

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 Assistant Director, Forest Management Bureau

Regional Instrumentation Focal Persons, 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 Assistant Secretary for Policy, Planning and Foreign Assisted and Special

Projects, and Director, in concurrent capacity

AGENDA

	Topic	Time
1.	Presentation of the highlights and agreements	8:55 AM
	made during the Webinar on Data Analysis held	
	last August 17-19, 2021	

2. Presentation on the protocol on site selection, installation along with budgetary requirement on the establishment of the CTD Groundwater Sensor.

3. 15-min Regional presentation of the Quarterly Report (Jul-Sep 2021) on data visualization and analysis (10 mins presentation, 5 mins open

10:00 AM

9:00 AM

forum)

DATE/TIME : November 4, 2021, 8:30 AM - 4:00 PM

MODE

Teleconference via Zoom Application

Meeting ID: 814 9779 8706

Passcode: InstruMeet

The attendance of the participants is highly enjoined to the above-mentioned meeting. For inquiries, you may contact Engr. Aliza Nicole B. Andes at 09151796791 or email Watershed Ecosystem Management Section at fred.wems@gmail.com.

Attached herein are the program of activities, copy of the agreements made during Webinar on Data Analysis, and the format of the quarterly/annual reports on data generated from the watershed monitoring instruments, for your reference.

MARCIAL C. AMARO, JR., CESO III

MEETING ON THE REGIONAL PRESENTATION OF QUARTERLY REPORTS ON THE DATA GENERATED FROM THE SCIENCE-BASED REAL-TIME WATERSHED MONITORING INSTRUMENTS 4 November 2021

PROGRAM OF ACTIVITIES

Time	Торіс	Concerned Office
8:30-8:35 AM	Opening Program	Moderator
8:35-8:45 AM	Introduction of Participants	Moderator
8:45-8:55 AM	Welcome Remarks	Marcial C. Amaro, Jr., CESO III Assistant Secretary for Policy, Planning and Foreign-Assisted and Special Projects and Director, in concurrent capacity
8:55-9:00 AM	Presentation of the highlights and major agreements made during the Webinar on Data Analysis held last August 17-19, 2021	For. Alice Castillo FRCD-WEMS Chief
9:00-10:00 AM	Presentation on the protocol on site selection, installation along with budgetary requirement on the establishment of the CTD Groundwater Sensor.	NWRB
10:00-12:00 NN	15-min Regional presentation of the Quarterly Report (Jul-Sep 2021) on data visualization and analysis (10 mins presentation, 5 mins open forum)	Presenters: CAR, NCR, Region 1-5 Panelists: PPS, FRCD, FPPKMD, Dr. Cruz
12:00-1:00 PM	Lunch	
1:00-3:00 PM	15-min Regional presentation of the Quarterly Reports (Jul-Sep 2021) on data visualization and analysis (10 mins presentation, 5 mins open forum)	Presenters: Region 6-13 Panelists: PPS, FRCD, FPPKMD, Dr. Cruz
3:00-3:30 PM	Synthesis of the quarterly reports	Moderator
3:30-3:45 PM	Way Forward	For. Alice Castillo FRCD-WEMS Chief
3:45-4:00 PM	Closing Remarks	For. Ma Teresa G. Aquino FRCD Chief



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Websile http://www.forestry.denr.gov.ph FOREST RESOURCES CONSERVATION DIVISION

MEMORANDUM

FOR

The Assistant Secretary for Policy, Planning and Foreign Assisted

and Special Projects, and Director, in concurrent capacity

THRU

The OIC Assistant Director

FROM

The Chief, Forest Resources Conservation Division

SUBJECT

REPORT ON THE WEBINAR ON DATA ANALYSIS AND

OPERATIONALIZATION OF SCIENCE-BASED REAL-TIME

WATERSHED MONITORING INSTRUMENTS

DATE

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This has reference on the recently concluded "Webinar on Data Analysis and Operationalization of Science-Based Real-Time Watershed Monitoring Instruments" held last August 17-19, 2021 via Zoom Meeting.

The said webinar aimed to capacitate technical personnel from field offices, concerned bureaus and agencies on how to: (a) capacitate technical personnel of Field Offices to generate datasets, knowledge, information and technology from modern and science-based instruments; (b) acquire basic skills and protocols to collaborate and operationalize the watershed instruments as multipurpose centers for research, education, training and extension activities; and (c) gain basic knowledge on how to analyze and use the generated real-time data and information in designing watershed management interventions.

The resource speakers for the webinar came from the PhilInstrument Corp. (PIC), University of the Philippines Los Baños (UPLB), Department of Public Works and Highways (DPWH), Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) and National Water Resource Board (NWRB). A total of 68 participants from CAR, NCR, Regions 1, 2, 3, CALABARZON, MIMAROPA, 5, 6, 7, 8, 9,10, 11, 12, and 13 and representatives from Policy and Planning Service, Office of the Undersecretary for Finance, Information Systems and Climate Change, Office of Undersecretary for Field Operations and Environment, Office of Assistant Secretary for Field Operations – Luzon, Office of Assistant Secretary for Field Operations – Wisayas, and Office of Assistant Secretary for Field Operations – Mindanao attended the webinar.

Among the major agreements made during the above-mentioned webinar are as follows:

1		OFFICE
eports on watershed	1.a. Submission of quarterly on the analysis of data generated from the AWS, AWLS, and CTD within the priority watersheds of the Regions.	All Regional Offices FOREST MANAGEMENT BU

ITEM	AGREEMENT	CONCERNED OFFICE
	Quarterly: Every 15 th day of the month of the following quarter	
	Annual: Every 15 th day of Jan of the following year	
	1.b. On AWLS - Analysis of data from AWLS to include: a) correlation of precipitation occurrence and water level; b) correlation of streamflow during low flow and mid flow season and water level (rating curve analysis).	All Regional Offices and PIC
	1.c. On AWS - Use of threshold values of rainfall (available in PAGASA website) that may result to flooding downstream.	
	1.d. On CTD – Data from Philippine Standard for Drinking Water to be used as threshold	
2. On regional presentation of the quarterly reports on AWS, AWLS, and CTD	A meeting with Regional Offices, PPS Central Office, FRCD, FPPKMD will be arranged for the Regions' presentation of data visualization and analysis.	FMB
3. On the manual of watershed monitoring instruments	Manual on Handheld Instruments to be provided to Regional Offices.	FMB
4. On the sharing of data	Meeting among* FMB, PAGASA, DPWH and NWRB re: linkage of data from other agencies.	FMB (FRCD, FPPKMD, KISS)
5. On CTD installation	Conduct of lecture on site selection, installation along with budgetary requirement for the establishment of CTD with FMB, NWRB, PIC and Dr. Cruz.	FMB
6. On the calibration of AWS instruments.	To include in the TOR of the supplier that instruments to be procured are calibrated by concerned agencies such as PAGASA prior to delivery.	TOR- FMB Procurement — Regional Offices
	To calibrate AWS instruments from NCR	NCR, PAGASA, and PIC
	On the calibration of installed instruments	Regional Offices

ITEM	AGREEMENT	CONCERNED OFFICE
7. On the road map for the installation of instruments on priority critical watershed	7.a. To install a complete set of instruments (AWS in the upstream, midstream, and downstream, AWLS and CTD) per priority critical watersheds	Regional Offices
	7.b. To review/reevaluate the number of unit of AWS/AWLS/CTD to install per watershed	FMB-WEMS
8. On the measurement of sediment using sediment bed load sampler instrument (lack of weighing scale and standard duration for collection of sediments)	To coordinate with EMB Central Office/Regional Office	FMB and DENR Region 2

Attached herein is the copy of the proceedings during the Webinar on Data Analysis and Operationalization of Science-Based Real-Time Watershed Monitoring Instruments, for your reference.

FOR YOUR INFORMATION.

FOR. ALICIA L. CASTILLO
Third Watershed Ecosystem Management Sec

Chief, Watershed Ecosystem Management Section Officer In Charge, FRCD

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 watershed/s being monitored
- monitoring instruments installed within the watershed
- status of the instruments

2. DATA ANALYSIS

- interpretation of data collected from each monitoring instrument such as Automated Weather Station (AWS), Automated Water Level Station (AWLS), and Conductivity, Temperature, and Depth, (CTD) Groundwater Sensor.
 - e.g. The total monthly rainfall depth recorded for the 3rd quarter ranges from 15mm to 25 mm.

The highest water level recorded is 20m.

- comparison of data recorded from the previous recordings. Include also the comparison of data recorded from similar instruments installed in other areas by other agencies, if possible.
- analysis of data by correlating various parameters with one another, as well as overlaying graphs such as, but not limited to the following:
 - a. Rainfall and air temperature
 - b. Rainfall and stream water level
 - c. Rainfall and CTD water level
 - d. Air temperature and water temperature
 - e. Stream flow during low/mid flow season and stream water level
- implications of the data analysis result on the condition of the watershed such as, but not limited to the following:
 - a) use of threshold values of rainfall (available in PAGASA website) that may result to flooding downstream
 - b) use of the data from Philippine Standard for Drinking Water as threshold for groundwater
 - c) possible cause of the increasing/decreasing/low/high value of data and its effect on the watershed condition

If possible, include the following:

- d) provide evidence to a statement made about a particular observation, for example, "The decrease of the level of groundwater through time may be attributed to the continued extraction of water while there is only a little rainfall to replenish the aquifer", start collecting related information e.g., number of wells of water districts or coops and wells used for irrigation in the watershed and estimate of the rate of total groundwater withdrawals. This may also be supported in part by overlaying graph of rainfall and groundwater level.
- e) include information gathered from other sources, i.e., information on typhoons, landslides, and other extreme events to include extent of damages (number of people/households affected, area of agricultural lands damaged,

etc), forest/grassfires, tree planting, new road and other infrastructure projects, fish kills, etc., may be considered.

3. SUMMARY AND CONCLUSION

- Summary of the report
- Major findings on the analysis

4. ANNEXES

- 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
 - 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.

Municipality Precipitation (mm) Temp. (C) Max. Adams Adams 133 24.42 35 Pilar 133 24.42 35 Pilar 189 23.1 36 Baggao 192.6 22.96 31 Baggao 192.6 22.96 31 Alcala 148.6 23.02 31 Alcala 148.6 25.52 33 Alcala 148.6 25.52 33 Alcala 148.6 25.52 33 Alcala 148.6 25.54 35.54 Antipolo 11155.2 23.88 35 Victoria 525.4 25.55 33 Victoria 525.4 25.05 3 Victoria 525.4 25.05 3 Victoria 525.4 25.05 3 Victoria 388.2 24.44 36 Bacacay 388.2 24.44 36 Polangui <td< th=""><th></th><th>Total</th><th>Average</th><th></th><th>Min</th><th>Average</th><th>Average</th><th>Average Vapor</th><th>Average Atmospheric</th><th>Average Vapor</th></td<>		Total	Average		Min	Average	Average	Average Vapor	Average Atmospheric	Average Vapor
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Cagavan River Watershod Cagavan Valley Alcala 148.6 23.02 31 Agno River Watershod Tarlac Capas 70.8 25.25 33 Agno River Watershod Tarlac Tarlac Tarlac City 41.4 25.52 33 Pasig-Laguna River Watershod Rizal Rodriguez 209.4 25.58 3 Pasig-Laguna River Watershod Rizal Anipolo 209.4 25.59 3 Pasig-Laguna River Watershod Oriental Mindoro Victoria 1155.2 23.88 3 Butas River Watershod Oriental Mindoro Victoria 525.4 25.05 3 Bicol River Watershod Oriental Mindoro Victoria 525.4 25.05 3 Bicol River Watershod Oriental Mindoro Calapan City 314.6 24.44 3 Bicol River Watershod Comarines Sur Iriga city 314.6 25.71 33 Bicol River Watershod Capiz Rovas City 38 26.36 3 Hamulauon River W		192.6	22.96	31.7	16.2	218.39	0.62	2.4	100.68	0.42
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Bicol River Watershed	Oriental Mindoro		24.87	33.8	20.7	294.72	2.61	2.61	98.2	0.57
Bicol River Watershed Camarines Sur Iriga city 314.6 25.71 32.8 Bicol River Watershed Albay Polangui 38 26.36 31 Hamulauon River Watershed Capiz Tapaz 462 25.01 33.3 Hamulauon River Watershed Capiz Dao 241.6 25.64 32.3 Hamulauon River Watershed Bohol Catigbian 551.4 24.9 32.8 Loboc River Watershed Bohol Loboc 238.4 26.22 32.5 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Dagami 698.8 24.94 32.8 San Joaquin River Watershed Leyte Dumingag 227 26.12 33.9 Salug Daku River Watershed Zamboanga del Sur Josefina 5.2 25.74 31.8 Magpangi River Watershed Zamboanga del Sur Josefina 5.2 23.22 33.4 Salug Daku River Watershed Zamboanga	Albav		24.44	30.1	21.2	222.98	1.59	2.49	99.1	0.58
Bicol River Watershed Albay Polangui 38 26.36 31 Hamulauon River Watershed Capiz Tapaz 462 25.01 33.3 Hamulauon River Watershed Capiz Dao 241.6 25.64 32.3 Abatan River Watershed Bohol Catigbian 551.4 24.9 31.2 Loboc River Watershed Bohol Loboc 238.4 26.22 32.8 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 Salug Daku River Watershed Leyte Dumingag 227 25.74 31.8 Salug Daku River Watershed Zamboanga del Sur Josefina 52 25.74 33.9 Salug Daku River Watershed Zamboanga del Sur Josefina 52 23.22 33.9 Salug Daku River Watershed Zamboanga del Sur Josefina 52 23.22 31.5 Salug Daku River Watershed Davao del		314.6	25.71	32.8	21.2		1.1	2.86	100.79	0.46
Panay River Watershed Capiz Roxas City 38 26.36 31 Hamulauon River Watershed Capiz Tapaz 462 25.01 33.3 Hamulauon River Watershed Capiz Dao 241.6 25.64 32.3 Loboc River Watershed Bohol Carmen 348.6 24.94 32.8 Loboc River Watershed Bohol Loboc 238.4 26.22 32.5 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 San Joaquin River Watershed Leyte Damingag 227 25.74 31.8 Salug Daku River Watershed Zamboanga del Sur Josefina 52.7 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Josefina 52.2 23.22 31.5 Salug Daku River Watershed Davao del Norte Talaingod 298.4 24.78 34.4					FOR BATTERY	REPLACEMENT/CHARGING	NT/CHARG	NG		
Hamulauon River Watershed Capiz Tapaz 462 25.01 33.3 Hamulauon River Watershed Capiz Dao 241.6 25.64 32.3 Abatan River Watershed Bohol Carmen 348.6 24.9 31.2 Loboc River Watershed Bohol Loboc 238.4 26.22 32.5 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 San Joaquin River Watershed Leyte Tanauan 670.6 25.74 31.8 Salug Daku River Watershed Zamboanga del Sur Josefina 52.7 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Josefina 52 23.22 31.5 Salug Daku River Watershed Davao del Norte Talaingod 298.4 24.78 34.4		38	26.36	31	22.4	286.29	1.66	2.78	100.79	29.0
Hamulation River Watershed Capiz Dao 241.6 25.64 32.3 Abatan River Watershed Bohol Catigbian 551.4 24.9 31.2 Loboc River Watershed Bohol Carmen 348.6 24.94 32.8 Loboc River Watershed Bohol Loboc 238.4 26.22 32.5 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Tanauan 698.8 24.93 32.4 Salug Daku River Watershed Zamboanga del Sur Josefina 227 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Josefina 5.27 26.12 33.9 Salug Daku River Watershed Zamboanga del Sur Josefina 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Capiz	462	25.01	33.3	21.5	195.97	0.26	2.67	99.24	0.52
Abatan River Watershed Bohol Catigbian 551.4 24.9 31.2 Loboc River Watershed Bohol Loboc 24.94 32.8 San Joaquin River Watershed Leyte Ormoc City 50.4 26.22 32.5 San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 San Joaquin River Watershed Leyte Tanauan 670.6 25.74 31.8 Salug Daku River Watershed Zamboanga del Sur Josefina 227 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Josefina 5.27 26.12 33.9 Salug Daku River Watershed Zamboanga del Sur Josefina 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Capiz	241.6	25.64	32.3	21.9	200.56	1.45	2.79	100.82	0.52
Loboc River Watershed Bohol Carmen 348.6 24.94 32.8 Loboc River Watershed Bohol Loboc City 238.4 26.22 32.5 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Tanauan 698.8 24.93 32.4 Salug Daku River Watershed Zamboanga del Sur Dumingag 227 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Josefina 5.27 26.12 33.9 Salug Daku River Watershed Zamboanga del Sur Josefina 5.27 26.12 33.9 Salug Daku River Watershed Norte Sergio Osmena 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Bohol	551.4	24.9	31.2	18.9	237.85	0.63	2.74	98.48	0.43
Loboc River Watershed Bohol Loboc City 50.4 26.22 32.5 San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 Salug Daku River Watershed Zamboanga del Sur Dumingag 227 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Josefína 5.27 26.12 33.9 Salug Daku River Watershed Zamboanga del Sur Josefína 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4		348.6	24.94	32.8	19.2	247.37	0.55	2.73	98.34	0.45
San Joaquin River Watershed Leyte Ormoc City 50.4 22.85 29 San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 Salug Daku River Watershed Leyte Tanauan 670.6 25.74 31.8 Magpangi River Watershed Zamboanga del Sur Josefina 227 26.12 33.9 Zamboanga del Sur Josefina Sergio Osmena 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4		238.4	26.22	32.5	22	282.99	1.39	2.84	100.76	0.59
San Joaquin River Watershed Leyte Dagami 698.8 24.93 32.4 Salug Daku River Watershed Leyte Tanauan 670.6 25.74 31.8 Magpangi River Watershed Zamboanga del Sur Josefina 227 26.12 33.9 Zamboanga del Sur Josefina Zamboanga del Sur Josefina 5.2 23.22 31.5 Salug Daku River Watershed Norte Sergio Osmena 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Levte		22.85	29	18.2	240.31	1.31	2.29	94.02	0.5
San Joaquin River Watershed Leyte Tanauan 670.6 25.74 31.8 Salug Daku River Watershed Zamboanga del Sur Aagpangi River Watershed Zamboanga del Sur Josefina Josefina 33.9 Salug Daku River Watershed Zamboanga del Sur Zamboanga del Sur Josefina Sergio Osmena 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Levte		24.93	32.4	20.9	228.87	0.41	2.7	98.57	0.47
Salug Daku River Watershed Zamboanga del Sur Dumingag Dumingag 227 26.12 33.9 Magpangi River Watershed Zamboanga del Sur Zamboanga del Sur Zamboanga del Sur Salug Daku River Watershed Sergio Osmena 5.2 23.22 31.5 Taeum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Levte	9'029	25.74	31.8	22.2	293.41	1.24	2.81	100.77	0.52
Magpangi River Watershed Zamboanga del Sur Josefina Jasug Daku River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Zamboanga del Sur	227	26.12	33.9	21.8	390.47	0.39	2.97	96.66	0.46
Salug Daku River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Zamboanga del Sur				FOR BATTERY	REPLACEMENT/CHARGING	NT/CHARGI	NG		
Tagum River Watershed Davao del Norte Talaingod 298.4 24.78 34.4	Zamboanga del Norte		23.22	31.5	18.4	163.12	0.62	2.61	94.76	0.26
	Davao del Norte	298.4	24.78	34.4	21.2	291.41	0.38	2.7	96.38	0.46
Davao River Watershed Davao del Sur Davao City					FOR BATTERY REPLACEMENT/CHARGING	REPLACEME	NT/CHARGI	NG		

0.42	0.24	0.43	0.67		0.41	0.36	00:0				5.0	90	0.0	0.1	0.1
94 62	95 68	96 66	90 05		99 84	100 \$	2.504			17 00	00.01	100 54	100.24		
2.5	2.43	2.37	2.7		0.81	2.01	OCATION	OCATION	OCATION	11.0	OGGER	205	- 1	1.43	1
0.37	690	0.43	0.65		0.45	0.37	TEOP PET	IT FOD DEI	IT FOR REI	200	SNT DATA I	1 03	TOTA NOT	וועוארוטוו	T/CHARGIN
276.56	24 08	278.27	309.08		262.28	215.91	N- INCTRIMEN	N. INSTRUMEN	N. INSTRIMEN	221.45	OF INSTRUME	375 14	DEDI ACEMEN	774 22	REPLACEMEN
19.1	16.3	191	216		21.3	213	SIGNAT INTERCEPTION: INSTRIMENT FOR BELOCATION	SIGNAL INTERCEPTION: INSTRUMENT FOR DELOCATION	SIGNAL INTERCEPTION: INSTRIMENT FOR REI OCATION	0.51	FOR REPLACEMENT OF INSTRUMENT DATA LOGGER	22.5	FOR BATTERY BEDI ACEMENT/CHARGENIC	68	FOR BATTERY REPLACEMENT/CHARGING
31.4	27.6	29.9	33.1		32.5	34	SIGNAL	SIGNAL	SIGNAL	200	FOR R	33.6		10 \$	
23.44	20.51	22.82	5.86		25.12	25.38				20.35	66.04	36.8		13.03	20.51
431.6	321.6	291.8	183.6		372.2	349.8				\$178		65.4		71.4	
Davao City	T'Boli	Lake Sebu	Sto Niño	Bayugan	Cabadbaran City	Butuan City				Manolo Fortich	Libona	Cagayan de Oro City	Pinuknok	Bauko	Tinglayan
Davao del Sur	South Cotabato	South Cotabato	South Cotabato	Agusan del Sur	Agusan del Norte	Agusan del Norte	Quezon City	Quezon City	Quezon City	Bukidnon	Bukidnon	Misamis Oriental	Kalinga	Mountain Province	Kalinga
Davao River Watershed	Tamontaca River Watershed	Tamontaca River Watershed	Tamontaca River Watershed	Agusan-Agusan del Norte River Watershed	Cabadbaran River Watershed	Magallanes River Watershed	Navotas River Watershed	Pending	Navotas River Watershed	Agusan-Misamis Oriental River Watershed	Agusan-Misamis Oriental River Watershed	Agusan-Misamis Oriental River Watershed	Cagayan River Watershed	Cagayan River Watershed	Cagayan River Watershed
Region 11	Region 12	Region 12	Region 12	Region 13	Region 13	Region 13	NCR	NCR	NCR	Region 10	Region 10	Region 10	CAR	CAR	CAR

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

	Watershed	Province	Municipality	Sitio/Baranoav	Average Denth (mm)	Average Temperature (°C)	Average Conductivity
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 Brov 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

2n 11	Davao River Watershed	Davao del Sur	Davao City	UM Campus, Matina	2253.2727	31.0476	1.2907
on 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).

			(D) (27:3)	Distance from the Sensor to River Bed (m)	MAX	MIN
watersneu Cagavan River Watershed	Kalinga	Tabuk	Canao Bridge		1.68	0.7
Navotas River Watershed			Atherton Bridge	7.2	38.14	0.46
Bulu River Watershed	Ilocos Norte	Between Bangui and Pagudpud	Caramuagen/ Bolo Bridge	14.6	7.78	0.37
Cagayan River Watershed	Cagayan Valley	Baggao	Ragarag Bridge	14.6	28.97	3.26
Agno River Watershed	Tarlac	Capas	Brgy. Lawis	14.6	3.96	0.64
Pasig-Laguna River Watershed	Laguna	Sta. Cruz	Pagsawitan Bridge	14	5.85	1.66
Mag-asawang Tubig	Oriental Mindoro	Calapan City	Abaton-Maidlang Bridge	14.6	9.61	7.05
Bicol River Watershed	Camarines Sur	Bula	Panuypuyan Bridge	11.3	1	1
Hamulauon River Watershed	Capiz	Dao	Duyoc	12.95	8.35	2.88
Loboc River Watershed	Bohol	Carmen	Katipunan Bridge	10.739	7.84	0.31
Sangputan River Watershed	Leyte	Jaro	Cabayungan Bridge, Brgy. 1 Poblacion	7	2.15	0.58
Salug Daku River Watershed	Zamboanga del Sur	Molave	Molave-Mahayag	10	6.22	1.54
Cugman River Watershed	Misamis Oriental	Cagayan de Oro City	Cugman	7.5	3.39	0.5
Padada River Watershed	Davao del Sur	Matanao	Padada Bridge, Brgy. Tamlangon	ī	6.51	2.94
Tamontaca River Watershed	South Cotabato	Marbel	Namnama Bridge	7	1.34	0.01
Guihao-an River Watershed	Agusan del Norte	Buenavista	Brgy. Rizal, Agusan	6	2.34	0.27