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 made during the Webinar on Data Analysis held last August 17-19, 2021	8:55 AM
2.	Presentation on the protocol on site selection, installation along with budgetary requirement on the establishment of the CTD Groundwater Sensor.	9:00 AM
3.	15-min Regional presentation of the Quarterly Report (Jul-Sep 2021) on data visualization and analysis (10 mins presentation, 5 mins open forum)	10:00 AM

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 frcd.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	Topic	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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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 :

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 – Visayas , 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:

ITEM	AGREEMENT	CONCERNED OFFICE
1. On the submission of quarterly and annual reports on watershed instrumentation monitoring	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

ITEM	AGREEMENT	CONCERNED OFFICE
	Quarterly: Every 15th day of the month of the following quarter Annual: Every 15th 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
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 from15mm 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.

	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