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Flash Flood Guidance Gazette

Flash Flood Guidance (FFG) Gazette, a bi-annual newsletter bringing users of FFG products – operational information, technical advances, case studies and education for the flash flood community.

The Flash Flood Guidance System (FFGS) Global Workshop

A note from the Editors:

This issue of the *Flash Flood Guidance Gazette* is dedicated to participant impressions from the Flash Flood Guidance System (FFGS) Global Workshop held in November 2019. The Workshop was organized by the World Meteorological Organization (WMO) in partnership with the U.S. Agency for International Development/Office of U.S. Foreign Disaster Assistance (USAID/OFDA), the U.S. National Weather Service (NWS) and the Hydrologic Research Center (HRC). The Turkish State Meteorological Service (TSMS) generously hosted the workshop in Antalya, Turkey from 4-8 November, 2019. The event was the first FFGS Global Workshop, bringing together users from national meteorological and hydrologic services, disaster managers, technical developers, and supporters from around the globe.

The workshop was the result of more than a decade of development and implementations of FFGS. It brought together a total of 169 participants, from 59 countries and 10 international organizations. Through formal presentations, poster sessions and break-out group discussions, the workshop provided the opportunity for FFGS users to come together and share experiences and lessons learned, with the goal of providing key input on the critical issue of sustainability. A road map for sustainability is essential such that advances made to date are maintained for the continued provision of early warnings of flash floods toward long term reductions in the loss of life and property caused by flash floods.

Rochelle Campbell and Theresa Modrick Hansen, Hydrologic Research Center, FFG Gazette Editors



Photo 1. Participants of the FFGS Global Workshop

Comments from the HRC Director

First, I would like to express sincere thanks to the Turkish State Meteorological Service (TSMS) and local organizing Agencies for their gracious hosting of the Global Workshop, and to the USAID/ Office of Foreign Disaster Assistance (OFDA) and WMO.

For the Hydrologic Research Center (HRC), this is the culmination of 25 years of research, science cooperation and technology transfer efforts in the field of operational hydrometeorology. HRC and its partners (USAID/OFDA, WMO, NOAA, and more recently CREWS) worked with Forecasters and Disaster Managers worldwide to streamline and fine tune science-based efforts to provide useful products for their difficult task: the prediction and warning of flash floods. Even though there is evidence that we are achieving this goal, the effort is not over. We need to develop new ways to sustain progress and to maintain a strong front against the ever increasing flash flood occurrences due to climate changes and the expanding built environment. This was the focus of discussions for this workshop, and the participants in plenary sessions and in workshop sessions worked together toward a solution for sustainability.

The Workshop yielded the *Antalya Statement* (**below**) that outlines the discussions and conclusions.

**Konstantine Georgakakos, Director
Hydrologic Research Center**



Photo 2. Dr. Georgakakos gives opening remarks at the Global Workshop

The Antalya Statement

For the well-being and prosperity of their citizens, national governments should recognize that the Flash Flood Guidance System has achieved a state of maturity that merits their expenditure of resources to implement and maintain its operational readiness. A concerted global effort is needed to ensure that the advances made to date are strengthened for the benefit of current and future generations.

Comment from WMO

My impression of the FFGS global workshop can be represented with one word, 'Wow!'.

The workshop was very much successful beyond my expectation. I have attended numerous conferences and workshops; however, I have never seen such active participation. During 5 days, we had plenary sessions, poster sessions, and breakout group sessions. Also, additional regional side meetings were held during lunch breaks and evenings –indicators of the member`s strong engagement.

The essential needs to promote sustainability were evident and it was comforting that there were many common challenges, such as, communication issues (at National level, with and between Regions, etc.), engagement with NDMAs and stakeholders, technical improvements, the roles of National, Regional Centers, and R2O (research to operation).

We also received a wide variety of requests, and will try to cover most of them. We will develop a WMO FFGS platform for your active communication, training and for sharing detailed information, experience and knowledge. We will organize a monthly video or teleconferences within regions and between regions. We will support development of AFFGS (Analysis FFGS) to provide more flexibility and access to update their current conditions and testify new functions. We will try to implement the expanded functions (Urban flooding, Landslide) to the countries. We must ensure ownership by all and that no country is left behind.

Through this issue of the FFG Gazette, I would like to thanks to the Turkish State Meteorological Service (TSMS) for their warm hospitality. None of this would have happened without the generous support from our great partners USAID, CREWS, Environment and Climate Change Canada, HRC, and NOAA—we look forward to strengthening the collaboration. Thanks to all chairs, facilitators, rapporteurs, and participants who made the workshop a success. If we make the sustainability successfully, maybe in 10 years, we will see each other again in the 2nd FFGS global workshop.



Photo 3. Female experts at the FFGS Global Workshop.

**Hwirin Kim, Chief
Hydrological Forecasting and
Water Resources Division, WMO**

*“A special thanks to four ladies:
Petra, Milica and Mireille of WMO
for their contributions, and Sezin
for her kind support.”*

- Hwirin

**Najeebullah Saraj, Forecast Manager
Afghanistan Meteorological Department
(AMD)**



As a participant at this Flash Flood Guidance System (FFGS) Global Workshop, I would like to share my impression and thoughts. This was quite useful and a positive workshop. We have

gained many new ideas and new ways of utilizing FFGS information. For the first time, I saw the Central American countries capability to use FFGS to predicate and locate landslides.

The poster presentation session was new idea. Honestly, it was perfect and let us see experiences of many other FFGS users. The new MapServer interface is a well developed service and this will make the process of forecasting quicker because the timing of flash floods does not allow time to use GIS tools. This interface will make it easier to locate the exact position of threat area.

Finally, I would like to say the arrangements, workshop venue and all related materials to this workshop were complete. I appreciate that I gained many new ideas and experiences from this workshop.



Photo 4. Representatives from AMD with the HRC Director during field trip.

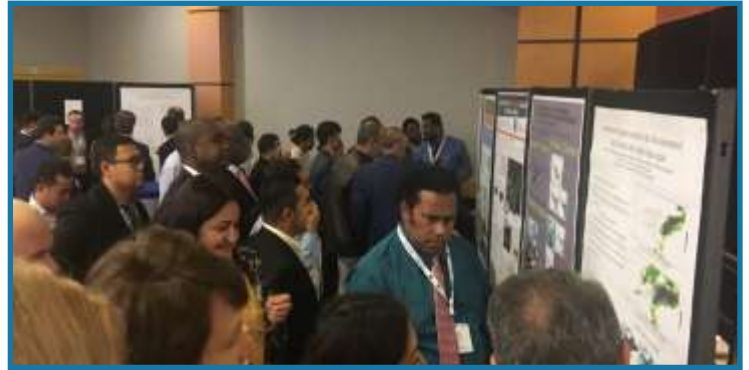


Photo 5. Snapshot from the Poster Sessions.

One big operational family!

As the first of its kind for the FFGS, the Global Workshop provided unique opportunities to participate, including onsite training, themed posters, and break-out group sessions. Last but not the least, the workshop resulted in enormous success by supporting the collective thinking of the FFGS with meteorologists, hydrologists, and disaster managers from all around the world.

It was declared in the workshop that FFGS has led to a reduction in the loss-of-lives and property in those countries where it has been used in the last decade. New improvements have been incorporated like Urban Flash Flood Early Warning System, with demonstration for the city of Istanbul in cooperation with the Turkish State Meteorological Service (TSMS). Nevertheless, there are still gaps and future work to be done such as countries which do not possess systems like FFGS, financial sources for keeping operational status, adding improvements and new applications. Therefore, FFGS sustainability, visibility, funding, training aspects were discussed in break-out sessions. One of the main points in the workshop is that global, regional and local communication need to be improved. Regional Centers need support and feedback from local countries, and flexibility within the system to support their regions.

**Emel Ünal, Meteorological Engineer
Turkish State Meteorological Service
(TSMS)**

Arifin Yussof, Meteorological Officer Brunei Darussalam Meteorological Department (BDMD)

With the global threat of climate change becoming more apparent, Brunei Darussalam, although a small country in the South-East Asian region, is also affected by the increasing frequency of severe weather and the resultant flash floods, which damages houses and property.

In our efforts to help the nation, Brunei Darussalam Meteorological Department (BDMD) has been an active user of the Southeastern Asia-Oceania Flash Flood Guidance System (SAOFFGS) after its operational launch in 2019. With such a tool, it has allowed our operational forecasters to analyze real-time products such as satellite precipitation estimates, Average Soil Moisture (ASM) and Flash Flood Guidance (FFG) products and help in the issuance of relevant color-coded weather warnings with the added information of flash flood risk areas.

During the global workshop, I had the opportunity to meet with colleagues from all over the world and as well as colleagues within the region. We shared experiences, knowledge, best practices and expertise. Everyone agreed on the success of the workshop. We were particularly intrigued and interested in the new development of an *analysis* version of the FFGS. Such a system that would be independent from the operational system and would be beneficial for member countries to conduct necessary research and adjustments to model parameters before implementing into the operational system. We also note the importance of sustainability especially in terms of financial and staff resources for the Regional Center in order to maintain the FFGS. Overall, the workshop was a wonderful platform for learning and everyone had a lovely time in the city of Antalya.

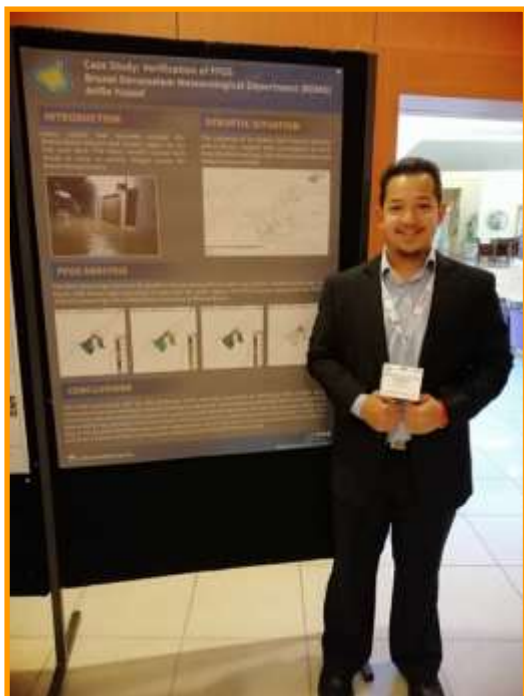
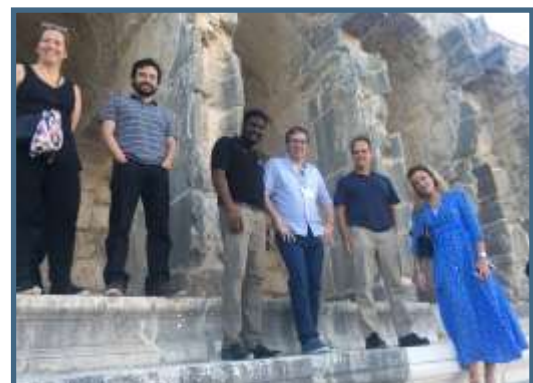


Photo 6. Mr. Yussof with the BDMD poster on FFGS Verification Case Study



Photo 7. As part of the workshop, TSMS arranged for a field trip to the ancient city of Aspendos. The photograph above shows the ancient theater, built in 155 A.D. Below are few participants enjoying the theater.



Juan Diego Naranjo Díaz, Meteorologist Instituto Meteorológico Nacional (IMN), Costa Rica

During the Flash Flood Guidance System (FFGS) Global Workshop, participants from countries around the world met to share our visions, experiences and concerns about the FFGS.

It was nice to observe the great success the expansion of the FFGS around the world, this being a fundamental tool for many countries in issuing preventative alerts for flash floods. As the meteorological services know, with more use and better understanding of the system, forecasters can explore ways to create new products with the system data and thus reach sectors in addition to hydrology, such as agriculture, public transport or geology among others.

However, there are also challenges ahead. In addition to technological aspects such as the ability to transmit and receive more data in real time, I understood a main concern is the need for ongoing training of both new users and experienced trainers, to train new staff regularly and thus ensure the use of the system for many more years. It is also necessary to improve the communication between the members of the regional centers, since the feedback of the needs of the users of the system to the Regional Center would facilitate the creation of road maps for the development and evolution of the FFGS.

In conclusion, the success in flash floods prevention goes hand in hand with having the best tools for this. The FFGS has proven to be very useful worldwide. This in turns means that each country must be committed to the FFGS and to have the necessary inputs at its disposal, and to make the best decision to save lives.



Photo 8. Dr. Sezin Tokar of USAID/OFDA welcoming participants to the Global Workshop.

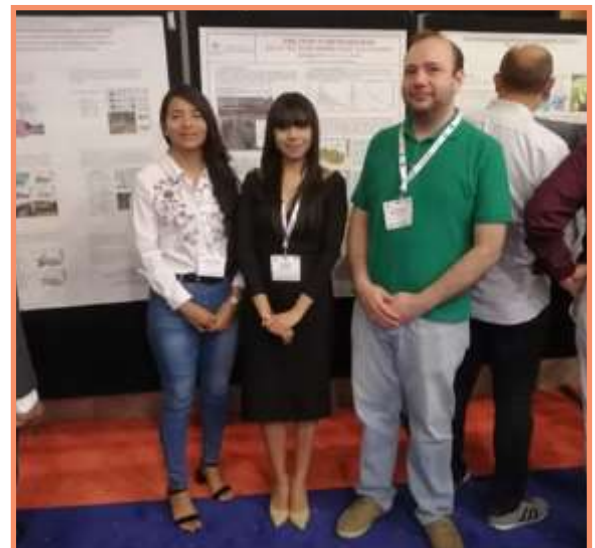


Photo 9. Participants from El Salvador during one of the poster sessions



Photo 10. Saying "hello" from the FFGS Global Workshop

Nepal's impression, thoughts and “take away” of Flash Flood Guidance System (FFGS) Global Workshop

We, Bikash Nepal and Sunil Pokharel, represented Nepal in the FFGS Global Workshop. It was an exciting opportunity for us to participate along with other experts and share our impression, experience and practices. The workshop activities were well designed for active participation through poster presentations and group discussions. It was interesting for us to observe the system performance in countries with topography similar to ours, as well as to compare the performance with other countries with dissimilar topography. We learnt from their implementations new ideas that we can apply to our own system.

Discussions were focused on data sharing and its impact on overall performance of the system. Also, the multiple extensions of the system, e.g. landslide susceptibility mapping to urban flood warning, were discussed during the workshop. This was very important. In the changing climate where rainfall extremes are rising, further development in multi-hazard early warning systems with improvements and sustainability are necessary. The FFGS has been an important decision support tool for issuing early warnings in the small flashy rivers of Nepal and other countries where neither monitoring stations nor forecasting systems are established.

The key take-away messages from the experience sharing workshop for us were mainly on the improvement of the overall system performance and ensuring sustainability. A general consensus was that funding is required for the sustainability which demands more public outreach and collaboration with donors as well as implementing organizations and future steps should be taken in this regard.

Finally, we are thankful to the Turkish State Meteorological Service (TSMS) for hosting us in the beautiful city of Antalya.



**Bikash Nepal, Meteorologist
Department of Hydrology and
Meteorology, Nepal**

**Sunil Pokharel, Hydrologist
Department of Hydrology and
Meteorology, Nepal**



Photo 11. Participants from the SAsiaFFGS region.

**Jelena Jerinic, Head of Hydrological Forecast & Early Warning Division
Dejan Vladikovic, Coordinator, Hydrological Forecasts and Warnings
Republic Hydrometeorological Service of Serbia**

The workshop was a magnificent meeting point for experts from around the world who use FFGS in their countries. The workshop was a great opportunity to gain insight into the scope of the FFGS project and activities as well as new tools.

What stood out for us at this workshop was the poster presentations. Participants shared their experience with the application of the FFGS via posters that were exhibited in the front hall of the conference room. This presentation method allowed attendees to get an overall look at issues other participants were facing in their countries related to flash floods and urban floods, landslides, issuance of alerts concerning the arrival of high water and flash flood defense.

As far as we are concerned, the cooperation and communication with Regional Centers are important. During the regional meeting for South Eastern Europe (SEE), we met with Regional Center staff of the Turkish Meteorological Agency for SEEFFGS. An informal SEEFFGS group within the WhatsApp application was established which enables easy and fast communication of issues related to FFGS within our region. Furthermore, our proposal regarding the introduction of the issuance of warnings on torrential floods into operational practice within the region was adopted.

A common recommendation noted during the workshop was the need to include additional data from radars and automatic weather stations, as well as NWP products in the FFGS. Also, recommendation for additional and regular trainings to be held more frequently due to staff fluctuations in all hydro-meteorological institutions in the region was highlighted.



Photo 11. Participants from Croatia, Serbia, and Bosnia-Herzegovina

It was also suggested that "work meetings" with colleagues from the region should be held more frequently in order to share and exchange relevant experiences related to the use of FFGS.

During the workshop, an episode of intense and heavy rainfall took place in Slovenia, Croatia, Bosnia & Herzegovina and Montenegro. This provided a good opportunity to exercise the capabilities of the SEEFFG system and hold real-time discussions of results among regional users..

We had expected that during the Workshop new products of the system with practical training would be presented in more detail. This did not happen, but is suggested for future workshops.

We take this opportunity to once again thank the organizers of the Workshop for the impeccable organization and look forward to continuing this project in the coming years.

**Jacqueline Rivera, Impact Forecast Specialist
Ministerio de Medio Ambiente Recursos Naturales (MARN)
El Salvador**

The Global Workshop brought together both current and new FFGS users from around the world. The main objective was to share best practices with other FFGS practitioners and assess measures of sustainability at country, regional and global levels.

The workshop environment was dynamic, combining short talk sessions by experts in the system and developers, interactive meetings between the participants, and poster exhibitions on different topics. The topics covered issues from technical information of the models, to forecast issuing methods, and verification.

For current users of FFGS, the workshop permitted the sharing of experiences, case studies examples, and verification efforts. For future users, the workshop was an excellent opportunity to see the potential in the FFGS and how that potential could support the operational processes for weather and flood monitoring in real time. The most discussed topics for improving the system were the inclusion of more numerical weather prediction models, radar data and hydrological models for urban floods.

Different users from different regional systems shared experiences and needs, such as:

- Data sharing
- Real-time communication between users from the same region
- Use of FFGS in operational processes
- Opportunities to strengthen the system components

In general, the approach of the workshop was effective since all countries were able to share experiences and learn from other regions and countries.

Important points discussed throughout the workshop were:

- Training as the first step to sustainability since well-trained forecaster can transmit information properly to others.
- SOP's are important for both operational and verification processes.
- Successful warnings come from well-trained forecasters and well calibrated models.
- MapServer is an important tool in the process for issuing warning and consider areas exposed to threats.
- Urban floods have become more severe and this type of model is important to develop.

The workshop was completely successfully. It was highly dynamic and combined different ways for sharing information. All attendees had the chance to learn and participate in the process of sharing experiences and taking ideas to make their own regional systems more sustainable.

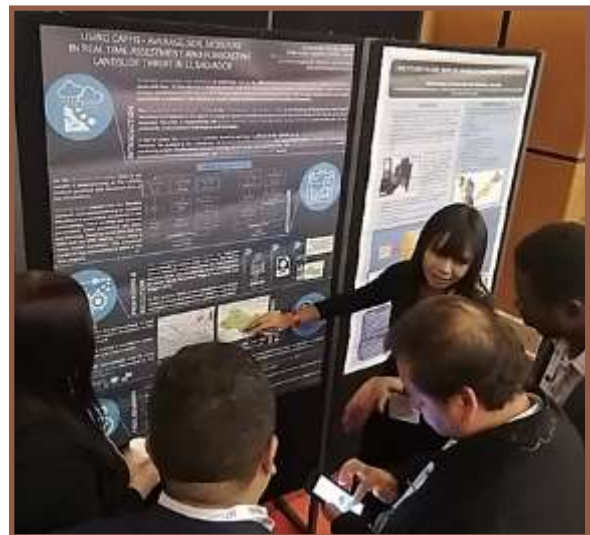


Photo 12. Ms. Rivera discusses her poster.