term plans		diversification - Cleaner production technology ('water for wealth')	- Advocacy on floods and drought related interventions

## Annex 3 – Participant list (by day)

15 September 2014

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## 16 September 2014

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## Annex 4 – Description of Stakeholders in Lake Victoria Basin

Organisation	Country	Main responsibility	Engagement on Flood and Drought Management Tools project
Lake Victoria Basin Commission (LVBC) <a href="http://www.lvbcom.org/">www.lvbcom.org/</a>	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.	Key stakeholder. WRIS knowledge, but currently no models or DSS.
Nile Basin Initiative (NBI) <a href="http://www.nilebasin.org">www.nilebasin.org</a>	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.	Knowledge of DSS; will be included as a learning basin.
Directorate of Water Resources Management, Ministry of Water and Environment, Uganda <a href="http://www.mwe.go.ug">http://www.mwe.go.ug</a>	Uganda	Set national policies and standards, managing and regulating water resources and determining priorities for water development and management.	To be kept informed
National Environment Management Authority, Kenya <a href="http://www.nema.go.ke">www.nema.go.ke</a>	Kenya	A government parastatal established to regulate environment issues.	Responsible for environmental regulation
Lake Victoria Basin Water Board <a href="http://www.maji.go.tz/basins/nine.php">http://www.maji.go.tz/basins/nine.php</a>	Tanzania (Basin organisation)	There are nine (9) water basins for the purposes of water resources administration and management.	Follow up meeting required

Mwanza Urban Water & Sewerage Authority <a href="http://www.mwauwasa.org/">http://www.mwauwasa.org/</a>	Tanzania	Autonomous -government owned-operating authority providing reliable and safe drinking water to Mwanza City, and disposal of wastewater.	Planning experience, mainly focusing on the inlet location.
National Water & Sewerage Corporation <a href="http://www.nwsc.co.ug/">http://www.nwsc.co.ug/</a>	Uganda	A public utility company 100% owned by the Government of Uganda, providing water and sanitation services in urban areas.	The project will collaborate with the office in Jinja. Specific requests for F&D support. Interested in WRIS and identification of hot spots. Mainly WQ focus.
Ministry of Water, Tanzania <a href="http://maji.go.tz/">http://maji.go.tz/</a>	Tanzania	Ministry responsible for sustainable management and development of water resources for social and economic development in Tanzania.	To be kept informed
WHO <a href="http://www.who.int">www.who.int</a>	Tanzania	Related to F&DMT project – Developing guidance on Climate-resilience water safety planning.	To be kept informed
Water Resource Management Authority <a href="http://www.wrma.or.ke/">http://www.wrma.or.ke/</a>	Kenya	The Water Resource Management Authority (WRMA) is a state corporation and leads on water resources management. It has regional offices based on drainage basins (catchment areas), and Water Resource User Associations (WRUAs) at the local level.	To be kept informed
Kisumu Water and Sewerage Company Limited <a href="http://www.kiwasco.co.ke/">http://www.kiwasco.co.ke/</a>	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.	Operator and does not perform planning. Need to coordinate with NEMA

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.	To be kept informed
Lake Victoria Water Services Board <a href="http://www.lvswaterboard.go.ke/">http://www.lvswaterboard.go.ke/</a>	Kenya	Lake Victoria South Water Services Board is a State Corporation which provides water and sanitation services in their area of jurisdiction.	Need follow up meeting