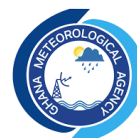




WORLD  
METEOROLOGICAL  
ORGANIZATION



**URBAN FLOOD FLOOD FORECASTING SYSTEM  
(UFFFS)  
27 – 29 May 2024**

**DAY ONE  
REPORT ON INTEGRATING FLOOD AND DROUGHT MANAGEMENT AND EARLY  
WARNING SYSTEM FOR CLIMATE ADAPTATION IN THE VOLTA BASIN**

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## INTRODUCTION

The world Meteorological Organization, Volta Basin Authority and Global Water Partnership, West Africa are implementing the Volta Flood and Drought Management project '*Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin*'.

The project was implemented in June 2019 and terminated in June 2024 and is being funded by the Adaptation Fund.

As part of the project, it seeks to address the issues of Urban flash floods by implementing Urban flash flood forecasting system (UFFFS) in three pilot urban cities of the Volta Basin and account for impacts associated to flash flood hazards and provide impact-based warning for National Meteorological and Hydrological Services (NMHSs).

The UFFFS once operationalized will be infused unto an existing Early Warning System known as the 'My Dewetra' and the methodology of the UFFFS is based on the combination of satellite observation and PySteps nowcasting algorithm.

The workshop brought on board various countries having a coverage of portions of the Volta Basin in their respective domain (Countries).

The concept of the workshop is to provide regional training on Urban flash flood forecasting system (UFFFS) over the Volta Basin as well as the NMHSs for the upcoming monsoon season.

## OBJECTIVES

The three (3) days regional workshop on Urban flash flood forecasting system (UFFFS) is geared towards:

- Presenting the Urban flash flood forecasting system (UFFFS) concept and products available for monitoring of Urban flash floods.
- Learning and experience sharing by NMHSs on hydro-meteorological monitoring, forecasting and early warning services.
- A theoretical and practical knowledge on Urban flash flood forecasting system (UFFFS).
- Preparing NMHSs for pre-knowledge on the coming monsoon season.

## **Workshop activities**

The Joint Workshop on Urban flash flood forecasting system (UFFFS) started on the first day at 9:30am and consisted of three sessions which was separated by a coffee break, lunch and another coffee break at 10:00 - 10:30, 12:00 - 13:00 and 15:30 - 16:00 respectively and with presentations by three countries.

### **DAY ONE**

The workshop was launched with a Welcome message from the Director General of the Ghana Meteorological Agency (GMet), who highlighted the concept of the former UN secretariat on climate action and Hydro-meteorological Institutes building resilience and being at the fore front of climate activities.

Also, he urged the participant to build capacity for resilience in order to save lives and properties and also enhance the grip of participating countries on their work towards climate action and Early warning systems.

The HKV representative, Doreen also shared her remarks by highlighting the concept of the Urban flash flood forecasting system(UFFFS) which started in Abidjan, the coupled effort of individuals and institution to help generated results even though it is still at a piloting stage over the three cities (Boundugu, Mango and Tamale).

She went ahead to notify the participant on the fact that, the system is still under a finalization stage and the prevailing effort to address and improve flash flood forecasting over the Volta basin.

The WMO representative, Ramesh, further on acknowledged the countries and institutional representatives that were available and also the Adaptation Fund for funding the entire project. He gave a brief scope of the VFDM and it concept of introducing an Early Warning System (EWS) in the Volta Basin for flood and drought and it initiative which falls in line with the WMO and UN call for EWS to help protect lives and also protect infrastructural damages by these Hydro-meteorological events.

The division concept of the workshop which is set to cover three days was also established and the first day was intended to cover the concept and techniques by member states used to monitor and forecast the Hydro-meteorological events.

A team from Ghana covered the first section with the concept of;

- Utilizing NWP in Flood forecasting - Bill, Joana and Felicity (Ghana, Gmet)

- VOLTALARMS EWS in Ghana – Daniel Adzakpo (Ghana, GMet)
- Multi-hazard bulletin for Ghana – Joshua Asamoah (Ghana, GMet)

The workshop proceeded with various countries presenting on the Tools and Products used by Hydro-Meteorological agencies for forecasting these events.



*Below captures the topics and presenters for countries that shared their experiences on the first day.*

Topic	Presenter and Country
Atelier régional de renforcement de capacité sur les prévisions de inondations urbaines	Dr Aboubacar M SIDIBE Ing MARIKO Adama, Mali
Presentation on Tools used for Heavy Rain Forecasting at GMet.	Mrs Muriel, Ghana, GMet
Flood forecasting over the Volta Basin	Kweku Asante, Ghana, Hyro
Informations systeme de provision	Zoungrana Raymulenole, Burkina Faso

The presenters gave detailed sources of data, imageries and the science that were employed by their institutions to do their respective forecasts and how it is also disseminated to the public for safety.

The presentations were subjected to questions that were well explained to provide clarity to member states. Suggestions on Common Alert Protocols (CAP) were also established to help provide insight to other countries that needed a fair idea on its use and operations.

## **DAY 2**

The second day began with the arrival of participants anticipating to be introduced to the Urban Flash Flood Forecasting System but few presentations by three participating countries namely Cote d'Ivoire, Benin Republic and Togo were to be made about the tools and dissemination platform for communicating their forecast to end users.

Also, most countries spoke about their project with the Volta Basin Authority, trans-boundary data and coordination to boost seasonal forecast in their respective domain.

Early Warning Systems were also a system used by these countries to help curb the menace of extreme meteorological events mostly with flood activities.

Most of the activities generated to help and diffuse forecast to the end users were not made in isolation but with the joint effort of most water related institutes in their domain just as the other countries in the sub-region.

The work was subjected to questions and contribution to help extend help in areas where other countries in the sub-region had a little fallback. Continuous discussion went on on challenges and gaps that could be filled with healthy scientific data and modeling tools. The grounds for further collaborations and joint workshops were established in attempt to have a tentative spectrum on both Early Warnings and Seasonal forecast over the sub-region.

The Urban Flash Flood Forecasting System was introduced by the co-coordinators from HKV (Dorien Lugt and Nicole Jungerman). This began with questions to assess the level of knowledge in basic satellite concept and also what participants expect with questions addressed on menti.com. The introduction to the UFFFS continued with the types of available satellite for rainfall measurement, their time of complete orbit and their respective resolution. Based on their characteristics, the meteosat was selected based on the criteria and nature of the product it produces which is of more benefit to the UFFFS.

The quality of nowcasting was established, showing its importance due to the time of issuance and its corresponding help to the UFFFS.

The concept of Numeric Weather Prediction which contains more physical processes was then compared to nowcasting which had a limit use of most physical simulations. Assessing the time span of the UFFFS and the foundational parameter needed for forecasting, the nowcasting was established as the concept suitable for use.

The technical background of the nowcasting tool was then probed further giving the sources used for retrieval and how it is implemented.

Also, the breakdown process and methodology for generating the UFFFS was displayed in order for participant to know the step-by-step approach used in producing the forecast.

The day closed with questions, contribution and also participants sharing their views on their experiences with nowcasting in their sub-regions.

### **DAY 3**

The final day started with a recap of the technical background of UFFFS, flood model, how it is developed and how it can be validated.

The section further presented the opportunity to highlight the products provided by the UFFFS (Nowcasting and flood maps).

Also, structural steps were given in relation to flood modeling. *Outlined below are the processes to achieve a good flood modeling:*

- Why modeling for floods
- Field survey
- Inundation modeling
- Validation of inundation
- Relationship between flood hazard maps and alert

Various stages were expatiated detailing every stage and its importance in generating the UFFFS.

Two types of models for floods were assessed and their concept in the UFFFS system was established.

The types were;

- Hydrological Modeling

- Hydraulic Modeling

The Hydrological modeling incorporated;

- Description of the process from rainfall and evapotranspiration and processes in the soil.
- Output discharge

Also, the hydrological modeling takes into consideration;

- Heavy rainfall
- Surface runoff
- Interaction with other surface water bodies and
- Locally; clogging of drainage debris

The Hydraulic modeling also incorporated;

- Description of the flow of water (discharge over land(2D) and through hydraulic structures)
- Output: Water level and inundation extent.

This model also included the inundation model based on the HEC-RAS data which is an open source.

The concept of the IDF was then established to have an insight of timescales, return periods and the increase in volume of rainfall based on projections.

Questions down-scaled from the previous day based on the concept of participant expectations on UFFFS were highlighted and addressed accordingly.

An insightful game of choice was established to examine the understanding of all participant to close the technical background of the workshop.

The day ended with remarks from the HKV and WMO representatives coupled with few recommendations and appreciation from the Director General of the Ghana Meteorological Agency (GMet).



APPENDIX

