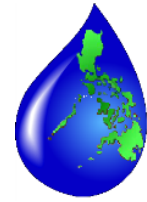


## Activity Report

Event: **4<sup>th</sup> PAGASA River Basin Flood Forecasting & Warning Centers' Conference & 2<sup>nd</sup> Streamgaging Field-Workshop**  
Date: **October 17-21, 2022**  
Venue: **Villa Caceres, Naga City, Camarines Sur**



### Background:

In retrospect, the 1<sup>st</sup> PAGASA River Basin Flood Forecasting & Warning Center Conference was held in May 2017 in Davao City and the 1<sup>st</sup> Streamgaging Field-Workshop was conducted in April 2019 in City of San Fernando, Pampanga. Both events were initiated through the efforts of the PRFFWC, being the main proponent of both undertakings.

After almost 2 years (2020-2021) of a none face-to-face group program activity in PAGASA due to the pandemic, the PRFFWC, through the support and coordination of other PAGASA divisions, once again opened the in-person RBFFWC program through the 4<sup>th</sup> PAGASA RBFFWC Conference & the 2<sup>nd</sup> Streamgaging Field-Workshop which was held this October 17-21 (2022) in Naga City, Camarines Sur.

This latest conference-workshop was already proposed in the 1<sup>st</sup> quarter of 2020 but unfortunately due to the pandemic situation it was put on-hold. In the last quarter of 2022, after an ease in the pandemic restrictions, the proposal was re-opened by PRFFWC and eventually was organized and pushed through with the usual intended group of PAGASA personnel who are manning the RBFFW System Operations Centers in the country, particularly the hydrologists / flood forecasters and also hydro technicians including systems telecom engineers.

The Pampanga River Basin Flood Forecasting and Warning Center (PRFFWC), being the pilot FFWS in the country, has always been in the forefront of organizing programs and activities for the RBFFWCs as there is always a need to engage, enjoin, capacitate and enhance the operational flood forecasting & warning activities of these centers.

The recently concluded 4<sup>th</sup> RBFFWC conference and the 2<sup>nd</sup> Streamgaging field-workshop had some of the following focused aspects such as providing updates and new ways in enhancing the operational flood forecasting & warning services of the RBFFWC, building up their hydrological databases, and a focus on engaging RBFFWC in carrying-out streamgaging activities.

### Conference & Field-Workshop highlights:

As per PAGASA Special Order 1317 S. 2022 a total of 22 participants from various division, mostly personnel from the various RBFFWC, of PAGASA were listed to attend the event. Additionally, 2 personnel from the UPRIS of National Irrigation Administration were also invited and joined on a special participation to the said event particularly in the streamgaging field-workshop as the said agency is also concerned in measuring river flow quantities in their field of activities.

The following PAGASA key officials were present, at some point, during the said event:

- Dr. Bonifacio G. Pajuelas, WSC, ODA for OS
- Ms. Nancy T. Lance, WSC, SL PRSD
- Ms. Vivien S. Esquivel, AWSC, NCR-PRSD



The opening day group picture of participants, resource speakers and key PAGASA officials together with the training section personnel of RDTD. (October 17, 2022)

The 5-day event was held in probably the best hotel in the area of Naga City, the Villa Caceres Hotel. For the streamgaging fieldwork, it was carried-out in literally one of the regularly flowing tributaries of Bicol River in the area of Naga City.



A view of the façade of the Villa Caceres Hotel along the Magsaysay Ave. in Naga City.

The event was practically divided in terms of topics for presentation and discussion that is for the conference side while lectures, fieldwork, and workshop for the streamgaging part. Most of the resource person were from the PAGASA; however, there were also 2 foreign lecturers who also discussed their line of expertise in the topics that were given to them.



The methodology for the event utilized the HyFlex learning setup, simultaneously streaming to a remote audience and coupled with the usual face-to-face (F2F) format. Onsite / F2F activities included practical exercises (as in the post streamgaging activities), write shops, reflections, and presentations.

The field-workshop was an on-hand activity for actual river-based measurements that is quite necessary in streamgaging activities.

Further, a relatively new platform of covering the event for documentation purposes and for archiving of the actual presentations / lectures which can be used for future learning references was presented and opened to participants during the said event. This was the PAGASA LMS platform (Unified Learning Advancement Platform: <https://ulap.weatherinfo.ph/>). It was through this platform that participants were asked to submit their assignments / exercises given during the event as a part of fulfilling the requirements for the said event course. It was also an interactive platform made available by the training section of RDTD for the online participants.

The streamgaging fieldwork was made quite practical to event attendees as actual streamgaging methods and related equipment were used during the field measurements thus making procedural work more easily understood and apart from having a worthwhile experience of doing the direct hands-on streamgaging activities.

**Event Conference-Workshop Participants and Resource Person, Secretariat & Support Staff, Drivers (PAGASA Special Order 1317 S. 2022):**

**Participants**

Name	Position	Division / Basin
Nimes, Nestor B.	Sr. Wx. Specialist	NCR PRSD / PRBFFWC
Yutuc, Rommel P.	Wx. Observer IV	NCR PRSD / PRBFFWC
Hagad, Pedro T.	Wx. Observer III	NCR PRSD / PRBFFWC
Hernandez, Gerald H.	Wx. Facs. Tech. I	NCR PRSD / PRBFFWC
De Vera, Gregorio II B.	Sr. Wx. Specialist	NL PRSD / ARBFFWS
Diaz, Lorenzo T.	Wx. Facs. Specialist II	NL PRSD / ARBFFWS
Lavadia, Loreto M.	Wx. Facs. Specialist I	NL PRSD / CRBFFWC
Fernandez, Angelo C.	Wx. Specialist I	NL PRSD
Maborang, Kristian D.	Wx. Specialist I	NL PRSD
Vergara, Mark Louie A.	Wx. Observer II	NL PRSD
Albaño, Josephine G.	Asst. Wx. Services Chief	SL PRSD / BRBFFWC
Ragodon, Dan R.	Wx. Facs. Specialist III	SL PRSD / BRBFFWC
Pila, Darwin R.	Wx. Facs. Tech. I	SL PRSD / BRBFFWC
Sabellano, Van Therese S.	Wx. Specialist I	V PRSD
Cuenca, Rolly M.	Wx. Observer I	V PRSD
Artigas, Jaymart L.	Wx. Specialist I	M PRSD / BMBFFWC
Castillo, Elton John H.	Wx. Specialist I	M PRSD / TRBFFWC
Dumanig, Dhina R.	Wx. Observer I	M PRSD / DRBFFWC
Mahilum, Araya A.	Wx. Specialist I	M PRSD / TLRBFFWC
Uson, Maria Cristina C.	Sr. Wx. Specialist	RDTD
Duran, Adelaida C.	Wx. Facs. Specialist II	HMD
Clemente, Laurence G.	Wx. Observer IV	HMD

**Resource Persons**

Name	Position	Division / Basin or Office
Hernando, Hilton T.	Asst. Wx. Services Chief	NCR PRSD / PRBFFWC
Mercado, Berlin V.	Asst. Wx. Services Chief	HMD
Macalalad, Rhonalyn V.	Wx. Specialist I	HMD
Zamudio, Nivagine C.	Wx. Specialist I	SL PRSD / BRBFFWC
Lopez, Marvin		HMD
Moron, Lorenzo	Sr. Wx. Specialist	RDTD
Ganal, Jr., R. B.	Wx Specialist II	NL PRSD
Sommer, Michael		Sommer Messtechnik

McHenry, John		American Society Committee on Hydrology
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**Event Secretariat and Support staff**

Name	Position	Division / Basin or Office
Bala, Michael S.	Asst. Wx. Services Chief	RDTD
Canillo, Lory Jean L.	Wx. Observer II	RDTD
Jagong, Gladys Angeline M.	Wx. Observer II	RDTD
Malazo, Mary Joyce	Wx. Observer Aide	NCR PRSD
<b>Event Drivers</b>		
Mendez, Renato A.	Wx. Observer Aide (FT)	AO
Batotoc, Erwin C.	Wx. Observer Aide (FT)	NCR PRSD
Peña, Paulino B.	Wx. Observer Aide (FT)	ETSD
Peña, Jonathan	Job Order	ETSD
Mison, Adolfo	Job Order	ETSD
Taguba, Reggie L.	Job Order	NL PRSD

**Summary of Presentations / Lectures / Activity brief:**

- 1. Presentation: “Recap of last River Basin Conference, Streamgaging Workshop”** (H.T. Hernando, PRFFWC, NCR-PRSD)

A brief on the 1<sup>st</sup> RBFFWC Conference rather than the last conference event was given as basically there were not much progress made from the first event to the last one conducted in 2019. The recap presented an outline of the tasks and activities of the RBFFWC and moreover ideas on how to enhance and sustain the operational flood forecasting & warning activities of RBFFWCs. On the other hand, the 1<sup>st</sup> streamgaging field-workshop was focused on the various methods and techniques in coming-up with discharge outputs.
- 2. Presentation & Discussion: “RBFFWC operations – best practices, challenges, gaps, and innovations”** (H.T. Hernando, PRFFWC, NCR-PRSD)

The presentation outlined on the following issues: history of FFWS in the Philippines; the concept of RBFFWC, reasons behind the setting-up of RBFFWCs, the center responsibilities and activities; and finally summarizing the presentation with the issue on why is there a need for a continuing RBFFWC conference for PAGASA - focusing on the challenges, gaps, and innovations.
- 3. Presentation: “Application of River Basin data / measurements to hydrological forecasting & research / modelling”** (R. V. Macalalad, HMD; presentation via online)

The presentation focused on the application of river basin data particularly for hydrological models such as for flood forecasting as a decision support system and for research such as in rainfall-runoff and inundation model experiment.
- 4. Presentation: “Machine Learning-based model: K-Nearest Neighbors and Logistics Regression for visualization and Prediction”** (L.J. Canillo, Training Section, RDTD)

Machine learning application such as using data to act on an objective is also made available for streamgaging purposes. Setting-up algorithms that will analyze and enable feed-in dataset to come-up with a prediction as in the case of a GIS-based Flood Management Information System which was utilized in some areas in Manila City for testing purposes.
- 5. Lecture: “Streamgaging basics, methods”** (D. R. Ragodon, BRBFFWC, SL-PRSD)

The basics of streamgaging mainly looked into the what, where, when, how and why of streamgaging activities. The various methods of getting and computing river velocity and how this will result to discharge information was mostly done during workshop proper.
- 6. Presentation: “River Cross-sectioning, Profiling, and other related river measurements** (J.M. Lopez, HMD; presentation via online)



The presentation provides a view of the various methods and techniques in taking the cross-section of a river channel as well as other measurement activities for capturing other important hydrological features within a river basin setting.

7. **Presentation: “Update of Flood Forecasting & Warning System** (B.V. Mercado, HMTS, HMD): The presentation walked us through the present situation of the PAGASA RBFFWC Centers; the various means of taking hydrological measurements (RR-WL data) using different sensors; and further included a brief explanation of the proposed set-up of X-band Radars that will augment river basin monitoring in the coming years.
8. **Lecture: “New approaches to river monitoring using the Radar Profiler”** (M. Sommer, Sommer Messtechnik)

The presentation focused more on the Radar Profiler (RP) which is basically the latest innovation in taking river velocity through a non-contact measurement of river surface velocity; eventually transmitting the measured info to an application that will provide the final discharge output. Of course, the river cross-sectional area is a required input to the application platform.



Event participants in their fieldwork attire took time for a photo session prior to the streamgaging fieldwork on the 3<sup>rd</sup> day of the conference (October 19, 2022)

9. **Lecture: “H-Q relationship, rating curve equation, rating table”** (H.T. Hernando, PRFFWC, NCR-PRSD)  
H-Q or stage-discharge relationship is usually a curved relationship that is developed by plotting discharge measurements at various water level and getting the equation of the said curve. The equation will represent the range of discharges at a certain river section corresponding to specific water level readings. The whole range of discharges for all the range of stages at that river section can be estimated from a resulting rating table.
10. **Lecture: “Development of Assessment Levels at forecasting points”** (H.T. Hernando, PRFFWC, NCR-PRSD)  
Assessment levels are the established river warning levels for a certain forecasting point in the monitored river channel that will served as a basis for RBFFWC to activate into a flood watch status and to guide the center in its issuance of its flood information to its target community. Developing the assessment levels would require continuous streamgaging activities as a lot of the river channels are dynamic especially after a relatively high flow regime.
11. **Presentation / Discussion: “Streamgaging database management”** (H.T. Hernando, PRFFWC, NCR-PRSD)  
The importance of being able to come up with a dataset of streamgaging activities, e.g., the varying river cross-sections of a certain river channel through time can be very helpful not only for flood forecasting activities but also for other hydrological-related activities such for river

infrastructure designs, etc. There can be a lot of actions that can be developed when there are continuing records of streamgaging activities for a certain river channel.

**12. Presentation: “Disaster Risk Reduction Efforts on Hydromet Hazards”** (R.B. Ganal, Jr., NL-PRSD; presentation via online)

The presentation highlighted mainly on the 4 thematic areas of DRRM, in particular focusing on RA 10121. It further relates the activities of FFW which falls within the thematic areas of Disaster Prevention and Mitigation and Disaster Preparedness. Finally, it gives some details on the issues of flood forecasting and disaster management as well as some particular roles of the RBFFWC before, during and after a flood event.

**13. Presentation: “DRR, Impact-based Forecasting of Hydromet Hazards”** (L. Moron, RDTD; presentation via online)

A complementary presentation to the conference was on the DRR and Impact-based forecasting for Hydromet Hazards. The rationale behind this formulation is that it would be more practical to provide warning information that would lead to a community’s action / activity as this will focus on a more robust response to hazards that are posed to affect the community. To simply put, as in the WMO concept on its Guidelines on Multi-Hazard Impact-based Forecast & Warning Services (WMO-NO. 1150, 2015), *“while there is a realization of what the weather (or flood) might be, there is frequently a lack of understanding of what the weather (or flood) might do.”*

**14. Presentation / Discussion: “Harmonization of Hydrological Information”** (H.T. Hernando, PRFFWC, NCR-PRSD)

Hydrological information provided by river basin centers should be complete and understandable to (intended) the target recipients (flood prone communities) within the basin such that a corresponding action / activity are undertaken at the local level especially during imminent flood events. Hence, it is imperative that hydrological information, particularly FAs and FBs (Flood Advisories & Flood Bulletins), should not only have the corresponding hazards that are likely to happen but rather also what will be the potential effects of these hazards in the activities of the communities that are forecasted to be affected. This is really the intention of the conference part of this event and that this topic should continually be raised in the next RBFFWC conference.

**15. Discussion / Presentation: “Ways Forward – RBFFWC Action / implementation Plan** (B.G. Pajuelas, NCR-PRSD (via online); M.S. Bala, TPIS, RDTD)

The culminating part of the event proper focuses on the plan of action of the RBFFWC as per the topics discussed during this conference. Further, an analysis and a push for the implementation and planning of the streamgaging activities in each RBFFWC has proved to be necessary and important in the enhancement of operational Flood Forecasting & Warning of a River Basin FFWC.

**(some) Event pictures:**



A set-up of Radar Profiler (RP30 and RQ 30) and other instruments at the upstream side of the measuring bridge.



Participants took turns in taking river cross-section by using dropdown line for sounding atop a bridge.



Bamboo floats were used as a means of describing the float method for river velocity measurements.



Using a winch with depth counter placed on a bridgeboard was another way of facilitating the measurement of river cross-sections.



(Top L) One of the conference workshop activities required participants to draw their river basin to gauge them as to how well do they know their basin of concern' (Top R) Participants show their drawn schematic of the river basins and were evaluated individually.



### The Learning Outcomes:

It was expected that at the end of the event the participants should somehow be able to have grasp, been aware of, and take action on the following activity issues:

- the best practices, challenges, gaps, and possible innovations as to their river basin of concern;
- to describe the use / importance of streamgaging in hydrological monitoring and operational flood forecasting and warning;
- to identify the appropriate method and approaches to streamgaging and river-related measurements as far as their monitored rivers / tributaries are concerned;
- and from the above previous statements, the river basin centers should (now) be able to conduct their streamgaging activities in their river basin;
- come-up with a schedule of conducting streamgaging in their RBFFWC;
- compute river flow / discharge and be able to update their forecasting point's rating curves;
- to build a streamgaging activity database for their respective river basins;
- For hydrological information, the river basin centers should create somehow some common formats when issuing flood warning information with recipient communities as their focus;
- to work-out an action / implementation plan for their respective river basins.

The above activity topics and issues have been covered during the conference and in the field-workshop but plainly there are still limitations to many of the river basin centers of PAGASA, e.g. lack of instruments-equipment, lack of personnel, limitations as to streamgaging experience, and a lot more. With this being an event margin, it is, therefore, highly recommended and a must that the PAGASA RBFFWC conference be a regular continuing program of the agency. The streamgaging activities of every river basin center should also be given importance as this is a vital program that is tied-up with the enhancement of operational flood forecasting and warning insofar as PAGASA mandate is concerned. Again, to mention that the ultimate goal is to empower the river basin centers.





The last day group photo of the conference (October 21, 2022)



PRFFWC-Dec2022

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