



FLOOD & DROUGHT MANAGEMENT TOOLS

Technical Training: Volta Basin Report

27-31 March 2017

Ghana Water Company limited

Accra, Ghana



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1. Summary

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 increased frequency and unpredictability of floods and droughts is a priority concern across scales from transboundary to local, along with the other multiple drivers that cause depletion and degradation of shared water resources.

The Flood and Drought Management Tools (FDMT) project (<http://fdmt.iwlearn.org/>) is funded by the Global Environment Facility (GEF) International Waters (IW) and implemented by UNEP, with the International Water Association (IWA) and DHI as the executing agencies. The project is developing online technical applications¹ which can be applied individually or together at the basin or local level to facilitate the inclusion of information about floods, droughts and future scenarios into Integrated Water Resources Management (IWRM) planning, Transboundary Diagnostic Analyses (TDA) and Strategic Action Plans (SAP), and Water Safety Planning (WSP). The project is being implemented from 2014 - 2018, and 3 pilot basins (Volta, Lake Victoria and Chao Phraya) are participating in development and testing.

Understanding how to use the technical applications is an important aspect of the future operational use and sustainability of the FDMT project, therefore, capacity on the use and interpretation of the tool and their outputs, as well as giving stakeholders an opportunity to provide feedback on the functionality of the tools will go a long way to achieving this.

The project has been holding a series of technical trainings targeting technical staff and junior to senior level water resource professionals from key project stakeholder. Trainings intend to provide a basis for bringing the basin organisations and relevant basin level authorities, and water utilities together around a planning tool, while being able to test and validate the technical content of tools. Feedback from the trainings are integrated into the development and refinement of the tools.

The objective of the technical trainings are to:

- Enhance stakeholders understanding of the methodology and tools developed under the FDMT project
- Provide stakeholders with an opportunity to give feedback on the technical content of the tools
- Refine the development of the methodology and tools based on stakeholder feedback

With support from Ghana Water Company Limited (GWCL), DHI and the International Water Association (IWA) organised a two day training with water utilities from 27 to 28 March, 2017 followed by three days with basin and national level organisation.

¹ The term tools and technical applications are used interchangeably. Tools in this context are defined as the technical applications being developed by the project and are available at <http://www.flooddroughtmonitor.com/home>

2. Technical training

2.1 Overview of training

Technical training on the use of the tools is scheduled on a yearly basis within each of the pilot basins. The technical training intends to provide capacity building as well as an opportunity for stakeholders to give feedback on the functionality and use of the developed tools to date. The feedback will be included in the further development and refinement of technical content of the tools.

The technical training provides a basis for bringing basin and national level organisations, and water utilities together around a common planning tool. The training was organised in two parts between March 27th and 31st in Accra, Ghana, first with water utilities, followed by basin and national level organisations. (See Annex 1 for agenda).

The technical training was based on real data from the Volta Basin. The training sessions reflect the developed functionality to date, hence the first technical training focused on the functionality available at the time of the training, while later trainings will include the functionality of the full planning tool.

Objective

The objective of the technical training is to:

- Enhance stakeholders understanding of the methodology and tools developed under the FDMT project
- Provide stakeholders with an opportunity to give feedback on the technical content of the tools
- Refine the development of the methodology and tools based on stakeholder feedback

Expected outcome of the workshop

The expected outcome of the technical training is that key stakeholders will understand the functionality, how to use the tools, and how the output from the tools can be used in decision making around flood and drought management planning at the stakeholder's respective level.

For the project, this will be an opportunity to get valuable feedback from the stakeholders on the functionality and how the developed tools could be used in decision-making.

Target group

The target group of the technical training is the technical staff within the key project stakeholders, junior to senior level water resource professionals as recommended by the stakeholders. The training in Accra focused on staff from the Ghana Water Company Limited (GWCL) from Ghana and National Office for Water and Sanitation (ONEA) from Burkina Faso from 27-28 March, 2017. The remaining three days was convened by the Volta Basin Authority (VBA) and catchment and national level representatives from both Ghana and Burkina Faso, namely the Water Resources Commission (WRC), Volta River Authority (VRA), Hydrological Service Department (HSD), Water Resources Department of GWCL and l'Agence de l'Eau de Nakambé. (See Annex 3 for full participant list).

2.2 Technical training

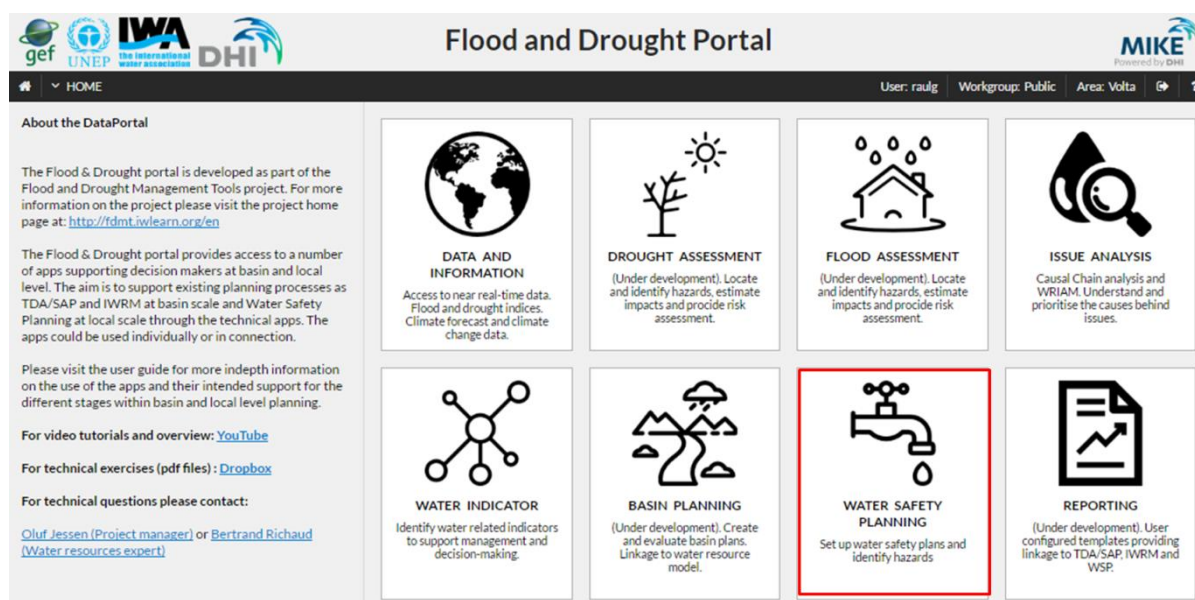
Local (water utility) level training: 27-28 March, 2017

From 27-28 March, 2017, GWCL and ONEA convened at GWCL headquarters. The national water utilities from Ghana and Burkina Faso, respectively participated in an interactive training focussed on how the project outputs could support the Water Safety Plan (WSP) implementation process through the assessment of catchment based hazards, as well as direct support of the Water Safety Planning implementation.

The first day focused on WSP and the project outputs that support the WSP implementation process. The second day focussed on the data and information

Day 1. WSP support

27 March, 2017



The first day, with the utilities, started with presentations from both GWCL and ONEA, focussing on the status of WSP, what their experience has been in addressing the challenges of developing and implementing WSP and how climate impacts are considered in their WSP. This was followed by a presentation on the climate resilient WSP; considering climate adaptation in the context of WSP development and implementation. The presentations provided context to the demonstration of the WSP supporting tool and the suite of exercises on describing the system, and defining the hazards, risks and control measures. Day one was closed by an explanation of ongoing development to the WSP supporting tool and a demonstration of the Water Indicator tool which enables users to identify water related indicators for understanding the current state of water resources, the changes in these resources and whether or not interventions produce the desired effect.

To view the documentation (presentation, and guiding material and exercises), click the items in the table below.

Overview of workshop and FDMT project
Presentation – Ghana Water
Presentation – ONEA
Introduction to WSP and Climate resilient WSPs
Introduction to Flood and Drought portal <ul style="list-style-type: none"> User registration and creation of workgroups Overview of the online tools WSP Support Tool
Exercise 1 - Describing the system
Exercise 2 - Defining the hazards, risks and control measures (focus on climate impacts)
Additional support for WSPs <ul style="list-style-type: none"> WSP mockups
Introduction to indicator tool <ul style="list-style-type: none"> Exercise 3 - Building and selecting indicators

The following section will list the feedback received by participants during the training. Note that all comments are highly considered; however, not all comments can be accommodated in the final output.

Feedback

Describing the system

- Allow users to type to search for component icons.
- When adding connectors between components, allow users to indicate process flow (flow direction). Furthermore, distinction is needed between solid and dashed lines to comply with the WSP manual.
- Link with GIS mapping of actual connections (e.g. pipe lines) – information on the pipes line would need to be accessible by the utility.
- Have a drag functionality to move, for example, components on the map.
- Enable users to add properties to a connection (e.g. if water quality deteriorates somewhere along the distribution line, this information is needed) – allow users to add a script (text) with an explanation.
- GWCL do not have all their treatment plants within the Volta Basin, there is a concern that the tool then becomes less relevant for them (this also relates to the data and information tool).

Additional support for WSPs

- It is important to keep a human dimension in place. The WSP should remain a supporting tool and not replacement for WSP development and implementation. Modelling future scenarios is therefore not an ideal functionality.

Water indicator tool

- Cloning functionality might result in too many clones of one indicator – consider an alternative approach where a new user can add to an existing indicator (e.g. e-mail system requesting access to contribute).
- There needs to be some degree of quality control to ensure relevance of content but to also avoid repetition of indicators.

Day 2. Data and information

28 March, 2017

Flood and Drought Portal

User: raulg | Workgroup: Public | Area: Volta | ?

About the DataPortal

The Flood & Drought portal is developed as part of the Flood and Drought Management Tools project. For more information on the project please visit the project home page at: <http://fdmt.iwlearn.org/en>

The Flood & Drought portal provides access to a number of apps supporting decision makers at basin and local level. The aim is to support existing planning processes as TDA/SAP and IWRM at basin scale and Water Safety Planning at local scale through the technical apps. The apps could be used individually or in connection.

Please visit the user guide for more indepth information on the use of the apps and their intended support for the different stages within basin and local level planning.

For video tutorials and overview: [YouTube](#)

For technical exercises (pdf files): [Dropbox](#)

For technical questions please contact:
[Oluf Jensen \(Project manager\)](#) or [Bertrand Richaud \(Water resources expert\)](#)

<p>DATA AND INFORMATION Access to near real-time data. Flood and drought indices. Climate forecast and climate change data.</p>	<p>DROUGHT ASSESSMENT (Under development). Locate and identify hazards, estimate impacts and provide risk assessment.</p>	<p>FLOOD ASSESSMENT (Under development). Locate and identify hazards, estimate impacts and provide risk assessment.</p>	<p>ISSUE ANALYSIS Causal Chain analysis and WRIAM. Understand and prioritise the causes behind issues.</p>
<p>WATER INDICATOR Identify water related indicators to support management and decision-making.</p>	<p>BASIN PLANNING (Under development). Create and evaluate basin plans. Linkage to water resource model.</p>	<p>WATER SAFETY PLANNING (Under development). Set up water safety plans and identify hazards.</p>	<p>REPORTING (Under development). User configured templates providing linkage to TDA/SAP, IWRM and WSP.</p>

The second day delved further into the importance of catchment information in implementing WSP. This was followed by an introduction to the data and information portal which provides users with access to near real-time data, flood and drought indices, climate forecast and climate change data. The global data sets are made available for any transboundary basin and are freely available. The data provides a basic data set for catchment planning. For a utility, data and information provided by the tool is useful for long-term planning and investment as well as understanding catchment impacts on their water supply system.

Following the introduction to the data and information tool, participants went through a number of exercises looking at different evaluation options focussing on rainfall data. These included evaluations of rainfall data, historical climate, rainfall deviation and Standardise Precipitation Index (SPI) and seasonal forecasting and forecasted SPI.

To view the documentation (presentation, and guiding material and exercises); click on the items in the table below.

Importance of catchment information in implementing WSPs
Introduction to data portal
<ul style="list-style-type: none"> • Exercise 4 - applying rainfall data
Exercise 5 - Historic climate evaluation
Drought Indices
<ul style="list-style-type: none"> • Exercise 6 - rainfall deviation and the SPI
Seasonal forecasting
<ul style="list-style-type: none"> • Exercise 7 - seasonal forecasting and forecasted SPI
Long term planning – use of climate data

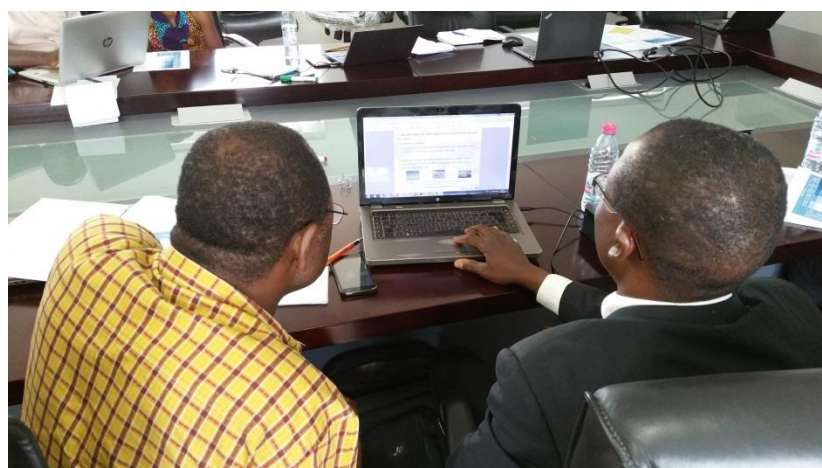
Feedback

Rainfall data

- In Ghana, rainfall data is not collected. Ghana Water can use this information for waer quality for operation use.
- ONEA also do not sue rainfall data but see the vale as it provides a forecast which can be used to plan at the catchment level (e.g. not installing fixed pumps but those which the level can be adjusted based on water levels).
- Suggestion to train the meteorological department on the use of this information.
- Possibility to gradually zoom out of charts (e.g. scroll of the mouse).
- Participants were keen on a video animation of the information to display the time series. However, as it is a web application, this will slow down the system.
- Only one data set can be viewed with at a time, explore possibility for more than 1 chart at a time.
- Explore possibility to save a chart.

Historical ensemble

- Legend order needs to be changed, as it is confusing (e.g. 2017-2016 should be 2016-2017).
- Issue of basin boundaries, Ghana Water, for example, operate outside of the Volta Basin as well, how can they access this information.
- To facilitate reading the charts, hovering over an item in the legend should better highlight the respective ensemble on the chart.



Basin and national level training: 29-31 March, 2017

From 29-31 March, 2017, basin and national level organisations convened at GWCL headquarters. Participants included staff from the Volta Basin Authority (VBA) and catchment and national level representatives from both Ghana and Burkina Faso, namely the Water Resources Commission (WRC), Volta River Authority (VRA), Hydrological Service Department (HSD), Water Resources Department of GWCL and l'Agence de l'Eau de Nakambé.

The training will demonstrate the use of the project outputs on a use case focusing on seasonal planning with the objective of improving resiliency of crops to drought. The use case will be present in all the exercises providing a context for the use of the project outputs. The training will focus on the currently developed outputs but the outputs to be delivered through the project as a whole will be introduced as well.

The first day focused on data and information. The second day addressed climate forecast, drought impact and the relevance for planning. The third day was dedicated to planning.

Day 3. Overview, data and information 29 March, 2017

The first day with the basin and national organisations focused on access to data and information, as this is relevant for any planning. Participants looked specifically at climate related drought indices and hazards and then other data sources made available by the data and information tool.

To view the documentation (presentation, and guiding material and exercises); click on the items in the table below.

Overview of workshop and FDMT project
Project outputs <ul style="list-style-type: none"> • Overview of project outputs • User registration and access
Water utility linkage <ul style="list-style-type: none"> • Outcomes from the water utility training • Short introduction to WSP and the linkage to catchment planning
Use case 1: seasonal planning Presentation of use case 1 for the training <ul style="list-style-type: none"> • Seasonal planning: Improving resiliency of crops to drought
Data and information <ul style="list-style-type: none"> • Introduction to satellite data (presentation)

<ul style="list-style-type: none"> • Demo of the data and information application
<i>Exercise</i> <ul style="list-style-type: none"> • Introduction to the data and information
Identify and locate climate hazard <ul style="list-style-type: none"> • Introduction to climate related drought indices and hazards
<i>Exercise</i> <ul style="list-style-type: none"> • Identify historic climate related hazards – step by step guide
Additional data <ul style="list-style-type: none"> • Introduction to additional data sources
Feedback and wrap up

Feedback

Data and information tool

- The tick icon for data and tools gives the impression that you can select more data sources or viewing options.
- In order to validate the global satellite data, users are required to download the data provide and validate this with their own on-ground observed data. Issue is that the station data is not freely available, so the project relies on satellite data acknowledging that satellite data performs differently in different regions.
- Explore the possibility of adding a new station, by the users, in order for user to adapt to a particular sub-basin.
- The data and information portal should be viewed as a tool to retrieve data and not to store.
- Going from one chart to another when changing from 1 point layer to another requires you to select chart again. It would be better if by changing from one 1 point layer to another the chart updates.

Day 4. Climate forecast, drought impact and planning

30 March, 2017

The second day focused on climate forecasting, drought impacts and how this information can be used in planning, looking at catchment run-off and a FAO crop model, AquaCrop.

To view the documentation (presentation, and guiding material and exercises); click on the items in the table below.

Drought assessment <ul style="list-style-type: none"> • Introduction to the steps in a drought assessment process
<i>Exercise</i> <ul style="list-style-type: none"> • Identify location and severity of drought hazards
Climate forecast <ul style="list-style-type: none"> • Introduction to seasonal and medium range forecast • Downscaling and skill assessment
<i>Exercise</i> <ul style="list-style-type: none"> • Use of climate forecast in seasonal planning
Drought impact - runoff ² <ul style="list-style-type: none"> • Introduction to catchment runoff • Catchment runoff with focus on seasonal planning – No autocalibration • Catchment runoff with focus on seasonal planning – Autocalibration
<i>Exercise</i>

² Session moved to day 3 training with basin and national level organisation

<ul style="list-style-type: none"> • Catchment runoff with focus on seasonal planning
Drought impact - crop production <ul style="list-style-type: none"> • Introduction to crop modelling • Crop model – step by step guide
Exercise <ul style="list-style-type: none"> • Crop modelling with focus on seasonal planning

Feedback

Normalized Difference Vegetation Index (NDVI)

- NDVI and other indices should not be used alone as one index alone does not say much. Variation in the NDVI information could be a result of a crop disease and not just a drought event.
- Explanations of how to interpret the information would be useful for each data source and viewing option and what the next steps should be based on observations.

Soil Water Index (SWI)

- SWI is used to look at the condition of the upper part of the soil; how wet it is. It gives a relative indication of the wetness of the soil.

Crop modelling

- Consider changing the input option for irrigated from true/false to yes/no.
- Indicate in brackets that “Fraction of RAW” is provided as a percentage.
- When you click on execute a message pops up, give option to click “okay” rather than closing the message.
- Provide planting date format as a drop-down menu (with calendar view, for example).
- Note: historical yield calculations are not linked to actual yields, however you can calibrate by comparing to a specific event that happened in the past.

General

- Explore the possibility to display 2 or more charts at the same time, as this facilitates comparison of information
- Indication of which combinations of indices to look at is useful for those that are unaware.
- Year order should be changed (e.g. 2017-2016 should be 2016-2017).

Day 5. Planning

31 March, 2017

The third day focused on planning at the basin level. Participants were introduced to the Issue Analysis application enabling users to understand and prioritise the causes being issues. An impression of the Basin Planning tool was provided demonstrating how users will be able to create and evaluate plans.

To view the documentation (presentation, and guiding material and exercises); click on the items in the table below.

Issue analysis <ul style="list-style-type: none"> • Background to CCA and WRIAM • Introduction to Issue analysis – step by step guide
Exercise <ul style="list-style-type: none"> • Group work on causes and priority of issues

Indicators³

- [Introduction to indicators in planning](#)

Exercise

- [Selection of indicators](#) – step by step guide

Planning

- [Background to planning application](#)

Exercise

- [Introduction to the planning application](#) – step by step guide
- [Creating and evaluation of plan](#)

Feedback

Issue Analysis

- Provide definitions of different input options as this will help users when filling in the table (e.g. Extent is understood differently by different organisations, this could be relative).
 - Immediate impact
 - Immediate cause
 - Underlying cause
 - Root cause
 - Extent
 - Seriousness
 - Permanence
 - Irreversibility
 - Cumulative character
 - Level of documentation
 - Score
 - Assessment
- The Issue Analysis tool should be used in a group, as input requires discussion.

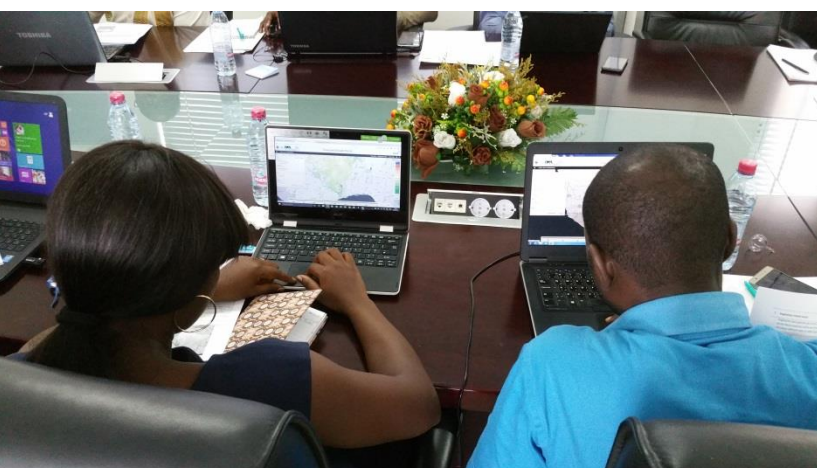
Catchment run-off – the tool helps you assess climate variability impacts on catchment run-off

- The model should take into account soil type if not already.
- Explore the possibility to look at small catchments
- Reservoirs need to be taken into account or hydro-power infrastructure

Basin Planning tool

- Currently this is a desktop version but will be converted to a web based application. Essentially this tool will combine the various tools demonstrated in the training.

³ Session was cancelled due to limited time. The Water Indicator tool enables users to identify water related indicators for understanding the current state of water resources, the changes in these resources and whether or not interventions produce the desired effect. More information can be found via the portal: www.flooddroughtmonitor.com.



Next steps (2017)

The following activities are planned for 2017:

- Finalise WSP support (easy overview and analysis of components with high risk, improve the hazard, control measure and monitoring flow, improve the reporting and dissemination functionality, and incorporating flood and drought elements)
- Finalise drought early warning and dissemination
- Development and validation of climate processing functionality
- Implementation of planning methods
- Support for Transboundary Diagnostic Analysis (TDA)
- Concept for climate change and flood management

For lack of knowledge, people perish. Capacity development, to ensure that key stakeholders understand how to use and interpret the tools is essential to the sustainability and continuity of the project outputs. Aside from the yearly trainings, the project is exploring other methods to keep stakeholders informed of new developments, e.g. newsletter, webinars demonstrating the use of project outputs, YouTube tutorials, updated step-by-step guides on the various applications, etc.

Annex 1 – Agenda

Local (water utility) level training

29 March 2017 – full day	
Time	Item
09:00-09:10	Welcome and introduction - GWCL
09:10-09:30	Overview of workshop and FDMT project
09:30-10:00	Presentation – Ghana Water (10 mins) Presentation – ONEA (10 mins) Q&A – 10 mins
10:00-10:30	Introduction to WSP and Climate resilient WSPs
10:30-11:00	Break
11:00-11:30	Introduction to Flood and Drought portal <ul style="list-style-type: none"> • User registration and creation of workgroups • Overview of the online tools • WSP Support Tool
11:30-12:30	Exercise 1 - Describing the system
12:30-13:30	Lunch
13:30-14:45	Exercise 2 - Defining the hazards, risks and control measures (focus on climate impacts)
14:45-15:30	Additional support for WSPs
15:30-16:00	Break
16:00-17:00	Introduction to indicator tool Exercise 3 - Building and selecting indicators
17:00	Wrap up

30 March 2017 – full day	
Time	Item
09:00-09:10	Recap of Day 1
09:10-09:30	Importance of catchment information in implementing WSPs
09:30-10:30	Introduction to data portal Exercise 4 - Applying rainfall data
10:30-11:00	Break
11:00-12:00	Exercise 5 - Historic climate evaluation
12:00-13:00	Lunch
13:00-14:00	Drought Indices Exercise 6 - Rainfall deviation and the SPI
14:00-15:00	Seasonal forecasting Exercise 7 - Seasonal forecasting and forecasted SPI
15:00-15:30	Break
15:30-16:30	Long term planning – use of climate data
16:30-17:00	Introduction to other tools
17:00-17:30	Discussion and wrap up

Basin and national level training

29 March 2017 – full day	
Time	Item
09:00-09:15	Welcome by VBA
09:15-09:30	Overview of workshop and FDMT project <ul style="list-style-type: none"> • Agenda and objectives • Project overview
09:30-10:00	Project outputs <ul style="list-style-type: none"> • Overview of project outputs

	<ul style="list-style-type: none"> • User registration and access
10.00-10.30	Water utility linkage <ul style="list-style-type: none"> • Outcomes from the water utility training • Short introduction to WSP and the linkage to catchment planning
10:30-11:00	Break
11:00-11:15	Use case 1: seasonal planning Presentation of use case 1 for the training <ul style="list-style-type: none"> • Seasonal planning: Improving resiliency of crops to drought
11:15-13:00	Data and information <ul style="list-style-type: none"> • Introduction to satellite data (presentation) • Demo of the data and information application <i>Exercise</i> <ul style="list-style-type: none"> • <i>Introduction to the data and information</i>
12:30-13:30	Lunch
14.00-15.30	Identify and locate climate hazard <ul style="list-style-type: none"> • Introduction to climate related drought indices and hazards <i>Exercise</i> <ul style="list-style-type: none"> • <i>Identify historic climate related hazards</i>
15:30-16:00	Break
16.00-16.45	Additional data <ul style="list-style-type: none"> • Introduction to additional data sources
16.45-17.00	Feedback and wrap up

30 March 2017 – full day

Time	Item
09.00-09.30	Questions based on experience from day 1
09.30-10.30	Drought assessment <ul style="list-style-type: none"> • Introduction to the steps in a drought assessment process <i>Exercise</i> <ul style="list-style-type: none"> • <i>Identify location and severity of drought hazards</i>
10:30-11:00	Break
11.00-13.00	Climate forecast <ul style="list-style-type: none"> • Introduction to seasonal and medium range forecast • Downscaling and skill assessment <i>Exercise</i> <ul style="list-style-type: none"> • <i>Use of climate forecast in seasonal planning</i>
13:00-14:00	Lunch
14.00-15.30	Drought impact - runoff <ul style="list-style-type: none"> • Introduction to catchment runoff <i>Exercise</i> <ul style="list-style-type: none"> • <i>Catchment runoff with focus on seasonal planning</i>
15:00-15:30	Break
16.00-17.00	Drought impact - crop production <ul style="list-style-type: none"> • Introduction to crop modelling <i>Exercise</i> <ul style="list-style-type: none"> • <i>Crop modelling with focus on seasonal planning</i>
17.00	Feedback and wrap up

31 March 2017 – full day

Time	Item
09.00-09.30	Questions based on experience from day 2

09.30-10.30	<p>Issue analysis</p> <ul style="list-style-type: none"> • Background to CCA and WRIAM <p>Exercise</p> <ul style="list-style-type: none"> • Group work on causes and priority of issues
10:30-11:00	<i>Break</i>
11.00-12.00	<p>Indicators</p> <ul style="list-style-type: none"> • Selection of indicators
12.00-13.00	<p>Planning</p> <ul style="list-style-type: none"> • Background to planning application <p><i>Exercise</i></p> <ul style="list-style-type: none"> • <i>Introduction to the planning application</i> • <i>Creating and evaluation of plan</i>
13:00-14:00	<i>Lunch</i>
13.00-15.30	Planning continued
15:00-15:30	<i>Break</i>
16.00-17.00	Wrap up and feedback

Annex 2 – Participants

Name	Organisation	Country	Email
Local level (water utility) participants			
John Eric Kwofie	Ghana Water Company Limited	Ghana	john.kwofie@ghanawater.info
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Annex 3 – General feedback

The following provide an overview of feedback from participants in the basin and national level training (31 March 2017)

Group 1 – GWCL	<p>Sediment dynamics in the water – there are issues with the rivers getting silted, so if the tool can help them to predict or forecast, or to know, have data on the levels of siltation – the sediment flows in the tributaries. Models to include sediment</p> <ul style="list-style-type: none"> We can look at sediment load, but not so much on transport (needs hydrological model) – but this is a complex <p>Weeds and algae issues (how can this be included, how can utilities see the development of the algae, in river systems, the times they occur in the year to prepare for this in future) – look at temp, chlorophyll (this is available for large lakes), nutrients</p> <p>Other basins (small ones within the Basin but also outside that are linked)</p>
Group 2 – VBA, WRC, VRA	<p>D&I tool</p> <ul style="list-style-type: none"> Compare results of 2 parameters (two different data types) Upload actual data for comparison or calibration (as was done with the run-off exercise) – issue with this is that any data that is uploaded will go to the system so will be accessible to others (it will be out of control as they are on a web server) – agreement that downloading the data and calibrating on your own system is better Flexible to select sub-catchment (in particular the rainfall run-off modelling) – any kind of catchment? – to accommodate people outside the basin but also inside the Volta Basin there are smaller sub-basins (that the 4 we have identified) Sustainability of the tool
General	<ul style="list-style-type: none"> Tool is very general so will be hard to use for specific cases Modelling quality – phosphate, nitrogen (nitrate)

Annex 4 – Evaluation form

Evaluation of Flood and Drought Management Tools Technical training Volta Basin

Name:

Organisation:

What was your overall impression of the training?

Excellent <input checked="" type="checkbox"/>	Good <input type="checkbox"/>	Acceptable <input type="checkbox"/>	Below expectations <input type="checkbox"/>
Comments:			

General	Too high	Acceptable			Too low
How did you find the technical content of the course?	1	2	3	4	5
	Agree			Disagree	
There was sufficient hands-on support during the training	1	2	3	4	5
Comments (specifically on the technical level of the training):					
	Too long				Too Short
The duration of the training was...	1	2	3	4	5
The time for discussions and group work was...	1	2	3	4	5
The time for individual hands-on exercises was...	1	2	3	4	5
Comments (specifically on length of the training and time provided to do each exercise):					

Presentations and demonstration of Flood and drought management tools	Agree		Disagree		
I have a good overall understanding of the Flood and Drought Management Tools project and what it is trying to achieve	1	2	3	4	5
The demonstration of the Flood and Drought Data Portal was clear	1	2	3	4	5
What could be improved and made clearer when presenting and demonstrating the tools?					
Are the tools provided too technical?					

Which tool are you likely to use and how?

Individual exercises and group work	Agree	Disagree
The individual exercises and group work helped increased my understanding of the flood and drought management tools	1 2 3 4 5	
Which did you prefer – group work or individual exercises (or a combination)? Why?		
What could be improved and made clearer?		

Course practicalities	Agree	Disagree
The venue was satisfactory	1 2 3 4 5	
Lunch and refreshments were satisfactory	1 2 3 4 5	
The training was well organised	1 2 3 4 5	
I received practical information well in advance	1 2 3 4 5	
Comments:		

Results of evaluation

Local (water utility) level training results

General					
	Response				
	Excellent	Good	Acceptable	Below expectation	
What was your overall impression of the training	5	2			
Comments	It was very good				
	Too high		Acceptable		Too low
	1	2	3	4	5
How did you find the technical content of the course?		3	3		
	Agree				Disagree
	1	2	3	4	5
There was sufficient hands on support during the training	5	1	1		
Comments (specifically the technical level of the training)	1. Satisfactory 2. Technical content of the training was good and very appropriate. Touches on almost all aspects of basin planning to support good water source quality. 3. Although I think the training was very useful, most of the tools we were trained on are not directly applied or used in Ghana water company. 4. The training is relevant for a certain level of understanding – it fits participants of ONEA level.				
	Too Long				Too Short
	1	2	3	4	5
The duration of the training was...		1	5	1	

n = 7

The time for discussion and group work was...		3	4		
The time for individual hands-on exercises was...		1	6		
Comments (specifically on length of the training and time provided to do each exercise)	1. Okay 2. Time provided for the building of the indicators was short. I think this part of the training is very useful for ONEA and should be focused on. 3. No Comments 4. Satisfactory.				

Presentations and demonstrations of flood and drought management tools						n = 7
	Response					
	Agree				Disagree	
	1	2	3	4	5	
I have a good overall understanding of the Flood and Drought Management Tools project and what it is trying to achieve	1	5	1			
The demonstration of the Flood and Drought portal was clear	2	4	1			
What could be improved and made clearer when presenting and demonstrating tools?						
Are the tools provided too technical?	1. The tools are very comprehensive and straight forward to understand and use 2. Not too technical 3. Acceptable 4. Manageable 5. No					
Which tool are you likely to use and how?	1. WSPs 2. Drought Assessment and indicator tools 3. Data and Information 4. Time series tools					

Individual exercises and group work						n = 7
	Response					
	Agree				Disagree	
	1	2	3	4	5	
The individual exercises and group work helped increase my understanding of the flood and drought management tools	2	4	1			
Which did you prefer - group work or individual exercises (or a combination)? Why?	1. Combination - it encourages the idea of sharing 2. Combination - Sharing of ideas and information is very efficient for development and progress 3. Group work 4. Group work - We had the full assistance of the trainers during the individual and group exercises provide an opportunity to discuss. 5. Both 6. Combination-Group work helps to interact with other participants. 7. Combination - I prefer group work but also some time to work alone					
What could be improved and made clearer?	1. A lot of emphasis is placed on Basin management and not much on protecting treated water after treatment 2. Training should be done t least twice a year 3. Will be good to add to training a brief introduction target each area/topic relating to a tool.					

Course practicalities						n = 7
	Response					
	Agree				Disagree	
	1	2	3	4	5	
The venue was satisfactory	1	6				
Lunch and refreshments were	1	5	1			

satisfactory					
The training was well organised	2	4	1		
I received practical information well in advance	5	1	1		
Comments	1. These trainings should be organised regularly to keep participants and stakeholders abreast with current findings. 2. Satisfactory delivery.				

Basin and national level training results

General						n = 8
	Response					
	Excellent	Good	Acceptable	Below expectation		
What was your overall impression of the training		8				
Comments	1. The training is good. Actual data and smaller catchments should be dealt with. Looking to already available platforms is not enough. 2. The tool appears to be too general to adapt for our work looking at the kind of infrastructure in the basin. The data however is very useful. 3. It is a good training program but only limited to the Volta Basin. 4. Training is good but it would be better if the slides are e-mailed after each training to refresh the course. 5. The Basins, such as Densu, etc. operated by GWCL need to be added. This will enable GWCL to apply the tool in the management of our water bodies. 6. The programme is interesting but not much time for a lot of demonstration and exercises.					
	Too high		Acceptable		Too low	
	1	2	3	4	5	
How did you find the technical content of the course?		7	1			
	Agree				Disagree	
	1	2	3	4	5	
There was sufficient hands on support during the training	4	3	1			
Comments (specifically the technical level of the training)	1. The technical level of the training was good, but I would like to do more in the administration of the tool, how to add new data and update them. 2. Very practical, informative and supported training. 3. Technically, my understanding of the tools is good. Detail training on the use of the tools is needed. 4. Okay					
	Too Long				Too Short	
	1	2	3	4	5	
The duration of the training was...			3	5		
The time for discussion and group work was...			6	2		
The time for individual hands-on exercises was...			6	2		
Comments (specifically on length of the training and time provided to do each exercise)	1. The length is short, the time for each exercise was good. 2. Was good and allowed us to experience all parts. Except the models that were not ready. 3. Length of training g is adequate. 4. The length of the training time provided is adequate. 5. Okay. 6. Need to have a lot of exercises than what we have.					

Presentations and demonstrations of flood and drought management tools						n = 8
	Response					
	Agree				Disagree	
	1	2	3	4	5	

I have a good overall understanding of the Flood and Drought Management Tools project and what it is trying to achieve	3	2	2		
The demonstration of the Flood and Drought portal was clear	3	3	2		
What could be improved and made clearer when presenting and demonstrating tools?	1. The presenting and demonstrating the tools was very good and clear. 2. The demonstration and the presentation was very good 3. Much emphasis should be based on the use of the various tools.				
Are the tools provided too technical?	1. Yes 2. Yes 3. They are usable to the domain of experts. 4. No 5. Yes 6. I think they are user friendly. 7. Disagree				
Which tool are you likely to use and how?	1. I want all of the, for elaboration of White Volta Master Plan. 2. All of them, in order to have a complete basin planning tool. 3. Data and information mostly to obtain data and perform analysis. 4. Rainfall forecast for flood forecast and reservoir inflow forecast. 5. Rainfall run-off tool 6. Sedimentation tools. 7. Rainfall run-off to forecast our dam levels in the future. 8. Issue analysis.				

Individual exercises and group work						n = 8
	Response					
	Agree			Disagree		
	1	2	3	4	5	
The individual exercises and group work helped increase my understanding of the flood and drought management tools	4	2	1			
Which did you prefer - group work or individual exercises (or a combination)? Why?	<div>1. I prefer group work because it allows us to share ideas.</div> <div>2. Combination of group and individual exercises, I can test my understanding first and share ideas in a group.</div> <div>3. Combination of both, it allowed us to assimilate better the information and understand the issues together while still having personal experience.</div> <div>4. Both – The individual exercise help me to get hands on and be able to use the tool later on. The group work give you others opinions to improve you understanding.</div> <div>5. I prefer group work because ideas are shared amongst the group.</div> <div>6. Group work since it helps to bring various ideas together.</div> <div>7. Group work because it helps in getting more ideas about the work form individuals within the group.</div> <div>8. Group work. Ideas are being shared.</div>					
What could be improved and made clearer?	<div>1. Customise the tools to adapt to specific basins and sub-basins.</div> <div>2. The exercises were clear; tools under development might be done so we can relate to them for flood and drought management.</div> <div>3. Explanation and providing advanced or after teaching copies of presentations.</div> <div>4. Demonstration and exercises.</div>					

Course practicalities						n = 8
	Response					
	Agree			Disagree		
	1	2	3	4	5	
The venue was satisfactory	3	3		2		
Lunch and refreshments were satisfactory	4	2	1	1		
The training was well organised	5	2	1			
I received practical information well in advance	3	1	1	2	1	

Comments	<ol style="list-style-type: none"> 1. The course has been well organized, but 20 USD for taxi and dinner is just okay. 2. It will be beneficial if the project considers looking at tributaries to the various dams in Ghana (i.e. Densu, Ankobra, etc.) 3. The food appears to be too spicy. The first day have only one menu – rice. 4. I hope future opportunities will be provided for refresher course and for those of us at colleagues who are not here. 5. The programme has to be residential.
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