Gmail **FRCD-WEMS Watershed Ecosystem Management Section <frcd.wems@fmb.denr.gov.ph>**

Regional Presentation of the Annual Report (January to December 2021) on Data Visualization and Analysis generated by the Watershed Monitoring Instruments

FRCD-WEMS Watershed Ecosystem Management Section <frcd.wems@fmb.denr.gov.ph> Thu, Apr 28, 2022 at 2:34 PM

To: DENR-R1 CBFM <denr1cbfm@gmail.com>, Marina Malamug <denr2_crb@yahoo.com>, PFMS -CDD <pfmscddr3@gmail.com>, Alyssa Denise Carreon <lyssaden@gmail.com>, Ronie Alpharo <ronie_alpa98@yahoo.com>, Cheska Barreda <cheska.barreda@gmail.com>, Cheska Barreda <denr5cddpambcs@yahoo.com>, Watershed R9 <watershedr9@gmail.com>, DENR R10 PFMS <pfms@r10.denr.gov.ph>, Watershed_CDD DENRCAR <denrcar.watershed.cdd@gmail.com>, cdd caraga <watershedmngtcaraga2018@gmail.com>, Lyka Ebreo <lyka.ebreo@yahoo.com>, PFMS CDD <pfmscdd2016@gmail.com>, Marylou Zarasate <pfms.cddxi@gmail.com>, Production Forest <pfms.denr12@gmail.com>, Analie Uayan <analie.uayan@yahoo.com>, ilanoronald83@gmail.com, CDDTS DENR-CAR <cddts.denrcar@gmail.com>, Emelyn Nuguid <ejenuguid@gmail.com>, gen.arbolonio@yahoo.com, DAILINDA VILLAMOR <villamordailinda@gmail.com>, michelle barroga <barrogamichelle12@gmail.com>, River Basin Coordinating Office CALABARZON <rbcocalabarzon@gmail.com>, Emerald Hufalar <emerald_hufalar@yahoo.com>, denr_baguio@yahoo.com.ph, r11@denr.gov.ph, DENR Region 6 <r6@denr.gov.ph>, R7@denr.gov.ph, John Carlo Legada <carlolegada@gmail.com>, denr7cdd2@gmail.com, wipcar@gmail.com, pangcoganorhassan@yahoo.com, denrncrejcarcillas@gmail.com, denrncrrtdejuan@gmail.com, denrpmd02pps@yahoo.com, ppdppso@yahoo.com, ppdppso@gmail.com, odpps@yahoo.com, "Ma. Teresa Aquino" <mtaquino@fmb.denr.gov.ph>, "Ma. Teresa Aquino" <materesaaquino@gmail.com>, Isabelita Austria <iaustria@fmb.denr.gov.ph>, Rex Victor Cruz <rocruz@up.edu.ph>
Cc: Alicia Castillo <alice_2000_ph@yahoo.com>, Angelito Jr Bisquera <ahbisquera1@alum.up.edu.ph>, Angelito Jr Bisquera <AHBISQUERA1@up.edu.ph>, fddimaculangan3@up.edu.ph, johncalvinclarete@gmail.com, for.jericangeles@gmail.com

Good day!

This is to inform you that the scheduled meeting on 3 May 2022 will be postponed due to the celebration of Eid al-Fitr. In this regard, the meeting on the Regional Presentation of the Annual Report (January to December 2021) on Data Visualization and Analysis generated by the Watershed Monitoring Instruments **is rescheduled on 4 May 2022 from 8:30 AM - 4:00 PM.**

Meeting details:
Meeting ID: 829 3846 9498
Password: 55726

Thank you and stay safe!

Watershed Ecosystem Management Section
Forest Resources Conservation Division
Forest Management Bureau
Phone : (63-2) 8925-9796
Email Address : fmb@denr.gov.ph

[Quoted text hidden]

Republic of the Philippines
Department of Environment and Natural Resources
FOREST MANAGEMENT BUREAU
Visayas, Avenue, Diliman, 1100 Quezon City
Tel. No.: (632) 8925-2141 / (632) 8927-4788
E-mail Address: fmb@denr.gov.ph Website: https://www.forestry.denr.gov.ph

NOTICE OF MEETING

FOR/TO : **The Director**, Policy and Planning Service
The Chief, Planning and Programming Division, PPS
Regional Instrumentation Focal Persons, DENR CAR, NCR, Regions 1-13
Regional Planning Officers, DENR CAR, NCR, Regions 1-13
The Chief, Forest Policy, Planning and Knowledge Management Division
The Chief, Forest Resources Conservation Division
The Chief, Watershed Ecosystem Management Section
Technical Staff, Watershed Ecosystem Management Section

FROM : The Director

AGENDA :

	Topic	Time
1.	Presentation of the highlights and agreements made during the Meeting on Regional Quarterly Report Presentation on Data Visualization and Analysis Conducted last November 4, 2021	9:15 A.M
2.	15-min Regional Presentation of the Annual Report (January - December 2021) on data visualization and analysis (10 mins presentation, 5 mins open forum)	9:45 A.M.

DATE : April 20, 2022, 8:30 AM – 4:00 PM

MODE : Teleconference via Zoom Application
Meeting ID: 82938469498
Passcode: 55726

The attendance of the participants is highly enjoined to the above-mentioned meeting. For inquiries, you may contact For. Alicia L. Castillo at (02) 89282891 or email us at Watershed Ecosystem Management Section at frcd.wems@fmb.denr.gov.ph.

Attached herein are the program of activities, copy of agreements made during the Meeting on Regional Presentation of the Quarterly Reports on watershed instrumentation held last November 4, 2021, and the format of the quarterly/annual report on data generated from the watershed monitoring instruments, for your ready reference.

TIRSO P. PARIAN, JR., *CESO IV*

MEETING ON THE REGIONAL PRESENTATION OF ANNUAL REPORTS ON THE DATA GENERATED FROM THE SCIENCE-BASED REAL-TIME WATERSHED MONITORING INSTRUMENTS

20 April 2022

PROGRAM OF ACTIVITIES

Time	Topic	Concerned Office
8:30-8:40 AM	Opening Program	Moderator
8:40-8:55 AM	Introduction of Participants	Moderator
8:55-9:15	Welcome Remarks	**Tirso P. Parian, Jr.**, *CESO IV* Director, Forest Management Bureau
9:15-9:45AM	Presentation of the highlights and agreements made during the Meeting on Regional Quarterly Report Presentation on Data Visualization and Analysis Conducted last November 4, 2021	**For Alicia L. Castillo** Chief, Watershed Ecosystem Management Section, FRCD, FMB
9:45.-12:00 NN	15-min Regional Presentation of the Annual Report (January to December 2021) on data visualization and analysis (10 mins presentation, 5 mins open forum)	Presenters CAR, NCR, Regions 1-3 Panelists: PPS, FRCD, FPPKMD, Dr. Cruz
12:00 – 1:00 PM	Lunch	
1:00 – 3:30 PM	15-min Regional Presentation of the Annual Report (January to December 2021) on data visualization and analysis (10 mins presentation, 5 mins open forum)	Presenters Regions 4-13 Panelists: PPS, FRCD, FPPKMD, Dr. Rex Victor O. Cruz
3:30-3:40 PM	Synthesis of the annual reports	Moderator
3:40– 3:50 PM	Way Forward	**For Alicia L. Castillo** Chief, Watershed Ecosystem Management Section, FRCD, FMB
3:50-4:00 PM	Closing Remarks	**For Ma. Teresa G. Aquino** Chief, Forest Resources Conservation Division, FMB

Republic of the Philippines
Department of Environment and Natural Resources
FOREST MANAGEMENT BUREAU
Visayas, Avenue, Diliman, 1100 Quezon City
Tel. No.: (632) 8925-2141 / (632) 8927-4788
E-mail Address: fmb@denr.gov.ph Website: https://www.forestry.denr.gov.ph

MEMORANDUM

FOR : The Assistant Secretary for Policy, Planning and Foreign Assisted and Special Projects, and Director, in concurrent capacity

THRU : The Chief, Forest Resources Conservation Division, and In-charge, Office of the Assistant Director

FROM : The Chief, Forest Protection Section and OIC, Forest Conservation Division

SUBJECT : **MEETING ON REGIONAL PRESENTATION OF WATERSHED INSTRUMENTATION DATA VISUALIZATION AND ANALYSIS CONDUCTED ON 4 NOVEMBER 2021**

DATE : NOV 19 2021

This has reference to the meeting held last 4 November 2021 regarding the above stated subject. The Regional Offices were requested to provide a brief presentation on the analysis and visualization of the result of the science-based and real-time watershed monitoring instruments in their area.

I. Attendees:

Name	Region	Office	Position
Capistrano, Melinda C	Central	PPS	Director
Aquino, Ma. Teresa	Central	FRCD	Chief
Cruz, Rex Victor O.	Central	UPLB CFNR	NAST Academician
Atienza, Marlon M.	Central	FPSS FPPKMD	Chief
Pajarito, Maria Erlinda P	NCR	NWRB	Engineer III
Castillo, Alicia	Central	WEMS FRCD	Chief
Angeles, Jeric	Central	WEMS FRCD	Forest Mgt Specialist II
Garcia, Yarah	Central	WEMS FRCD	Project Development Officer
Andes, Aliza Nicole	Central	WEMS FRCD	Project Development Officer
Bisquera, Angelito	Central	WEMS FRCD	Project Development Officer
Lagon, Abel	Central	WEMS FRCD	Sr Forest Mgt Specialis
Manugan, Jenilyn L.	CAR	DENR	Database Manager
Ota-Ot, Conario D.	CAR	CDD	Forest Management Specialist
De Juan, Richelle T.	NCR	CDD-PFMS	Forest Technician I
De Guzman, Mark Gabriel, B	NCR	CDD	Forest Extension Officer
Nuguid, Emelyn Joyce E	NCR	CDD PFMS	Forester II
Del Rosario, Anna Patricia C.	NCR	FMB-FPPKMD	Project Development Officer

Name	Region	Office	Position
Lucas, Christian M.	1	CDD	Data Management Officer
Durian, Mark Anthony T.	2	DENR	Database Manager
Jose Bueno, Jr	2	CDD	Development Management Officer
Soriano, Reymar B.	3	CDD	Project Monitoring and Evaluation Officer
Calderon, Gabriel P.	4A	DENR REGIONAL OFFICE	Forester I
Orbizo, Kier, L.	4A	CDD	Database Management Information System Analyst
Pamulaklakin, Guilbert A.	4A	PFMS-CDD	Rbco Technical Staff
Alpajaro, Ronie, E.	4B	CDD	Engineer II
Lester John A. Estremera	4B	DENR	DMISA II
Ancheta, Jaime, Jr. M	4B	CDD, PFMS	Forester III
Legada, John Carlo N	6	CDD	Development Management Officer I
Villamor, Dailinda T.	8	CDD	Forest Management Specialist
Josua Salceda	8	DENR REGION 8	Database Analyst
Barroga, Michelle F.	9	DENR REGION	Environmental Management Specialist
Alumbro, Nico V.	10	CDD	DMISA-I
Uayan, Analie L.	10	CDD	Development Management Officer II
Lonzaga, Rhyan R.	9	DENR-CDD	DMISA
Ebreo, Lyka, B	12	CDD-PFMS	Environmental Management Specialist I
Arbolonio, Genalyn J.	13	CDD	Science Research Specialist I
Custo, Sanny A.	13	CENRO BAYUGAN CITY	Watershed Focal Person
Serviano, Ma. Jessa L	13	CENRO TUBAY	Project Evaluation Assistant
Lamanilao, Gemma M.	13	CENRO TUBAY	Forest Ranger
Cuizon, Helen D.	13	DENR CENRO NASIPIT	Watershed Staff
Alas, Rosemarie A.	13	DENR CENRO NASIPIT	Forester I

II. Preliminaries

The meeting was called to order at 8:45AM. The opening message by the Assistant Secretary for Policy, Planning and Foreign Assisted and Special Projects and concurrent FMB Director was read by For. Alicia Castillo. In the message, the Assistant Secretary enjoined everyone to cooperate and participate during the meeting in order to capture the concerns specific to each region and provide a solution to these problems.

For. Castillo presented the highlights and major agreements during the Webinar on Data Analysis held last 17-19 August 2021 in order to provide the rationale of undertaking this meeting.

III. Highlights of the Meeting

Engr. Erlinda Pajarito of the NWRB presented the protocols on the selection, installation along with the budgetary requirements on the establishment of Conductivity, Temperature and Depth (CTD) Groundwater Sensor in order to apprise the Regional Offices in this concern. After this, the Regions presented their Quarterly Report. The copies of the presentations can be accessed at the link. https://bit.ly/2021_3Q_Instrumentation and the highlights of their presentations and discussions are summarized below.

Topic/Subject	Highlights/Agreements
On the Presentation of Engr. Pajarito	Dir. Capistrano clarified the statement of "minimal data" generated from the instruments and was responded by Engr Pajarito that there is a need for telemetry in order to make use of all the 61 monitoring wells. At present, there are only 22 monitoring wells with telemetry. Engr. Pajarito also clarified that NWRB is in partnership with Ateneo de Manila University (ADMU) and Department of Science and Technology Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST PCIEERD) hence not all the wells are turned over to them. Dr. Cruz emphasized the importance of contextualizing the readings of the instruments in order to determine the overarching aspirations and determine the behavior of the groundwater resource. For. Aquino clarified whether there is a flexibility in the unit cost of PHP785,000.00 for establishing monitoring wells and Engr. Pajarito responded that depending on actual situations, the unit cost may be lowered or increased.
Regional Presentations CAR (Mr. Canario Ota-ot)	Dr. Cruz emphasized to all regions that it is vital to determine the trend on the given set of data. It is also important to determine other monitoring stations from PAGASA and DOST NOAH for example in order to complement the results. It is important to note the presence of natural and social events in the watersheds which is an important input to the comprehensive analysis of the watershed For. Aquino agreed with the importance of capturing the details for such event as this will help in the holistic behavior of watersheds.
NCR (Ms. Emelyn Nuguid)	Dr. Cruz commended the presentation of comprehensive datasets as presented by NCR.

Topic/Subject	Highlights/Agreements
	He suggested that one of the criteria in the selection and targeting of watersheds for CRVA and IWMP should be the presence of watershed instruments. For. Aquino also emphasized the importance of correlating PAGASA and DOST data on extreme natural and social events as these may provide information on the behavior of watersheds
Region I (Mr. Christian Lucas)	Dir. Capistrano emphasized the practical use of data and its analysis in terms of DENR (particularly on IWMP) and should be included in the report. She added that FMB should generate a clustering on the watershed data analysis on a macro level. Dr Cruz suggested to consider the usability of data with other information that needs to be gathered as an ideal tool in the monitoring and application to planning. For Aquino expressed the need to present the analysis on watershed instruments to the management and planning officers of the regions for science based decision making.
Region II (Mr. Jose Bueno)	Dr. Cruz commended the presentation as all parameters were presented well. He added that DENR can also share copy of the data to LGUs and MAO for them to utilize these data. For. Aquino emphasized the implication and advantage of the data analysis to Build Back Better (BBB) Project and other major initiatives Director Capistrano added that in the execution of the Devolution Transition Plan (DTP) of Mandanas, these data are indeed essential for the LGU to manage their jurisdictions
Region III (Mr. Reymar Soriano)	Dir. Capistrano emphasized the importance of involving the Regional Planning Officers on the use of these data for the formulation of Budget Proposal and Forward Estimate. She suggested to invite the regional planning officers in similar activities. Dr. Cruz explained the importance of capturing the whole trend from the first reading of the instrument in order to have a whole picture of the events. For. Aquino emphasized the importance of determining these trends in terms of managing the watersheds.
Region IV A (Mr. Keith Orbizo)	Dir. Capistrano emphasized the need to understand the technical and specific data and information of watershed instruments by all, especially the Extension Officers.

IV. Ways Forward

The synthesis and ways forward based on the agreements was presented to the body by Engineer Aliza Nicole Andes.

ITEM	AGREEMENT	DATE	RESPONSIBLE OFFICE
1. Succeeding regional presentation	Include the Regional Planning Officers in the regional presentation of annual report	1st week of Feb	All Regional Offices
2. Format of Quarterly Report	-Revise the quarterly report format integrating the unique components of the presentation from each Regions. -Include the implications/application of the data to ENR plans, activities, and programs.	Dec-21	FMB
3. Additional AWLS	To conduct field work to identify the appropriate areas for the installation of additional AWLS	Nov-21	FMB, Region 5
4. Inventory of the instruments	Conduct inventory of the existing and functioning instruments reflecting those installed by FMB and other agencies to avoid duplication of instruments.	Dec-21	FMB
5. Roadmap for the installation of instruments	Use the presence of watershed instruments as parameter in targeting and prioritizing watersheds for CRVA. Meeting with Dr. Cruz, ERDB, PPS, FPPKMD, FRCD and one student knowledgeable on statistics on the road map for the installation of instruments.	Dec-21 Dec 2, 2021	All Regional Offices
6. Maintenance of instruments	Regional Office to submit proposal request for additional budget for the maintenance of instruments.	Dec-21	All Regional Offices
7. CRVA and IWMP	Prioritize the preparation of CR cum VA and IWMP of the 30 pilot watersheds with instruments if there is no existing CR cum VA and IWMP, yet.	Dec-21	FMB
8. Standard values of data	Conduct meeting with NWRB,DPWH and PAGASA on the standards use for the monitoring of the data being generated by the AWS, AWLS and CTD Groundwater Sensor	Dec-21	FMB

ITEM	AGREEMENT	DATE	RESPONSIBLE OFFICE
9. Cost for the maintenance	Review of unit cost and budget allotted for the maintenance of the watershed monitoring instruments.	Dec-21	FMB
10. Capacity Building Activity	Conduct capacity building activity for the Regional Offices including Climate Change Service in data analysis, usage of purchased laboratory equipment, and proper maintenance of the equipment.	Mar-22	FMB, Climate Change Service and All Regional Offices
11. Budget Proposal	Any proposal on watershed instrumentation needed by the RO's and FMB be included in the 3-yr forward estimate.	Dec-21	FMB and All Regional Offices

The meeting adjourned at 6:00PM.

FOR THE DIRECTOR'S INFORMATION AND FURTHER INSTRUCTIONS, IF ANY, PLEASE.

RAUL M. BRIZ

FORMAT OF THE QUARTERLY/ANNUAL REPORT ON DATA GENERATED FROM THE SCIENCE-BASED REAL-TIME WATERSHED MONITORING INSTRUMENTS

Quarterly/annual reports being submitted by the Regional Offices shall not only include DENR-installed watershed instruments but also instruments installed by other agencies. Each section of the report shall reflect information such as, but not limited to the following:

1. INTRODUCTION
    - brief description of the whole watershed being monitored
        - location
        - area
        - importance of the watershed (source of water for domestic, irrigation, commercial, industrial and ecosystem purposes; others)
    - monitoring instruments installed within the watershed with map of the watershed showing location where instruments were installed and table shown below

Instrument	Purpose	Location (Coordinates, Bgy, Town/City	Date Installed	Status

2. DATA ANALYSIS
    - Summary of the date collected for the period using the table below

Parameter	Number of Instruments Installed	Period Covered	Average	Maximum	Minimum
Rainfall					
Air Temperature					
Relative Humidity					
Wind Velocity					
Wind Direction					
Solar Radiation					
Streamflow Level (m)					
Streamflow (cms)					
Streamflow Temp (C)					
Groundwater Level (m					
Soil Moisture					
Conductivity					

NOTE: Average values are computed arithmetic average for all instruments installed in the watershed (e.g., average of rainfall from all AWS installed in the watershed). Maximum and minimum values are the maximum and minimum values observed in the watershed from all instruments.

- Trend analysis for each parameter using line or bar graphs covering data collected from the beginning to the period being reported

- Include also the comparison of data recorded from similar instruments installed in other areas by other agencies, if possible.

- Correlation of various parameters with one another as appropriate using 2-dimensional graphs:
  a. Rainfall and air temperature
  b. Rainfall and stream water level
  c. Rainfall and CTD water level
  d. Air temperature and water temperature
  e. Streamflow during low/mid flow season and stream water level

- Brief explanation of the trend of a parameter observed by exploring attribution to other parameters monitored, and attribution to natural and human activities observed/recorded during the period.

If appropriate, include the following:

- Include secondary data such as historical data and projections from existing masterplans and correlate these in the present data to improve the analysis.

- Include a list of key events in the watershed during the period of report such as but not limited to natural and human-induced disasters (forest/grass/brushfires, landslides, flashfloods, typhoons, excessive rainfall event, storm surge, earthquake, volcanic eruption) with estimated cost of damages and persons affected, programs, activities, projects, policies (e.g., tree planting, road construction, apprehensions of illegal forest activities, launching of forest and environmental related activities/programs (e.g., solid waste and wastewater management, IEC and advocacy, etc.).

Event – Natural and Human-induced Disaster	Description	Date	Location (long/lat, barangay, town/city, province)	Number of individuals affected	Estimated Cost of Damages

Event – Program, Activity, Project	Description	Date	Location (long/lat, barangay, town/city, province)	Organizer (Individuals), Group, Organization, NGA, NGO	Status

3. SUMMARY AND CONCLUSION

- Summary of the report
- Major findings on the analysis

4. RECOMMENDATIONS

Include in this section recommendations on how to utilize the results of the analysis data gathered during the period in making science-based decisions related to the DENR programs and activities being implemented by your Region.

- Use of threshold values of rainfall (available in PAGASA website) that may result to flooding downstream
- Use of the data as referenced from Philippine Standards for Drinking Water for providing advisories on safe use of water from the groundwater
- Use in determining the rate of groundwater extraction that will not exceed the rate of recharge
- Use of weather data to guide farmers in adapting their farming practices
- Use of streamflow quality and quantity data to guide the management of land uses and land use practices in the watershed to ensure that streamflow quality and quantity are not adversely affected (e.g., to determine how much forests should be maintained in the watershed, and how much uplands can be used for upland farming or agroforestry)
- Use in the identification of areas in the watershed that need priority actions such as but not limited to highly eroded and landslide areas, flood prone areas, and deforested areas, critical areas vulnerable to farming and other intensive uses
- Use in identification of areas that are safe and suitable for ecotourism

5. ANNEXES

- profile of the whole watershed (developed following the DENR Technical Bulletin)
- tabulated summary of data downloaded from the instruments including manually downloaded data (sample tables attached).
- visualization/graph of each recorded data including overlaying graphs
- include permanent sections that shall be updated in the succeeding reports, whenever necessary, namely:
    a. List of all watersheds showing all geographic information (coordinates, sitio, barangay, municipality, province at least)
    b. List of instruments per watershed with all essential geographic information (coordinates, elevation, sitio, barangay, municipality, province at least), and status of each instrument with dates as appropriate.
    c. Map showing the various watersheds and location of all monitoring instruments and the extent of the area covered by each instrument.
    d. List and description of all instruments and their respective purposes (i.e, data being collected, and potential applications of the data being collected).
    e. List of focal persons including members of monitoring team per watershed
- Include a log of data requests during the period being reported from DENR offices, LGUs, academe, NGOs, etc. Include the name of requesting agency/office/person, date of request, data requested, use of data being requested, and name of the watershed.

NOTE: Ideally, making application and implication statements at this early stage about the data being gathered and reported for the period should be avoided in order not to appear that there is already conclusive evidence being used as the basis of applications. However, potential applications and implications may be stated but with clear caution that the datasets so far gathered are still far from being adequate to support evidence-based conclusions and recommendations.

SAMPLE TABLES

Table 1. Summary of Climatological Data Obtained from the Installed Automated Weather Stations for January 2021.

	Watershed	Province	Municipality	Total Precipitation (mm)	Average Temp. (°C)	Max Temp. (°C)	Min Temperature (°C)	Average Solar Radiation (W/m^2)	Average Wind Speed (m/s)	Average Vapor Pressure (kPa)	Average Atmospheric Pressure (kPa)	Average Vapor Pressure Deficit (kPa)
Region 1	Bulu River Watershed	Ilocos Norte	Adams	FOR BATTERY REPLACEMENT/CHARGING								
Region 1	Buaya River Watershed	Ilocos Norte	Gregorio del Pilar	133	24.42	33.5	15.8	362.33	1.17	2.37	97.4	0.84
Region 1	Bulu River Watershed	Ilocos Norte	Dumalneg	221	23.77	30.5	18.4	316.55	2.28	2.25	100.36	0.71
Region 2	Cagayan River Watershed	Cagayan Valley	Baggao	189	23.1	32.4	16.8	259.28	-	2.33	100.94	0.52
Region 2	Cagayan River Watershed	Cagayan Valley	Baggao	192.6	22.96	31.7	16.2	218.39	0.62	2.4	100.68	0.42
Region 2	Cagayan River Watershed	Cagayan Valley	Alcala	148.6	23.02	31.9	18.4	222.8	1.79	2.44	100.84	0.39
Region 3	Agno River Watershed	Tarlac	Capas	70.8	25.25	31.8	20.2	269.52	0.49	2.82	99.112	-
Region 3	Agno River Watershed	Tarlac	San Jose	72.4	25.52	33.5	18.5	359.43	0.72	2.56	99.53	0.76
Region 3	Agno River Watershed	Tarlac	Tarlac City	41.4	25.58	31.9	19.1	374.09	1.7	2.88	100.31	-
Region 4A	Pasig-Laguna River Watershed	Rizal	Rodriguez	INSTRUMENTS WASHED OUT DUE TO TYPHOON ULYSSES								
Region 4A	Pasig-Laguna River Watershed	Rizal	Antipolo	INSTRUMENT UNDER REPAIR								
Region 4A	Pasig-Laguna River Watershed	Laguna	Liliw	209.4	23.99	31.7	18.5	219.55	0.66	2.49	98.72	0.51
Region 4B	Mag-asawang Tubig	Oriental Mindoro	Victoria	1155.2	23.88	32.4	20.5	148.82	-	2.99	99.97	0.22
Region 4B	Butas River Watershed	Oriental Mindoro	Victoria	525.4	25.05	32	21.2	203.51	0.62	2.99	100.86	0.21
Region 4B	Bongabong River Watershed	Oriental Mindoro	Calapan City	186	24.87	33.8	20.7	294.72	2.61	2.61	98.2	0.57
Region 5	Bicol River Watershed	Albay	Bacacay	388.2	24.44	30.1	21.2	222.98	1.59	2.49	99.1	0.58
Region 5	Bicol River Watershed	Camarines Sur	Iriga city	314.6	25.71	32.8	21.2	255.74	1.1	2.86	100.79	0.46
Region 5	Bicol River Watershed	Albay	Polangui	FOR BATTERY REPLACEMENT/CHARGING								
Region 6	Panay River Watershed	Capiz	Roxas City	38	26.36	31	22.4	286.29	1.66	2.78	100.79	0.67
Region 6	Hamulauon River Watershed	Capiz	Tapaz	462	25.01	33.3	21.5	195.97	0.26	2.67	99.24	0.52
Region 6	Hamulauon River Watershed	Capiz	Dao	241.6	25.64	32.3	21.9	200.56	1.45	2.79	100.82	0.52
Region 7	Abatan River Watershed	Bohol	Catigbian	551.4	24.9	31.2	18.9	237.85	0.63	2.74	98.48	0.43
Region 7	Loboc River Watershed	Bohol	Carmen	348.6	24.94	32.8	19.2	247.37	0.55	2.73	98.34	0.45
Region 7	Loboc River Watershed	Bohol	Loboc	238.4	26.22	32.5	22	282.99	1.39	2.84	100.76	0.59
Region 8	San Joaquin River Watershed	Leyte	Ormoc City	50.4	22.85	29	18.2	240.31	1.31	2.29	94.02	0.5
Region 8	San Joaquin River Watershed	Leyte	Dagami	698.8	24.93	32.4	20.9	228.87	0.41	2.7	98.57	0.47
Region 8	San Joaquin River Watershed	Leyte	Tanauan	670.6	25.74	31.8	22.2	293.41	1.24	2.81	100.77	0.52
Region 9	Salug Daku River Watershed	Zamboanga del Sur	Dumingag	227	26.12	33.9	21.8	390.47	0.39	2.97	99.96	0.46
Region 9	Magpangi River Watershed	Zamboanga del Sur	Josefina	FOR BATTERY REPLACEMENT/CHARGING								
Region 9	Salug Daku River Watershed	Zamboanga del Norte	Sergio Osmena	5.2	23.22	31.5	18.4	163.12	0.62	2.61	94.76	0.26
Region 11	Tagum River Watershed	Davao del Norte	Talaingod	298.4	24.78	34.4	21.2	291.41	0.38	2.7	96.38	0.46
Region 11	Davao River Watershed	Davao del Sur	Davao City	FOR BATTERY REPLACEMENT/CHARGING								

Region 11	Davao River Watershed	Davao del Sur	Davao City	431.6	23.44	31.4	19.1	276.56	0.37	2.5	94.62	0.42
Region 12	Tamontaca River Watershed	South Cotabato	T'Boli	321.6	20.51	27.6	16.3	24.08	0.62	2.43	89.56	0.24
Region 12	Tamontaca River Watershed	South Cotabato	Lake Sebu	291.8	22.82	29.9	19.1	278.27	0.43	2.37	92.96	0.43
Region 12	Tamontaca River Watershed	South Cotabato	Sto Niño	183.6	5.86	33.1	21.6	309.08	0.65	2.7	99.05	0.67
Region 13	Agusan-Agusan del Norte River Watershed	Agusan del Sur	Bayugan									
Region 13	Cabadbaran River Watershed	Agusan del Norte	Cabadbaran City	372.2	25.12	32.5	21.3	262.28	0.45	0.81	99.84	0.41
Region 13	Magallanes River Watershed	Agusan del Norte	Butuan City	349.8	25.38	34	21.3	215.91	0.37	2.91	100.5	0.36
NCR	Navotas River Watershed	Quezon City		SIGNAL INTERCEPTION; INSTRUMENT FOR RELOCATION								
NCR	Pending	Quezon City		SIGNAL INTERCEPTION; INSTRUMENT FOR RELOCATION								
NCR	Navotas River Watershed	Quezon City		SIGNAL INTERCEPTION; INSTRUMENT FOR RELOCATION								
Region 10	Agusan-Misamis Oriental River Watershed	Bukidnon	Manolo Fortich,	517.8	20.35	29.2	15.8	231.45	0.43	2.11	88.61	0.3
Region 10	Agusan-Misamis Oriental River Watershed	Bukidnon	Libona	FOR REPLACEMENT OF INSTRUMENT DATA LOGGER								
Region 10	Agusan-Misamis Oriental River Watershed	Misamis Oriental	Cagayan de Oro City	65.4	26.8	33.6	22.5	325.14	1.03	2.95	100.54	0.6
CAR	Cagayan River Watershed	Kalinga	Pinukpok	FOR BATTERY REPLACEMENT/CHARGING								
CAR	Cagayan River Watershed	Mountain Province	Bauko	71.4	13.03	19.5	6.8	274.22	-	1.42	-	0.1
CAR	Cagayan River Watershed	Kalinga	Tinglayan	FOR BATTERY REPLACEMENT/CHARGING								

Table 2. Summary of Groundwater Data Obtained from the CTD Groundwater Sensors for January 2021.

	Watershed	**Province**	**Municipality**	**Sitio/Barangay**	**Average Depth (mm)**	**Average Temperature (°C)**	**Average Conductivity (mS/cm)**
Region 2	Cagayan River Watershed	Cagayan Valley	Baggao	Masical	7534.8177	27.7403	0.3065
Region 3	Agno River Watershed	Tarlac	San Jose	CBFM Areas of Help Farmers Association	3629.5500	27.0000	0.1090
Region 4A	Pasig-Laguna River Watershed	Rizal	Rodriguez	Sitio Wawa, Brgy. San Rafael	721.7016	26.6240	0.6213
Region 4B	Mag-asawang Tubig	Oriental Mindoro	Victoria	MinsCAT	8947.7081	26.5186	0.2463
Region 5	Bicol River Watershed	Camarines Sur	Bula	Catasan Elementary School, Brgy. San Miguel	9877.7959	28.5000	0.4808
Region 6	Malaguit River Watershed	Capiz	Pontevedra	Malag-It	4754.4916	28.7000	0.3945

Region 11	Davao River Watershed	Davao del Sur	Davao City	UM Campus, Matina	2253.2727	31.0476	1.2907
Region 12	Tamontaca River Watershed	South Cotabato	Sto. Niño	Poblacion	8338.1058	28.3000	0.1702

Table 3. Summary of Water Level Obtained from the Automated Water Level Station (AWLS).

Region	Watershed	Province	Municipality	Sitio/Barangay	Distance from the Sensor to River Bed (m)	MAX	MIN
CAR	Cagayan River Watershed	Kalinga	Tabuk	Canao Bridge		1.68	0.7
NCR	Navotas River Watershed			Atherton Bridge	7.2	38.14	0.46
Region 1	Bulu River Watershed	Ilocos Norte	Between Bangui and Pagudpud	Caramuagen/ Bolo Bridge	14.6	7.78	0.37
Region 2	Cagayan River Watershed	Cagayan Valley	Baggao	Ragarag Bridge	14.6	28.97	3.26
Region 3	Agno River Watershed	Tarlac	Capas	Brgy. Lawis	14.6	3.96	0.64
Region 4A	Pasig-Laguna River Watershed	Laguna	Sta. Cruz	Pagsawitan Bridge	14	5.85	1.66
Region 4B	Mag-asawang Tubig	Oriental Mindoro	Calapan City	Abaton-Maidlang Bridge	14.6	9.61	7.05
Region 5	Bicol River Watershed	Camarines Sur	Bula	Panuypuyan Bridge	11.3	-	-
Region 6	Hamulauon River Watershed	Capiz	Dao	Duyoc	12.95	8.35	2.88
Region 7	Loboc River Watershed	Bohol	Carmen	Katipunan Bridge	10.739	7.84	0.31
Region 8	Sangputan River Watershed	Leyte	Jaro	Cabayungan Bridge, Brgy. 1 Poblacion	7	2.15	0.58
Region 9	Salug Daku River Watershed	Zamboanga del Sur	Molave	Molave-Mahayag	10	6.22	1.54
Region 10	Cugman River Watershed	Misamis Oriental	Cagayan de Oro City	Cugman	7.5	3.39	0.5
Region 11	Padada River Watershed	Davao del Sur	Matanao	Padada Bridge, Brgy. Tamlangon	-	6.51	2.94
Region 12	Tamontaca River Watershed	South Cotabato	Marbel	Namnama Bridge	7	1.34	0.01
Region 13	Guihao-an River Watershed	Agusan del Norte	Buenavista	Brgy. Rizal, Agusan	9	2.34	0.27