

# UTILIZING EFCOS DATA FOR DISASTER MANAGEMENT @ MMDRRMOC/MMDA-FCIC

By RAMON J. SANTIAGO  
Consultant/Adviser on DRRM  
Seminar/Workshop on EFCOS Operations  
18 February 2016



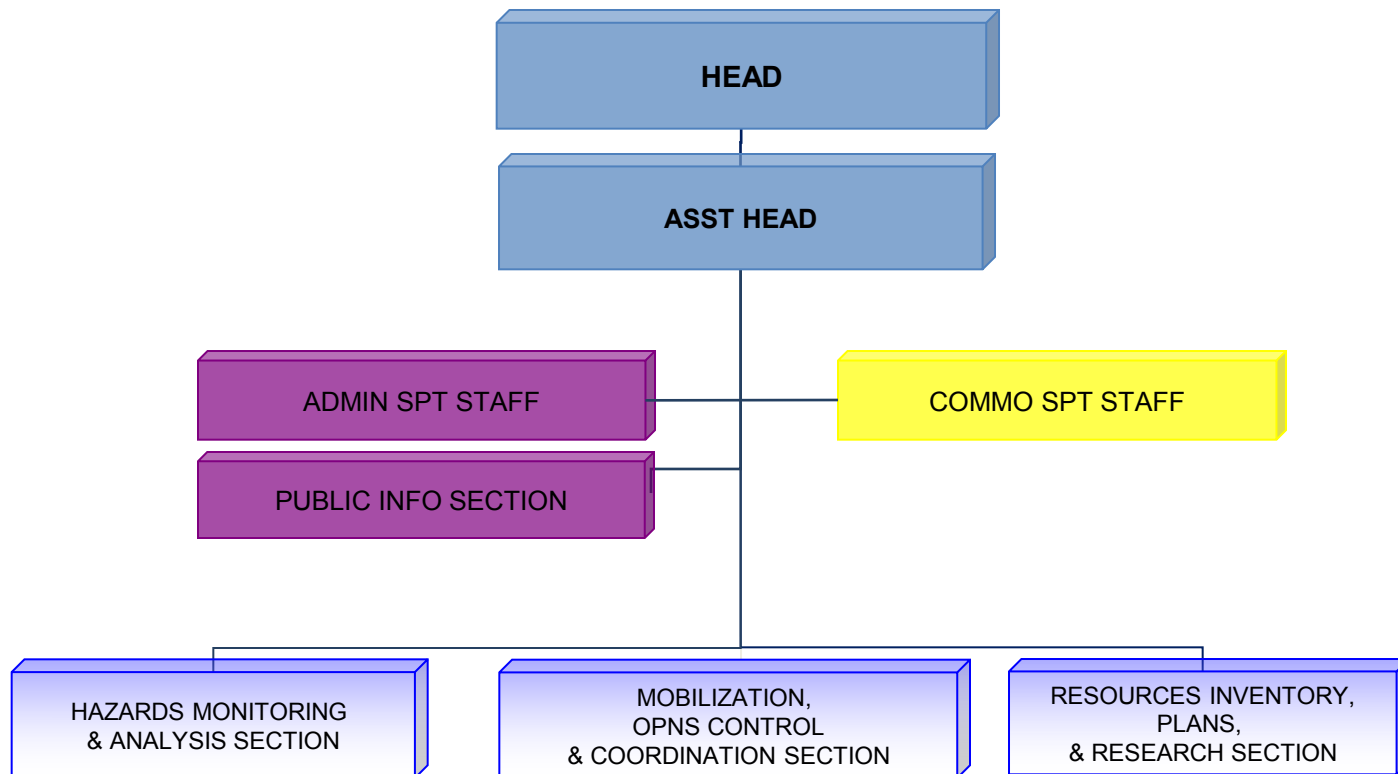
# FLOOD CONTROL INFORMATION CENTER & DISASTER RISK REDUCTION AND MANAGEMENT OPERATION CENTER (3 August 2012)

- SERVE AS AN OPERATIONS COORDINATION AND CONTROL FACILITY FOR MMDA AND MMDRRMC DURING INCLEMENT WEATHER AND EMERGENCIES
- PROVIDE DECISION SUPPORT SYSTEM FOR MMDA AND MMDRRMC
- ESTABLISH AND PROVIDE COMMUNICATIONS AND DECISION LINKS AMONG MMDA OPERATING UNITS, METRO LGUS, MMDRRMC, AND NDRRMC DURING CRITICAL SITUATIONS
- SERVE AS INFORMATION AND KNOWLEDGE CENTER FOR MMDA AND OTHER CLIENTS ON HYDRO-METEOROLOGICAL CONCERNS
- PROVIDE COMPLEMENTARY PUBLIC SAFETY ADVISORIES AND WARNING

## **MISSION AND FUNCTION**

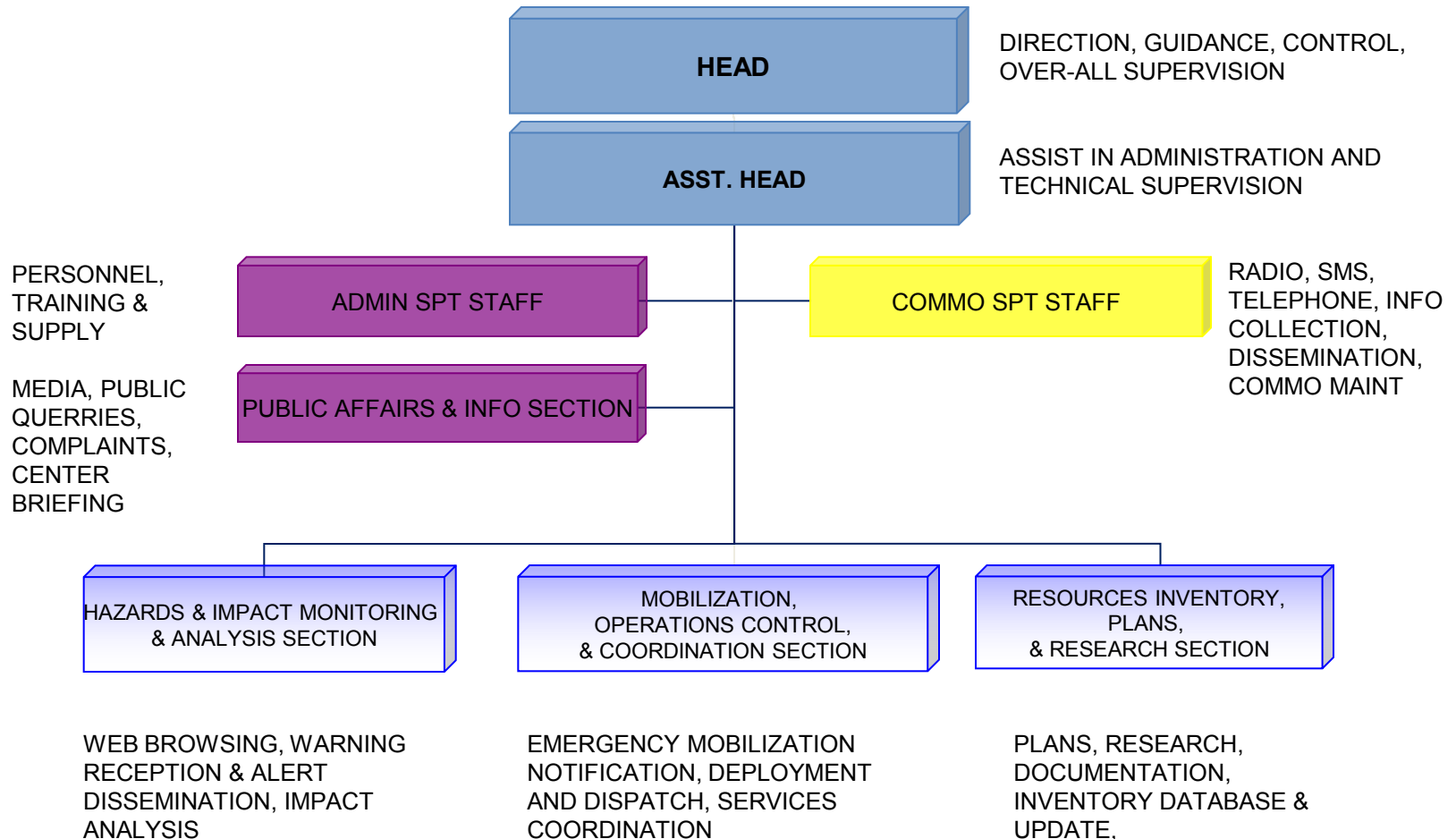
# MMDA FLOOD CONTROL INFORMATION CENTER/METRO MANILA DISASTER RISK REDUCTION AND MANAGEMENT OPERATION CENTER (FCIC - MMDRRMOC)

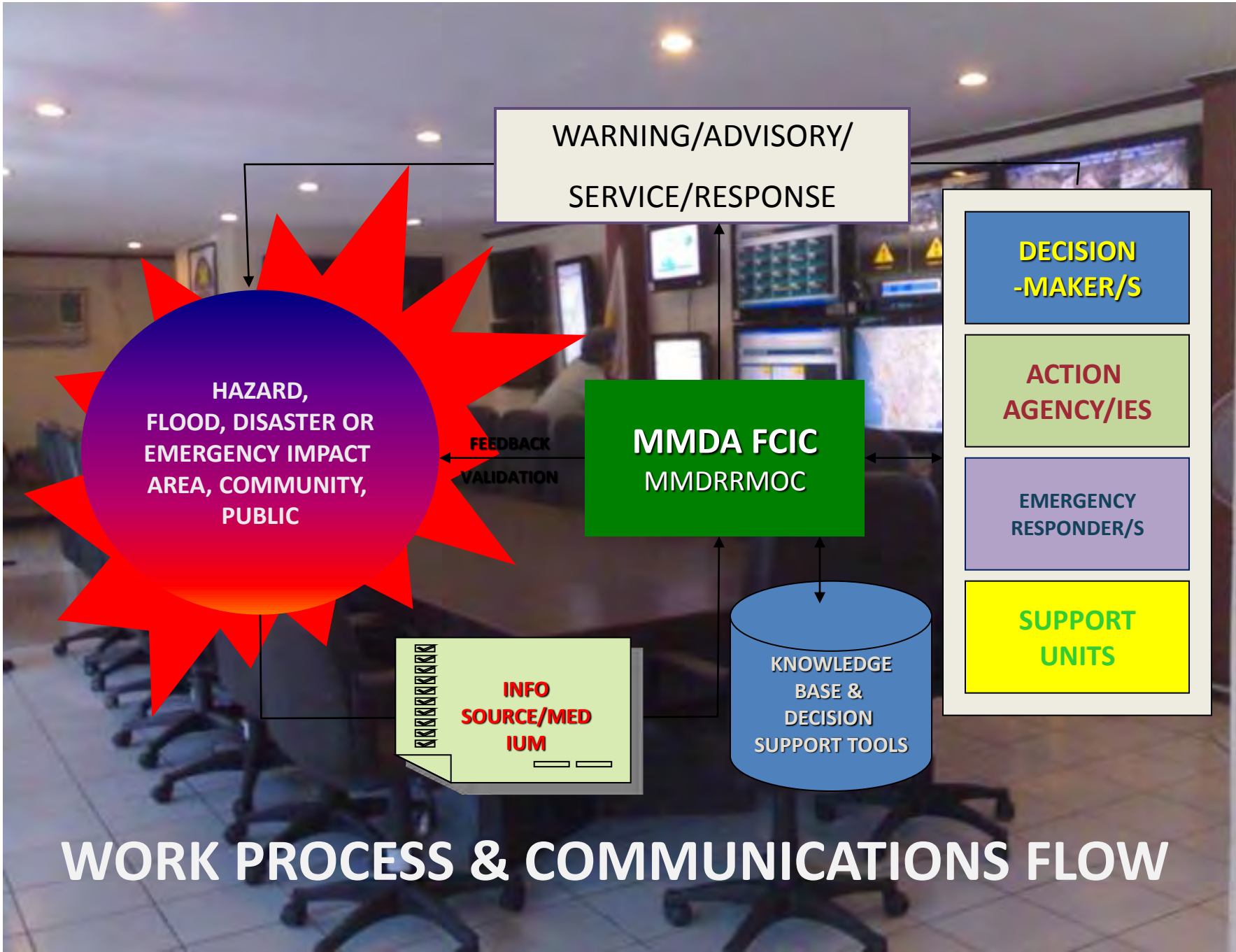
## ORGANIZATIONAL STRUCTURE



# MMDA FLOOD CONTROL INFORMATION CENTER/METRO MANILA DISASTER RISK REDUCTION AND MANAGEMENT OPERATION CENTER (FCIC - MMDRRMOC)

## FUNCTIONAL STRUCTURE





WARNING/ADVISORY/  
SERVICE/RESPONSE

- DECISION-MAKER/S
- ACTION AGENCY/IES
- EMERGENCY RESPONDER/S
- SUPPORT UNITS

HAZARD,  
FLOOD, DISASTER OR  
EMERGENCY IMPACT  
AREA, COMMUNITY,  
PUBLIC




MMDA FCIC  
MMDRMOC

INFO  
SOURCE/MED  
IUM

KNOWLEDGE  
BASE &  
DECISION  
SUPPORT TOOLS

**WORK PROCESS & COMMUNICATIONS FLOW**

# THUNDERSTORM WARNING




WARNING	MEANING	DISSEMINATION
<p><b>Information</b></p> 	<p>Thunderstorm is <i>less likely</i> to develop in the Metro Manila area</p>	<p>This will be disseminated thru Twitter and Website.</p>
<p><b>Watch</b></p> 	<p>Thunderstorm formation is <i>likely</i> to develop within the next twelve (12) hours. This is more general than a warning.</p>	<p>This will be disseminated thru Twitter, Website and fax</p>
<p><b>Warning</b></p> 	<p>Thunderstorm is <i>threatening</i> a specific area(s) within the next 2 hours. Updates will be issued as frequent as necessary</p>	<p>This will be disseminated thru SMS, Twitter, website</p>



# Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)



## HEAVY RAINFALL WARNING LEVELS

RAINFALL VALUES (mm)	MEANING	WARNING
<p>Rainfall of <b>7.5 to 15 mm per hour</b> has fallen or expected to fall and most likely to continue for the next 3 hours.</p>	<p>Community <b>AWARENESS</b>  <b>FLOODING</b> is <b>POSSIBLE</b> in low lying areas and near river channels            For flooded areas, <b>receding of flood</b> is <b>expected</b> due to less rainfall.</p>	<p><b>Advisory</b></p> 
<p>Rainfall of <b>more than 15mm up to 30mm within 1 hour</b> has fallen or expected to fall or if continuous rainfall for the past 3 hours is more than <b>45mm to 65mm</b> and most likely to continue for the next 3hours.</p>	<p>Community <b>PREPAREDNESS</b>  <b>FLOODING</b> is <b>THREATENING</b> in low lying areas and near river channels            If flooding occurs, expect a <b>recession of flooding</b> due to less rainfall.</p>	<p><b>Alert</b></p> 
<p>Rainfall of <b>more than 30mm within 1 hour</b> has fallen or expected to fall or if continuous rainfall for the <b>past 3 hours is more than 65mm</b> and most likely to continue for the next 3 hours.</p>	<p>Community <b>RESPONSE</b>  <b>SERIOUS FLOODING</b> is <b>EXPECTED</b>            Take necessary precautionary measures</p>	<p><b>Action</b></p> 

**Disclaimer:** Rainfall threshold values are arbitrary and may vary depending on the area of concern. These will be refined as soon as more data become available.



# FLOOD IMPACT TO MOTORISTS

<b>Flood Depth</b>	<b>Flood Level</b>	<b>Impact to Motorist</b>
Extremely High	36" - above	Not passable to all types of vehicle
Very High	19" - 36"	Not passable to medium vehicles but passable to buses and trucks
High	13" - 18"	Not passable to light vehicle but passable to medium vehicles
Medium	6" - 12"	Flooded but passable to all types of vehicles
Low	Below 6"	Flooded but passable

# FCIC protocol when alert is raised by PAGASA or when rain is observed in MM

Alert Color Code	Rainfall values	Duration	Rain Category	Potential Impact	Action Level	FCIC Action/s
None	< 2.5 mm/hr	30 min.	Light	None	Awareness	Monitor
None	2.5 – 7.5 mm/hr	1 Hour	Moderate	Ponding; congestion	Awareness	Monitor
Yellow	7.5 – 15mm/hr	3 Hours	Heavy	Pocket flooding	Awareness	<ul style="list-style-type: none"> <li>• Relay</li> <li>• Monitor</li> </ul>
Orange	15 – 30 mm/hr	6 Hours	Intense	Flooding is threatening	Preparatory	<ul style="list-style-type: none"> <li>• Relay</li> <li>• Monitor</li> <li>• Alert</li> </ul>
Red	> 30 mm/hr	12 Hours +	Torrential	Evacuation on low lying areas for possible flash flood	Emergency Action	<ul style="list-style-type: none"> <li>• Relay</li> <li>• Monitor</li> <li>• Mobilize or Dispatch</li> <li>• Coordinate</li> </ul>

# PAG-ASA



[DOST HOME](#) [DOST AGENCIES](#) [DOST REGIONAL OFFICES](#)

Department of Science and Technology  
Services Institutes



## PAGASA

PHILIPPINE ATMOSPHERIC, GEOPHYSICAL & ASTRONOMICAL SERVICES ADMINISTRATION  
Tracking the sky helping the country



HOME



ABOUT US



CONTACT US

PHILIPPINE STANDARD TIME: 13 May 2014 09:31:06 PM

search

PAGASA Regional Services Division (PRSD) | [ICR](#) | [Northern Luzon](#) | [Southern Luzon](#) | [Visayas](#) | [Mindanao](#)



PAGASA  
CITIZEN'S CHARTER

WEATHER

HYDROMETEOROLOGY

CLIMATE & AGRONET

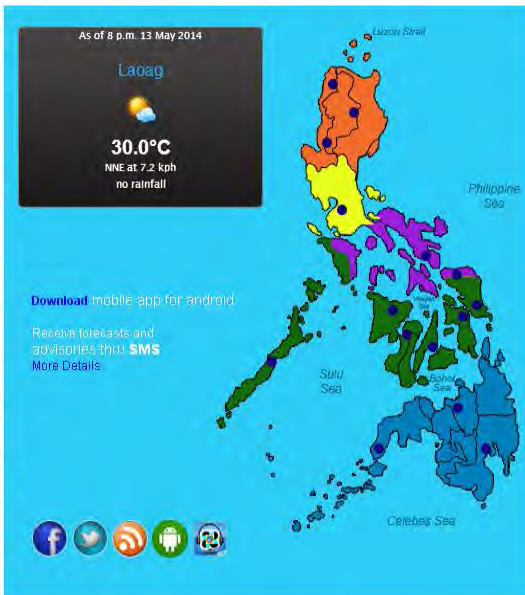
AVIATION WEATHER

ASTRONOMY

REGIONAL SERVICES

RAINFALL WARNING

TROPICAL CYCLONE



### WEATHER WARNING/ADVISORIES

#### Weather Advisory

No weather advisory issued.

#### Tropical Cyclone Update

As of today, no tropical cyclone is existing within the Philippine Area of Responsibility (PAR)

#### 24-Hour Public Weather Forecast

### HYDROLOGICAL INFO/WARNINGS

Issued as of 12 MAY 2014 at 9:00 a.m.

#### Basin Flood Bulletins/Advisories

As of 12 MAY 2014

#### Status of Monitored Dams

Issued as of 13 May 2014 at 6:00 a.m.

### CLIMATE ADVISORIES

#### Heat Index

Issued at : 5:00 AM 13 MAY 2014

Valid

Beginning : 5:00 AM today until 5:00 AM tomorrow

...

#### El Niño Watch

PHILIPPINE AREA OF RESPONSIBILITY (PAR)

### ASTRONOMICAL UPDATE

#### Astronomical Diary

Issued: May 2014

As summer approaches, the days get longer in the Philippines. After sunset, the g...

As of 2014-05-13 21:00:00: Daanbantayan, Cebu Air Temperature: 29.3°C Humidity: 66.3%

### Extended Forecast

[Iligan City](#)

[Laoag City](#)

[Baguio City](#)

[Legazpi City](#)

[Puerto Princesa City](#)

[Metro Cebu](#)

[pagasa.dost.gov.ph/](http://pagasa.dost.gov.ph/)

# PAGASA – Status of Monitored Dams

PHILIPPINE STANDARD TIME: 13 May 2014 09:48:16 PM

search

Home » Hydrometeorology » Services » Status of Monitored Dams



PAGASA  
CITIZEN'S CHARTER

STATUS OF MONITORED  
DAMS

GENERAL FLOOD  
ADVISORIES  
(REGIONAL)

BASIN FLOOD  
BULLETINS (PAMPANGA,  
AGNO, BICOL, &  
CAGAYAN RIVER  
BASINS)

BASIN HYDROLOGICAL  
FORECAST

## Status of Monitored Dams

[\(Click here to view location of these dams and Hydrograph\)](#)

DATE UPDATED: 13-May-2014  
TIME UPDATED: 6:00 AM

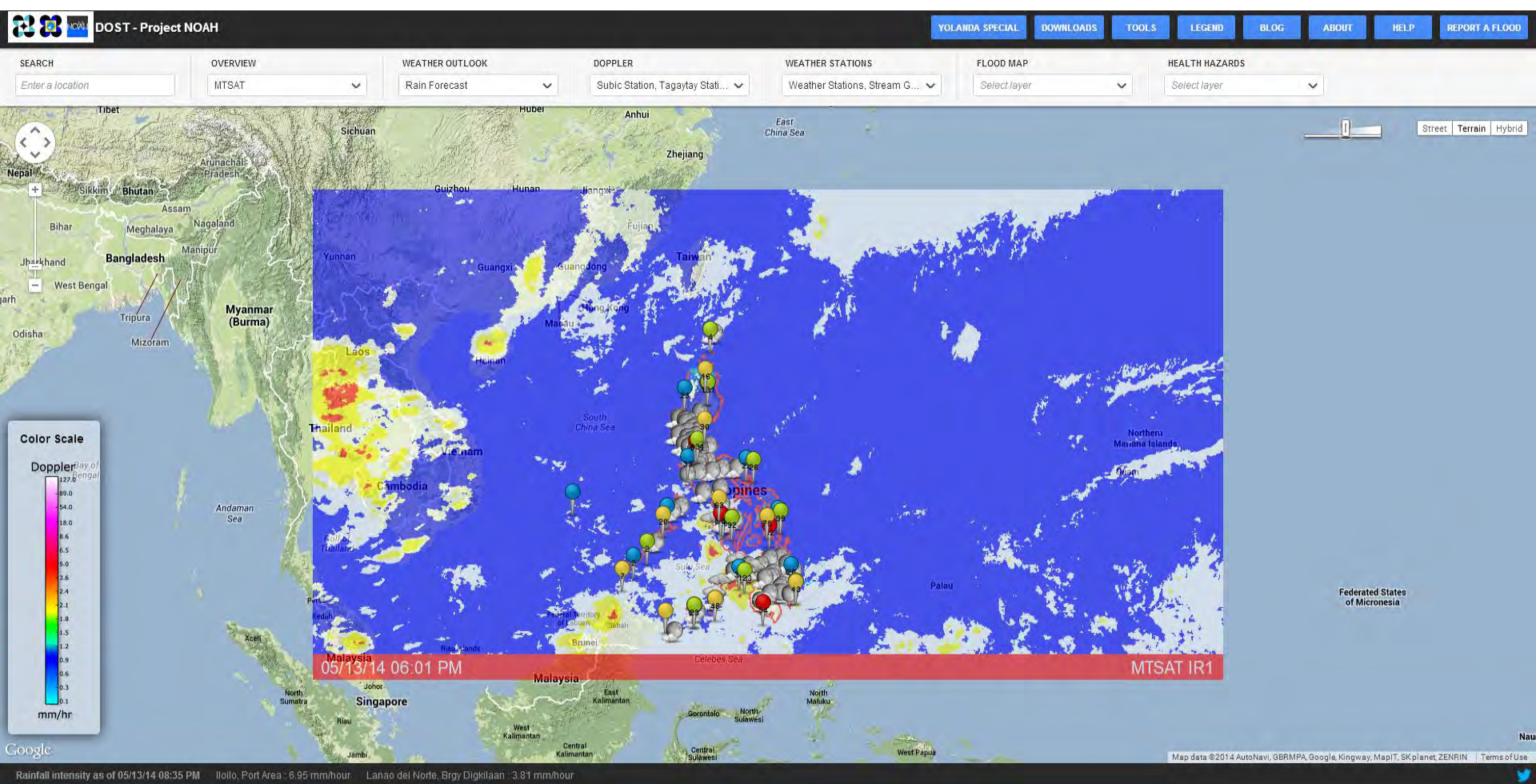
	Observation Time & Date	Reservoir Water Level (RWL) (m)	24-Hr WL Deviation	Normal High Water Level (NHWL) (m)	Deviation from NHWL (m)	Elevation from Rule Curve (m)	Deviation from Rule Curve (m)	Gate Opening
ANGAT	6:00 AM	179.47						
	13-May		-0.33	212.00	-32.53	185.23	-5.76	
	6:00 AM	179.80			-32.20	185.32	-5.52	
IPO	6:00 AM	99.66				-	-	
	13-May		-0.05	100.80		-	-	
	6:00 AM	99.71			-1.09	-	-	
LA MESA	6:00 AM	78.22				-	-	
	13-May		-0.03	80.15		-	-	
	6:00 AM	78.25			-1.90	-	-	
AMBUKLAO	6:00 AM	740.51				745.00	-4.49	
	13-May		-0.13	752.00	-11.49	745.00	-4.36	
	6:00 AM	740.64			-11.36	745.00	-4.36	
BINGA	6:00 AM	569.13				565.00	4.13	
	13-May		-0.76	575.00	-5.87	565.00	4.13	
	6:00 AM	569.89			-5.11	565.00	4.89	
SAN ROQUE	6:00 AM	238.30				237.90	0.40	
	13-May		-0.18	280.00	-41.70	237.90	0.40	
	6:00 AM	238.48			-41.52	238.06	0.42	
PANTABANGAN	6:00 AM	182.01				199.25	-17.24	
	13-May		0.02	216.00	-33.99	199.25	-17.24	
	6:00 AM	181.99			-34.01	199.26	-17.27	
MAGAT	6:00 AM	168.84				175.90	-7.06	
	13-May		-0.17	193.00	-24.16	175.90	-7.06	
	6:00 AM	169.01			-23.99	176.01	-7.00	
CALIRAYA	6:00 AM	286.90				-	-	
	13-May		-0.12	288.00	-1.10	-	-	
	6:00 AM	287.02			-0.98	-	-	

SRE/RABIJESC

Trend for the past 24 hours:  
 + Deviation indicates increase from previous WL  
 - Deviation indicates decrease from previous WL

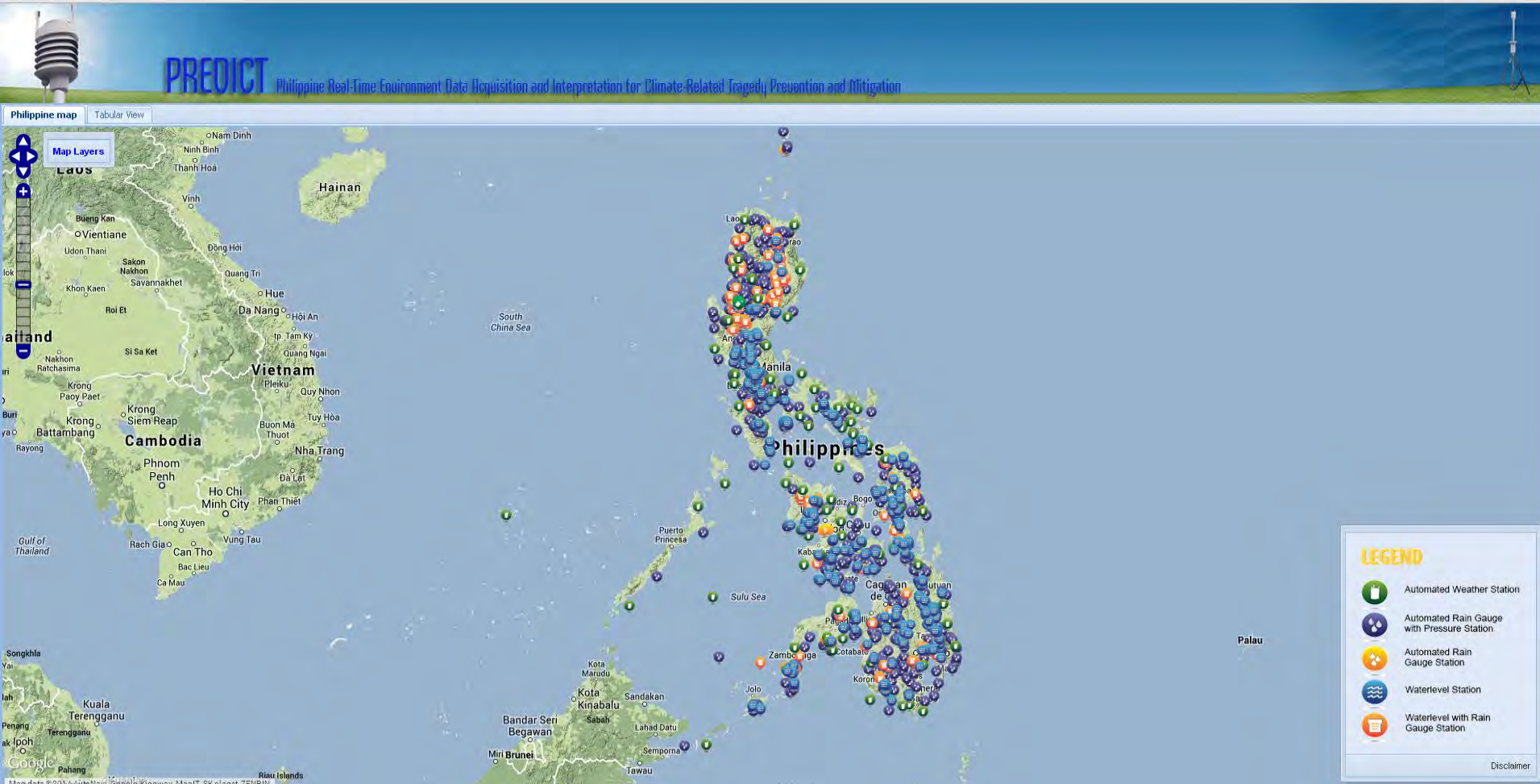
Data Source: Dam Operating/Managing Agencies

# Project Noah



Noah.dost.gov.ph

# ASTI - DOST



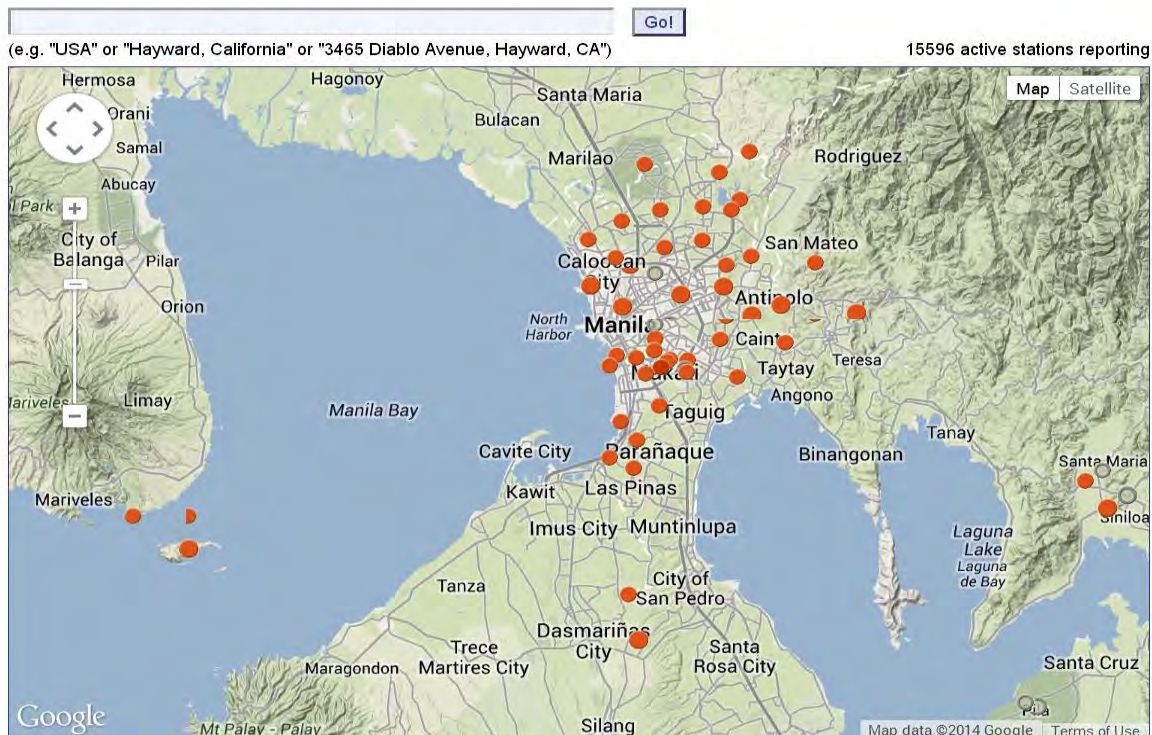
[fmon.asti.dost.gov.ph](http://fmon.asti.dost.gov.ph)

# Weatherlink



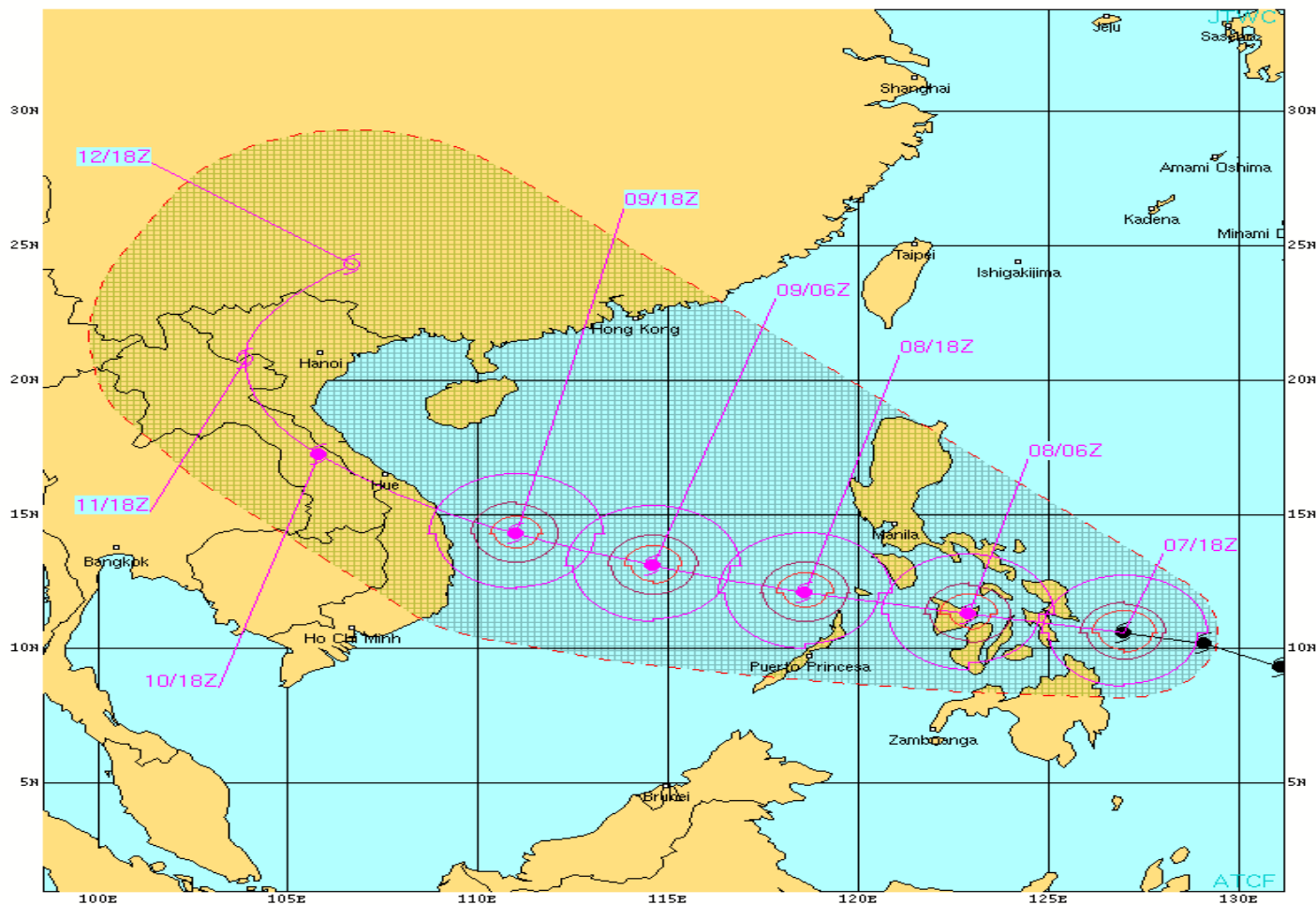
[Find Out More](#) | [FAQ's](#) | [Order Now](#) | [Register](#)

[WeatherLink Station Map](#) | [Login](#)



[www.weatherlink.com](http://www.weatherlink.com)

# NRL - Monterey



**SUPER TYPHOON SIW (HAIYAN) WARNING #19**  
 WIPN83 PGTW 072100  
 071800Z POSIT: NEAR 10.6N 127.0E  
 MOVING 280 DEGREES TRUE AT 21 KNOTS  
 MAXIMUM SIGNIFICANT WAVE HEIGHT: 50 FEET  
 07/18Z, WINDS 170 KTS, GUSTS TO 205 KTS  
 08/06Z, WINDS 145 KTS, GUSTS TO 175 KTS  
 08/18Z, WINDS 135 KTS, GUSTS TO 165 KTS  
 09/06Z, WINDS 125 KTS, GUSTS TO 150 KTS  
 09/18Z, WINDS 110 KTS, GUSTS TO 135 KTS  
 10/18Z, WINDS 065 KTS, GUSTS TO 080 KTS  
 11/18Z, WINDS 045 KTS, GUSTS TO 055 KTS  
 12/18Z, WINDS 040 KTS, GUSTS TO 050 KTS

CPA TO:	NM	DTG
ZAMBOANGA	268	08/06Z
MANILA	175	08/13Z
SUBIC_BAY	177	08/15Z
PUERTO_PRINCESA	139	08/16Z
HO_CHI MINH_CITY	295	10/02Z
HA NOI	23	10/06Z
HA NOI	108	12/00Z

BEARING AND DISTANCE	DIR	DIST (NM)	TAV (HRS)
MANILA	223	205	24
PUERTO_PRINCESA	358	144	24
SUBIC_BAY	210	137	24
ZAMBOANGA	327	374	24

○ LESS THAN 34 KNOTS  
 ⊗ 34-63 KNOTS  
 ● MORE THAN 63 KNOTS  
 PAST 6 HOURLY CYCLONE POSITS IN BLACK  
 FORECAST CYCLONE POSITS IN COLOR





# CENTRAL WEATHER BUREAU OF TAIWAN



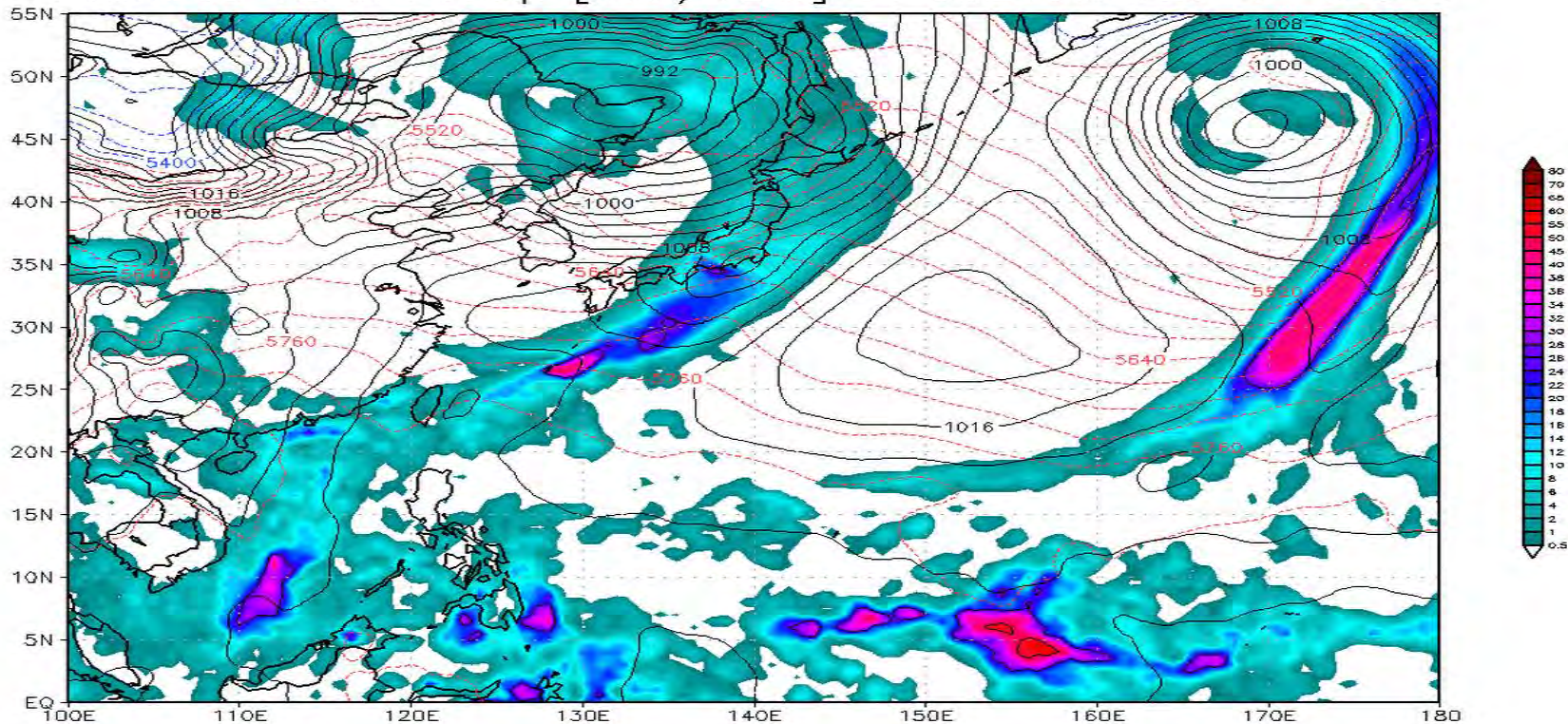
[www.cwb.gov.tw/V7e/observe/satellite/Sat\\_EA.htm](http://www.cwb.gov.tw/V7e/observe/satellite/Sat_EA.htm) /

# FNMOC

(Fleet Numerical Meteorology and Oceanography Center)

NOGAPS Japan Tau 00 SLP and Thickness

NAVGEM\_japan SLP [hPa] and 1000 to 500 Thickness [m] Analysis  
Previous 12HR Precip [mm/12hr] VT 00Z13MAY2014 TAU 0



GrADS: COLA/IGES

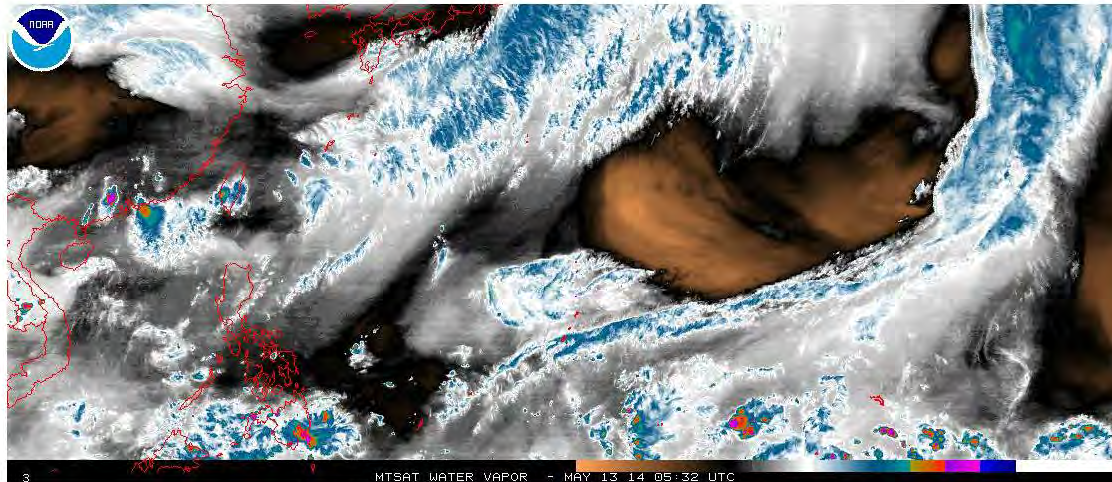
NAVGEM Data provided by FNMOC, Monterey, CA  
GrADS Graphics by NRL Marine Meteorology Division

[www.nrlmry.navy.mil/metoc/nogaps/NOG\\_japan\\_alltau\\_slpt.html](http://www.nrlmry.navy.mil/metoc/nogaps/NOG_japan_alltau_slpt.html)

# NOAA PRODUCTS

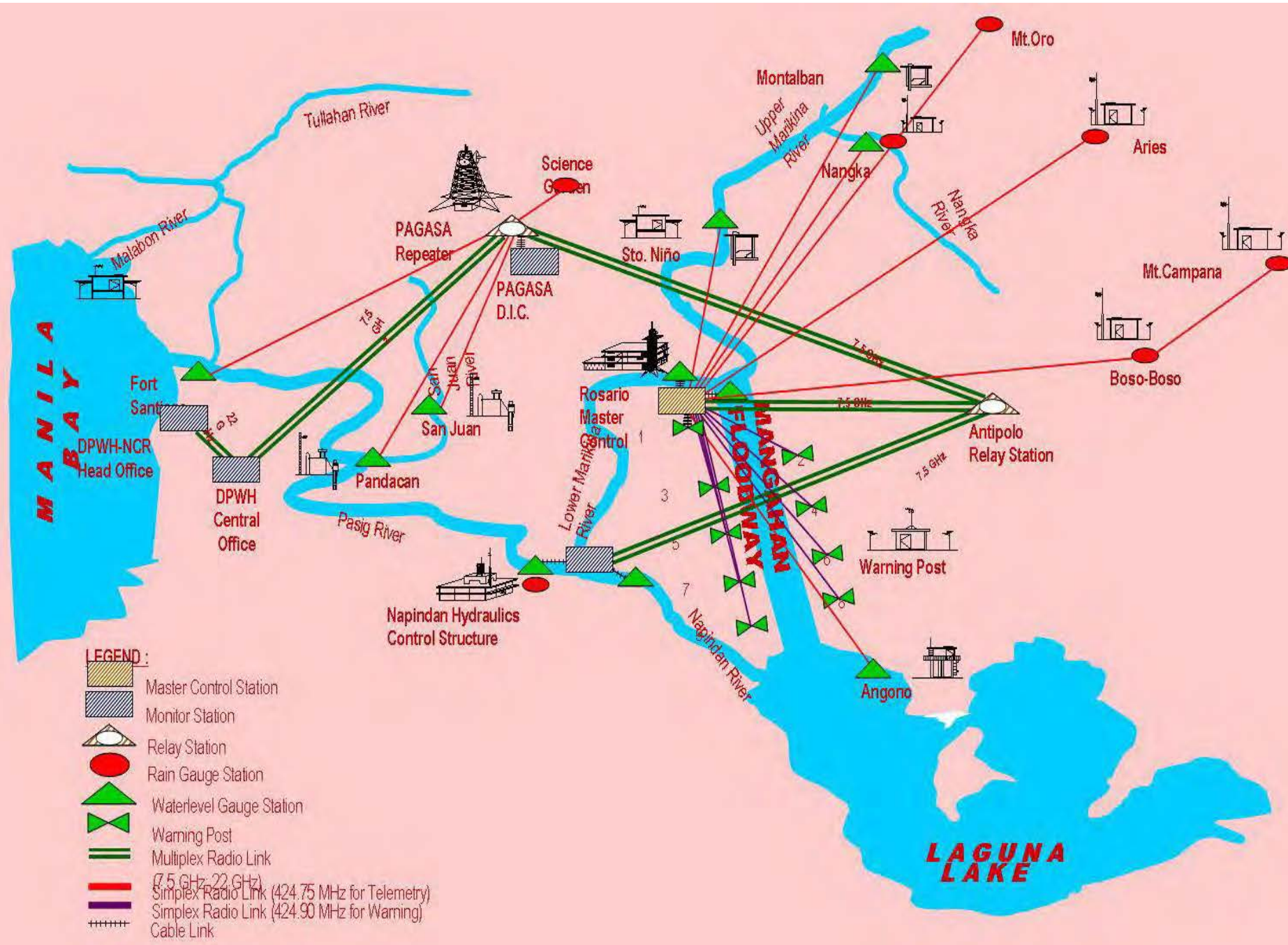
## Tropical West Pacific - Water Vapor Loop

LatLon  Trop Fest Pts  SST



This loop intended for informational purposes only!  
For Emergency situations and/or decisions, please refer to your local Emergency Management Office.  
[Additional Flash Information](#)

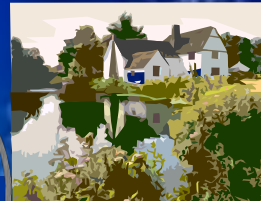
[www.ssd.noaa.gov/mtsac/twpac/flash-wv.html](http://www.ssd.noaa.gov/mtsac/twpac/flash-wv.html)



- LEGEND :**
-  Master Control Station
  -  Monitor Station
  -  Relay Station
  -  Rain Gauge Station
  -  Waterlevel Gauge Station
  -  Warning Post
  -  Multiplex Radio Link
  -  Simplex Radio Link (424.75 MHz for Telemetry)
  -  Simplex Radio Link (424.90 MHz for Warning)
  -  Cable Link

# METRO MANILA EMERGENCY COMMUNICATIONS NETWORK

THREATENED OR AFFECTED COMMUNITIES AND GENERAL PUBLIC




**NDRRMOC**



**GMA 7**



**MM DRRMC Action Agencies**



**Volunteers**



**MMDA Metro Base**



**MMDA FCIC/  
MMDRRMOC**

**MMDA FLOOD CONTROL & SEW MGT OFFICE**

**MMDA EFCOS & PUMPING STATIONS**

**MMDA FCSMO District Opns Engineers**

**10 Flood Ctrl Bayanihan Zone Alliances**

**17 Metro LGUs**

MM Emergency Strike Force

Other MMDA Operating Units

HPSEPO Pub Sfty Div Emerg Response Group

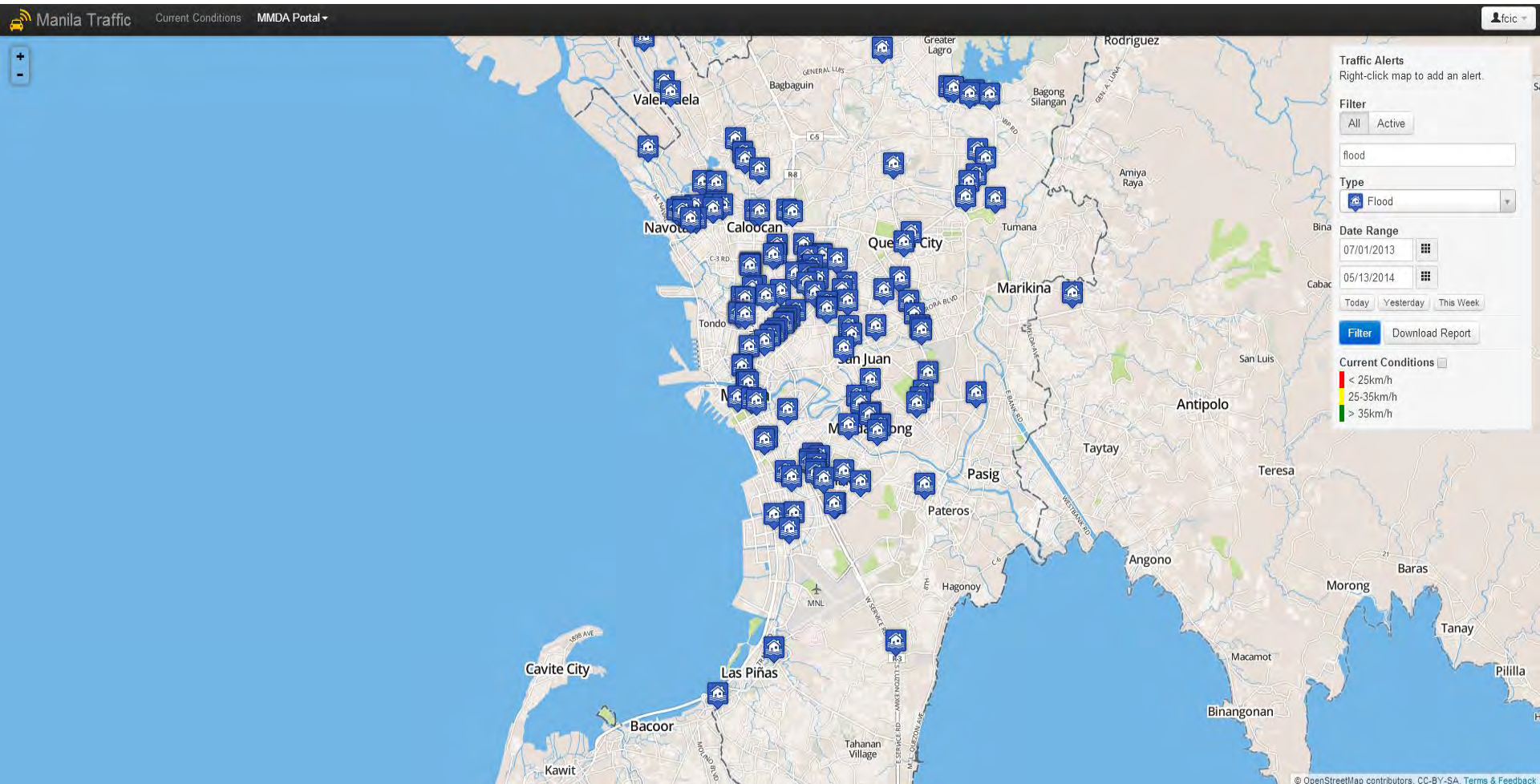
TDO Road Emergency Group

Task Force "UNOS"

Task Force 'RAINBOW'



# Incident Mapping

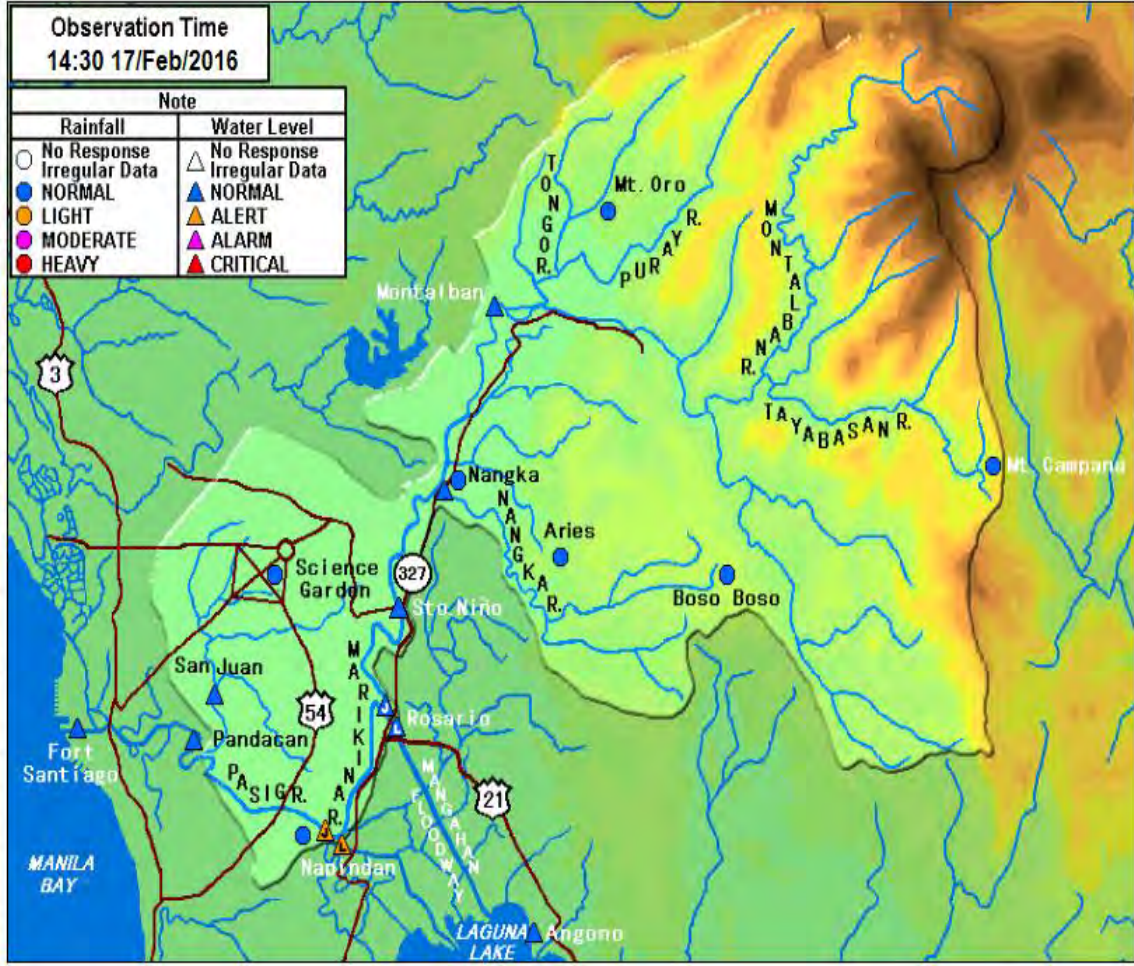


[mmda.dev.conveyal.com](http://mmda.dev.conveyal.com)

# ISSUES AND NEEDS PRESENTED TO WORLD BANK, 4 JUNE 2014

- **Latency of Information**-crucial to timely decision and credibility
- **Almost real-time links to data source to serves as trigger of timely action and response** prior to processed warning from PAGASA (such as Doppler Radar, Project Noah, etc...)
- **Improved Platform for Plotting and Sharing Information and Actions** that can be viewed by numerous stakeholders
- **Improved archiving and reporting application** to aid flood control measures programming

**MAP**  
**DIAGRAM**





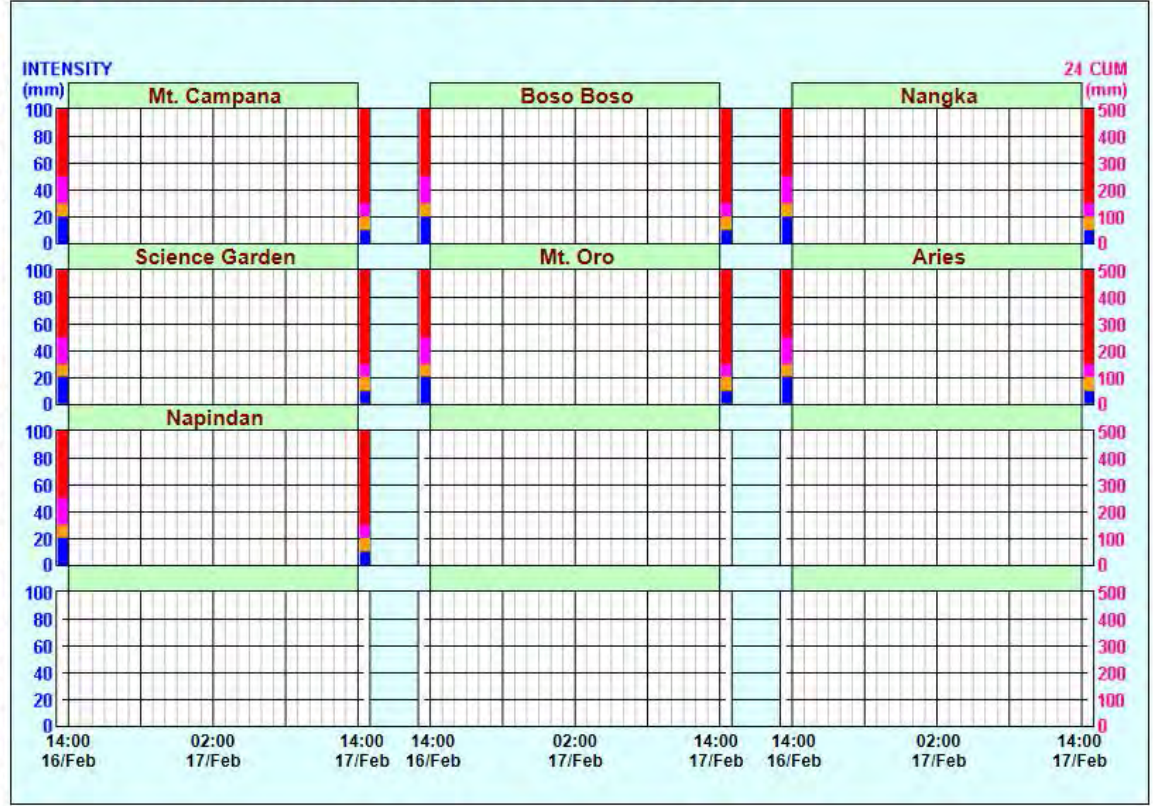
- SCALE HOURLY
- SCALE 10 min.
- Montalban**
- Nangka
- Sto.Niño
- Rosario J.S.
- Rosario L.S.
- Napindan J.S.
- Napindan L.S.
- Angono
- San Juan
- Pandacan
- Fort Santiago



Data Search [hh:mm/DD/MM/YYYY] 03:00/16/02/2016 JUMP TIME- TIME+ LATEST LATEST

- RAINFALL HOURLY
- RAINFALL 10 min.
- WATER LEV. HOURLY
- WATER LEV. 10 min.
- BASIN MEAN HOURLY
- BASIN MEAN 10 min.

Flood Status Graph1 Graph2 Gate Status Table Forecast



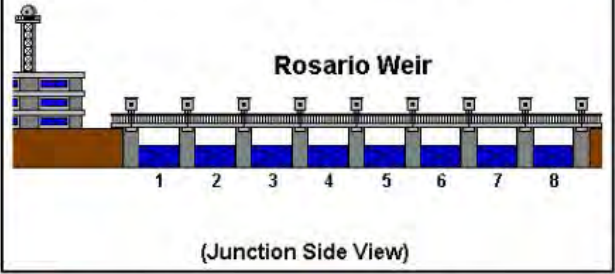
Department of Public Works and Highways

- RosarioWeir Status
- RosarioWeir OP. Chart
- NapindanWeir Status
- NapindanWeir OP. Chart

Observation Time  
14:40 17/Feb/2016

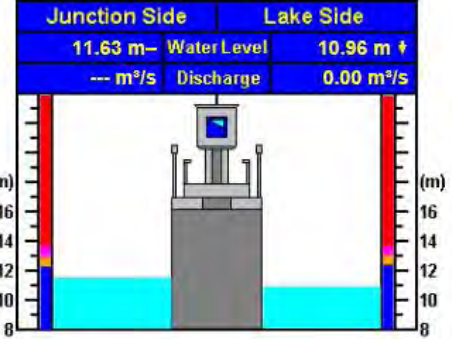
Gate State

Last Operation Time : 14:34 28/Jan/2016



- Full Open
- Full Close
- Open
- Error

Water Level & Discharge



OBSERVATION TIME [D/M/Y h:m]	Montalban			Nangka			Sto.Niño			Rosario JS			Rosario LS			Napindan JS			Napindan LS		
	WTRLV [m]	DISCH [m³/s]	BASINM [mm]	WTRLV [m]	DISCH [m³/s]	BASINM [mm]	WTRLV [m]	DISCH [m³/s]	BASINM [mm]	WTRLV [m]	DISCH [m³/s]	BASINM [mm]	WTRLV [m]	DISCH [m³/s]	BASINM [mm]	WTRLV [m]	DISCH [m³/s]	BASINM [mm]	WTRLV [m]	DISCH [m³/s]	BASINM [mm]
17/Feb/2016 01:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.64	---	0	11.04	0.00	0	10.76	---	0	10.78	0.00	0
17/Feb/2016 02:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.64	---	0	10.98	0.00	0	10.74	---	0	10.76	0.00	0
17/Feb/2016 03:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	10.98	0.00	0	10.74	---	0	10.75	0.00	0
17/Feb/2016 04:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	10.93	0.00	0	10.73	---	0	10.75	0.00	0
17/Feb/2016 05:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	11.05	0.00	0	10.75	---	0	10.77	0.00	0
17/Feb/2016 06:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	11.11	0.00	0	10.78	---	0	10.80	0.00	0
17/Feb/2016 07:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.62	---	0	11.05	0.00	0	10.78	---	0	10.79	0.00	0
17/Feb/2016 08:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.62	---	0	10.99	0.00	0	10.78	---	0	10.80	0.00	0
17/Feb/2016 09:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.62	---	0	11.00	0.00	0	10.79	---	0	10.80	0.00	0
17/Feb/2016 10:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.62	---	0	10.98	0.00	0	10.80	---	0	10.82	0.00	0
17/Feb/2016 11:00	20.55	---	0	15.80	---	0	11.90	218.43	0	11.62	---	0	11.07	0.00	0	10.83	---	0	10.85	0.00	0
17/Feb/2016 12:00	20.54	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	11.01	0.00	0	10.86	---	0	10.87	0.00	0
17/Feb/2016 12:50																					
17/Feb/2016 13:00	20.54	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	11.02	0.00	0	10.88	---	0	10.90	0.00	0
17/Feb/2016 13:10																					
17/Feb/2016 13:20																					
17/Feb/2016 13:30																					
17/Feb/2016 13:40																					
17/Feb/2016 13:50																					
17/Feb/2016 14:00	20.54	---	0	15.80	---	0	11.90	218.43	0	11.63	---	0	10.96	0.00	0	10.92	---	0	10.93	0.00	0
17/Feb/2016 14:10																					
17/Feb/2016 14:20																					
17/Feb/2016 14:30																					
17/Feb/2016 14:40																					

NOTES: \*\*\* = NO DATA , --- = INVALID DATA/ERROR

OBSERVATION TIME [D/M/Y h:m]	Mt.Campana		Boso Boso		Nangka		Science Garden		Mt.Oro		Aries		Napindan	
	INTEN [mm]	CUM RF [mm]	INTEN [mm]	CUM RF [mm]	INTEN [mm]	CUM RF [mm]	INTEN [mm]	CUM RF [mm]	INTEN [mm]	CUM RF [mm]	INTEN [mm]	CUM RF [mm]	INTEN [mm]	CUM RF [mm]
17/Feb/2016 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 10:00	0	0	0	0	0	0	0	0	0	***	0	0	0	0
17/Feb/2016 11:00	0	0	0	0	0	0	0	0	0	***	0	0	0	0
17/Feb/2016 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 12:50														
17/Feb/2016 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 13:10														
17/Feb/2016 13:20														
17/Feb/2016 13:30														
17/Feb/2016 13:40														
17/Feb/2016 13:50														
17/Feb/2016 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17/Feb/2016 14:10														
17/Feb/2016 14:20														
17/Feb/2016 14:30														
17/Feb/2016 14:40														

NOTES: \*\*\* = NO DATA , --- = INVALID DATA/ERROR

**Observations**

*Rainfall*

Aries  
Boso Boso  
Mt. Campana  
Mt. Oro  
Nangka  
Napindan  
Science  
Garden

*Water Level*

Angono  
Fort Santiago  
Montalban  
Nangka  
Napindan DS  
Napindan US  
Pandacan  
Rosario DS  
Rosario US  
San Juan  
Sto Nino

*Discharge*

Fort Santiago  
Montalban  
Nangka  
Napindan DS  
Napindan US  
Pandacan  
Rosario DS  
Rosario US  
San Juan  
Sto Nino

*Gate Levels*

Napindan1  
Napindan2  
Napindan3  
Napindan4  
Rosario1  
Rosario2  
Rosario3  
Rosario4  
Rosario5  
Rosario6  
Rosario7  
Rosario8

**Forecasts**

*Catchment Rainfall*

Lower Pasig  
River  
Upper Pasig  
River

*Water Level*

Angono  
Fort Santiago  
Montalban  
Nangka  
Napindan DS  
Napindan US  
Pandacan  
Rosario DS  
Rosario US  
San Juan  
Sto Nino

*Discharge*

Fort Santiago  
Montalban  
Nangka  
Napindan DS  
Napindan US  
Pandacan  
Rosario DS  
Rosario US  
San Juan  
Sto Nino

*Gate Levels*

Napindan1  
Napindan2  
Napindan3  
Napindan4  
Rosario1  
Rosario2  
Rosario3  
Rosario4  
Rosario5  
Rosario6  
Rosario7  
Rosario8

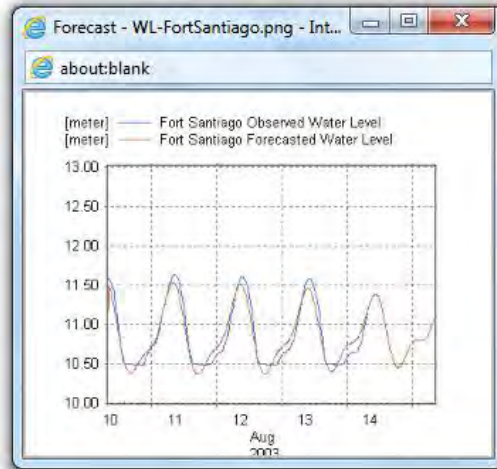
**Maps and Bulletins**

*Maps*

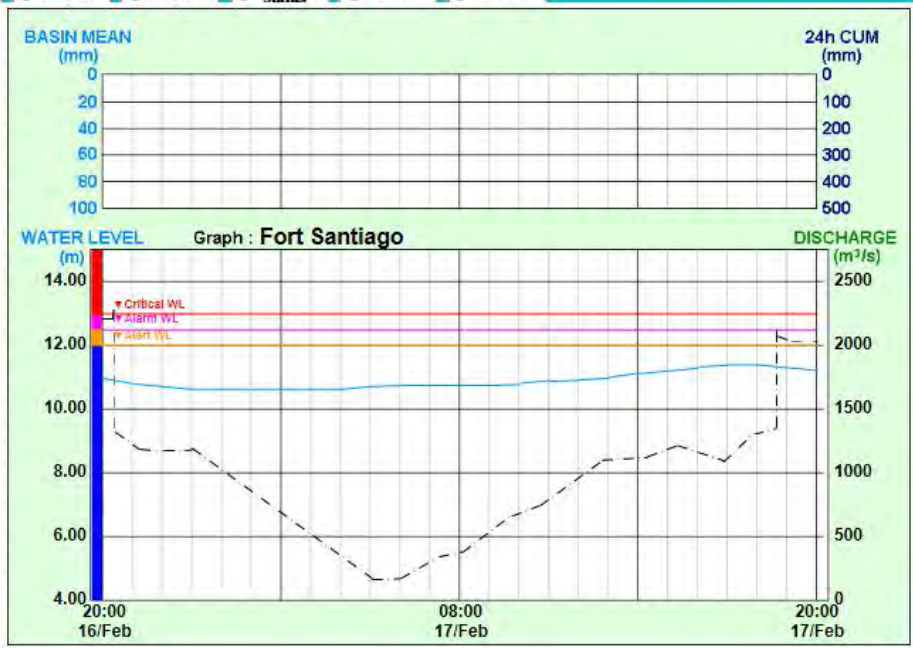
Rainfall Status  
Water Level Status  
Rainfall Map

*Bulletins*

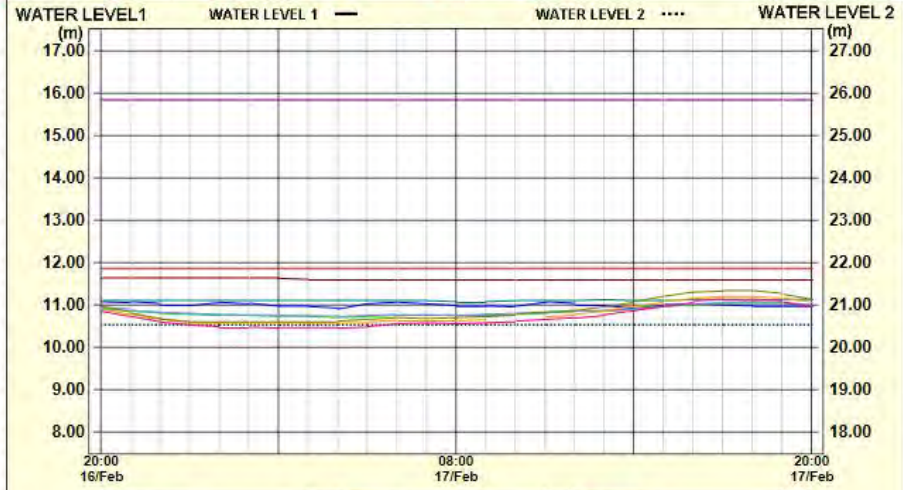
Water Level Status



- Flood Status
  - Graph1
  - Graph2
  - Gate Status
  - Table
  - Forecast
- - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  -

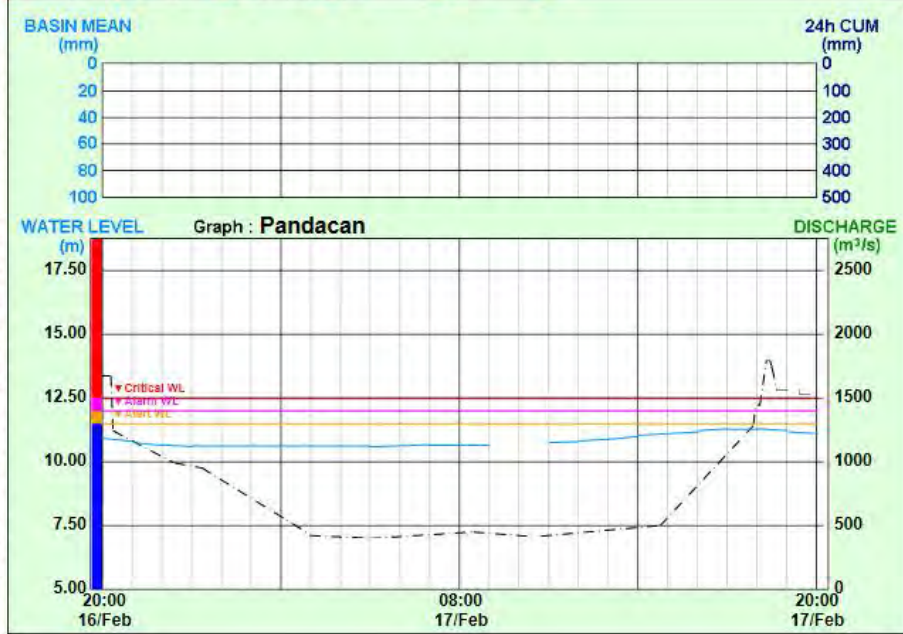


- RAINFALL HOURLY
- RAINFALL 10 min.
- WATER L.V. HOURLY
- WATER L.V. 10 min.
- BASIN MEAN HOURLY
- BASIN MEAN 10 min.

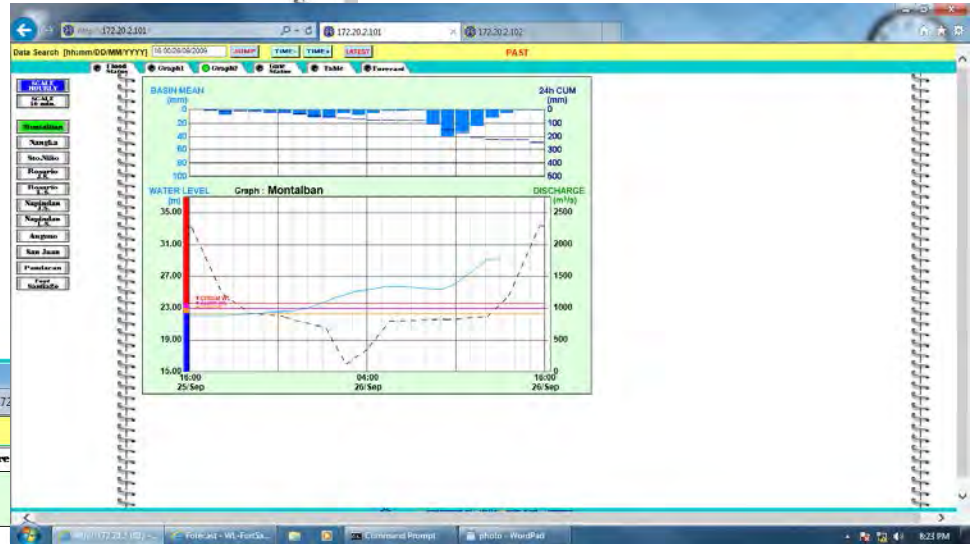




- SCALE HOURLY
- SCALE 10 min.
- Montalban
- Nangka
- Sto.Niño
- Rosario I.S.
- Rosario I.S.
- Napindan I.S.
- Napindan I.S.
- Angono
- San Juan
- Pandacan**
- Fort Santiago



Taskbar area showing three open application windows: a graph window, a map window, and a data window.



# CONCLUSION

- IMPROVED ACCESS TO HYDRO-MET INFORMATION
- TIMELY INFORMATION APPLICABLE TO DISASTER RISK REDUCTION SUCH AS FLOOD FORECASTING FEATURES
- RELIABLE DATA TRANSMISSION BACKBONE
- IMPROVED ARCHIVING FOR FLOOD INCIDENCE CORRELATION AND REPORTING

*OUR VISION.....*

**BECOME ONE OF THE  
PHILIPPINES' CENTERS OF  
EXCELLENCE ON DISASTER RISK  
REDUCTION AND MITIGATION**

**THANK YOU VERY MUCH FOR  
YOUR ATTENTION!**

**HAVE A NICE DAY!**



Department of Science and Technology  
Philippine Atmospheric, Geophysical and Astronomical Services Administration



# **FLOOD FORECASTING & WARNING SYSTEM FOR METRO MANILA**

ENG'R. MAXIMO F. PERALTA

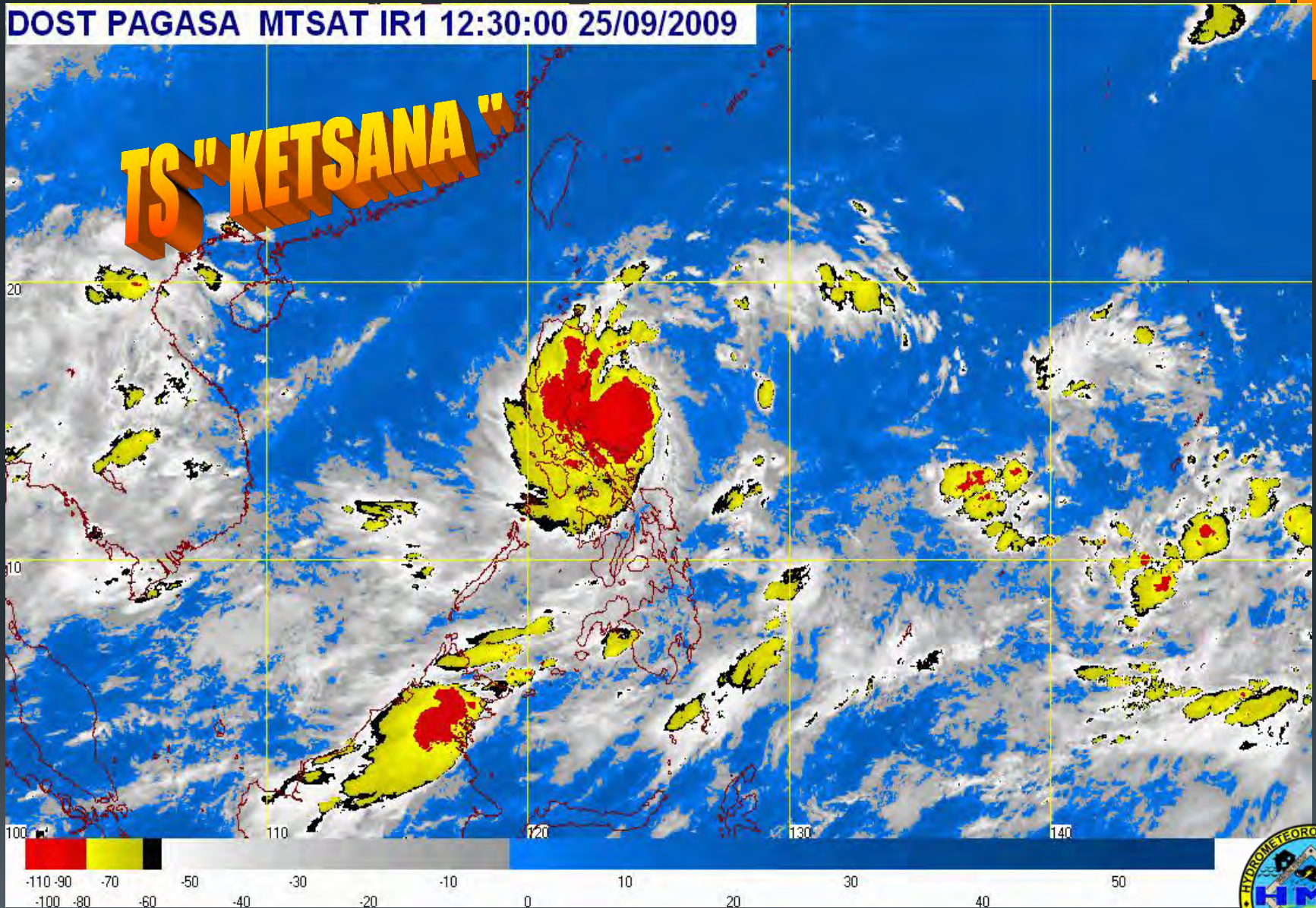
**HYDROMETEOROLOGY DIVISION**

Philippine Atmospheric Geophysical and Astronomical Services Administration

# BACKGROUND :

DOST PAGASA MTSAT IR1 12:30:00 25/09/2009

**TS "KETSANA"**

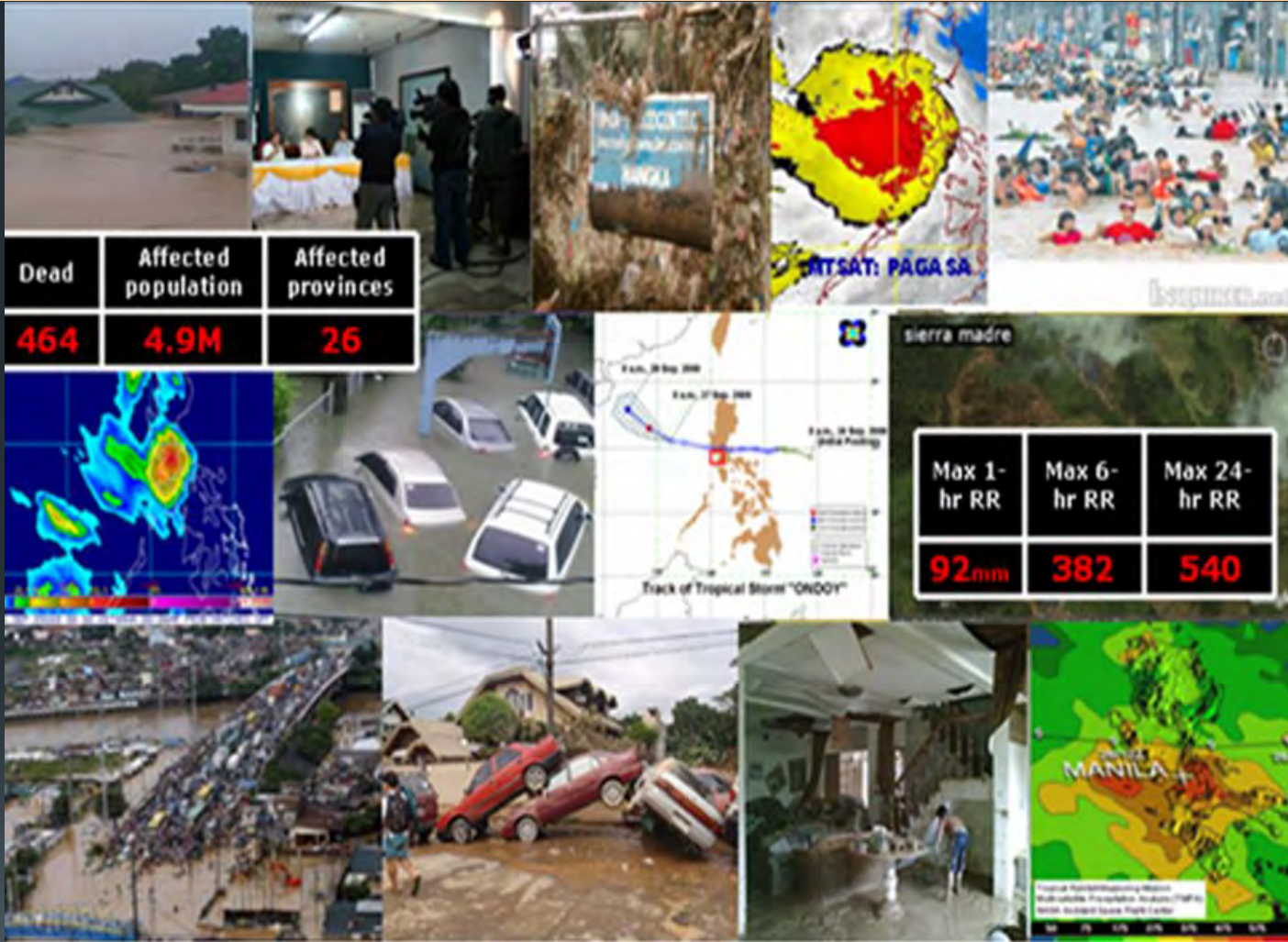


**T.S. Ketsana crossing Central Luzon**



# IMPACT OF T.C. "KETSANA" (Ondoy)

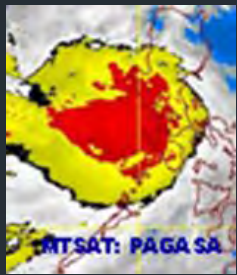
## September 26, 2009





# Case study: Flood in Metro Manila due to TS Ondoy

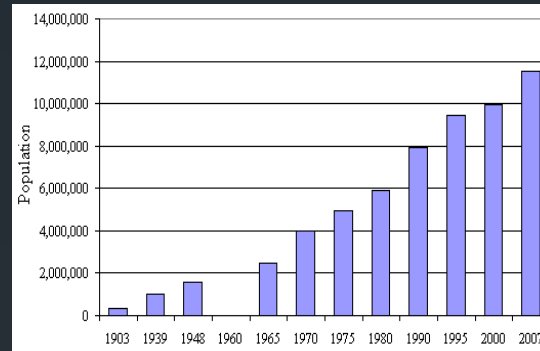
In 2003, Bankoff described in depth that Metro Manila's vulnerability to flooding has evolved as a result of the degree of interplay between climate, topography, resource use, and culture over time. The flood due to TS Ondoy in Sep 2009 proved it.



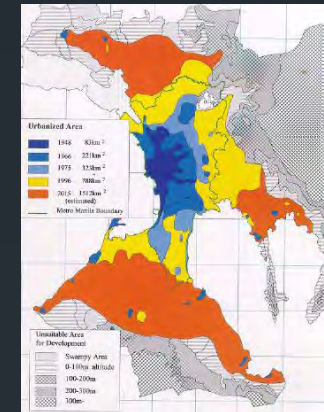
Intense rainfall



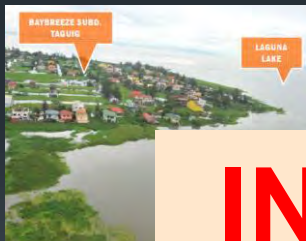
Insufficient carrying capacities



High/dense population



High urbanization level



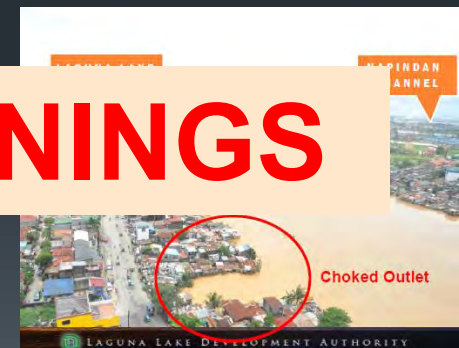
**INSUFFICIENT WARNINGS**



Unabated/rampant development



Deforestation



Informal settlers



"tracking the sky....helping the country..."

# WATER-RELATED DISASTER MITIGATION MEASURES

## STRUCTURAL MEASURES

*Reduce upstream runoff inflow*

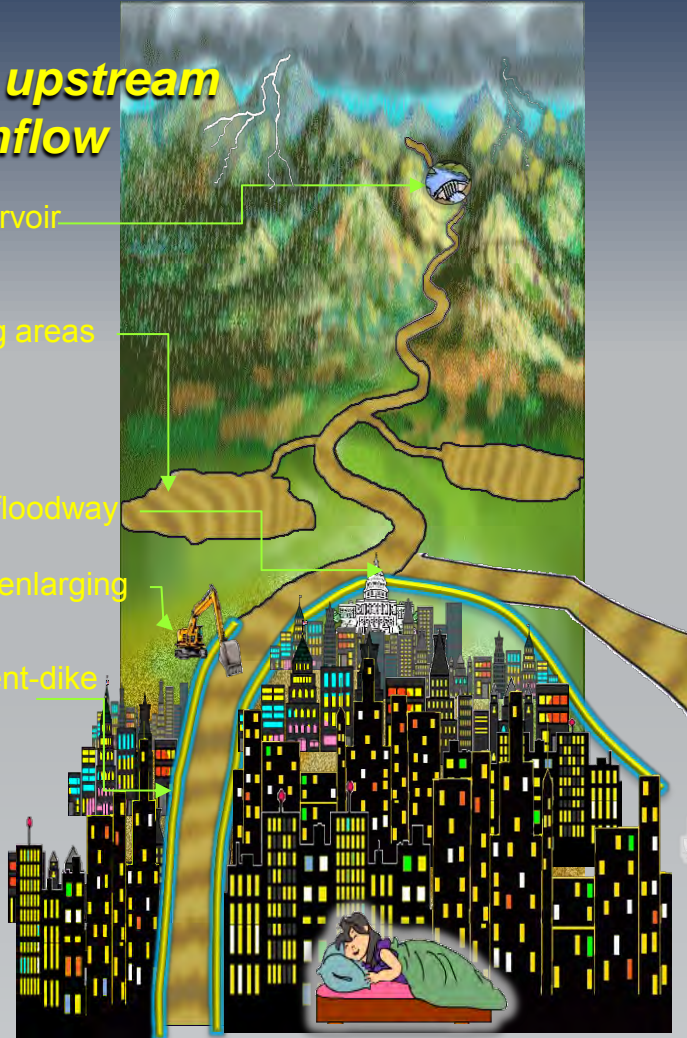
Dam, reservoir

Retarding areas

Bypass, floodway

Channel enlarging

Embankment-dike



**MOVE THE WATER AWAY FROM THE PEOPLE...!!**

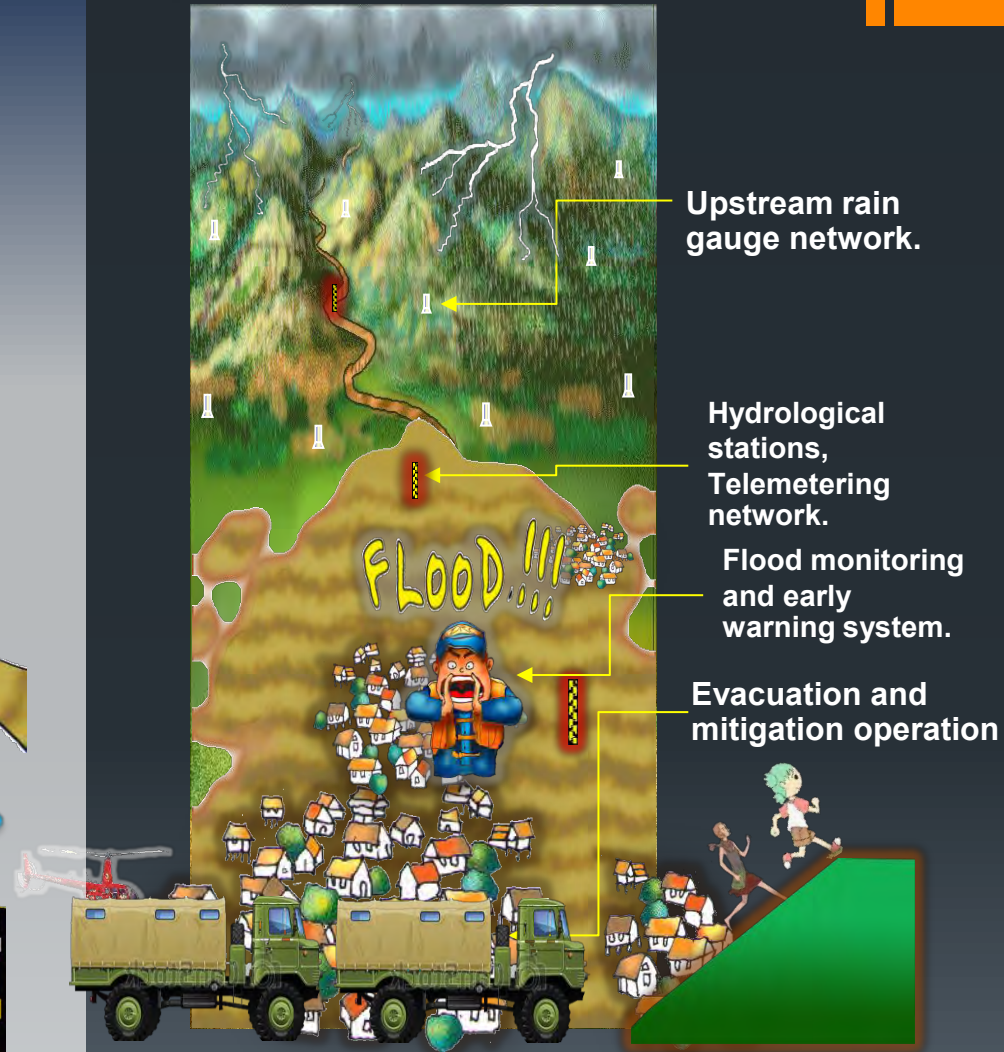
## NON-STRUCTURAL MEASURES

Upstream rain gauge network.

Hydrological stations, Telemetering network.

Flood monitoring and early warning system.

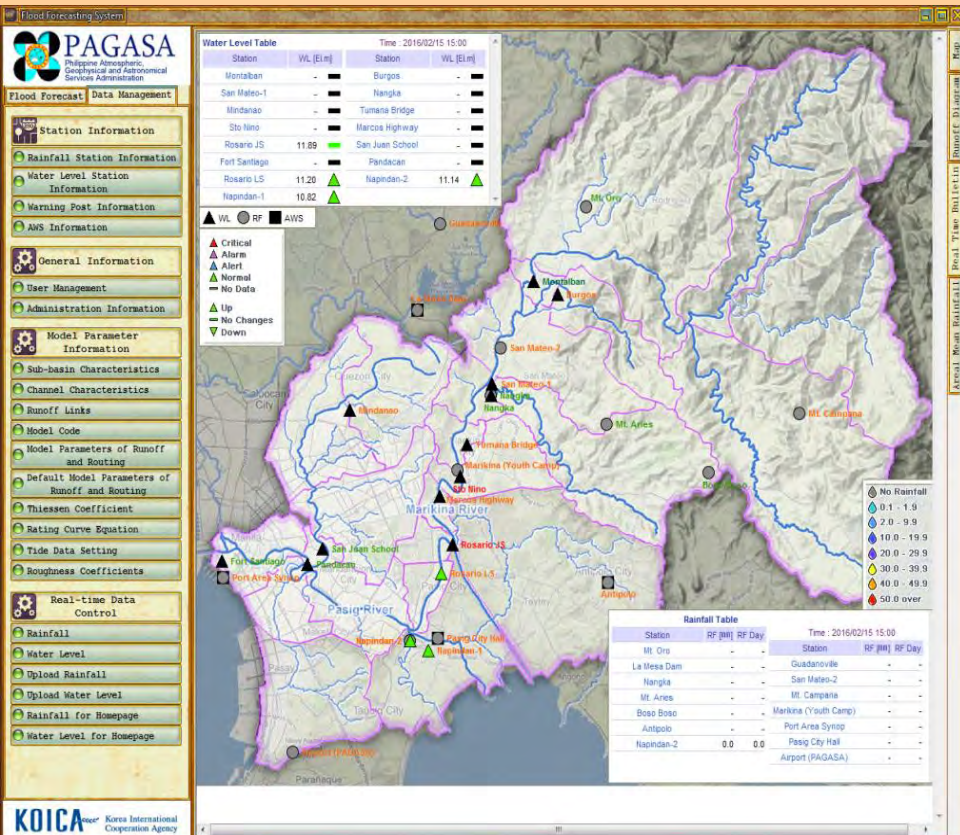
Evacuation and mitigation operation



**MOVE THE PEOPLE AWAY FROM THE WATER ...!!**

# To complement the EFCOS Project: “ESTABLISHMENT OF EARLY WARNING SYSTEM AND MONITORING SYSTEM FOR DISASTER MITIGATION IN METRO MANILA OR EWS 2 PROJECT”

**TARGET AREA : PASIG-MARIKINA RIVER BASIN**



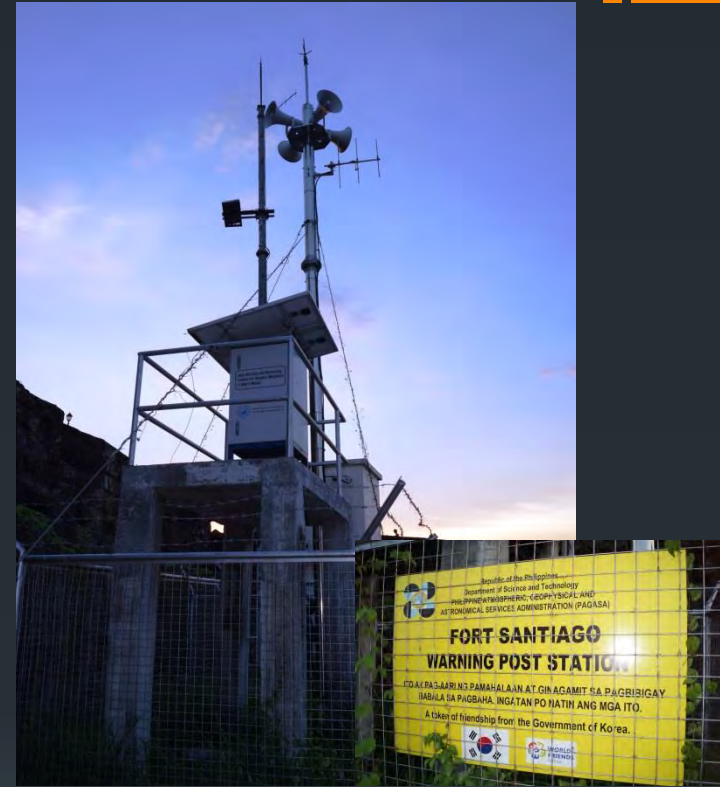
- Funded by Korean Government
- Established in **2010** after Typhoon Ondoy
- Installation was completed in **2012**
- IEC Conducted in **2013**
- Fully Operational in **2014**

## Project Component :

1. Data Collection System
2. Flood Forecast System
3. Early Warning System
4. Communication Network



# Example of Flood Monitoring Equipment:



# Data Collection System Module:

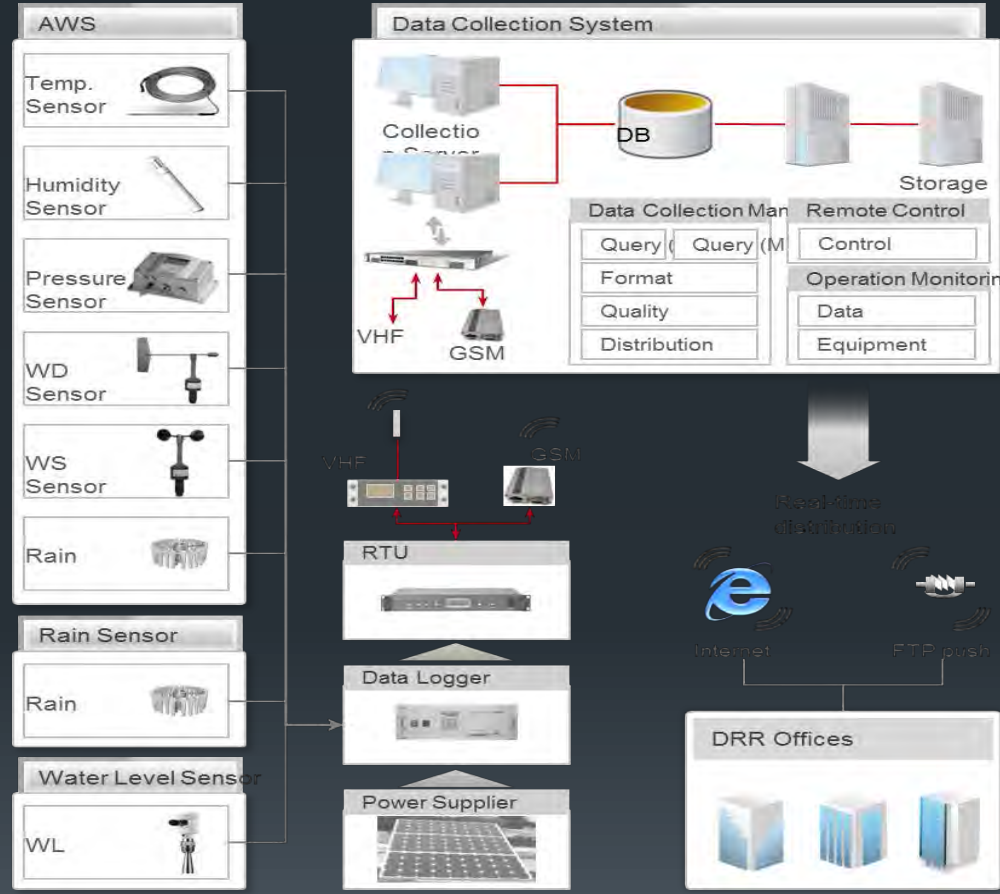
## 4 Automatic Weather Stations



## 10 Rainfall Gauging Stations

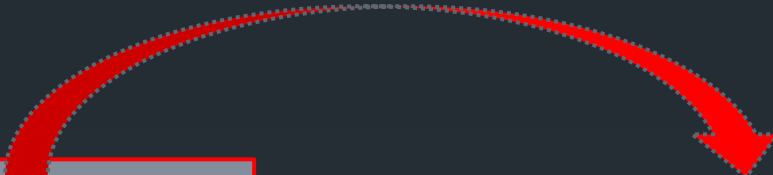


## 10 Waterlevel Gauging Stations



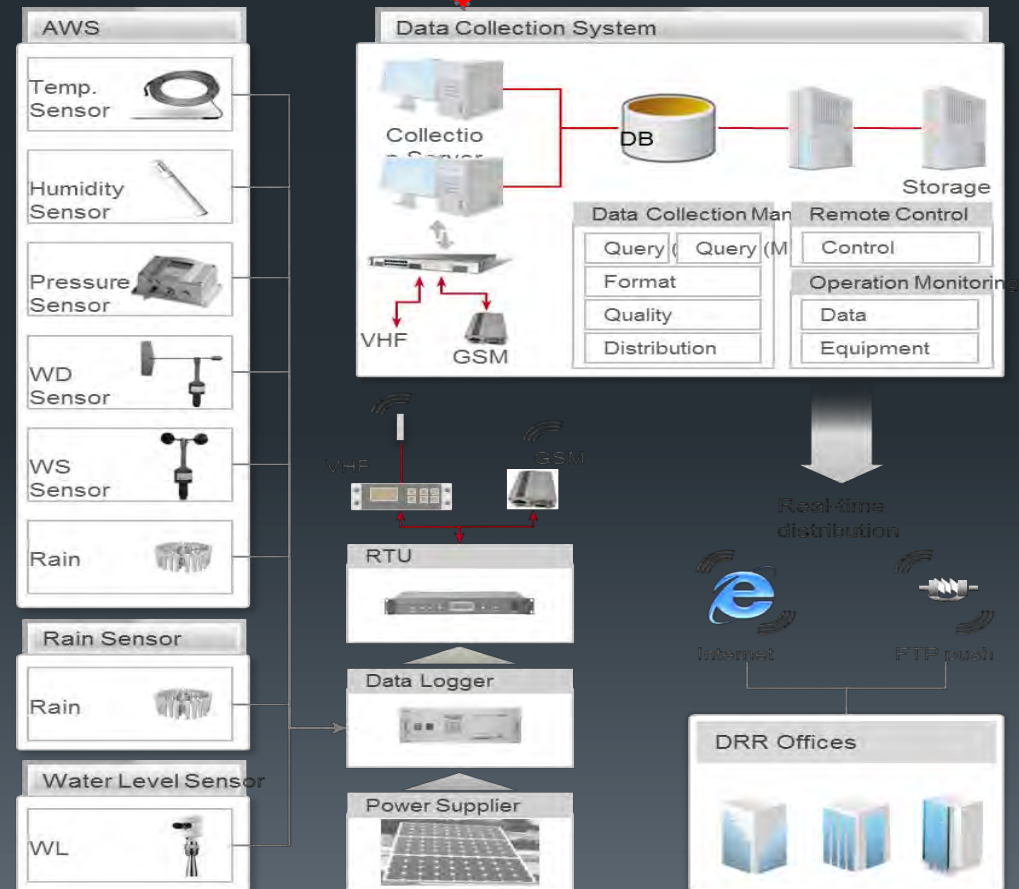
# Expanded Data Collection System Module:

- EFCOS Stations were considered in the design of the Hydrological Network intended for Pasig Marikina River Basin.
- The collected data on the said stations were integrated to the system.

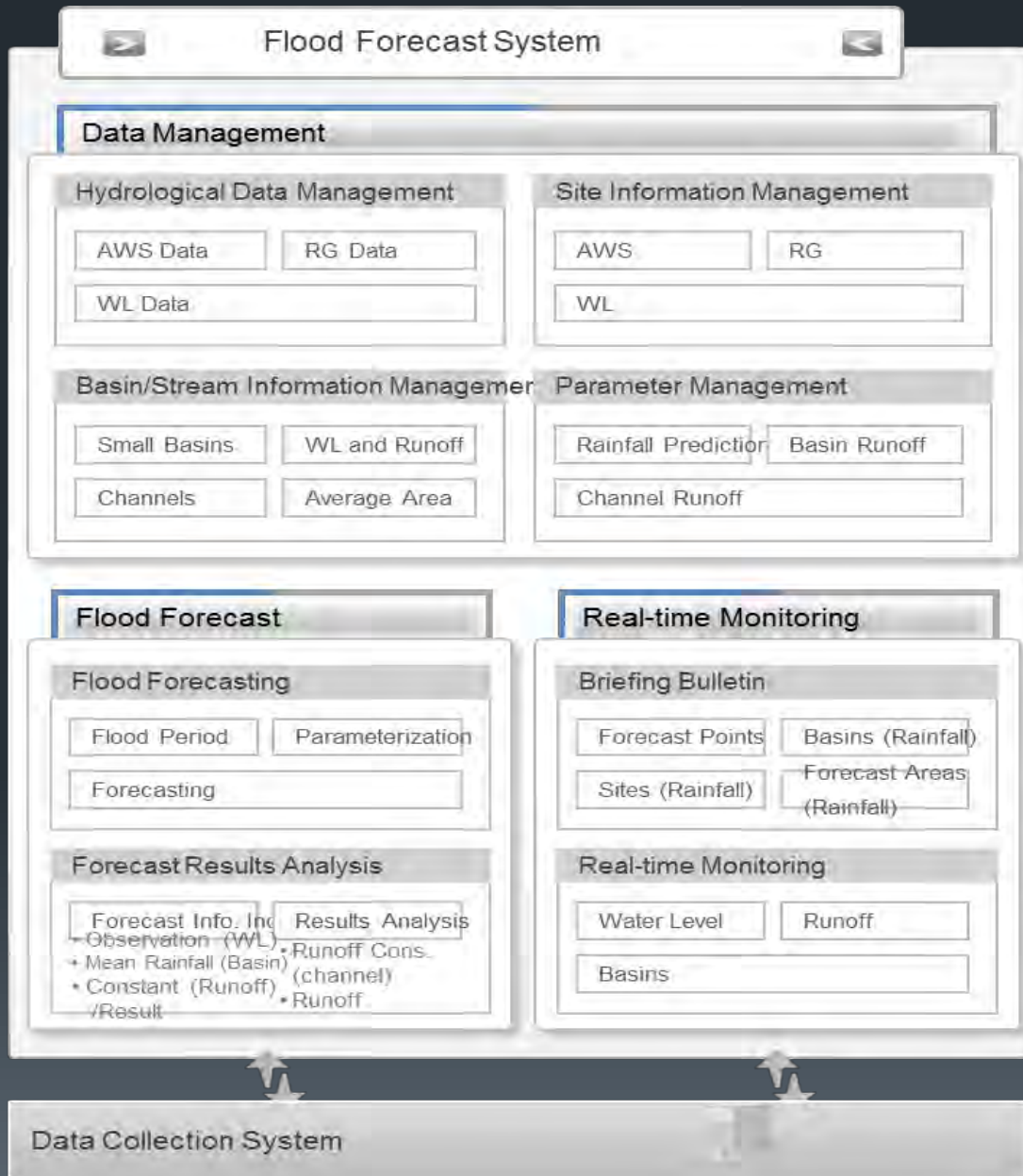


Location Map of EFCOS Stations

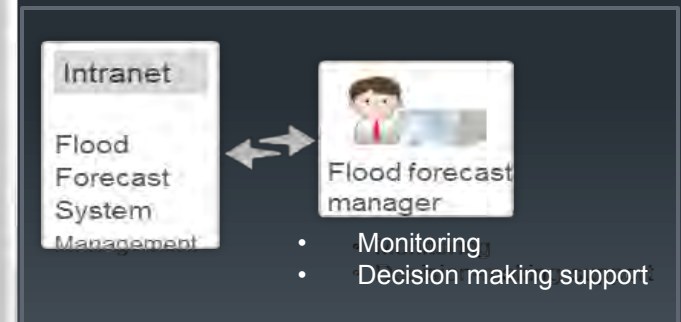
**7 Rainfall Stations**  
**11 Waterlevel Gauging Stations**



# FLOOD FORECASTING SYSTEM:



**PAGASA DIC**



# FLOOD FORECASTING SYSTEM:

## SCREEN SHOT OF GRAPHICAL UNIT INTERFACE (GUI) OF THE SYSTEM

The screenshot displays the PAGASA Flood Forecasting System GUI. The interface is divided into several sections:

- Header:** "Flood Forecasting System" window title and the PAGASA logo (Philippine Atmospheric, Geophysical and Astronomical Services Administration).
- Navigation:** "Flood Forecast" and "Data Management" tabs.
- Control Panels:**
  - Flood Event:** Includes a calendar icon and a "Flood Event" button.
  - Parameters:** Includes a weather icon and buttons for "Modification R5", "Parameters for Excess Rainfall", "Forecasted Rainfall", "Parameters for Basin Runoff", and "Parameters for Channel Routing".
  - Runoff and Routing:** Includes a runoff icon and buttons for "Calculations of Runoff and Routing", "Hydrograph", "CSV Output", and "Transfer to EWS".
  - Hydraulic Model (FLDWAV):** Includes a dam icon and buttons for "Preparation of Input File", "Modification Input File", "Hydraulic Routing", "Hydrograph", and "CSV Output".
- Flood Event Information Table:**

Flood Event Information	
Watershed	Manila
Flood ID	20131101
Beginning Time	2013-08-16 00:00
Ending Time	2013-11-22 00:00
Current Time	2013-11-07 15:00
- Map:** A topographic map of the Manila area with various locations marked. A legend in the top-left corner identifies symbols: WP (yellow square), WP[DRR] (cyan square), WL[KOICA] (orange triangle), WL[MMDA] (green triangle), and WL[UNDP] (purple triangle). Labeled locations include Rodriguez-2, Eastwood Rodriguez, Rodriguez-1, Montalban, Delacosta Subdiv, Burgos, San Mateo-2, San Mateo Mun. Hall, San Mateo-1, Nangka, Tumana Bridge, Marikina City Hall, Sto Nino, People's Park, Marcos Highway, Marikina River, San Juan School, NDCC-OCDC, Mercury Avenue, Rosario JS, Rosario LS, Pasig River, Guadalupe, Pasig City Hall, Napindan-2, and Napindan-1. Other cities like Marikina, Valenzuela, and Taguig are also visible.
- Right Sidebar:** A vertical navigation menu with buttons for "Map", "Areal Mean Rainfall", "Real Time Bulletin", "Runoff Diagram", and "Map".
- Footer:** The KOICA (Korea International Cooperation Agency) logo.



# EARLY WARNING SYSTEM:

**Flood Forecast System**

**Data Management**

**Hydrological Data**

- AWS
- RG
- WL

**Parameters**

- Precipitation forecast
- Basin runoff
- Channel runoff

**Flood Prediction Management**

**Flood prediction**

- Flood period
- Parameter
- Forecasting

**Results analysis**

- Reference
- Report



Results



Obs. Data

**Early Warning System**

**Early Warning System (1)**

**Warning Management**

Automatic Manual

Decision of Warning Area

Selection of Warning Scenario

Warning Activation

Results Check-up

SMS Messages

**Remote Control**

Transmitter-Receiver

**Equipment Monitoring**

Status of Equipment

Working Monitoring

**Status Display**

Good/No Good

**Communication**

VHF GSM

**Warning Posts (20)**

**Warning Broadcasting**

- Voice
- Siren
- Results Transmission
- Save of Scenario

**System Diagnosis**

- Self-diagnosis
- Results transmission

**Comm. Power**

- VHF
- GSM
- Solar
- Commercial

**Emergency Warning System (7)**

**Warning Broadcasting**

- Voice
- Siren
- Results Transmission
- Save of Scenario

**System Diagnosis**

- Self-diagnosis
- Results transmission

**Comm. Power**

- VHF
- GSM
- Solar
- Commercial

# EARLY WARNING SYSTEM:

- Location of 20 Warning Post along Pasig Marikina River Basin

**Flood Forecasting Early Warning System**

Local Time : 2013-11-10 20:36

**Warning Post Monitoring**

**Menu**

- Early Warning System
  - Warning Post
  - Hold List
  - Alarm List
- Observation System
  - AWS / RG / WL
- Report Inquiry
  - Report Alarm
  - Report SMS
- SMS
  - SMS Management
  - SMS Send
- Status Inquiry
  - Status Equipment
  - Status Data
- Full Screen
  - Full Screen

**Station List**

Station	Forecast Level	Current Level
Wawa Dam	--	--
Eastwood Rodriguez	--	--
Rodriguez-2	--	--
Rodriguez-1	--	--
Burges	--	--
Delacosta Subdiv.	--	--
San Mateo-2	--	--
San Mateo-1	--	--
Nangka	--	--
Tumana Bridge	--	--
Sio Nino	--	--
Marcos Highway	--	--
People's Park	--	--
Mercury Avenue	--	--
San Juan School	--	--
Rosario JS	--	--
Rosario LS	--	--
Guadalupe	--	--
Napindan-2	--	--
Ermit Santiago	--	--

**Alarm List**

Add  Delete  Save  Reset  All\_Issue  All\_Stop

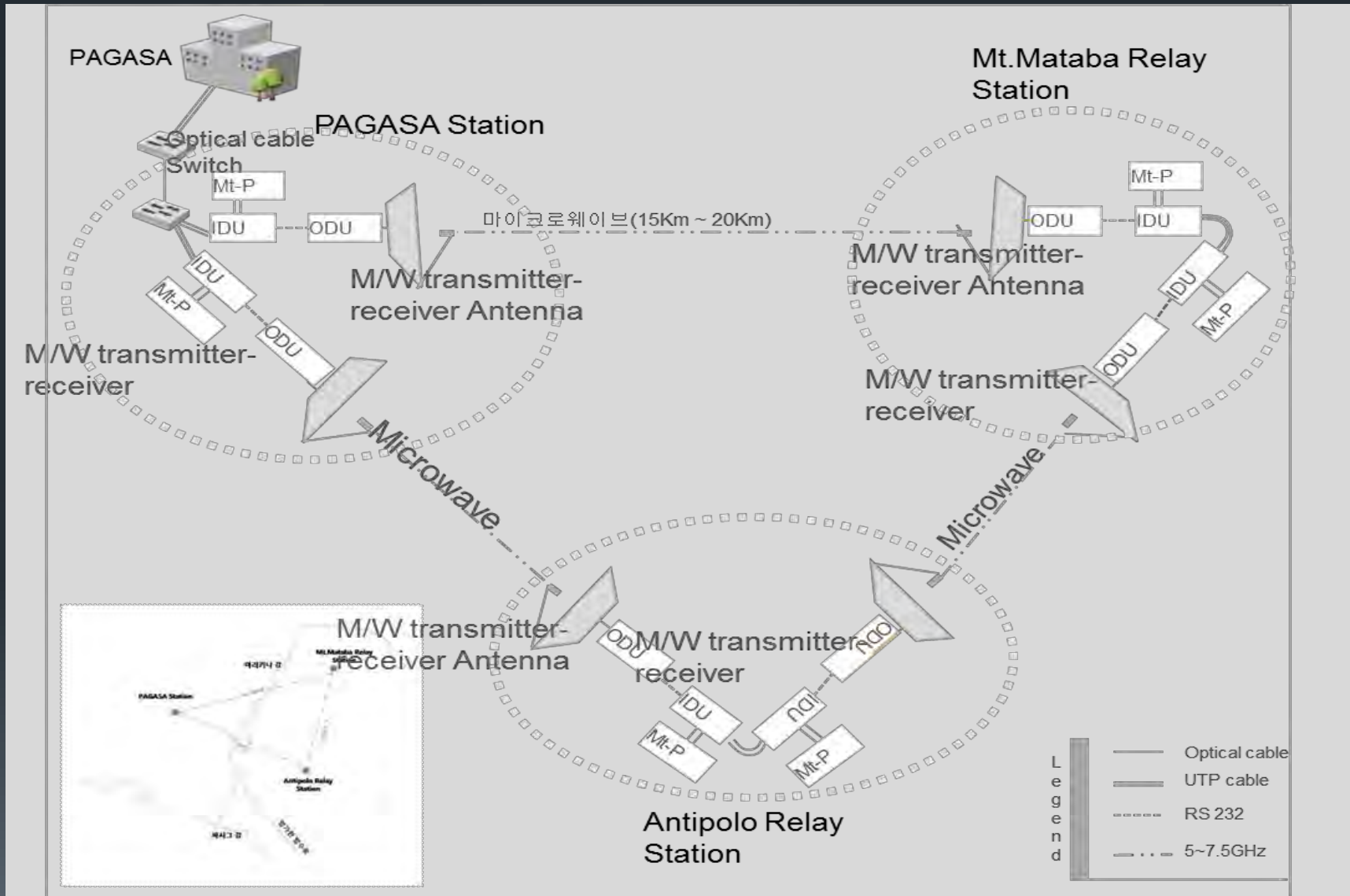
Status	Warning Post	TimeStamp	Warning Level			Alert Time	Alert WL	Alarm Time	Alarm WL	Critical Time	Critical...	Remarks
			Forecast	Current	Control							
Issue	Sto Nino				2							
Stop	Marcos Highway				2							

Selective SMS

Submit Cancel

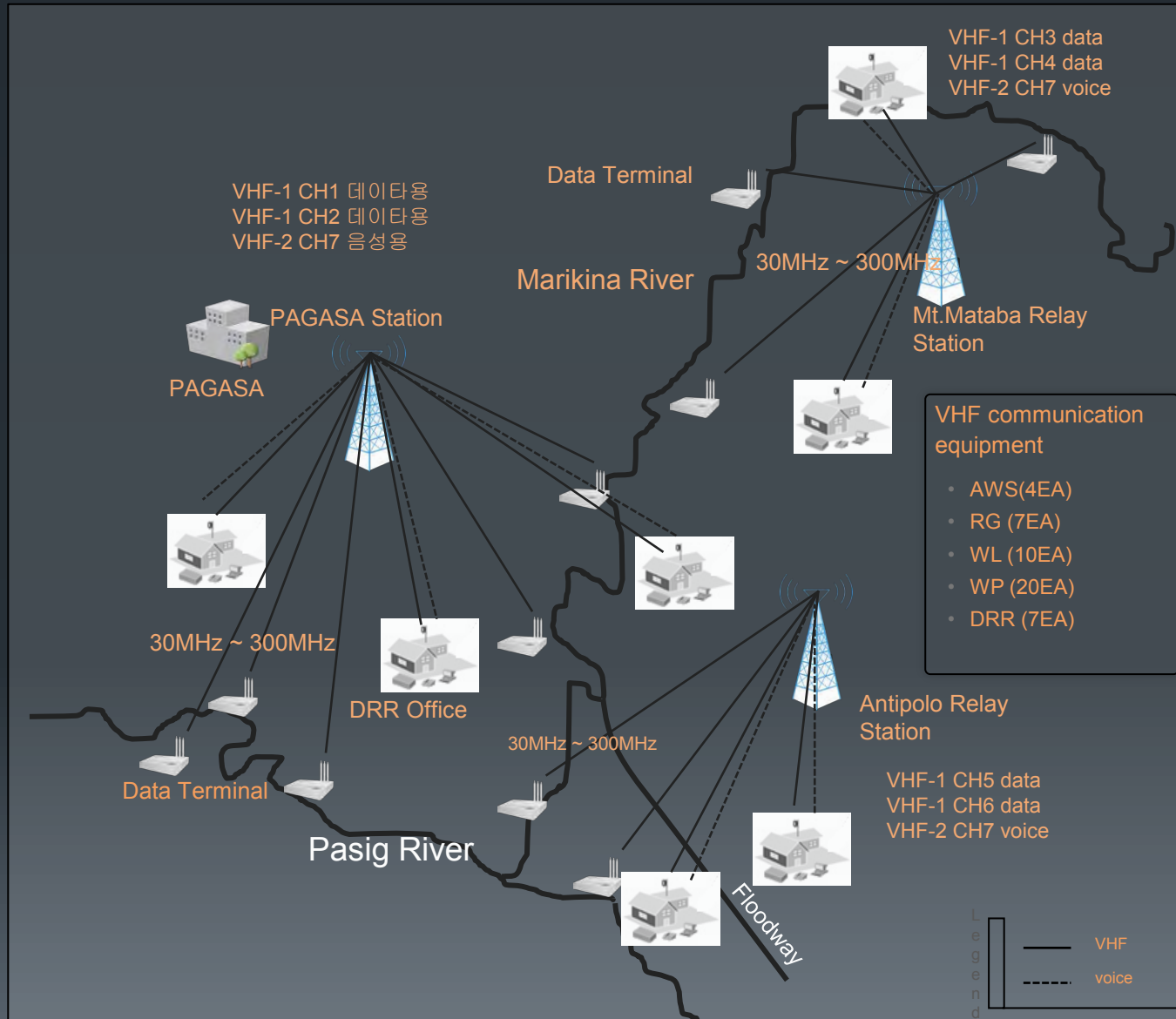
# COMMUNICATION SYSTEM:

## Microwave Communication



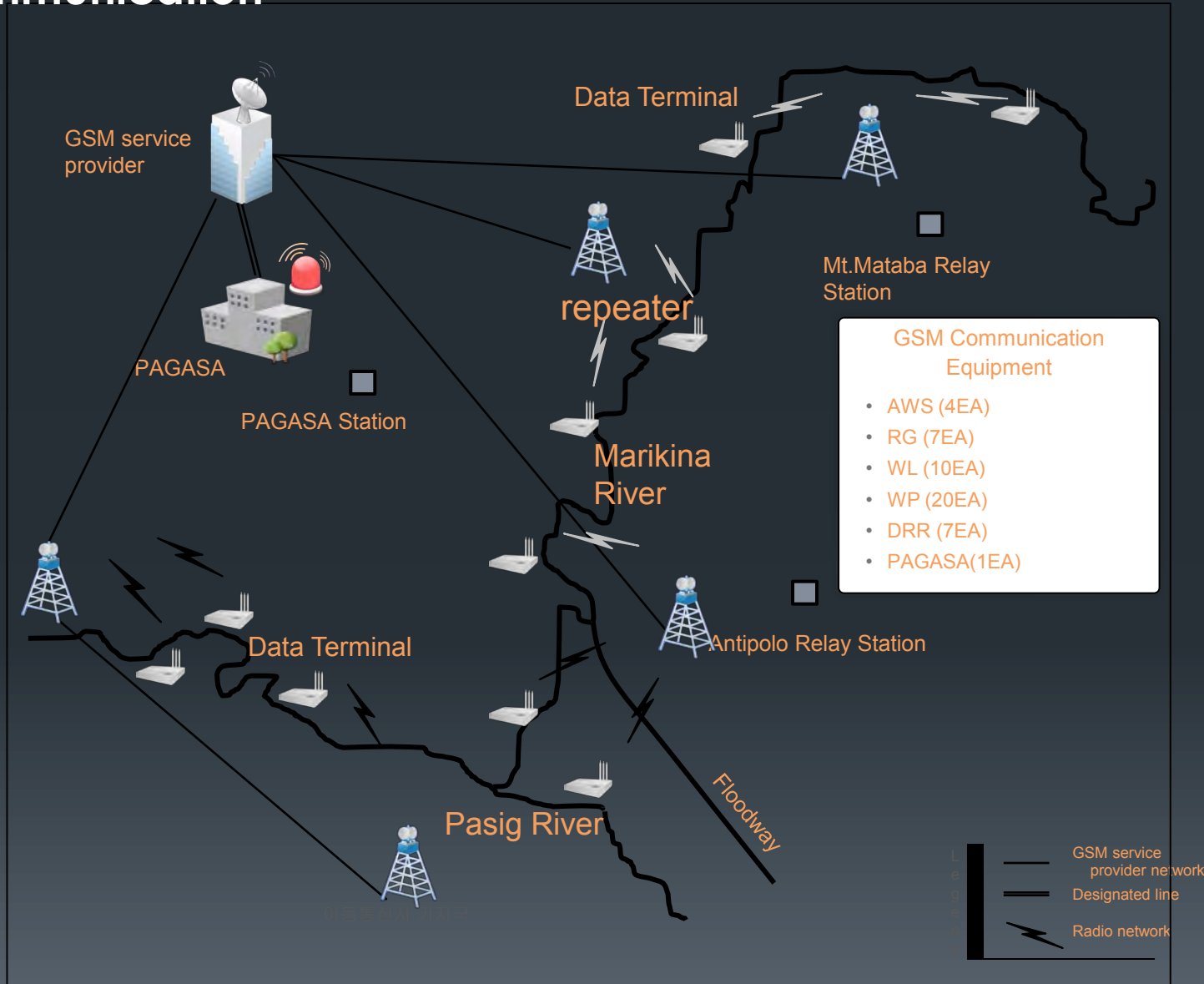
# COMMUNICATION SYSTEM:

## VHF Radio Communication



# COMMUNICATION SYSTEM:

## GSM Communication



# PAGASA WEBSITE:

Republic of the Philippines  
**PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION**  
*"tracking the sky...helping the country"*

## NATIONAL ASTRONOMY WEEK

THEME: "Updating the Skills of Personnel from PAGASA Regional Services Division (PRSD) in Understanding Astronomical Events"

**FREE!** Planetarium Shows Stargazing & Telescoping

General Weather - Aviation - Marine - Tropical Cyclones - Floods - Climate - Agriculture - Astronomy - Regional Forecasts

YOU ARE HERE - HOME

PHILIPPINE STANDARD TIME  
**02:39:15 PM**  
 18 February 2016 Thursday

Current Weather Weather Map Satellite Radar

**PAGASA CITIZEN'S CHARTER**

- WEATHER Advisories
- RAINFALL and THUNDERSTORM Warning
- FLOOD Info/Warnings
- CLIMATE Advisories
- ASTRONOMY Info
- Products and Services
  - PAGASA-DOST: Met-Hydro Decision Support Inboxes
  - Weather Forecasts from Numerical Prediction Model
  - Flood Monitoring for Metro Manila**

Legend

**PAGASA-DOST**  
 #NCR\_PRSD 18 February 2016 02:13PM  
 Light to moderate #rains affecting #Quezon(Sen-Nakar, Real), #Bulacan... #me/607Zap/mL

**PAGASA-DOST**  
 #WS\_PRSD  
 @ 11:07 AM 18 Feb 2016  
 Light to moderate r... affecting over #Cebu(Lapu-lapu, Cordova) & nearby... #me/61... #asyg

**PAGASA-DOST**  
 Tweet to @dost\_pagsa

Latest News

**J-POW PROJECT 2ND ANNUAL SEMINAR**

Read more...  
**TYPHOON "NONA" OUT- AND THIS NEW TROPICAL CYCLONE NAME COULD BE YOU**

Typhoon "Nona" is out and this new tropical cyclone name could be you

Another destructive typhoon was decommissioned from the list of tropical cyclone names in the Philippines as recommended by the Weather Division of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).

**PAGASA**  
 Philippine Atmospheric, Geophysical and Astronomical Services Administration

Search Time: 2014/09/19 01:40

Time: 2014/09/19 01:40

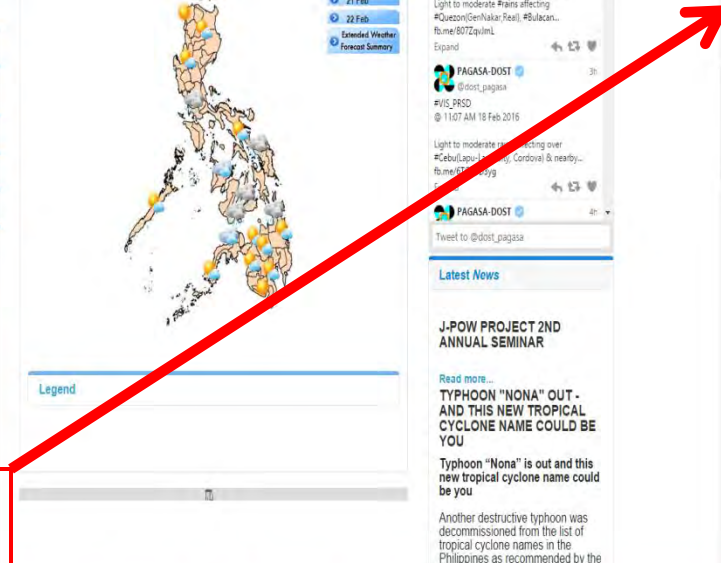
Water Level Map

- Water Level
- Map
- Table
- Rainfall
  - Map
  - Table
  - Areal Mean Rainfall
- AWS
  - Map
  - Table

Station	WL (E1.m)	Alert (E1.m)	Alarm (E1.m)	Critical (E1.m)
Montalban	22.66	22.40	23.96	23.80
Burges	27.36	27.48	27.96	28.40
San Mateo-1	16.69	16.80	16.80	20.00
Nangka	16.17	16.50	17.10	17.70
Mindanao	32.48	33.00	34.00	35.00
Tomasna Bridge	13.74	17.26	18.26	19.26
Sto Nino	13.60	15.00	15.00	17.00
Marconi Highway	13.39	14.50	14.50	16.50
Rosario JS	13.45	13.50	14.00	15.00
San Juan School	11.24	11.00	11.50	12.00
Fort Santiago	-	11.00	11.50	12.00
Pandacas	11.37	11.00	11.50	12.00
Rosario LS	12.39	13.00	13.50	14.00
Napanitan-2	11.47	13.00	14.00	15.00
Napanitan-1	11.44	13.00	14.00	14.50

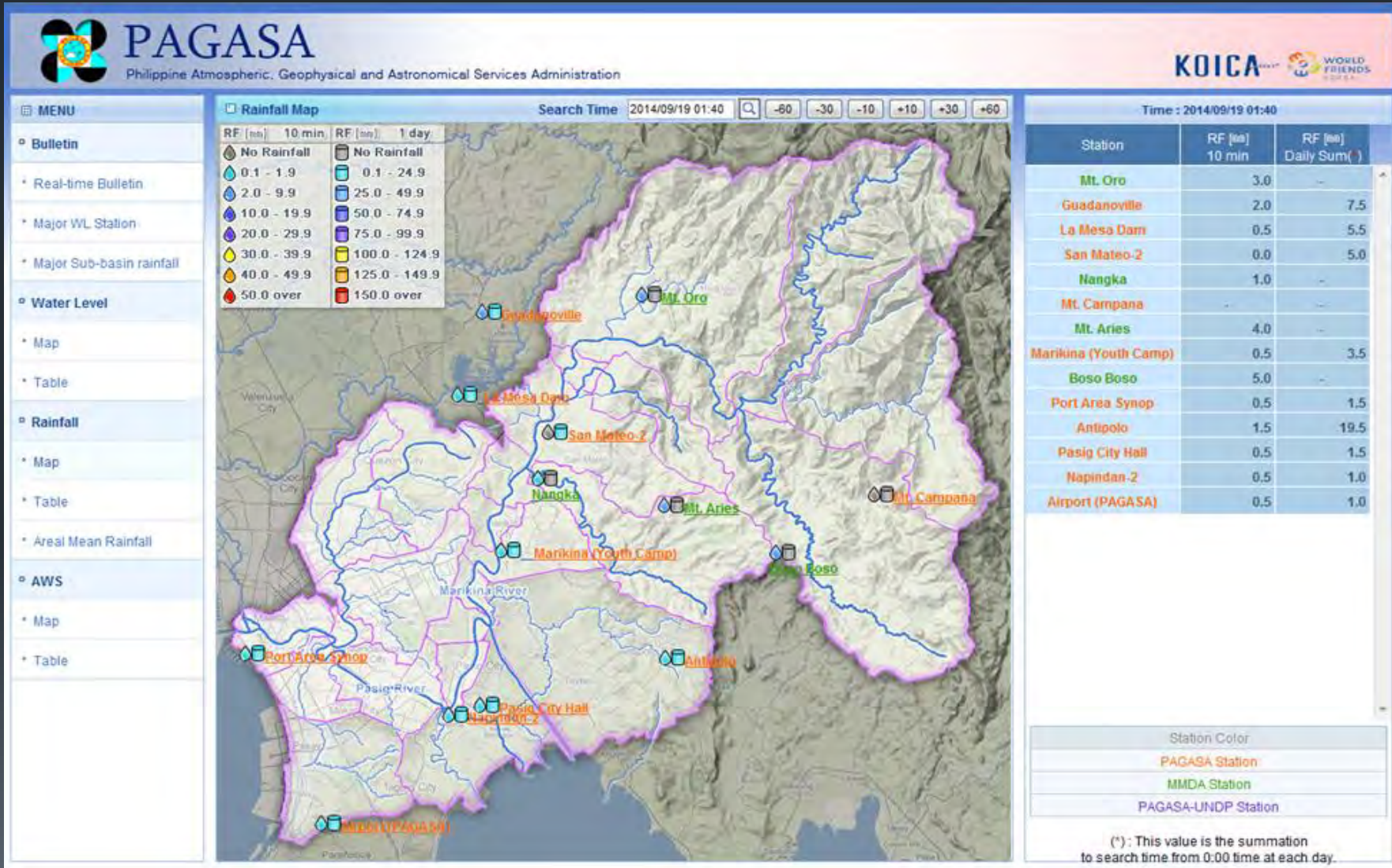
Station Color

- PAGASA Major Station: MMCA Major Station
- PAGASA Station: MMCA Station
- PAGASA-UNDP Station



**EXAMPLE OF FLOOD  
WARNING ACTIVATION  
DURING THE PASSAGE  
OF TYPHOON MARIO  
(SEPTEMBER 14, 2014)**

# RAINFALL INTENSITY of PMRB as of 1:40 AM September 19, 2014





# STATUS OF WATERLEVEL of PMRB as of 1:40 AM September 19, 2014



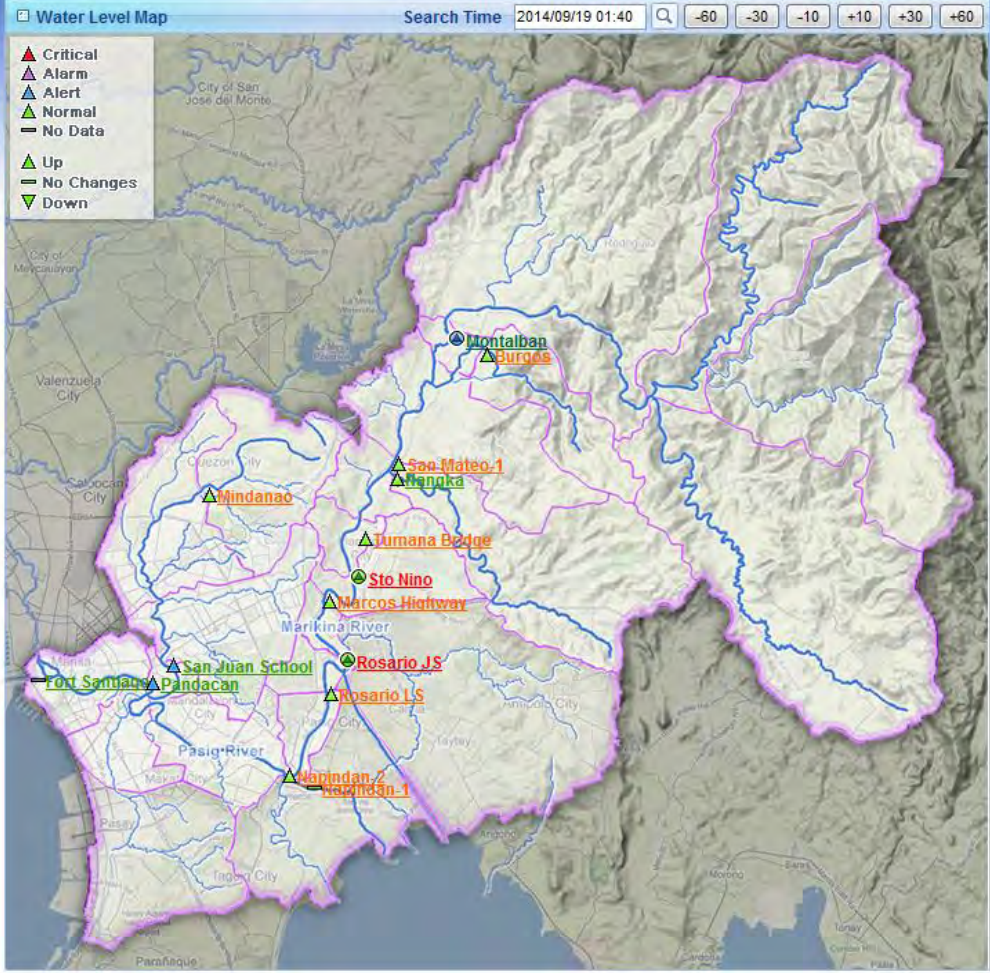
**PAGASA**

Philippine Atmospheric, Geophysical and Astronomical Services Administration

KOICA



- MENU**
- Bulletin**
  - Real-time Bulletin
  - Major WL Station
  - Major Sub-basin rainfall
- Water Level**
  - Map
  - Table
- Rainfall**
  - Map
  - Table
  - Areal Mean Rainfall
- AWS**
  - Map
  - Table



Time : 2014/09/19 01:40

Station	WL (Ft. m)	Alert (Ft. m)	Alarm (Ft. m)	Critical (Ft. m)
<b>Montalban</b>	22.66	22.40	23.00	23.60
Burgos	27.36	27.40	27.90	28.40
San Mateo-1	16.69	18.00	19.00	20.00
Nangka	16.17	16.50	17.10	17.70
Mindanao	32.48	33.00	34.00	35.00
Tumana Bridge	13.74	17.26	18.26	19.26
Sto Nino	13.60	15.00	16.00	17.00
Marcos Highway	13.39	14.50	15.50	16.50
Rosario JS	13.45	13.50	14.00	15.00
San Juan School	11.34	11.00	11.50	12.00
Fort Santiago	-	11.00	11.50	12.00
Pandacan	11.37	11.00	11.50	12.00
Rosario LS	12.39	13.00	13.50	14.00
Napindan-2	11.72	14.00	14.50	15.00
Napindan-1	11.44	13.50	14.00	14.50

Station Color

PAGASA Major Station	MMDA Major Station
PAGASA Station	MMDA Station
PAGASA-UNDP Station	

# Rainfall Intensity of PMRB as of 5:40 AM



**PAGASA**

Philippine Atmospheric, Geophysical and Astronomical Services Administration



MENU

Bulletin

- Real-time Bulletin
- Major WL Station
- Major Sub-basin rainfall

Water Level

- Map
- Table

Rainfall

- Map
- Table

Areal Mean Rainfall

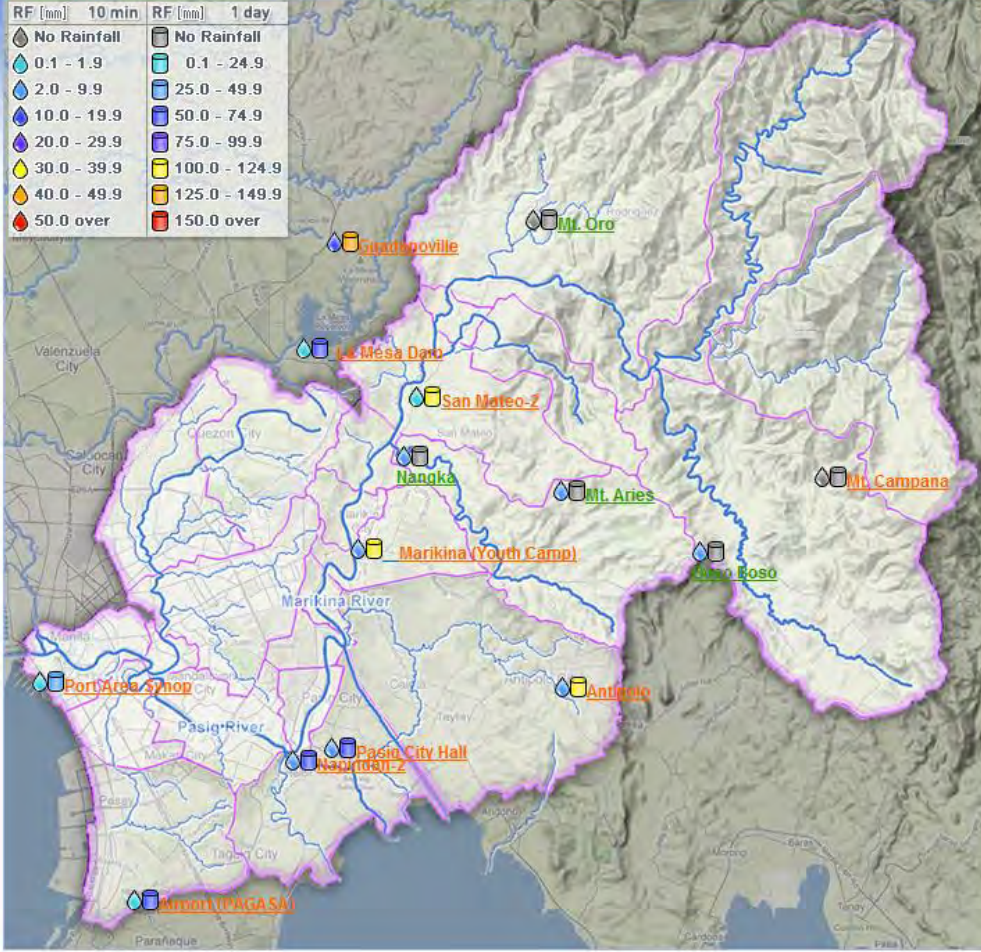
AWS

- Map
- Table

Rainfall Map

Search Time 2014/09/19 05:40

RF [mm]	10 min	RF [mm]	1 day
No Rainfall	No Rainfall	No Rainfall	No Rainfall
0.1 - 1.9	2.0 - 9.9	10.0 - 19.9	20.0 - 29.9
30.0 - 39.9	40.0 - 49.9	50.0 over	
0.1 - 24.9	25.0 - 49.9	50.0 - 74.9	75.0 - 99.9
100.0 - 124.9	125.0 - 149.9	150.0 over	



Time : 2014/09/19 05:40

Station	RF [mm] 10 min	RF [mm] Daily Sum(*)
Mt. Oro	0.0	-
Guadanoville	12.0	143.5
La Mesa Dam	0.5	66.5
San Mateo-2	0.5	103.0
Nangka	8.0	-
Mt. Campana	-	-
Mt. Aries	8.0	-
Marikina (Youth Camp)	4.5	117.0
Boso Boso	6.0	-
Port Area Synop	0.5	26.0
Antipolo	3.5	123.0
Pasig City Hall	3.5	70.5
Napindan-2	2.0	55.0
Airport (PAGASA)	0.5	68.5

Station Color
PAGASA Station
MMDA Station
PAGASA-UNDP Station

(\*) : This value is the summation to search time from 0:00 time at each day.

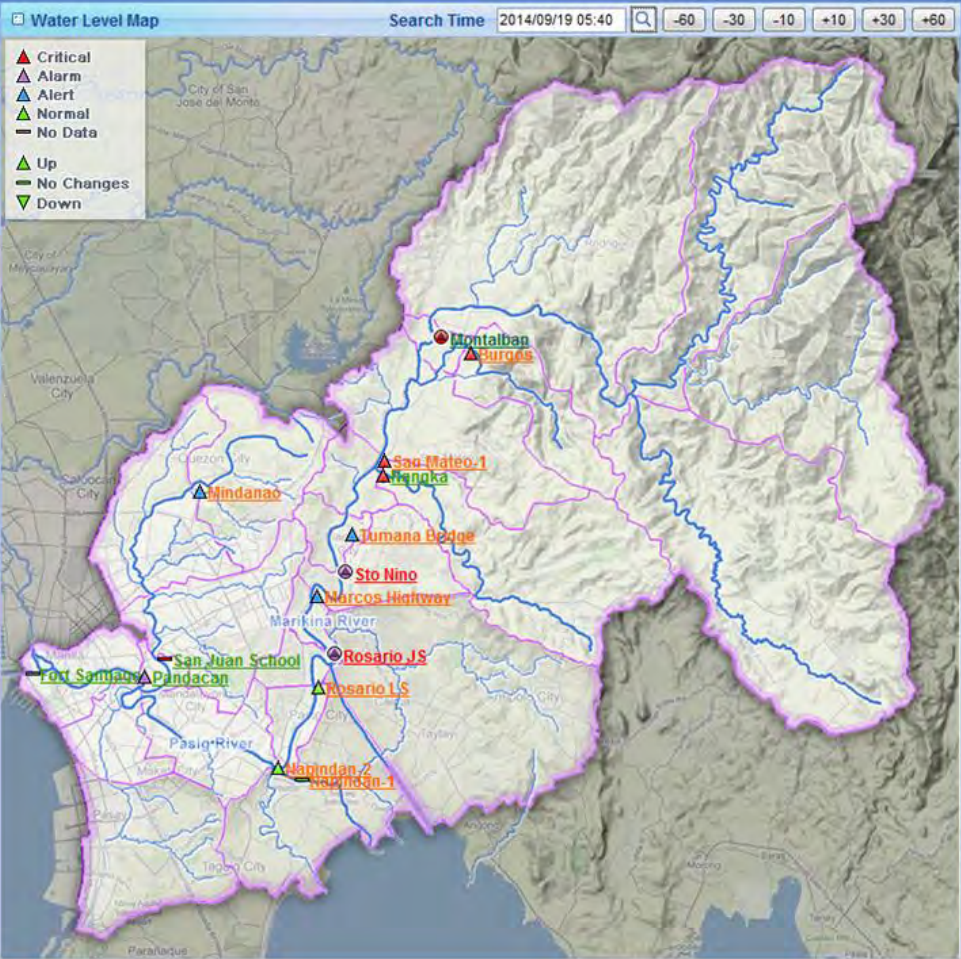
# WATERLEVEL of PMRB as of 5:40 AM



**PAGASA**  
Philippine Atmospheric, Geophysical and Astronomical Services Administration



- MENU**
- Bulletin**
  - Real-time Bulletin
  - Major WL Station
  - Major Sub-basin rainfall
- Water Level**
  - Map
  - Table
- Rainfall**
  - Map
  - Table
  - Areal Mean Rainfall
- AWS**
  - Map
  - Table



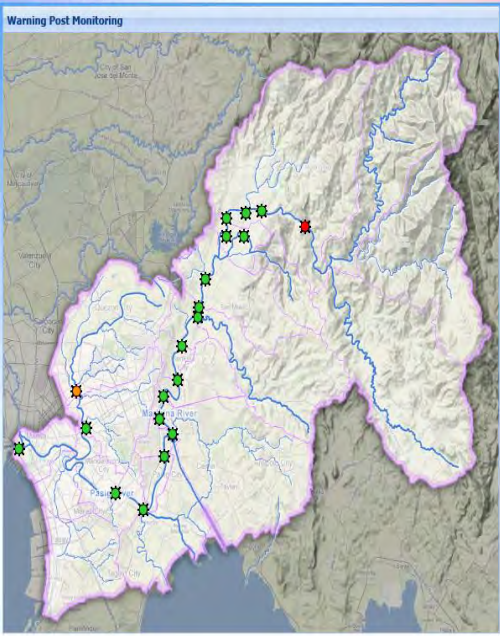
Time : 2014/09/19 05:40

Station	WL [El. m]	Alert [El. m]	Alarm [El. m]	Critical [El. m]
Montalban	26.05	22.40	23.00	23.60
Burgos	28.95	27.40	27.90	28.40
San Mateo-1	20.39	18.00	19.00	20.00
Nangka	19.94	16.50	17.10	17.70
Mindanao	33.93	33.00	34.00	35.00
Tumana Bridge	17.91	17.26	18.26	19.26
Sto Nino	16.83	15.00	16.00	17.00
Marcos Highway	15.33	14.50	15.50	16.50
Rosario JS	14.02	13.50	14.00	15.00
San Juan School	13.30	11.00	11.50	12.00
Fort Santiago	-	11.00	11.50	12.00
Pandacan	11.94	11.00	11.50	12.00
Rosario LS	12.86	13.00	13.50	14.00
Napindan-2	12.00	14.00	14.50	15.00
Napindan-1	11.65	13.50	14.00	14.50

Station Color	
PAGASA Major Station	MMDA Major Station
PAGASA Station	MMDA Station
PAGASA-UNDP Station	

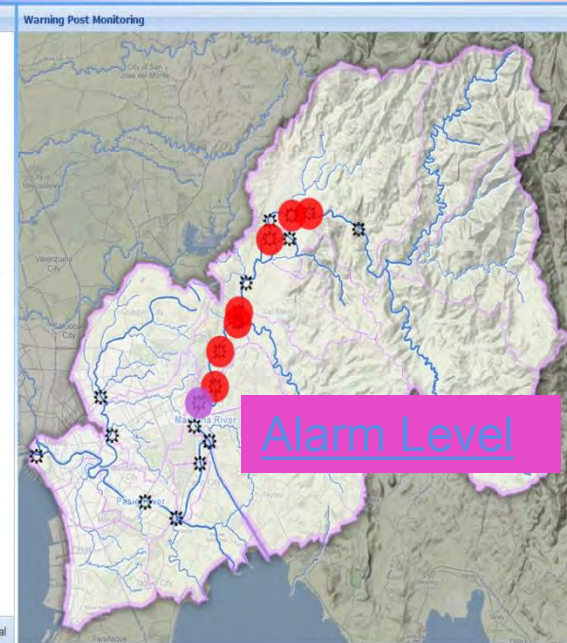
- Menu
- Early Warning System
  - Warning Post
- Observation System
  - AWS / RG / WL
- Status Inquiry
  - Status Equipment
  - Status Data
- Full Screen
  - Full Screen



Local Time : 2014-09-22 18:18

Station	Forecast Level	Current Level
Wawa Dam	--	--
Eastwood Rodriguez	--	--
Rodriguez-2	--	--
Rodriguez-1	--	--
Burgos	--	--
Delacosta Subdiv.	--	--
San Mateo-2	--	--
San Mateo-1	--	--
Nangka	--	--
Tumana Bridge	--	--
Sto Nino	--	--
Marcos Highway	--	--
People's Park	--	--
Mercury Avenue	--	--
San Juan School	--	--
Rosario JS	--	--
Rosario LS	--	--
Guadalupe	--	--
Napindan-2	--	--
Fort Santiago	--	--

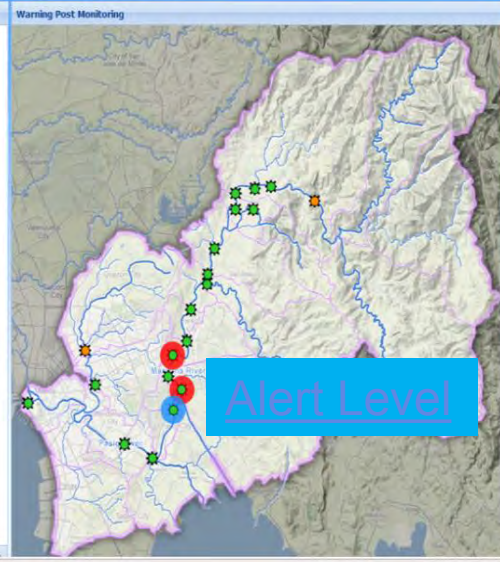
- Menu
- Early Warning System
  - Warning Post
  - Hold List
  - Alarm List
- Observation System
  - AWS / RG / WL
- Report Inquiry
  - Report Alarm
  - Report SMS
- SMS
  - SMS Management
  - SMS Send
- Status Inquiry
  - Status Equipment
  - Status Data
- Full Screen
  - Full Screen



Local Time : 2014-09-19 06:00

Station	Forecast Level	Current Level
Wawa Dam	--	--
Eastwood Rodriguez	--	--
Rodriguez-2	--	●
Rodriguez-1	--	--
Burgos	--	--
Delacosta Subdiv.	--	●
San Mateo-2	--	--
San Mateo-1	--	●
Nangka	--	●
Tumana Bridge	--	●
Sto Nino	--	●
Marcos Highway	--	●
People's Park	--	●
Mercury Avenue	--	●
San Juan School	--	--
Rosario JS	--	--
Rosario LS	--	--
Guadalupe	--	--
Napindan-2	--	--
Fort Santiago	--	--

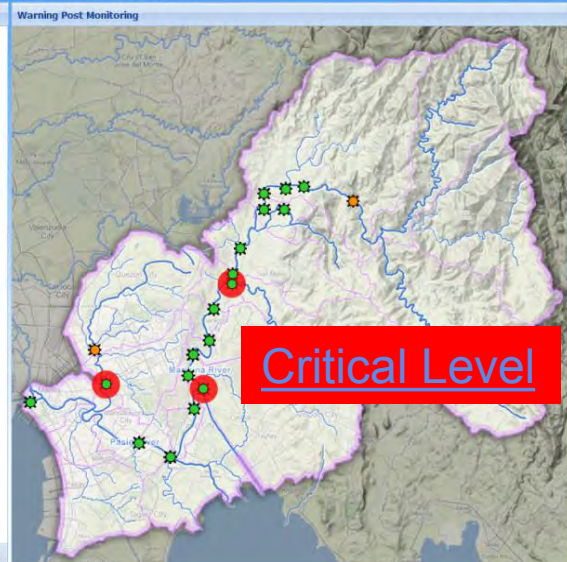
- Menu
- Early Warning System
  - Warning Post
  - Hold List
  - Alarm List
- Observation System
  - AWS / RG / WL
- Report Inquiry
  - Report Alarm
  - Report SMS
- SMS
  - SMS Management
  - SMS Send
- Status Inquiry
  - Status Equipment
  - Status Data
- Full Screen
  - Full Screen



Local Time : 2014-09-19 06:33

Station	Forecast Level	Current Level
Wawa Dam	--	--
Eastwood Rodriguez	--	--
Rodriguez-2	--	--
Rodriguez-1	--	--
Burgos	--	--
Delacosta Subdiv.	--	--
San Mateo-2	--	--
San Mateo-1	--	--
Nangka	--	--
Tumana Bridge	--	--
Sto Nino	--	--
Marcos Highway	--	●
People's Park	--	--
Mercury Avenue	--	--
San Juan School	--	--
Rosario JS	--	●
Rosario LS	--	●
Guadalupe	--	--
Napindan-2	--	--
Fort Santiago	--	--

- Menu
- Early Warning System
  - Warning Post
  - Hold List
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  - Report Alarm
  - Report SMS
- SMS
  - SMS Management
  - SMS Send
- Status Inquiry
  - Status Equipment
  - Status Data
- Full Screen
  - Full Screen



Local Time : 2014-09-19 06:08

Station	Forecast Level	Current Level
Wawa Dam	--	--
Eastwood Rodriguez	--	--
Rodriguez-2	--	--
Rodriguez-1	--	--
Burgos	--	--
Delacosta Subdiv.	--	--
San Mateo-2	--	--
San Mateo-1	--	--
Nangka	--	●
Tumana Bridge	--	--
Sto Nino	--	--
Marcos Highway	--	--
People's Park	--	--
Mercury Avenue	--	--
San Juan School	--	●
Rosario JS	--	●
Rosario LS	--	--
Guadalupe	--	--
Napindan-2	--	--
Fort Santiago	--	--

# STATUS OF WATERLEVEL STATIONS

Station Name	Alert	Alarm	Critical
1. MONTALBAN	22.48 (12:40 AM-Sept 19)	23.17 (2:20 AM-Sept 19)	23.91 (2:40 AM-Sept 19)
2. BURGOS	27.44 (1:50 AM-Sept 19)	28.06 (2:40 AM-Sept 19)	28.52 (3:10 AM-Sept 19)
3. SAN MATEO 1	18.21 (3:00 AM-Sept 19)	19.08 (3:50 AM-Sept 19)	20.06 (5:20 AM-Sept 19)
4. NANGKA	16.50 (2:00 AM-Sept 19)	17.40 (2:40 AM-Sept 19)	17.88 (3:00 AM-Sept 19)
5. TUMANA	17.22 (4:30 AM Sept 19 )	18.25 (6:00 AM-Sept 19)	19.26 (6:50 AM-Sept 19)
6. STO.NIÑO	15.14 (3:10 AM Sept 19)	16.02 (4:20 AM-Sept 19)	17.11 (6:00 AM Sept 19)
7. MARCOS HIGHWAY	14.55 (4:10 AM Sept 19)	15.56 (6:00 AM Sept 19)	16.59 (7:00 AM Sept 19)
8. ROSARIO JS	13.54 (2:00AM Sept 19)	14.02 (5:40 AM Sept 19)	15.01 (7:30 AM Sept 19)
9. ROSARIO LS	13.07 (6:10 AM Sept 19)	13.51 (7:00 AM Sept 19)	14.03 (8:50 AM Sept 19)
10. NAPINDAN 2	<b>DID NOT REACHED FLOOD WARNING LEVELS</b>		
11. NAPINDAN 1			
12. MINDANAO	33.83 (2:50 AM)	34.46 (3:00 AM)	35.01 (6:00 AM)
13. SAN JUAN SCHOOL	11.12 (6:40 PM – Sept 18)	11.58 (2:40 AM – Sept 19)	12.18 (3:00 AM – Sept 19)
14. PANDACAN	11.02 (6:20 PM-Sept 18)	11.54 (2:50 AM-Sept 19)	12.00 (6:20 AM-Sept 19)

# Summary of Warning Post Activation

Station Name	Alert	Alarm	Critical	REMARKS
1. Eastwood Rodriguez	3:36 AM	4:04 AM	5:52 AM	
2. Rodriguez 2	3:36 AM	4:04 AM	5:52 AM	
3. Rodriguez 1	3:40 AM	4:04 AM	5:52 AM	
4. De la Costa Subdivision	1:35 AM	2:31 AM	4:19 AM	
5. Burgos Station	1:45 AM	2:37 AM	3:16 AM	
6. San Mateo 2	1:36 AM	2:31 AM	4:19 AM	
7. San Mateo 1	3:07 AM	4:01 AM	5:52 AM	
8. Nangka	3:10 AM	4:08 AM	5:52 AM	
9. Tumana Bridge	3:10 AM	4:08 AM	5:52 AM	
10. Sto. Niño	3:10 AM	4:09 AM	5:52 AM	
11. Marcos Highway	4:08 AM	5:56 AM	6:27 AM	
12. Rosario J.S.	2:11 AM		6:06 AM	
13. Rosario L.S.	6:29 AM		10:17 AM	
14. People's Park	2:41 AM	3:23 AM	6:02 AM	Failure of the Amplifier at the Station caused the unsuccessful sounding of the warning post during the actual operation.
15. San Juan (Pumping	3:06 AM	3:23 AM	6:02 AM	



# Flood Forecasting Early Warning System

**Menu**

- [-] Early Warning System
  - Warning Post
  - Hold List
  - Alarm List
- [-] Observation System
  - AWS / RG / WL
- [-] Report Inquiry
  - [Report Alarm](#)
  - Report SMS
- [-] SMS
  - SMS Management
  - SMS Send
- [-] Status Inquiry
  - Status Equipment
  - Status Data
- [-] Full Screen
  - Full Screen

**Criteria**

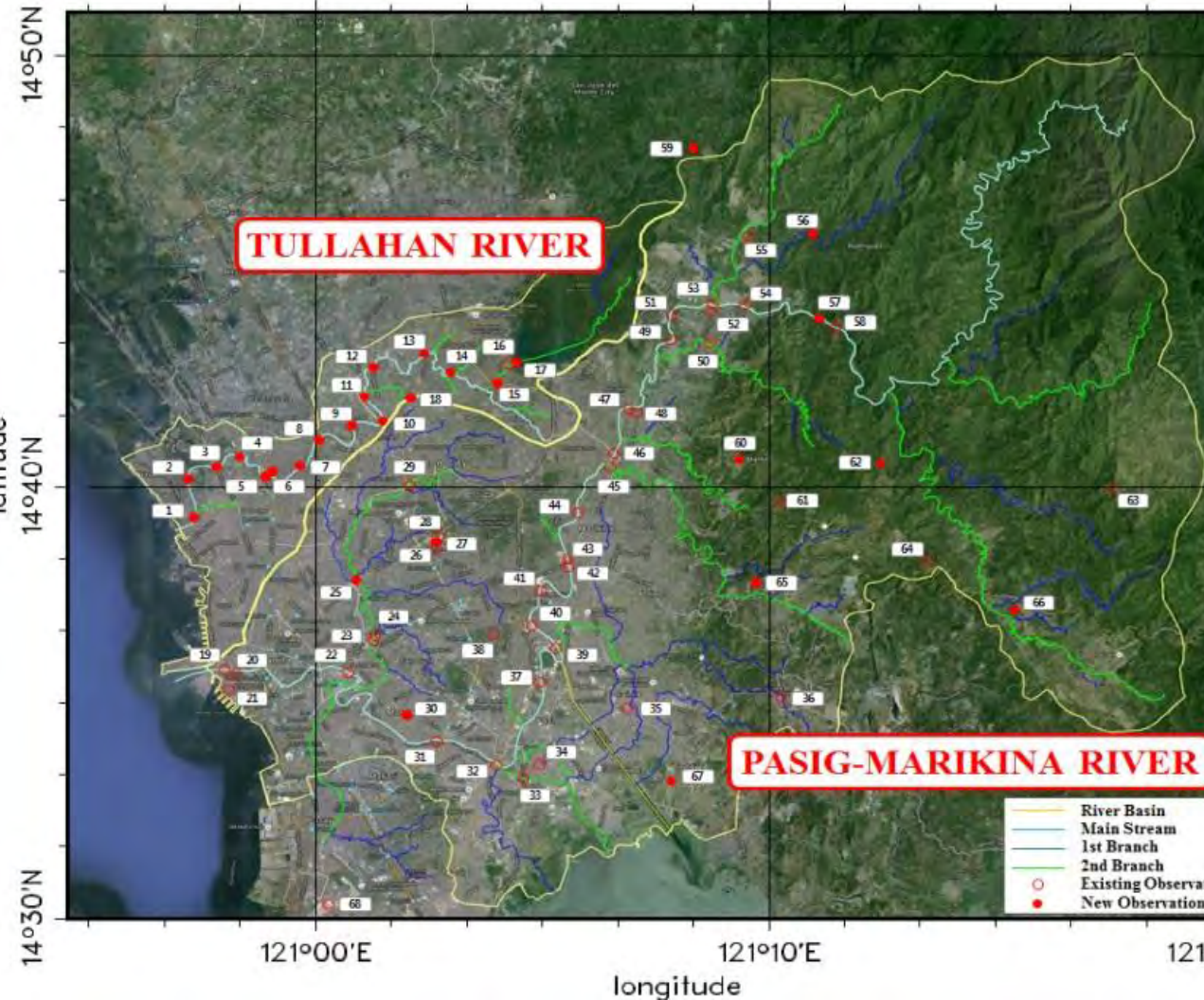
Station:  From (yyyy-mm-dd):  To (yyyy-mm-dd):  SEQ:  Name:  Status:  Level:

**Report Alarm**

Time Stamp ▲	SEQ	ID	Status	Level	Process S...	Comunicat...	Result	Remarks	Type	SMS
[-] Eastwood Rodriguez										
14/09/19 03:36	517	admin	Issue	Alert	Success	VHF	Normal	--	by Manual...	N
14/09/19 03:40	517	admin	Hold	Alert	Waiting	VHF	--		by Manual...	N
14/09/19 03:47	517	admin	Stopped		Success	VHF	Normal		by Manual...	N
14/09/19 04:04	520	admin	Issue	Alarm	Success	VHF	Normal	--	by Manual...	N
14/09/19 04:08	520	admin	Stopped		Success	VHF	Normal		by Manual...	N
14/09/19 05:52	523	admin	Issue	Critical	Success	VHF	Normal	--	by Manual...	N
14/09/19 05:56	523	admin	Hold	Critical	Waiting	VHF	--		by Manual...	N
14/09/19 06:02	523	admin	Hold	Critical	Waiting	VHF	--		by Manual...	N
14/09/19 06:06	523	admin	Stopped		Success	VHF	Normal		by Manual...	N

# STRENGTHENING OF EWS2 :

## “AUTOMATION OF FLOOD EARLY WARNING SYSTEM FOR DISASTER MITIGATION IN GREATER METRO MANILA OR EWS 3 PROJECT”



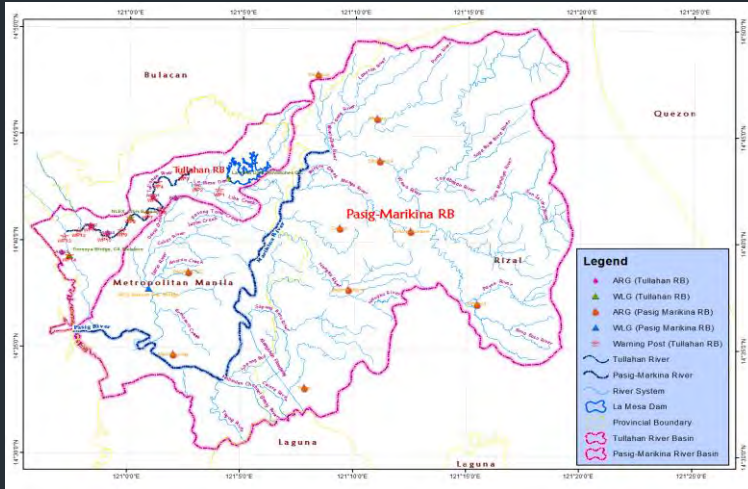
No.	NAME	EXISTING	NEW	Longitude	Latitude
1	Tanayya Bridge, C4, Malabon	WP, WLG		120°57'25.33"E	14°50'17.60"N
2	Gov. W. Pascual Avenue	WP		120°57'59.20"E	14°40'10.30"N
3	Tinajasos Bridge, Marcelo H. del Pilar Street	WP		120°57'47.12"E	14°40'26.17"N
4	Philippine National Railways Equipment Depot	WP, ARG		120°58'18.44"E	14°40'42.06"N
5	Tullahan Bridge, MacArthur Highway	WP		120°58'56.64"E	14°40'13.54"N
6	Valenzuela National HS	ARG		120°59'58.28"E	14°40'22.06"N
7	Brgy 164 Zone 14 Libas Reparo, Caloocan	WP		120°59'41.10"E	14°40'28.35"N
8	NLEX, Libas Bypass	WP, WLG		121° 0'3.30"E	14°41' 8.00"N
9	Brgy 164 Zone 14, Talipapa, Navaliches	WP		121° 0'40.05"E	14°41'18.41"N
10	Tullahan Bridge, Mindanaw NLEX	WP		121° 1'20.72"E	14°41'32.56"N
11	San Pedro 9 Subdivision	WP, ARG		121° 1'3.87"E	14°42' 8.67"N
12	San Bartolome Delta Bridge, Katipunan Avenue	WP		121° 1'15.48"E	14°42'44.75"N
13	Tullahan Bridge, Quirino Highway, Navaliches	WP		121° 1'24.28"E	14°43'7.27"N
14	Sino G, Brgy. Sta. Lucia	WP		121° 1' 3.70"E	14°43' 3.80"N
15	Commonwealth Avenue, North Fairview	WP		121° 1'59.86"E	14°43' 3.78"N
16	La Mesa Dam	ARG		121° 1'14.30"E	14°42'19.17"N
17	La Mesa Dam, Navaliches Q. C.	WLG		121° 1'23.23"E	14°42'55.88"N
18	Boracay Hall San Bartolome QC	ARG		121° 1'24.45"E	14°42' 3.32"N
19	Fort Santiago	WLG		120°58'1.63"E	14°55'45.29"N
20	Fort Sandbag	WP		120°58'12.53"E	14°55'41.09"N
21	Fort Aras Synop	ARG		120°58'4.30"E	14°55'17.98"N
22	Pandacan	ARG		121° 0'44.72"E	14°55'59.68"N
23	San Juan School	ARG		121° 1'10.89"E	14°56'25.18"N
24	San Juan School	ARG		121° 1'10.32"E	14°56' 31.72"N
25	People's Park	ARG		121° 0'53.70"E	14°57'46.00"N
26	PAGASA-WPEC	DRR		121° 2'30.33"E	14°58'29.40"N
27	PAGASA-DIC	ARG		121° 2'30.80"E	14°58'32.32"N
28	PAGASA Science	ARG		121° 2'30.98"E	14°58'42.31"N
29	Mindanaw	ARG, WLG		121° 2' 9.15"E	14°40' 2.23"N
30	Mandabiyong	ARG		121° 2'1.28"E	14°34'40.63"N
31	Gudabang	WP		121° 2'41.53"E	14°34' 8.68"N
32	Napindan 2	WP, ARG, WLG		121° 3'50.57"E	14°33'30.53"N
33	Napindan 1	WLG		121° 3'53.70"E	14°33'13.69"N
34	Paag City Hall	DRR, ARG		121° 4'53.54"E	14°33' 3.28"N
35	Calinao	DRR, ARG		121° 0'51.61"E	14°34'40.97"N
36	Antipala	ARG		121°10'16.10"E	14°35' 9.81"N
37	Rosario LE	WP, WLG		121° 4'58.75"E	14°35'24.97"N
38	NDCC-CCD	DRR		121° 5'55.70"E	14°35'56.38"N
39	Rosario JR	WP, WLG		121° 8'20.81"E	14°36'13.69"N
40	Mercury Avenue	WP		121° 4'45.09"E	14°36'48.58"N
41	Mercos Highway	WP, WLG		121° 4'56.26"E	14°37'35.12"N
42	Sto Nino	WP, WLG		121° 8'55.24"E	14°38'9.30"N
43	Moribans (Youth Camp)	ARG		121° 8'29.57"E	14°38'19.98"N
44	Tanayna Bridge	WP, WLG		121° 8'47.45"E	14°39'23.14"N
45	Nangla	WP, ARG, WLG		121° 0'51.00"E	14°40'25.00"N
46	San Mateo 1	WP, WLG		121° 0'35.04"E	14°40'46.37"N
47	San Mateo 2	WP, ARG		121° 0'52.79"E	14°41'47.41"N
48	San Mateo Mtn. Hall	DRR		121° 7'42.77"E	14°41'42.28"N
49	Delacosta Subdiv.	WP		121° 7'51.60"E	14°43'19.29"N
50	Dugos	WP, WLG		121° 8'40.32"E	14°43'18.96"N
51	Rodriguez 1	WP, WLG		121° 7'49.23"E	14°43'59.49"N
52	Rodriguez Mtn. Hall	DRR		121° 8'44.18"E	14°43' 56.33"N
53	Rodriguez 2	WP		121° 8'46.26"E	14°43' 56.90"N
54	Estero del Rodriguez	WP		121° 0'30.00"E	14°44'14.79"N
55	M. Oro	ARG		121° 0'35.40"E	14°45'48.00"N
56	Miscap		ARG	121°10'39.20"E	14°45'48.17"N
57	Site Waves		ARG	121°11'17.50"E	14°45'48.84"N
58	Wawa Dam	WP, WLG		121°11'29.86"E	14°45'38.72"N
59	Macabud		ARG	121° 8'21.08"E	14°47'51.08"N
60	Calaviz		ARG	121° 9'21.46"E	14°48'38.58"N
61	Mt. Ariles	ARG		121°10'15.55"E	14°50'38.56"N
62	Pantong Bukawe		ARG	121°12'29.41"E	14°40'31.05"N
63	Mt. Campana	ARG		121°17'32.76"E	14°50'56.56"N
64	Boo Boo	ARG		121°13'27.94"E	14°50'15.89"N
65	Bugang Nayon		ARG	121° 9'45.94"E	14°57'46.03"N
66	MGMHS	ARG		121°15'27.86"E	14°57'6.00"N
67	TESDA Building		ARG	121° 7'48.81"E	14°53'9.95"N
68	Airport (PAGASA)	ARG		121° 0'16.82"E	14°50'20.59"N



# Automation of Flood Early Warning System for Disaster Mitigation in Greater Metro Manila or EWS 3 Project

## Target Areas:

- Pasig-Marikina-Tullahan River



- On-going Project
- Target Date of Completion : 2017



## Expected Outcomes:

**LEVEL-I** Infrastructure development in the Tullahan river basin (TRB) and reinforcement of basis for growth in the Pasig- Marikina river basin (PMRB)

- to establish additional (15) rainfall gauging station and 4 waterlevel gauging stations for PMTRB
- To establish 14 warning post and flood monitoring facilities such as CCTV at Tullahan RB
- To integrate a flood forecasting and warning system for TRB with the existing system of PMRB

**LEVEL-II** Human resource training : Ensuring sustainable growth engine

- To introduce professional education and training in flood management including workshop, training course
- To build a PAGASA centered integrated watershed flood management system

**LEVEL-III** Flood damage mitigation : Building the safety network of infrastructures

- To mitigate flood damage by developing a highly advance flood forecasting and warning system
- To ensure sufficient time to evacuate through systematic flood management.



**THANK YOU!**