Republic of the Philippines
Department of Environment and Natural Resources
MIMAROPA Region
Provincial Environment and Natural Resources Office

June 28, 2022

MEMORANDUM

FOR : Regional Executive Director
MIMAROPA Region

THRU : The ARD for Technical Services
DENR MIMAROPA

FROM : In-Charge, Office of the PENRO
Oriental Mindoro

SUBJECT : **SUBMISSION OF MONTHLY REPORT ON DATA GENERATED FROM THE SCIENCE-BASED REAL-TIME WATERSHED MONITORING INSTRUMENTS FOR MONTH OF JUNE 2022**

This has reference to the installed watershed instruments within the four sites of Mag-Asawang Tubig River Watershed and one (1) in Bongabong River Watershed.

Forwarding is the monitored and analyzed data generated from the Automated Water Level Station (AWLS) of Mag-Asawang Tubig River Watershed located at Abaton Madlang Bridge, Parang Calapan City,Province of Oriental Mindoro.

The three (3) AWS including the one (1) GWMS are non-operational because the instruments are dismantled and transported in Manila for the scheduled calibration, relative to these, there were no downloaded data to be used in in-depth analysis.

Attached is the narrative report of the reports for your reference.

For information and record.

ALMA E. GIBE

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TSD-CDS/aem

Republic of the Philippines
Department of Environment and Natural Resources
MIMAROPA Region
Provincial Environment and Natural Resources Office

June 28, 2022

MEMORANDUM

TO : In-Charge. Office of the PENRO
Oriental Mindoro

TRHU : The Chief, Technical Services Division

FROM : CDS Personnel

SUBJECT : **SUBMISSION OF MONTHLY REPORT ON DATA GENERATED FROM THE SCIENCE-BASED REAL-TIME WATERSHED MONITORING INSTRUMENTS FOR MONTH OF JUNE 2022**

This is to submit the monitored and analyzed data generated from the Automated Water Level Station (AWLS) of Mag-Asawang Tubig River Watershed located at Abaton Madlang Bridge, Parang Calapan City,Province of Oriental Mindoro. The three (3) AWS including the one (1) GWMS are non-operational because the instruments are dismantled and transported in Manila for the scheduled calibration, relative to this there were no downloaded data to be used in in-depth analysis.

Using the prescribe reporting format for the report from the Office of Forest Management Bureau to have a uniform reporting and in order to effectively and efficiently monitor and assess the data being generated from the installed instrumentation for watershed.

For information and record.

ALISTER EARL M. MEMAN
DMITS-CDS

MONTHLY REPORT ON DATA GENERATED FROM THE SCIENCE-BASED REAL-TIME WATERSHED MONITORING INSTRUMENTS
JUNE 2022

I. INTRODUCTION

Mag-Asawang Tubig Watershed (Victoria, Oriental Mindoro)

The Mag-asawang Tubig Watershed (MTRW) is one of the major watersheds in Oriental Mindoro, 12,533 hectares of which is proposed for rehabilitation in the 2013-2019 PDPFP. It is a critical watershed because of its role in food production, supplying irrigation to 40,000 hectares of rice fields in the flood plains of Mag-asawang Tubig and Bucayao Rivers. These two major rivers are connected viaPangalaan River, which branches out from Mag-asawang Tubig and joins Bucayao River flowing through Calapan City before it discharges to Calapan Bay.

The watershed is also expected to support the proposed hydroelectric power plant which is another vital support mechanism for the development and progress of the province and the whole island.

The Municipality of Victoria is 34 kilometers-about half an hour travel from Calapan City, the provincial capital of Oriental Mindoro, Victoria is bounded on the north by the Municipality of Naujan, on the southeast by the Municipality of Socorro, and on the southwest by the Municipality of Sablayan, one of the Municipalities of Occidental Mindoro. The town's geographical location is approximately 130^0 11' latitude and 121^0 17' longitude.

Installation of Ground Water Monitoring Station in the compound of MINSU

A Ground Water Monitoring Station was installed along the vicinity of MinSU Compound, this area was identified due to its elevation level, and this location was considered a flood prone area.

The Department of Environment and Natural Resources of Oriental Mindoro adapt the FMB Technical Bulletin No.17 " Adaptation of the Setting –up of Instrumentation in watersheds" to ensure monitoring that requires constant collection of accurate and data using standard techniques and instruments to generate real time data and information relevant to the characterization of the watershed management in Oriental Mindoro. This where fully supported by policy and pronouncement in the national level also mirrored in international scene. The term 'manageable' is critical in the identification of the planning unit as watershed size varies widely from less than a hundred hectares to several thousand hectares. The bigger watersheds are commonly referred to as river basins while the smaller units, are sometimes called, sub-watersheds or micro-watersheds. The river basin is divided into multitudes of watersheds. Under ideal situation—the various watersheds that make up the river basin should be managed in ways that protect the overall integrity of the river basin—but this ideal system may be hard to achieve, especially if large portions of the river basins are already degraded or beyond repair.

Locator Map of Watershed Installed within the Province of Oriental Mindoro

GPS location of Instrumentation installed within the jurisdiction of Oriental Mindoro (Fig 1.)

x6-04979 / DA, Victoria

GPS Location

Latitude	13.1161873
Longitude	121.1842457
Altitude	111.8 m
Fix accuracy	1670
Fix timestamp	1643299381
Number of satellites	12
Time zone	UTC+08

Automated Weather Station (AWS), DA Victoria (Fig2.)

x6-04980 / Macatoc Elem. Sch

GPS Location

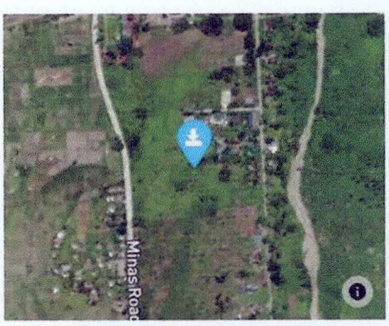
Latitude	13.1963574
Longitude	121.2452057
Altitude	32.1 m
Fix accuracy	2088
Fix timestamp	1647879301
Number of satellites	13
Time zone	UTC+08

Automated Weather Station (AWS), Macatoc Elementary School (Fig.3)

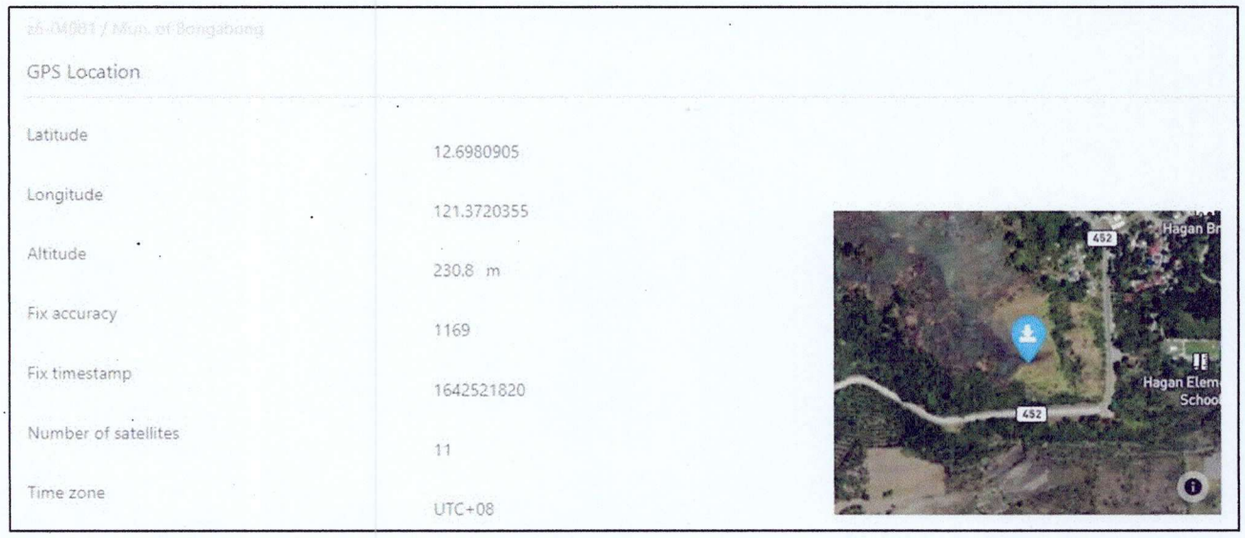
x6-04985 / MINSCAT, Victoria

GPS Location

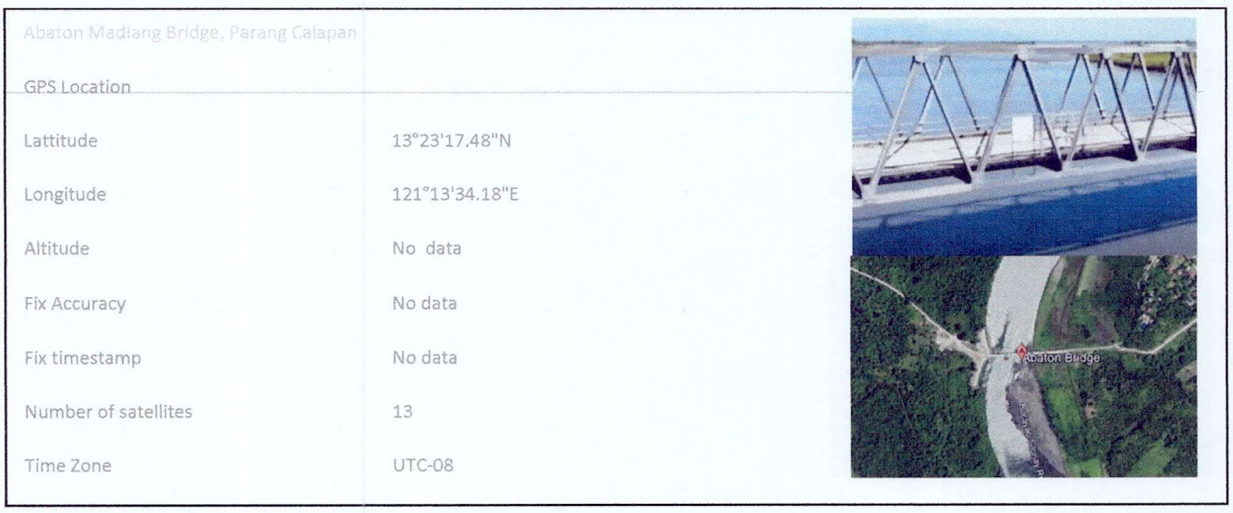
Latitude	13.1534587
Longitude	121.1857318
Altitude	84.2 m
Fix accuracy	1484
Fix timestamp	1633709197
Number of satellites	12
Time zone	UTC+08



Ground Water Monitoring Station (GWMS), MinSU, Victoria (Fig.4)



Automated Weather Station (AWS), Municipality of Bongabong (Fig. 5)



Automated Water Level Station (AWLS), Abaton Madlang Bridge, Parang Calapan City (Fig 6.)

Table 1. Location and function of Installed Watershed Instruments Installed, Oriental Mindoro

Instrument	Purpose	Location		Date Installed	Status
		Name	Coordinates,Brgy, Town/City		
Automated Water Level Station (AWLS)	This is a solar –powered setup device composed of Advanced remote Data Acquisition Unit with a non-volatile memory capable of storing approximately one year of data, two independent high-capacity rechargeable lithium polymer batteries as backup power supply, GSM module capable of sending data in a configurable time interval and a water level sensor. The device monitors and transfersin a real-time the water level data of Mag-asawangTubig Watershed in Oriental Mindoro.	Abaton-Madlang Bridge, Parang, Victoria, Calapan City Oriental Mindoro, Mag-Asawang Tubig River Watershed	Lat $13^0$23'17.00"N Long $121^0$13'34.00" E	January 2019	Instrument is in good condition With fence and Signage With Barangay Resolution

Ground Water Monitoring Station	This is a solar-powered setup device composed of an Advanced remote Data Acquisition Unit with a non-volatile memory capable of storing approximately one year of data, two independent high-capacity rechargeable lithium polymer batteries as backup power supply, GSM module capable of sending data in a configurable time interval and a ground water sensor. The device monitors and transfer in real-time the ground level data of Mag-asawangTubig Watershed in Oriental Mindoro	Barangay Alcate, Victoria, oriental Mindoro (MinSCAT Compound), Mag-Asawang Tubig River Watershed	Lat $13^0$9'12.00 N Long 121.1857^{0}11'8.00 " E	May 22, 2019	As of the present it is not active The Whole instrument must me under repair and subscription is already expired. With Fence by MinSU and Signage by DENR
Automated Weather Station (AWS)	This is a solar-powered setup device composed of an Advanced remote Data Acquisition Unit with a non-volatile memory capable of storing approximately one year of data, two independent high-capacity rechargeable lithium polymer batteries as backup power supply, GSM module capable of sending data in a configurable time interval and a microclimate sensor. The device monitors the air temperature and humidity and measures rain volume and wind velocity, rain intensity, and air pressure found in the interface between the body and support surface of Mag-asawangTubig Watershed in Oriental Mindoro.	Macatoc Elementary School, School, Victoria, Oriental Mindoro, Mag-Asawang Tubig River Watershed	Lat $13^0$11'46.00"N Long $121^0$14'42.00"E	May 22, 2019	Though the instruments are in good condition, the whole set of the instruments installed are temporary dismantled for calibration maintenance and troubleshoot ing.
Automated Weather Station (AWS)	This is a solar-powered setup device composed of an Advanced remote Data Acquisition Unit with a non-volatile memory capable of storing approximately one year of data, two independent high-capacity rechargeable lithium polymer batteries as backup power supply, GSM module capable of sending data in a configurable time interval and a microclimate sensor. The device monitors the air temperature and humidity	Barangay Alcate, Victoria, Oriental Mindoro (DA Compund), Oriental Mindoro, Mag-Asawang Tubig River Watershed	Lat $13^0$6'58.00"N Long $121^0$11'3.00"E	May 22, 2020	Though the instruments are in good condition, the whole set of the instruments installed are temporary dismantled for calibration maintenance and troubleshoot ing.

	and measures rain volume and wind velocity, rain intensity, and air pressure found in the interface between the body and support surface of Mag-Asawang Tubig Watershed in Oriental Mindoro.				
Automated Weather Station (AWS)-Hagan	This is a solar-powered setup device composed of an Advanced remote Data Acquisition Unit with a non-volatile memory capable of storing approximately one year of data, two independent high-capacity rechargeable lithium polymer batteries as backup power supply, GSM module capable of sending data in a configurable time interval and a microclimate sensor. The device monitors the air temperature and humidity and measures rain volume and wind velocity, rain intensity, and air pressure found in the interface between the body and support surface of Bongabong Watershed in Oriental Mindoro.	DENR CENRO Roxas Barangay Hagan, Bongabong, Oriental Mindoro (Ranger Station), Bongabong River Watershed	Lat $12^0$41'23.00"N Long $121^0$22'19.00"E	May 21,2019	Though the instruments are in good condition, the whole set of the instruments installed are temporary dismantled for calibration maintenance and troubleshooting.

The aim of the automatic weather station (AWS) network is to monitor weather phenomena for forecasting, climatology, and research. Real-time monitoring is realized using the latest Web technologies. The network incorporates both broadband and GPRS data transmission to ensure real-time data streaming. The telecommunication infrastructure is proposed to be upgraded in terms of speed.

To establish a good and competent source of reliable data from the pilot of watershed management requires various forms of resources or capital to support the activities that 'natural resource management' entails. The task is made more challenging by the fact that most of these watersheds have already been turned into settlement areas. The institutional capital includes political (local government unit--LGU) support to the whole idea of pushing for the watershed-based water resource management strategy. The LGU support should come from the political units closest to the watersheds—which usually consist of the municipalities and barangays that are found within the watershed, both those living in the uplands and in the downstream areas. The creation of watershed management council or task forces is also an important institutional infrastructure that could help implement watershed management initiatives. This council is important given that there are various interest groups found in the watershed, some of them having conflicting interests on the resources found therein—and hence, would have different perspectives on how the watershed shall be managed.

In some cases, the institutions may simply include different user groups and coalition of said groups—but whatever forms they take—for as long as they share the same goal of achieving watershed protection—then, the watershed management strategy has a good chance of succeeding. Closely linked to institutional capital is social capital—which roughly refers to collective action by local community members who live and/or affected by the state of the environment in the watershed. They include both the upstream communities and the downstream communities that are made up of the household sector, industries and commercial establishments, and other interest groups in the area. Without the support of these various groups of people—it is difficult to foresee a situation where in efforts to protect the watershed would succeed. By collective action, we mean active involvement in watershed protection efforts, either through direct involvement in carrying out the various activities or through financial support to these undertakings. The participation of the people as partners in resource management is sought for. Looking at the people who are directly involved in the management tasks—it is clearly important that they should be equipped with some forms of intellectual capital such as the technical skills necessary in watershed management and the required supporting administrative skills.

II. DATA ANALYSIS

A. Mag-Asawang Tubig River Watershed (MATRW)

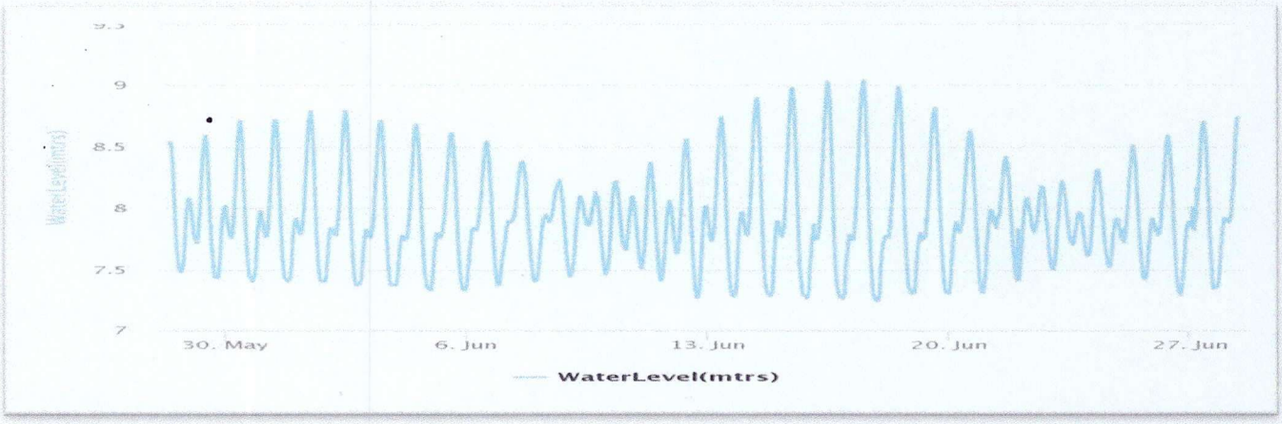


Figure 7. Monthly Streamflow level (m) in Abaton Bridge, Mag-Asawang Tubig River Watershed for June 2022

The stream flow level averages to 7.91 m for month of June. The water level rose to a maximum of 9.04 m on June 16 while the lowest was detected on June 17 with 7.24 m.

Table 2. *Summary of data from Automated Water Level Station (AWLS), Abaton Madlang Bridge, Parang Calapan City, Mag-Asawang Tubig River Watershed for June 2022.*

Watershed Monitoring Instrument Parameter	Number of Instruments Installed	Period Covered	Average	Maximum	Minimum
Streamflow Level (m)	1	June 1- June 28, 2022	WaterLevel(mtrs) : 7.9068 SystemBattery(volts) : 12.5855	WaterLevel(mtrs) : 9.04 SystemBattery(volts) : 13.49	WaterLevel(mtrs) : 7.24 SystemBattery(volts) : 12.18

Table 3. *Summary of data from Automated Weather Station (AWS), Barangay Alcate, Victoria, Oriental Mindoro (DA Compund), Mag-Asawang Tubig River Watershed*

Watershed Monitoring Instrument Parameter	Number of Instruments Installed	Period Covered	Average	Maximum	Minimum
Rainfall	1	no data available	no data available	no data available	no data available
Air Temperature	1	no data available	no data available	no data available	no data available
Relative Humidity	1	no data available	no data available	no data available	no data available
Wind Velocity	1	no data available	no data available	no data available	no data available
Wind Direction	1	no data available	no data available	no data available	no data available
Solar Radiation	1	no data available	no data available	no data available	no data available
Streamflow Level (m)	0	no data available	no data available	no data available	no data available
Streamflow Temp (c)	0	no data available	no data available	no data available	no data available
Groundwater Level (m)	2	no data available	no data available	no data available	no data available
Soil Moisture	2	no data available	no data available	no data available	no data available
Conductivity	2	no data available	no data available	no data available	no data available

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.
*Data is being requested at National Irrigation Administrator for Streamflow Level (m) and Streamflow Temp (c).

Table 4. *Summary of data from Automated Weather Station (AWS), Macatoc Elementary School, School, Victoria, Oriental Mindoro, Mag-Asawang Tubig River Watershed*

Watershed Monitoring Instrument Parameter	Number of Instruments Installed	Period Covered	Average	Maximum	Minimum
Rainfall	1	no data available	no data available	no data available	no data available
Air Temperature	1	no data available	no data available	no data available	no data available
Relative Humidity	1	no data available	no data available	no data available	no data available
Wind Velocity	1	no data available	no data available	no data available	no data available
Wind Direction	1	no data available	no data available	no data available	no data available
Solar Radiation	1	no data available	no data available	no data available	no data available
Streamflow Level (m)	0	no data available	no data available	no data available	no data available

Streamflow Temp (c)	0	no data available	no data available	no data available	no data available
Groundwater Level (m)	2	no data available	no data available	no data available	no data available
Soil Moisture	2	no data available	no data available	no data available	no data available
Conductivity	2	no data available	no data available	no data available	no data available

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.
*Data is being requested at National Irrigation Administrator for Streamflow Level (m) and Streamflow Temp (c).

Table 5. *Summary of data from Ground Water Monitoring Station (GWMS), Barangay Alcate, Victoria, Oriental Mindoro (MinSU Compound) Mag-Asawang Tubig River Watershed*

Watershed Monitoring Instrument Parameter	Number of Instruments Installed	Period Covered	Average	Maximum	Minimum
Rainfall	0	no data available	no data available	no data available	no data available
Air Temperature	0	no data available	no data available	no data available	no data available
Relative Humidity	0	no data available	no data available	no data available	no data available
Wind Velocity	0	no data available	no data available	no data available	no data available
Wind Direction	0	no data available	no data available	no data available	no data available
Solar Radiation	0	no data available	no data available	no data available	no data available
Streamflow Level (m)	0	no data available	no data available	no data available	no data available
Streamflow Temp (c)	0	no data available	no data available	no data available	no data available
Groundwater Level (m)	2	no data available	no data available	no data available	no data available
Soil Moisture	0	no data available	no data available	no data available	no data available
Conductivity	2	no data available	no data available	no data available	no data available

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.

B. Bongabong River Watershed (BRW)

Table 6. *Summary of data from Automated Weather Station (AWS), DENR CENRO Roxas Barangay Hagan, Bongabong, Oriental Mindoro (Ranger Station), Bongabong River Watershed*

Watershed Monitoring Instrument Parameter	Number of Instruments Installed	Period Covered	Average	Maximum	Minimum
Rainfall	1	no data available	no data available	no data available	no data available
Air Temperature	1	no data available	no data available	no data available	no data available
Relative Humidity	1	no data available	no data available	no data available	no data available
Wind Velocity	1	no data available	no data available	no data available	no data available
Wind Direction	1	no data available	no data available	no data available	no data available
Solar Radiation	1	no data available	no data available	no data available	no data available
Streamflow Level (m)	0	no data available	no data available	no data available	no data available
Streamflow Temp (c)	0	no data available	no data available	no data available	no data available
Groundwater Level (m)	2	no data available	no data available	no data available	no data available
Soil Moisture	2	no data available	no data available	no data available	no data available
Conductivity	2	no data available	no data available	no data available	no data available

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.
*Data is being requested at National Irrigation Administrator for Streamflow Level (m) and Streamflow Temp (c).

A daily monitoring is done using the Hydrosphere platform for the Automatic Water Level Station, located at Abaton-MAdlang Bridge, Parang, Victoria Calapan City, Oriental Mindoro, Mag-Asawang Tubig River Watershed. There were no available data to be analyzed at installed Ground Water Monitoring Station located at Barangay Alcate, Victoria, Oriental Mindoro (MinSU Compound) because as of now data logger in not available and a request is already submitted for replacement.

Since the two (2) Automatic Weather Station located at Brgy, Alcate, Victoria, Oriental Mindoro (DA Compund) and Macatoc Elementary School, Victoria, Oriental Mindoro within the radius of Mag-Asawang Tubig River Watershed and one (1) Automatic Weather Station located at DENR CENRO Roxas Brgy. Hagan, Bongabong, Oreintal Mindoro (Ranger Station), Bongabong River Watershed are under maintenance and instruments are being retrieve and were transported to manila for calibration and updating. It was on May 17-18, 2022, when we travel to Victoria, Bongabong Oriental Mindoro to retrieve all the said instruments.

I was not able to make a comparison of data from different affiliated agencies because as of now no data was provided by them. It was agreed on the agreement that this affiliated agencies will support the program base on the Department of Environment and Natural Resources FMB Technical

Bulletin No. 17 regarding "Adaptation on the Setting-Up of Instrumentations on watersheds on the Province of Oriental Mindoro", where in the purposed of the data gathered is to do comparison of data recorded from similar instruments installed in their respective area of jurisdiction.

To address the problem, a letter of follow up will be sent to the following agency regarding the data needed for comparison; PAGASA, DOST and CDRRMD as soon as possible.

Recommendations

It is a must to calibrate and repair all damaged instruments installed in the watershed for continuity of the program because the importance of these instruments are vital to the community, it will allow them to be prepared and become aware, and use all the provided information from the analyze data from the instrumentation to make them more adoptable to the changeable climatic occurrence in the surrounding and environment.

Since all Automated Weather Station (AWS) instruments are being dismantled and sent to Manila for calibration purposes, there will be a temporary stop in monitoring of data until the calibration will be done. Only the Automatic Water Level Station, located at Abaton-Madlang Bridge, Parang, Victoria Calapan City, Oriental Mindoro, Mag-Asawang Tubig River Watershed is being monitored.

The data requested from other affiliated agency are not yet available for the in-depth analysis of the data and also the calibration of DOST-PAGASA team is ongoing. If the availability of instruments will be available on August, all calibrated instrumentation will be pick- up to manila and be installed again to their respective location.

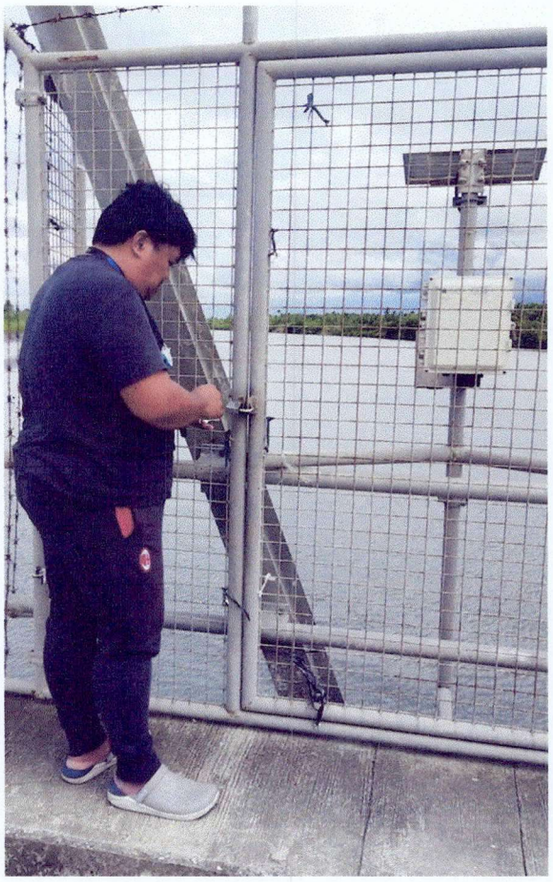
Thus, the continuity of data will be available for in-depth analysis.

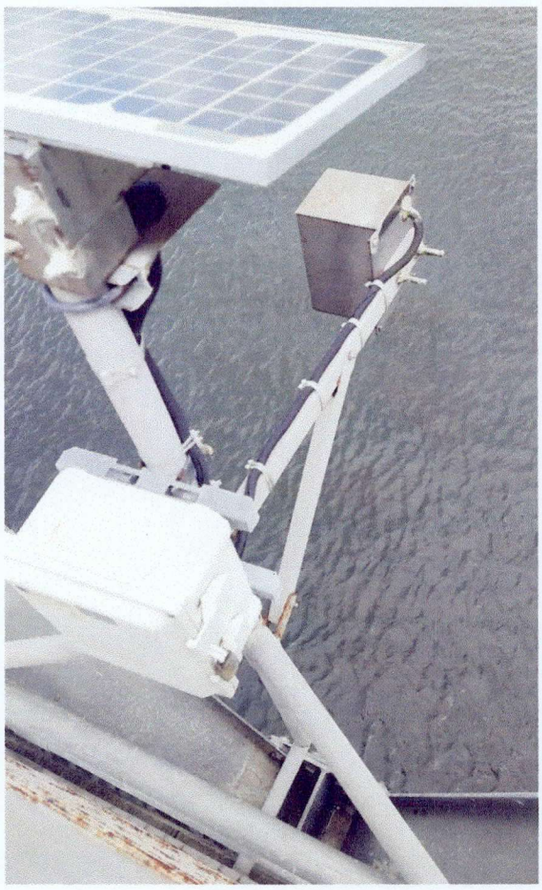
Prepared by:

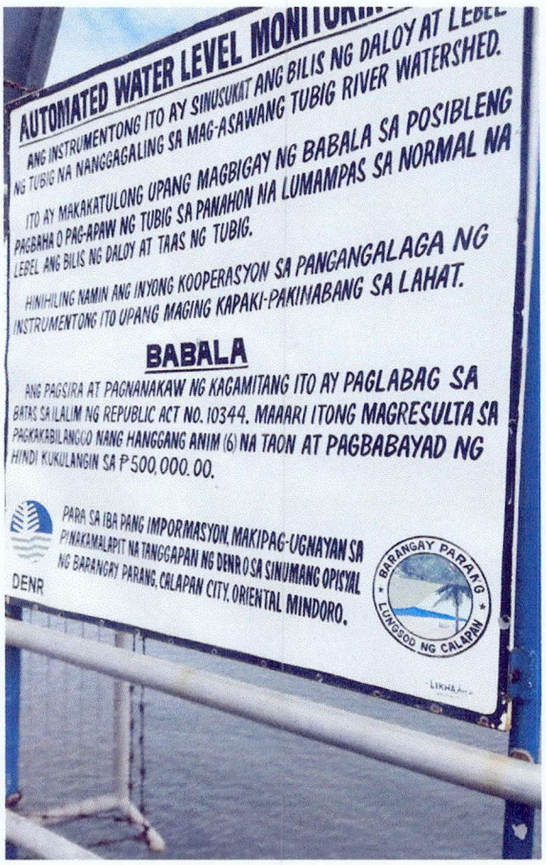
Alister Earl M. Meman
Database Manager IT Specialist

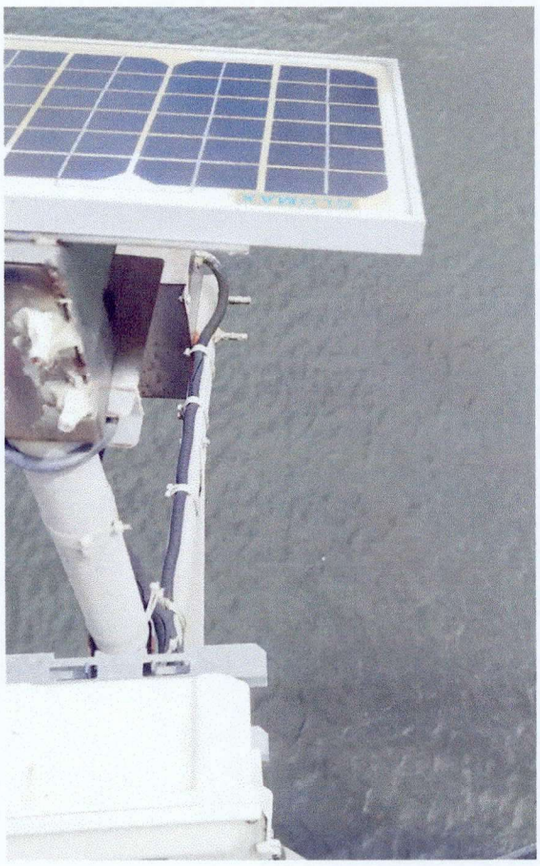
Noted by:

AMOR D. ASI
Chief, Conservation and Development Section









Conduct of Monitoring and Inspection for Automatic Water Level Station Instrumentation, located at Abaton-MAdlang Bridge, Parang, Victoria Calapan City, Oriental Mindoro, Mag-Asawang Tubig River Watershed.