

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



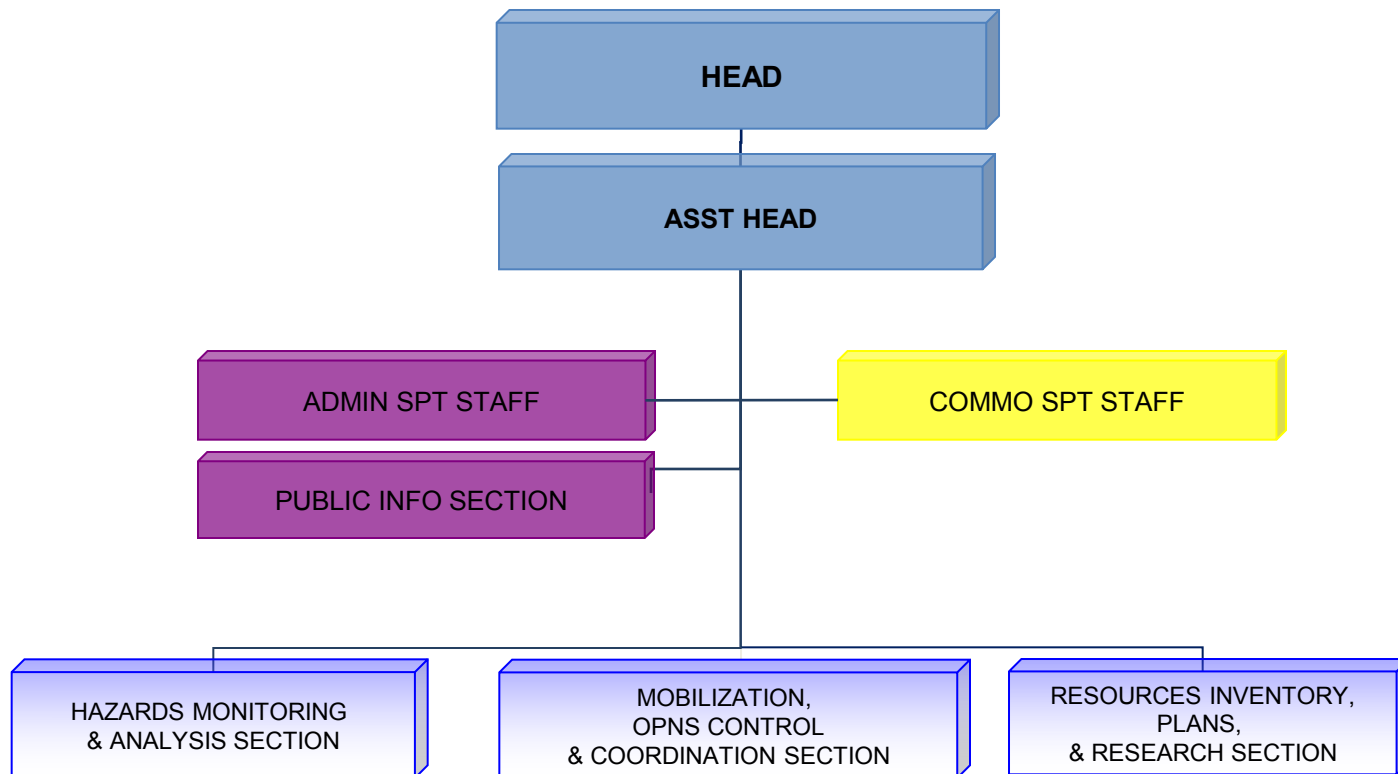
FLOOD CONTROL INFORMATION CENTER & DISASTER RISK REDUCTION AND MANAGEMENT OPERATION CENTER (3 August 2012)

- 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

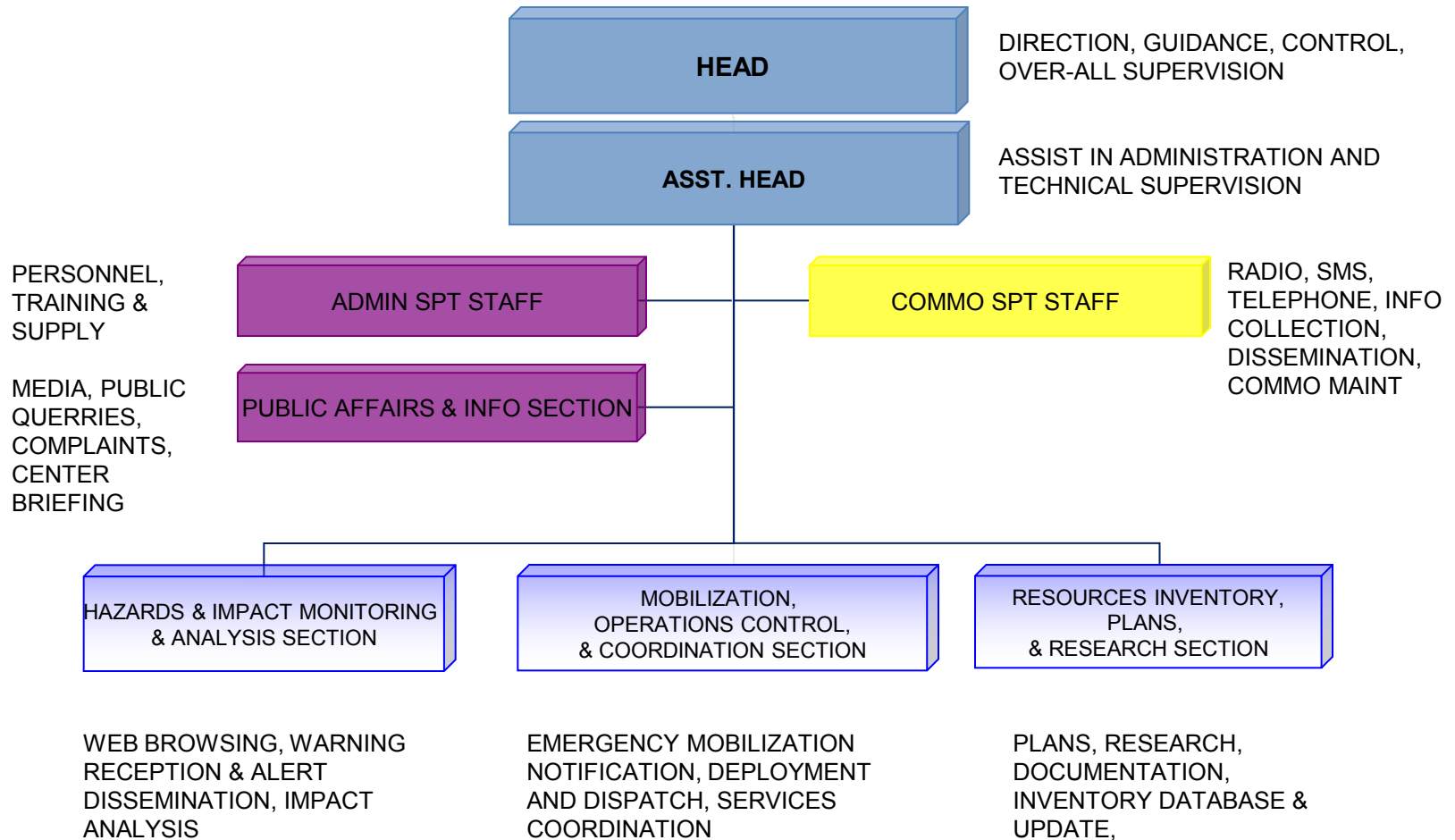
MMDA FLOOD CONTROL INFORMATION CENTER/METRO MANILA DISASTER RISK REDUCTION AND MANAGEMENT OPERATION CENTER (FCIC - MMDRRMOC)

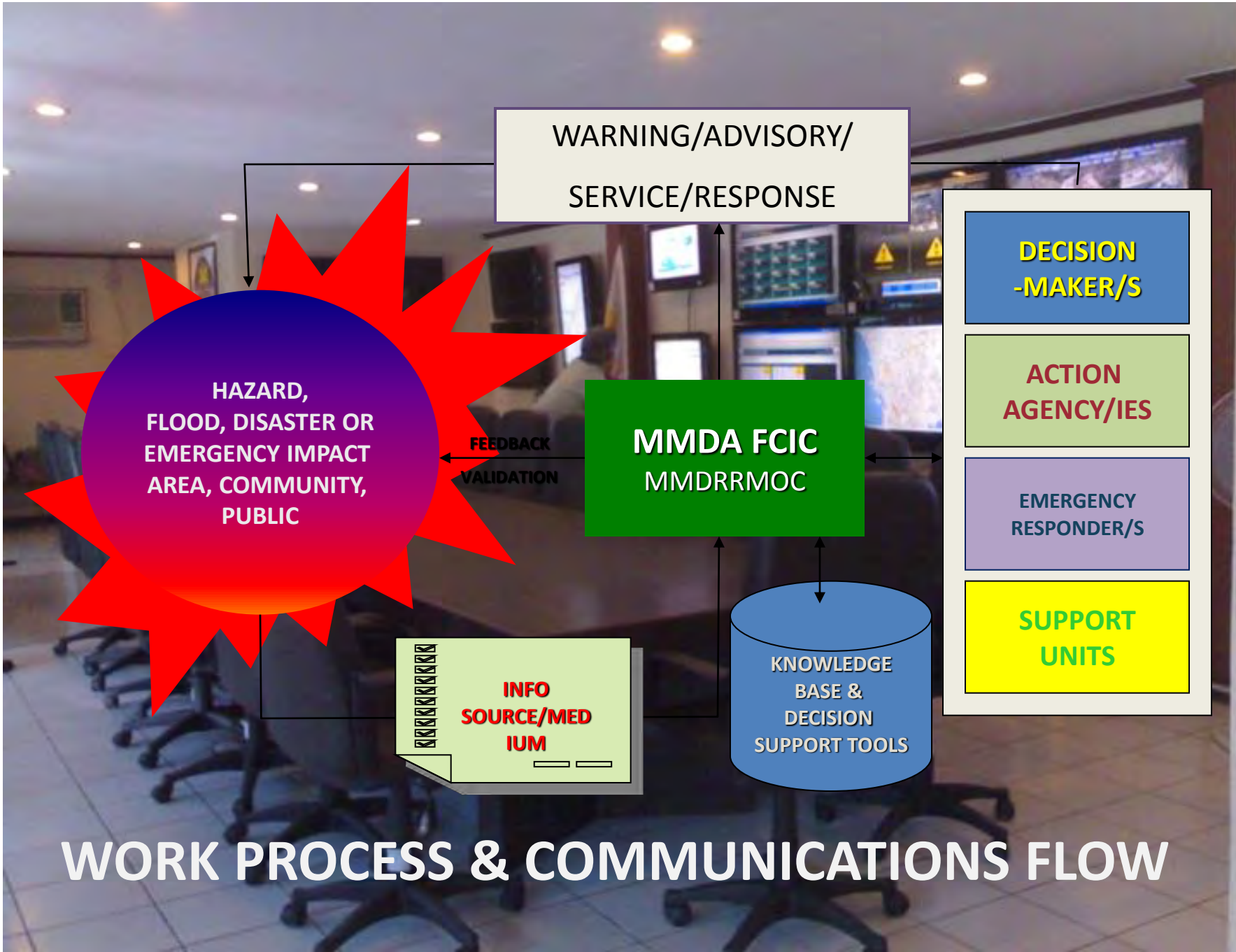
ORGANIZATIONAL STRUCTURE



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




FUNCTIONAL STRUCTURE





WORK PROCESS & COMMUNICATIONS FLOW

THUNDERSTORM WARNING




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

Flood Depth	Flood Level	Impact to Motorist
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"> • Relay • Monitor
Orange	15 – 30 mm/hr	6 Hours	Intense	Flooding is threatening	Preparatory	<ul style="list-style-type: none"> • Relay • Monitor • Alert
Red	> 30 mm/hr	12 Hours +	Torrential	Evacuation on low lying areas for possible flash flood	Emergency Action	<ul style="list-style-type: none"> • Relay • Monitor • Mobilize or Dispatch • Coordinate

PAG-ASA



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Department of Science and Technology
Services Institutes



PAGASA

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



HOME



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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 & AGRICULTURE

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

[Iloilo City](#)

[Laoag City](#)

[Baguio City](#)

[Legazpi City](#)

[Puerto Princesa City](#)

[Metro Cebu](#)

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

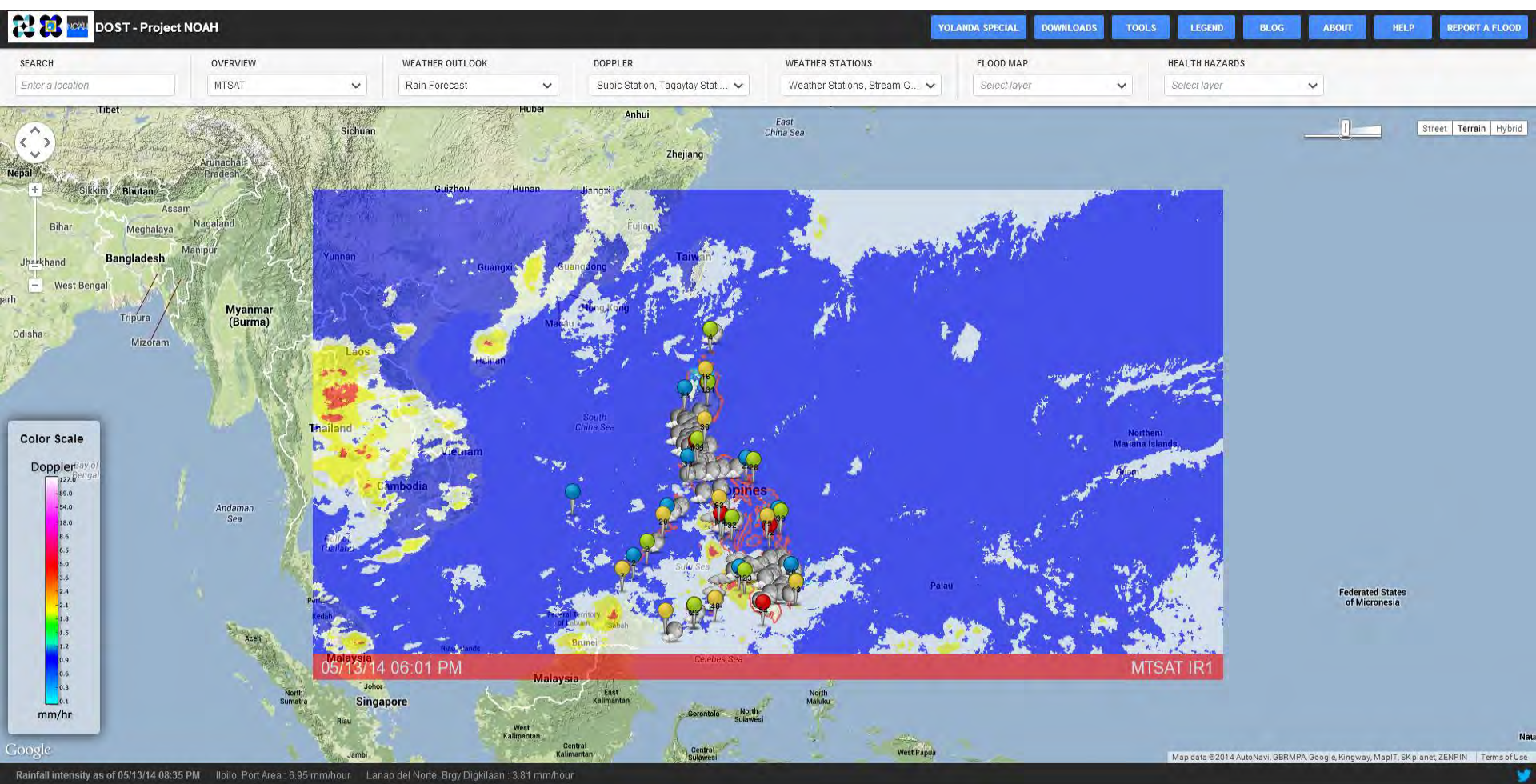
	Observation Time & Date	Reservoir Water Level (RWL) (m)	24-Hr WL Deviation	Normal High Water Level (NHWL) (m)	Deviation from NHWL (m)	Elevation from Rule Curve (m)	Deviation from Rule Curve (m)	Gate Opening
ANGAT	6:00 AM	179.47						
	13-May		-0.33	212.00	-32.53	185.23	-5.76	
	6:00 AM	179.80						
IPO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

SRE/RABIJESC

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

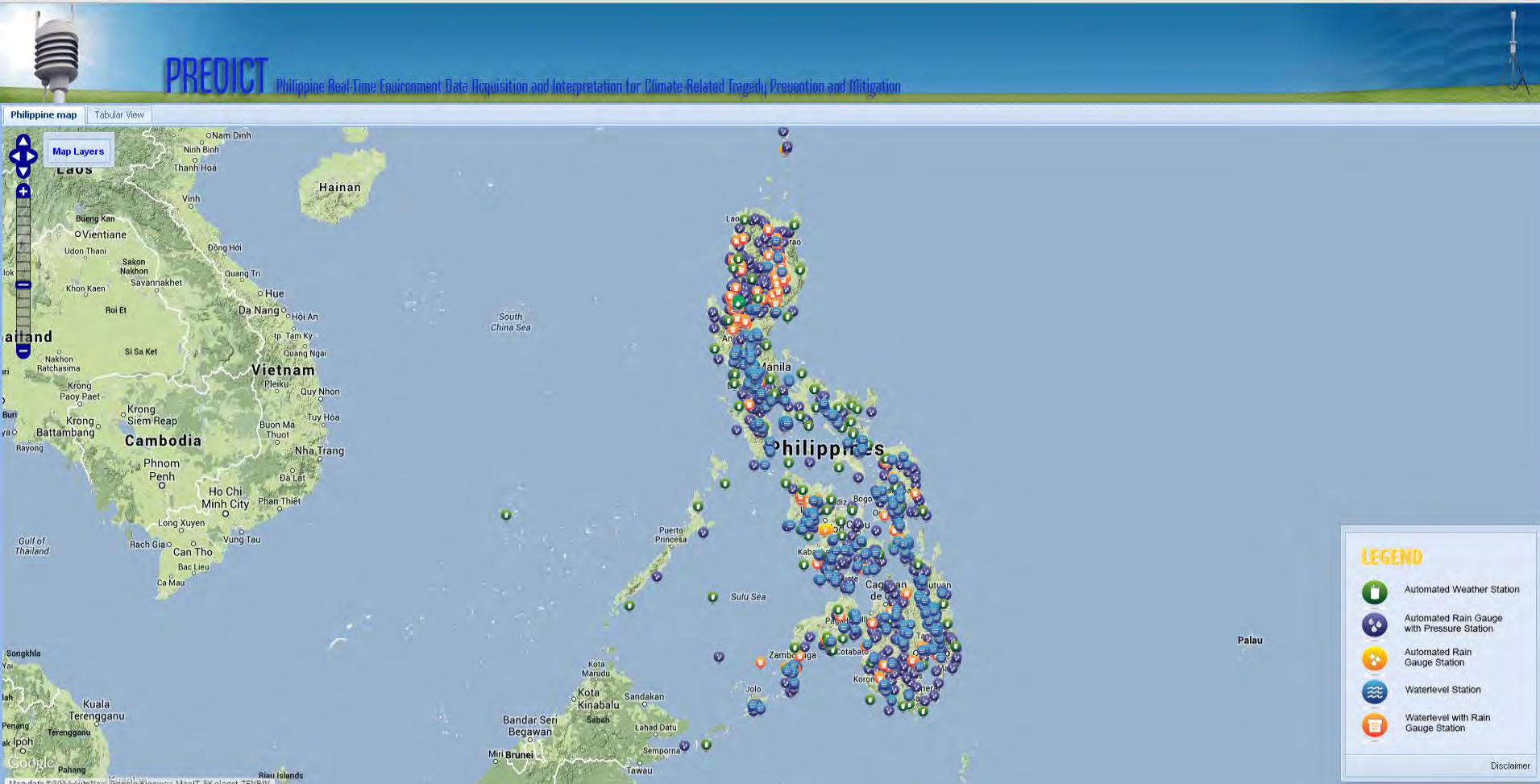
Data Source: Dam Operating/Managing Agencies

Project Noah



Noah.dost.gov.ph

ASTI - DOST



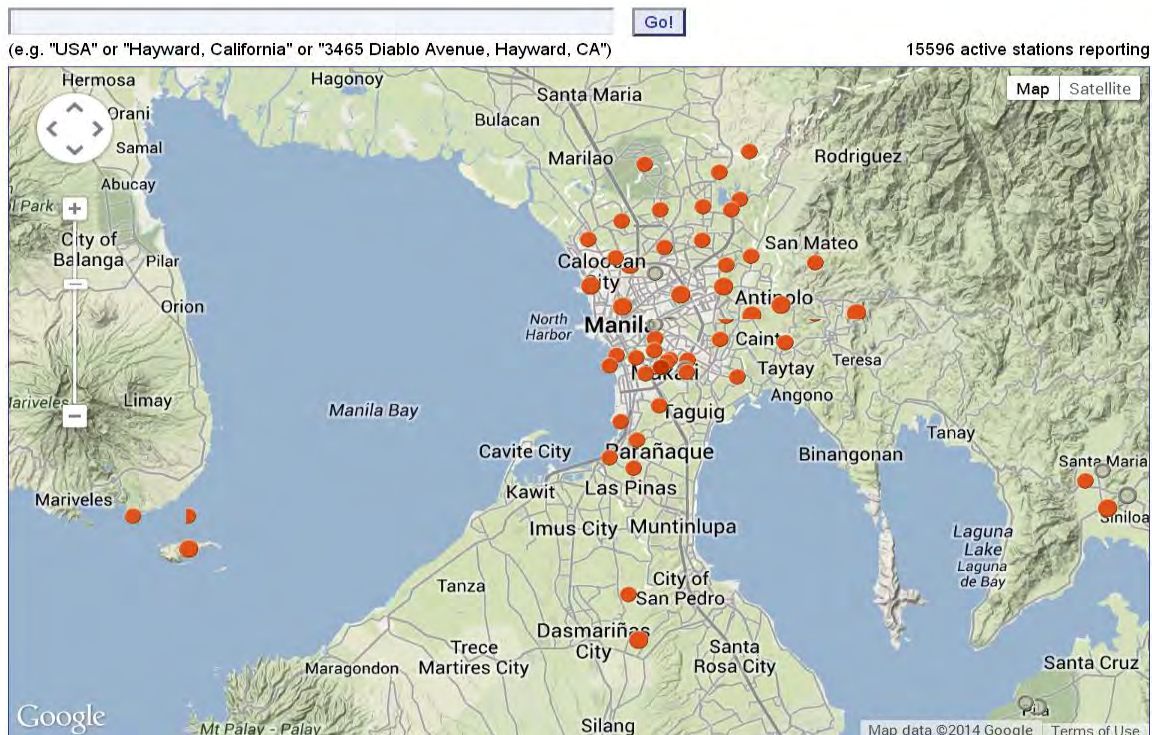
fmon.asti.dost.gov.ph

Weatherlink



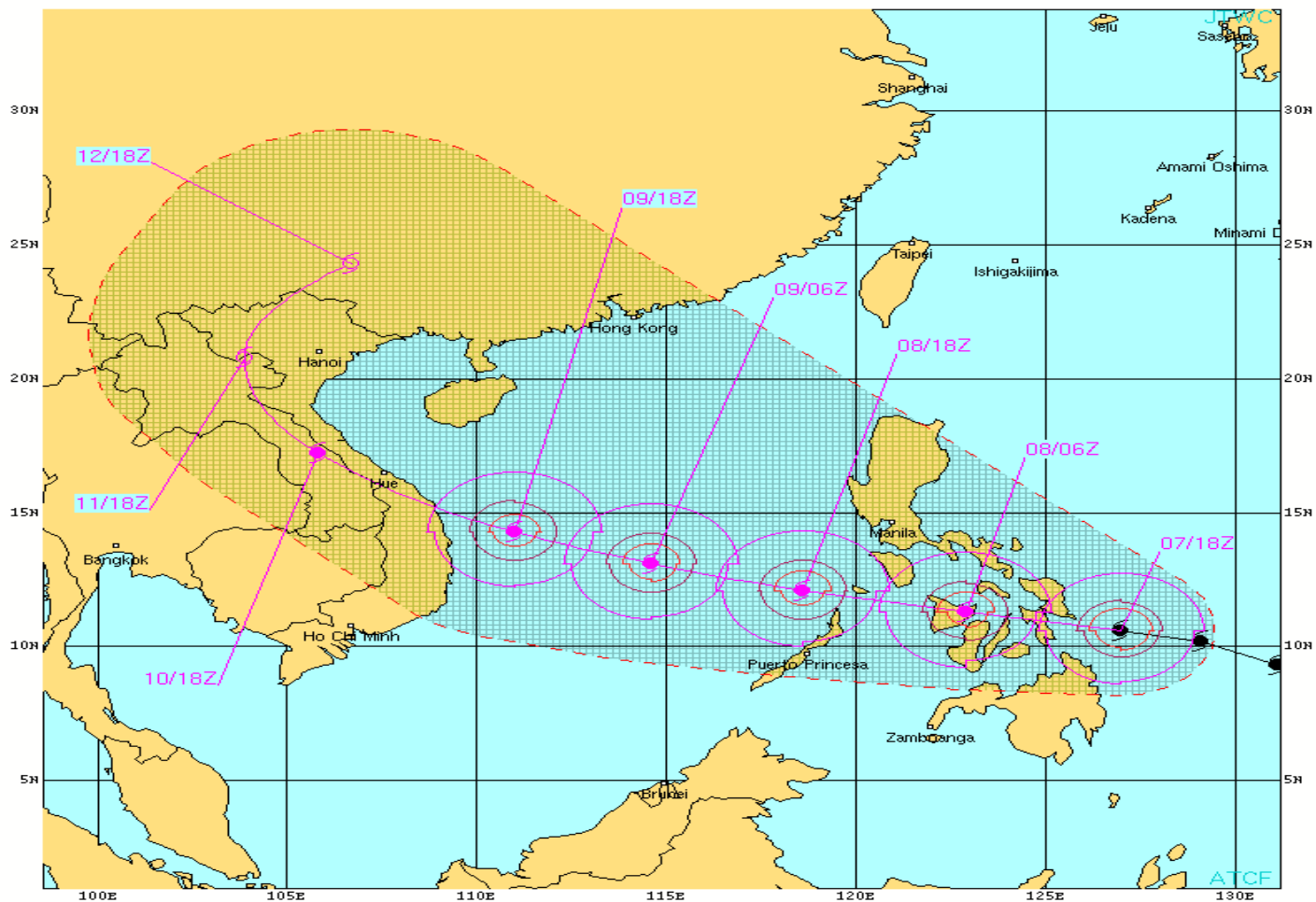
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[WeatherLink Station Map](#) | [Login](#)



www.weatherlink.com

NRL - Monterey



SUPER TYPHOON 31W (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

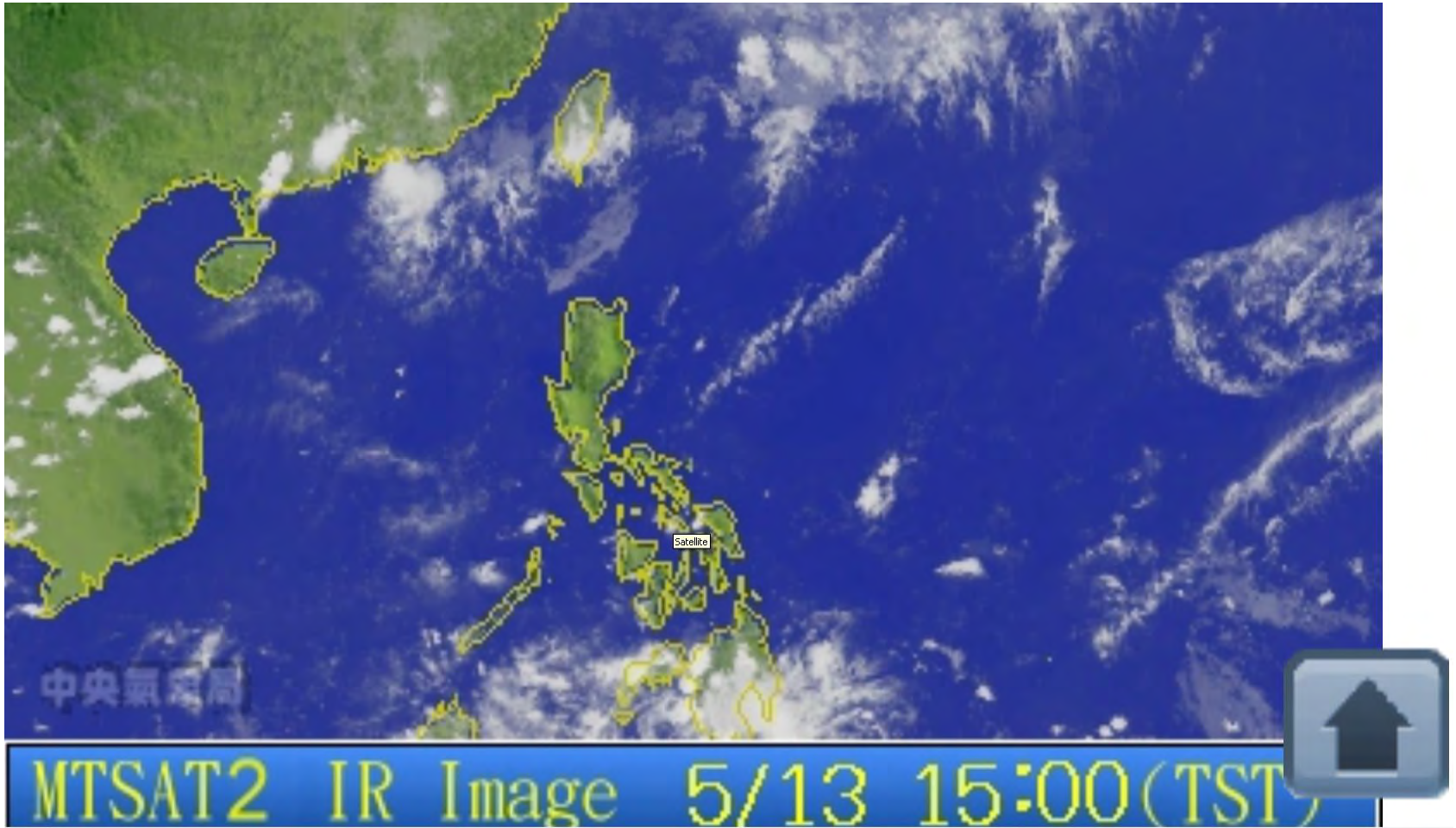
CPA TO:	NM	DTG
ZAMBOANGA	268	08/06Z
MANILA	175	08/13Z
SUBIC_BAY	177	08/15Z
PUERTO_PRINCESA	139	08/16Z
HO_CHI MINH_CITY	295	10/02Z
HA NOI	23	10/06Z
HA NOI	108	12/00Z

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



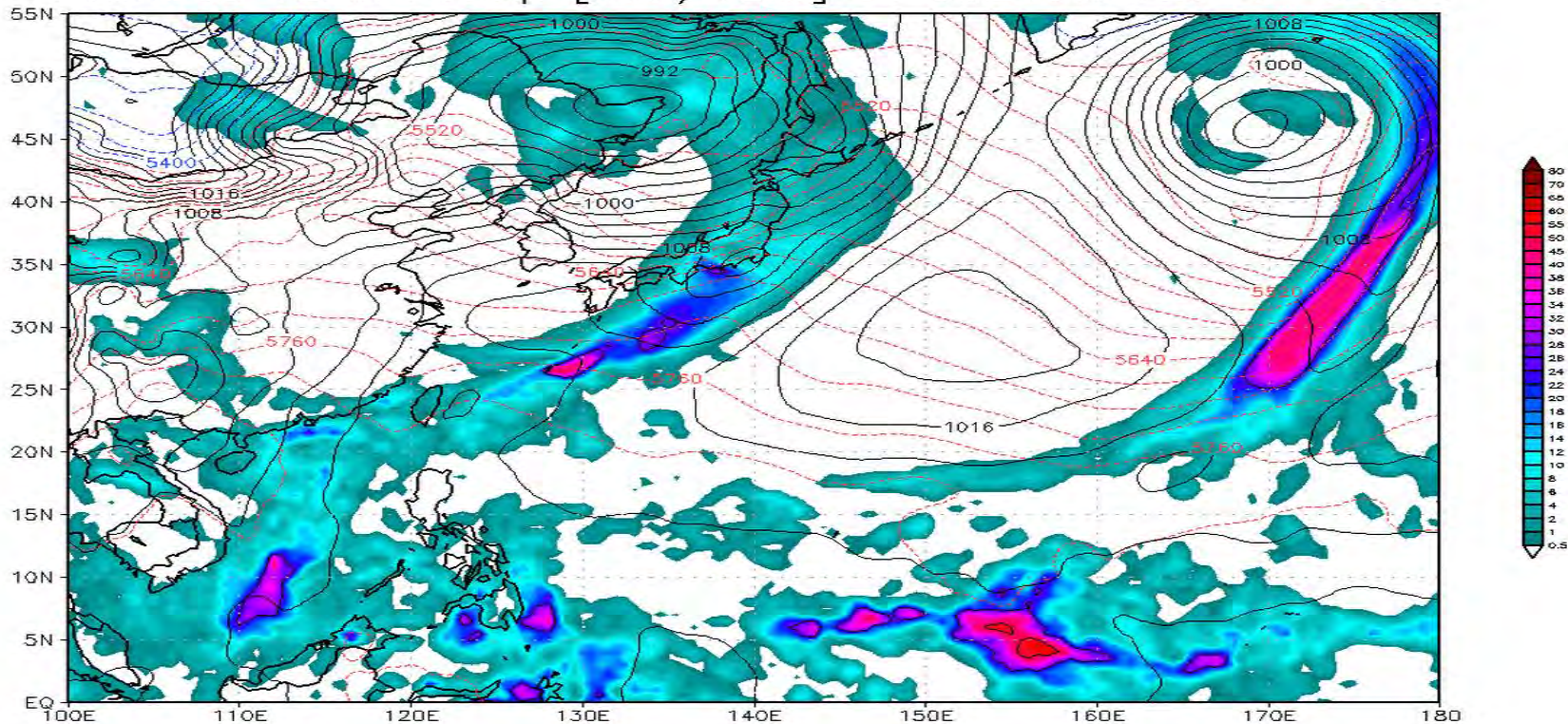
www.cwb.gov.tw/V7e/observe/satellite/Sat_EA.htm /

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



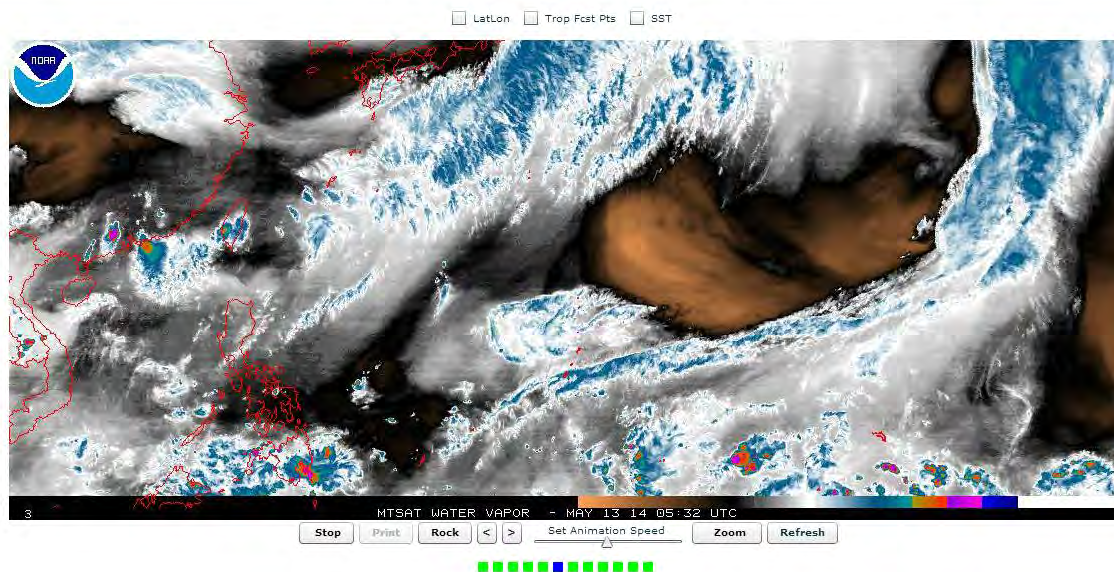
GrADS: COLA/IGES

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

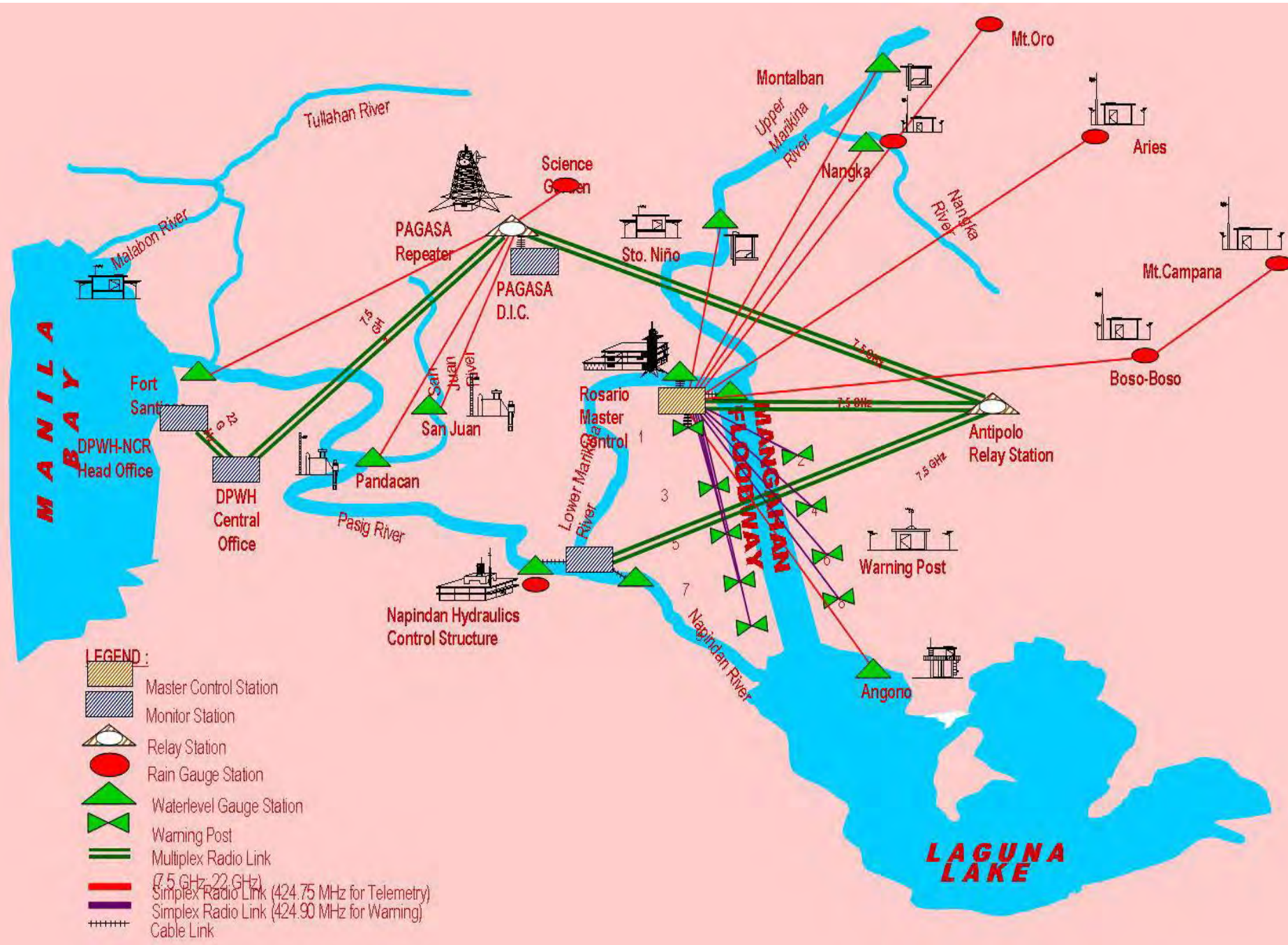
NOAA PRODUCTS

Tropical West Pacific - Water Vapor Loop



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



MANILA BAY

LAGUNA LAKE

Tullahan River

Malabon River

Montalban
Upper Marikina River

Nangka River

Pasig River

Lower Marikina River

Napindan River

Fort Santiago
DPWH-NCR Head Office

DPWH Central Office

PAGASA Repeater
PAGASA D.I.C.

Rosario Master Control

Antipolo Relay Station

Napindan Hydraulics Control Structure

Warning Post

Angono

Mt. Oro

Aries

Mt. Campana

Boso-Boso

Science Garden

Sto. Niño

Nangka

San Juan

Pandacan

1

3

5

7

2

4

6

8

7.5 GHz

7.5 GHz

7.5 GHz

7.5 GHz

LEGEND :

Master Control Station

Monitor Station

Relay Station

Rain Gauge Station

Waterlevel Gauge Station

Warning Post

Multiplex Radio Link (7.5 GHz - 22 GHz)

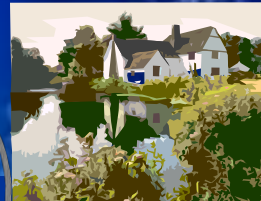
Simplex Radio Link (424.75 MHz for Telemetry)

Simplex Radio Link (424.90 MHz for Warning)

Cable Link

METRO MANILA EMERGENCY COMMUNICATIONS NETWORK

THREATENED OR AFFECTED COMMUNITIES AND GENERAL PUBLIC



MMDA FLOOD CONTROL & SEW MGT OFFICE



MMDA EFCOS & PUMPING STATIONS



MMDA FCSMO District Opns Engineers



10 Flood Ctrl Bayanihan Zone Alliances



17 Metro LGUs



NDRRMOC



GMA 7



MM DRRMC Action Agencies



Volunteers



MMDA Metro Base



MMDA FCIC/ MMDRRMOC



MM Emergency Strike Force

Other MMDA Operating Units

HPSEPO Pub Sfty Div Emerg Response Group

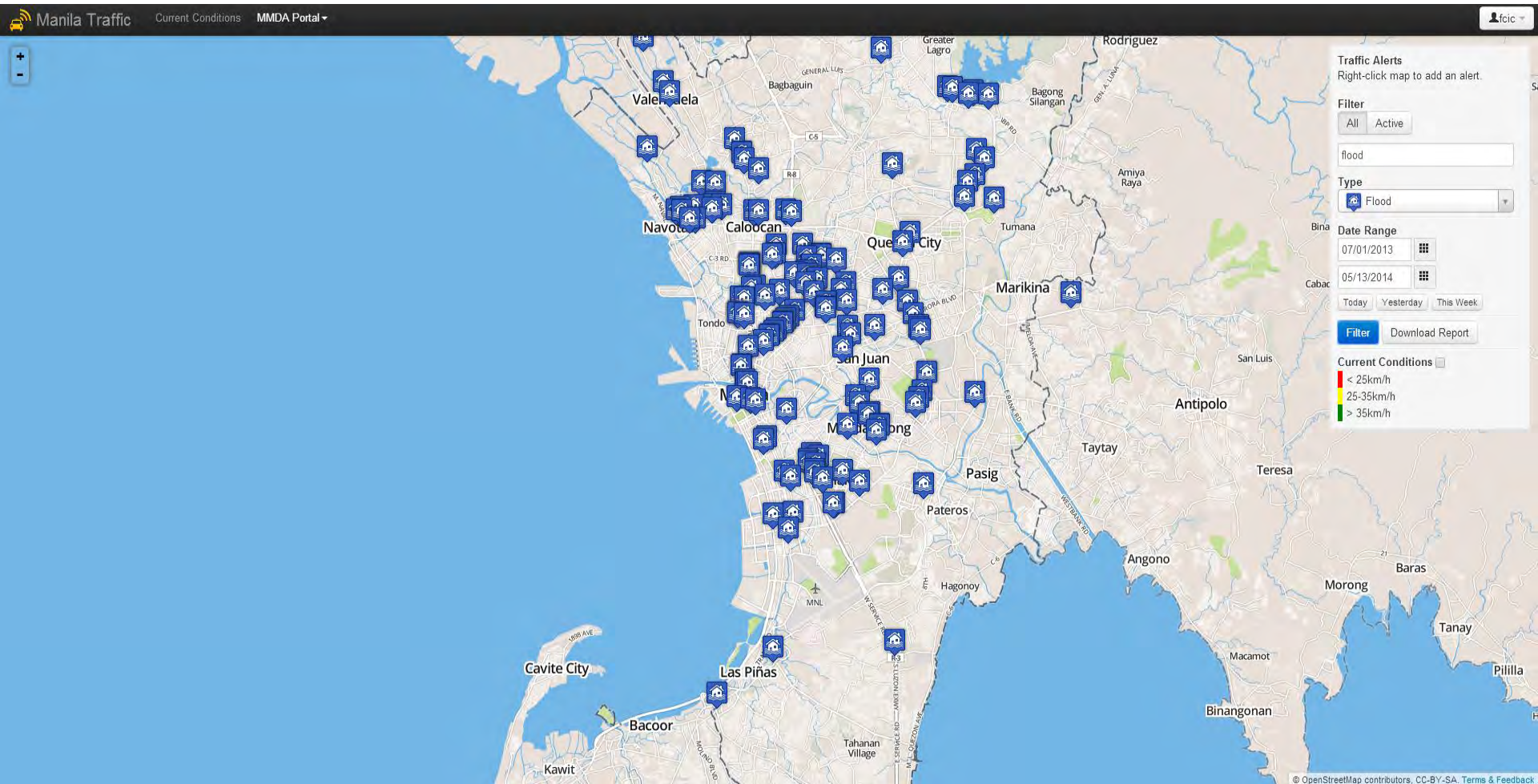
TDO Road Emergency Group

Task Force "UNOS"

Task Force 'RAINBOW'



Incident Mapping

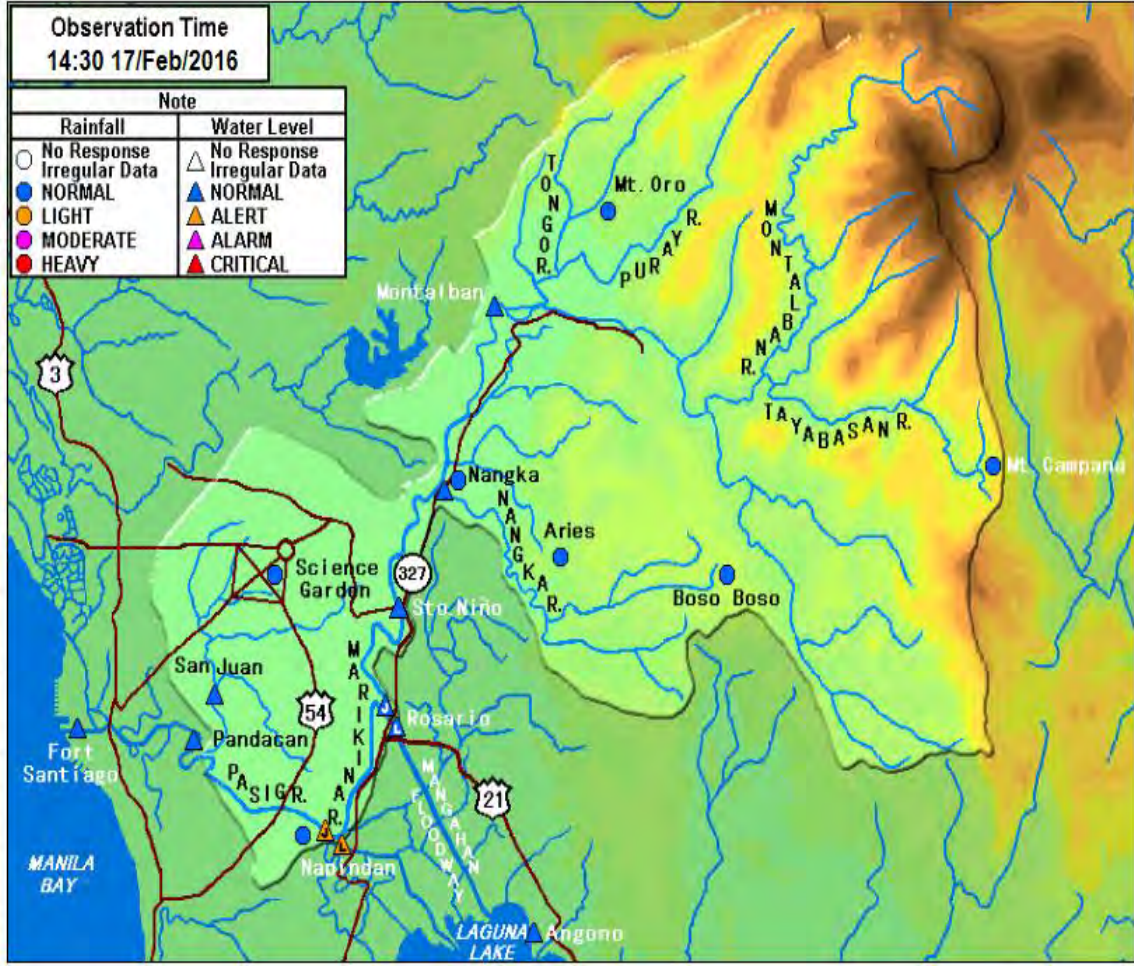


mmda.dev.conveyal.com

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

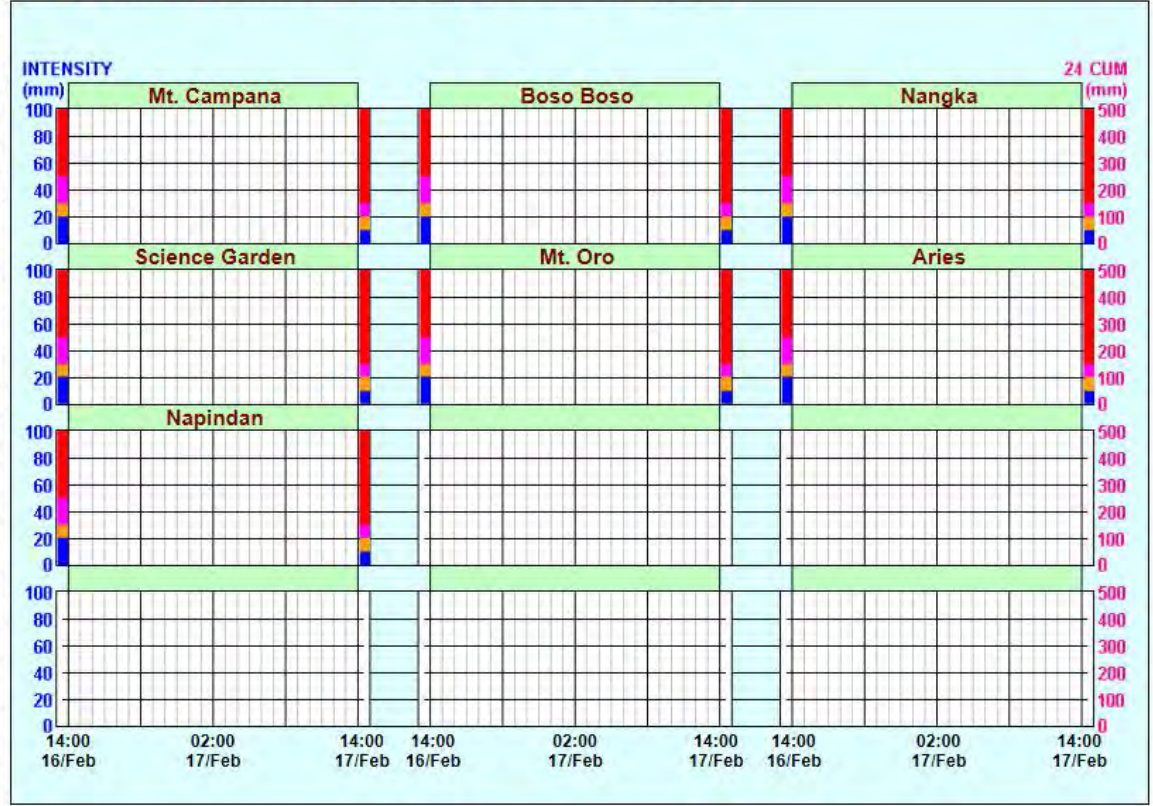
MAP
DIAGRAM



- 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



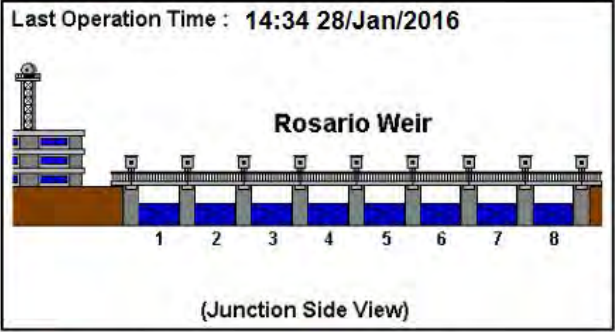
- RAINFALL HOURLY
- RAINFALL 10 min.
- WATER LEV. HOURLY
- WATER LEV. 10 min.
- BASIN MEAN HOURLY
- BASIN MEAN 10 min.



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

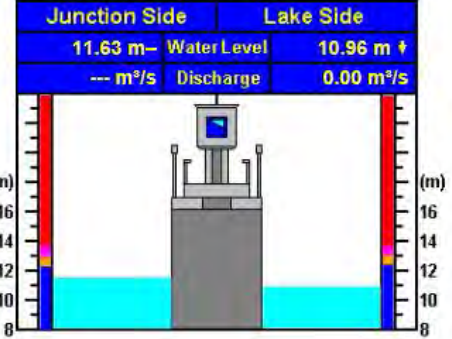
Observation Time
14:40 17/Feb/2016

Gate State



- 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

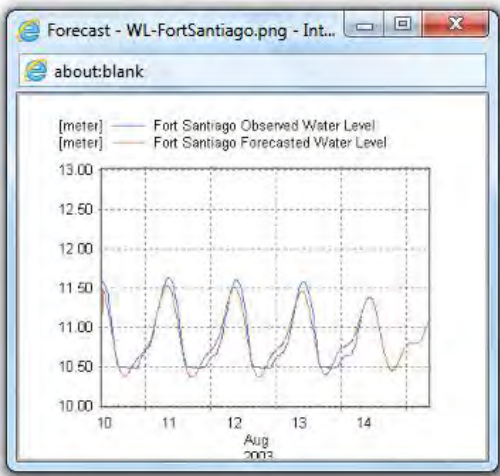
Maps and Bulletins

Maps

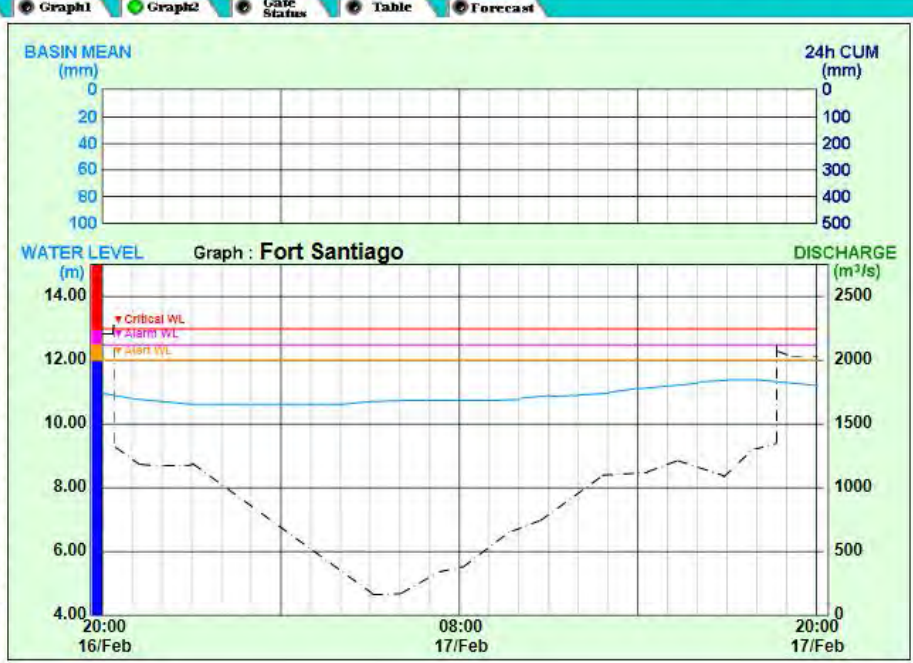
- Rainfall Status
- Water Level Status
- Rainfall Map

Bulletins

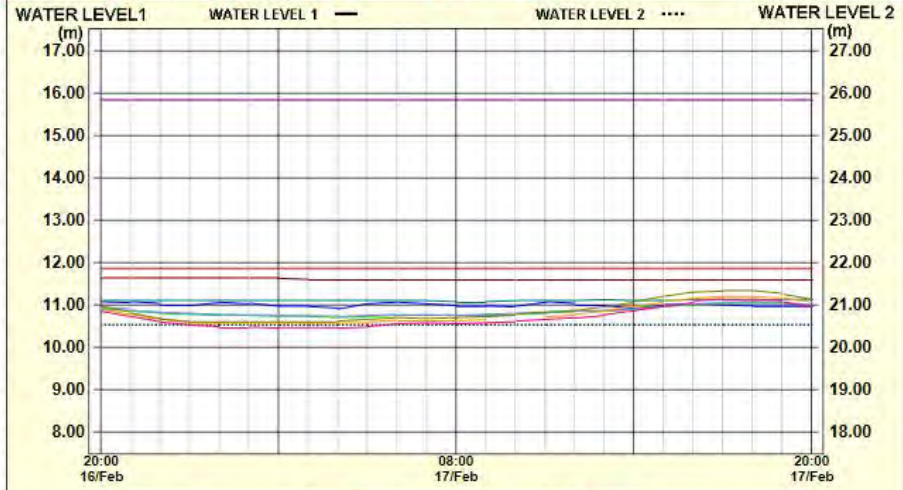
- Water Level Status



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

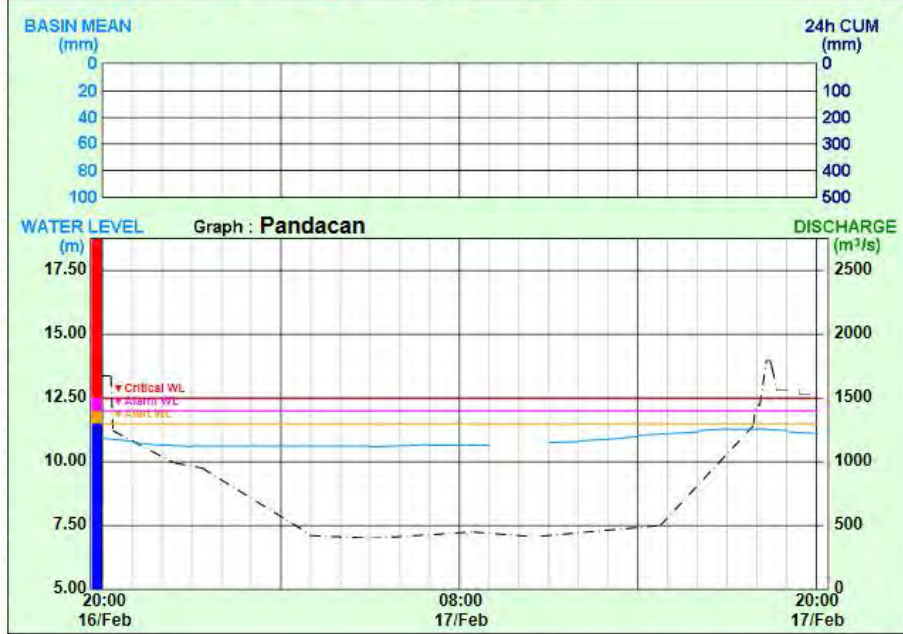


- RAINFALL HOURLY
- RAINFALL 10 min.
- WATER L.V. HOURLY
- WATER L.V. 10 min.
- BASIN MEAN HOURLY
- BASIN MEAN 10 min.

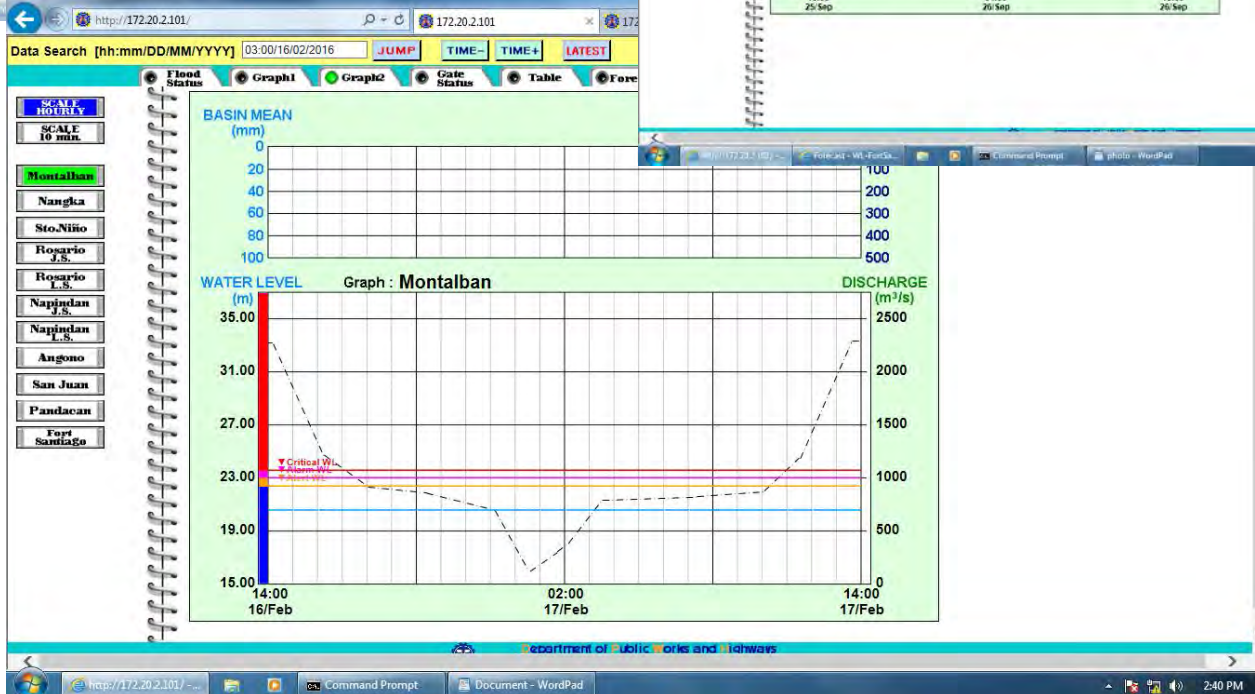


Montalban	Nangka	Sto. Niño	
Rosario(Junction Side)	Rosario(Lake Side)	Napindan(Junction Side)	
Napindan(Lake Side)	Angono	San Juan	
Pandacan	Fort Santiago		

- 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 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

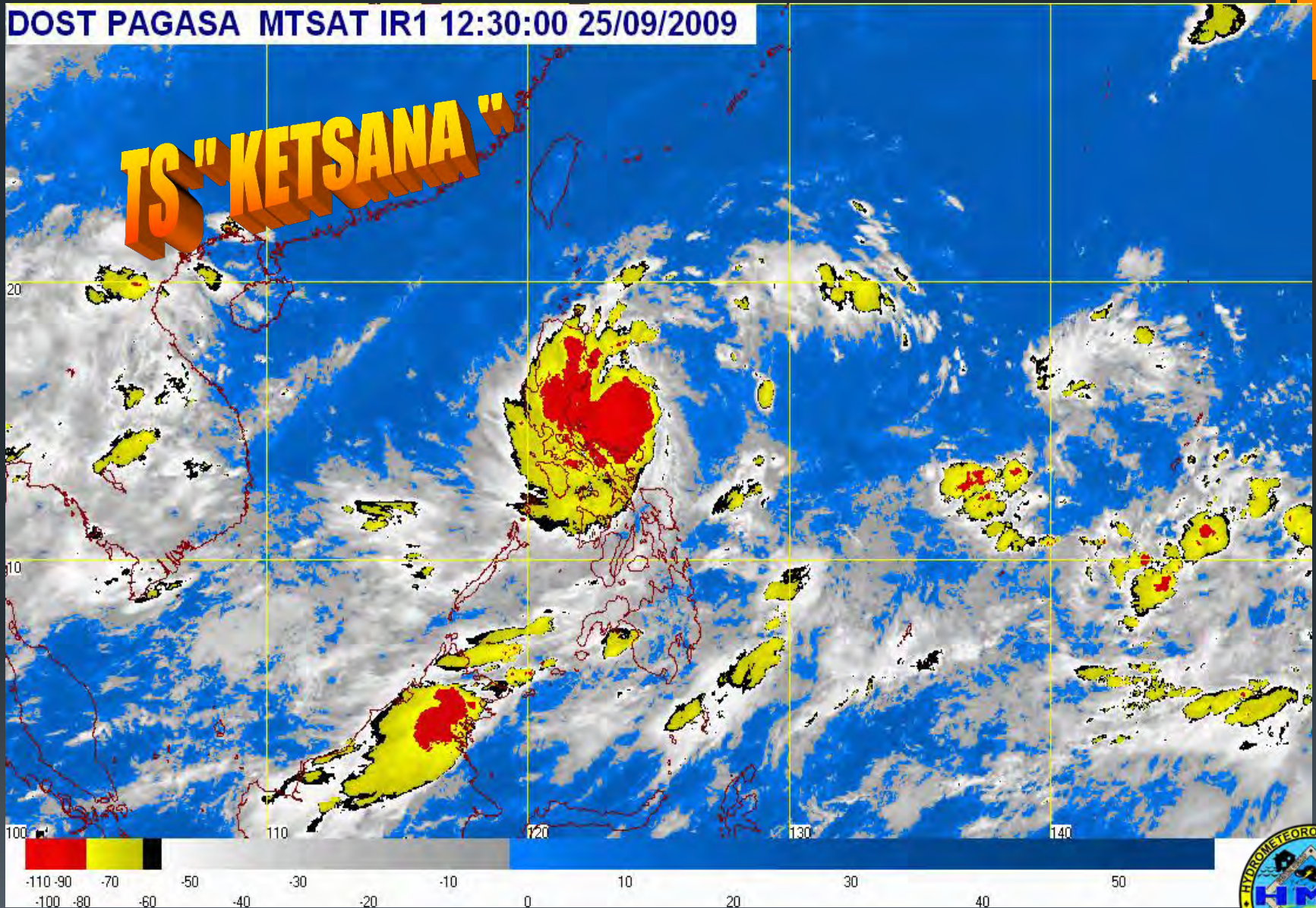
HYDROMETEOROLOGY DIVISION

Philippine Atmospheric Geophysical and Astronomical Services Administration

BACKGROUND :

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

TS "KETSANA"

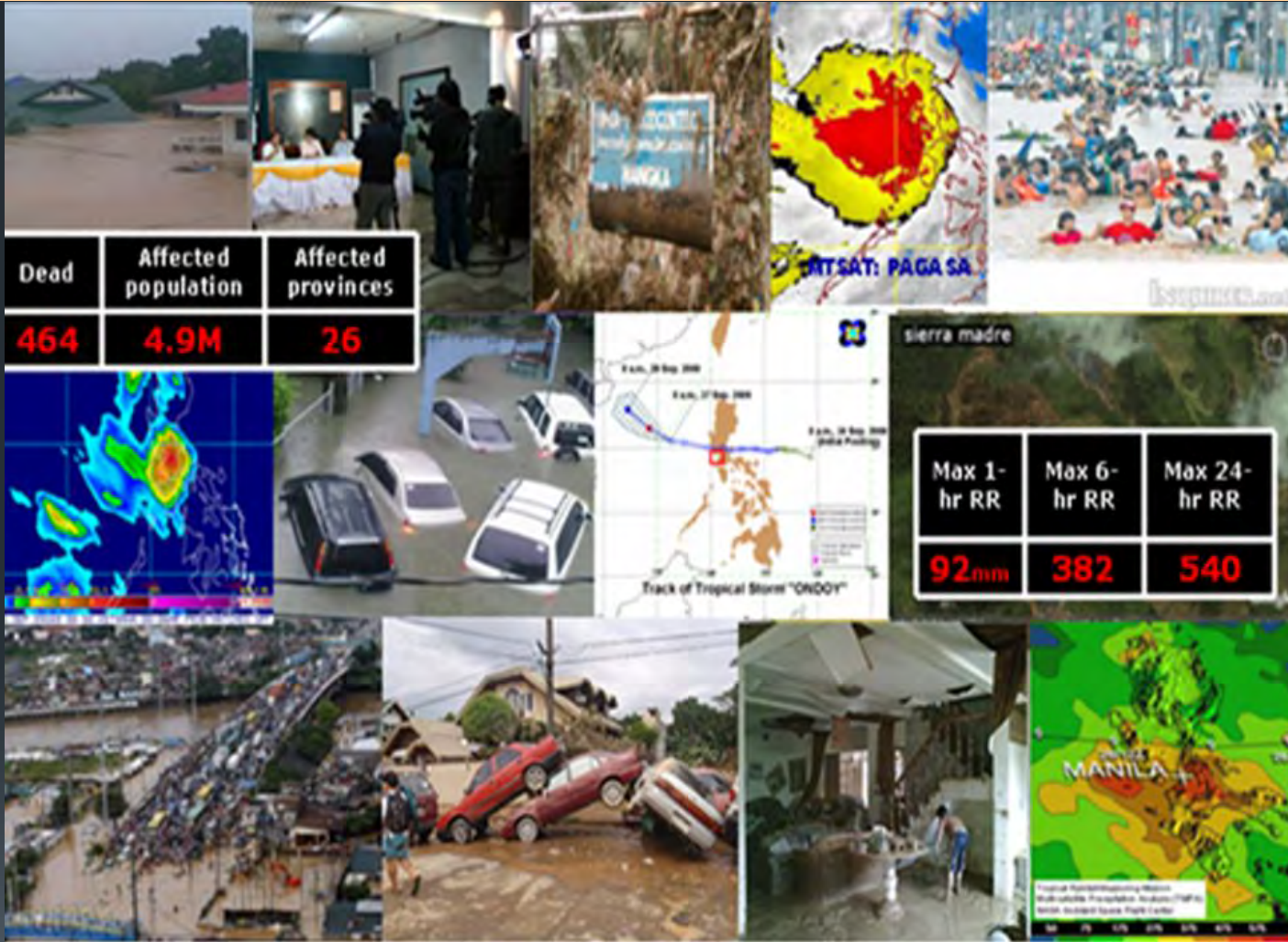


T.S. Ketsana crossing Central Luzon



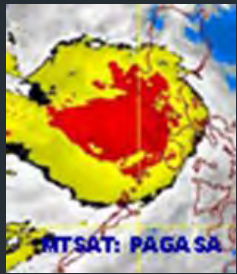
IMPACT OF T.C. "KETSANA" (Ondoy)

September 26, 2009

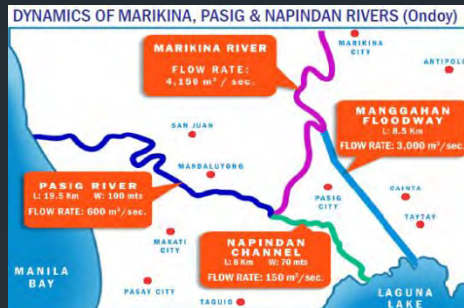


Case study: Flood in Metro Manila due to TS Ondoy

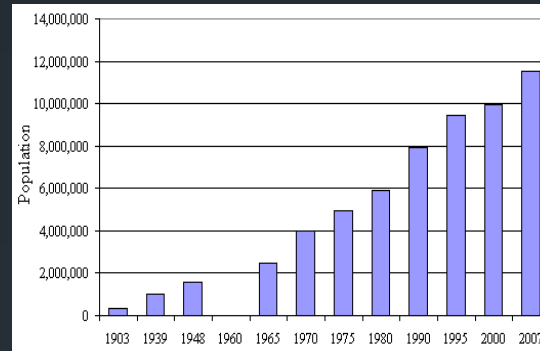
In 2003, Bankoff described in depth that Metro Manila's vulnerability to flooding has evolved as a result of the degree of interplay between climate, topography, resource use, and culture over time. The flood due to TS Ondoy in Sep 2009 proved it.



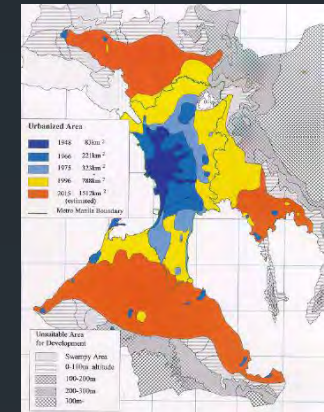
Intense rainfall



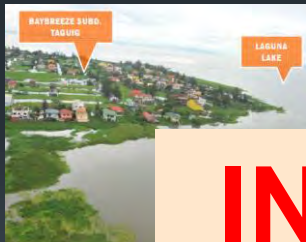
Insufficient carrying capacities



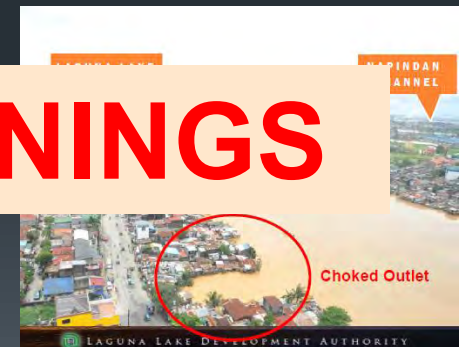
High/dense population



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

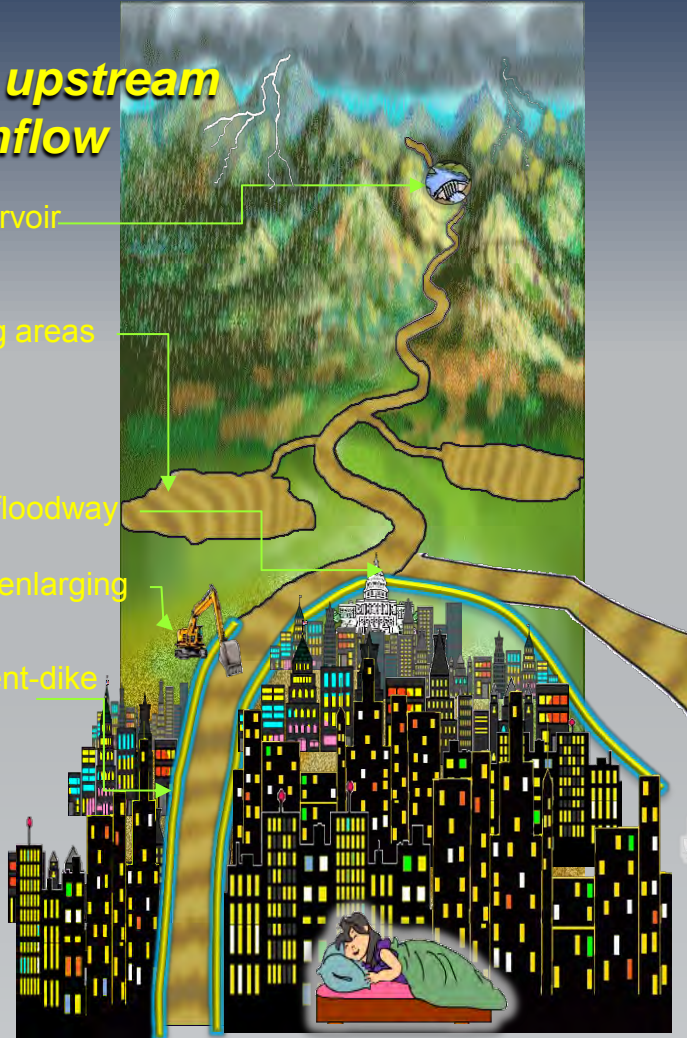
Dam, reservoir

Retarding areas

Bypass, floodway

Channel enlarging

Embankment-dike



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

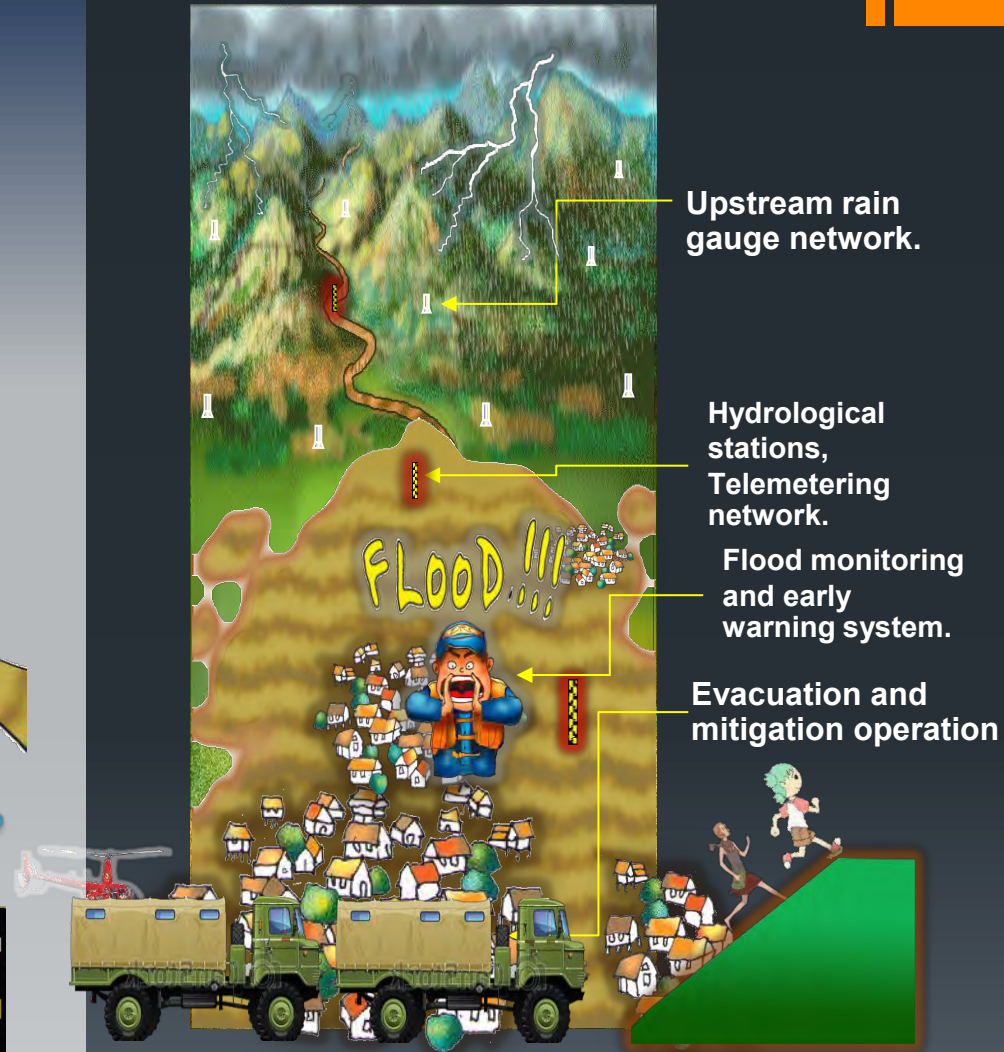
NON-STRUCTURAL MEASURES

Upstream rain gauge network.

Hydrological stations, Telemetering network.

Flood monitoring and early warning system.

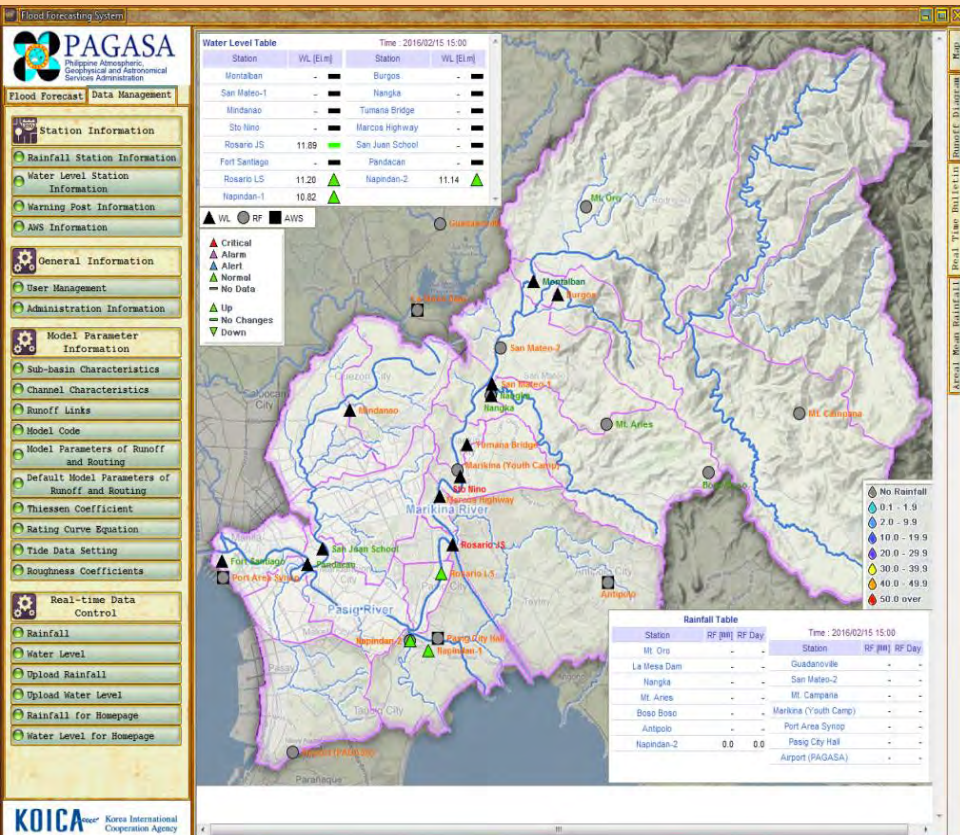
Evacuation and mitigation operation



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:

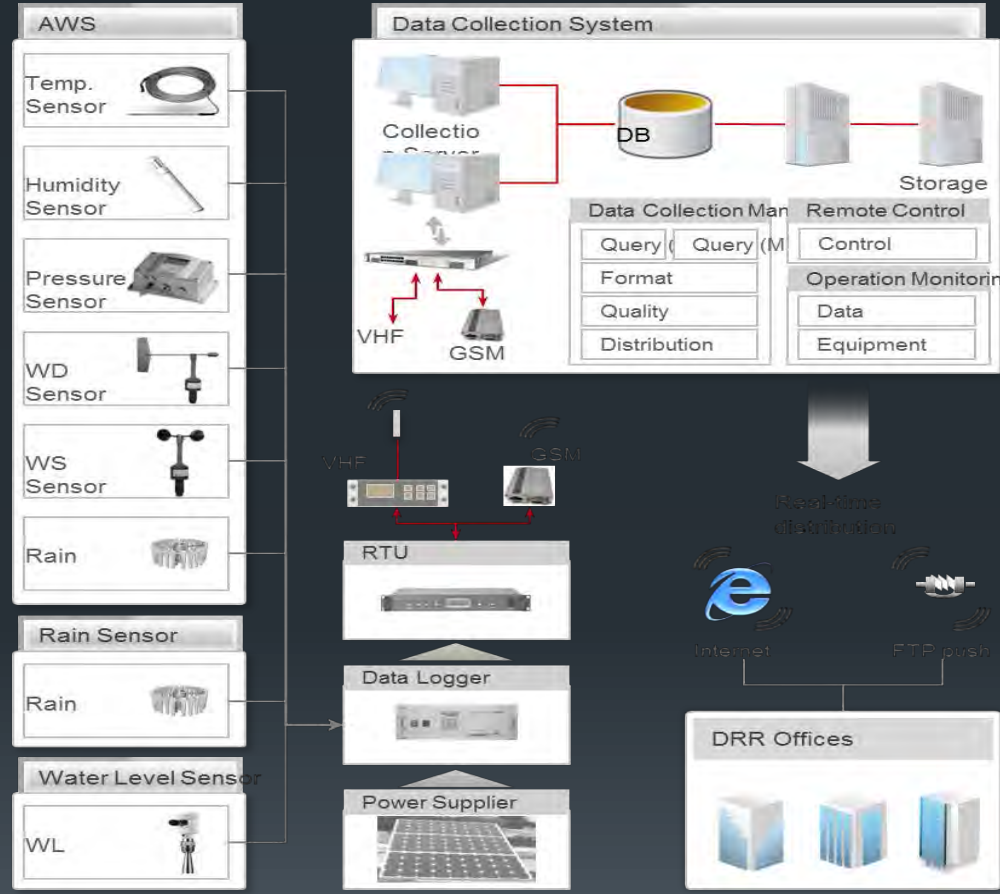
4 Automatic Weather Stations



10 Rainfall Gauging Stations



10 Waterlevel Gauging Stations



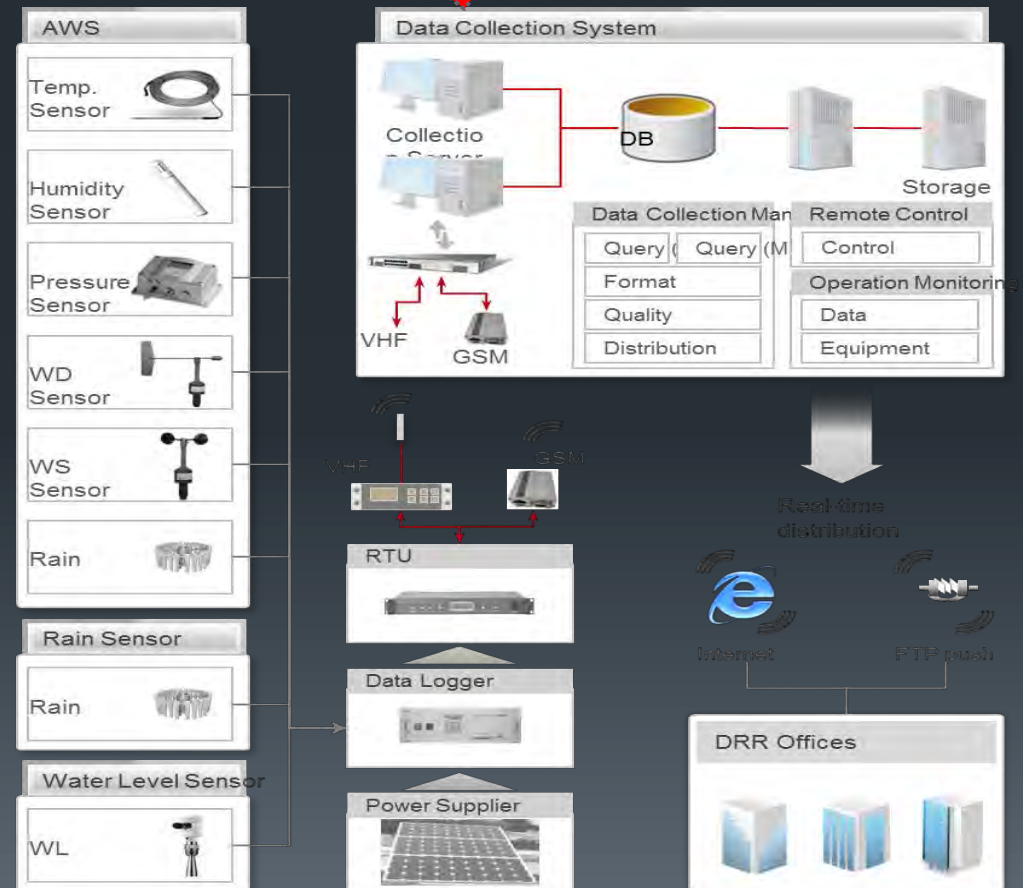
Expanded Data Collection System Module:

- 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.

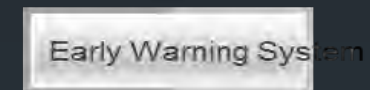
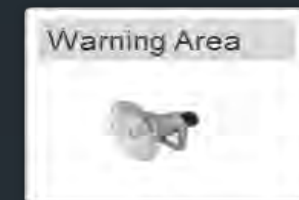
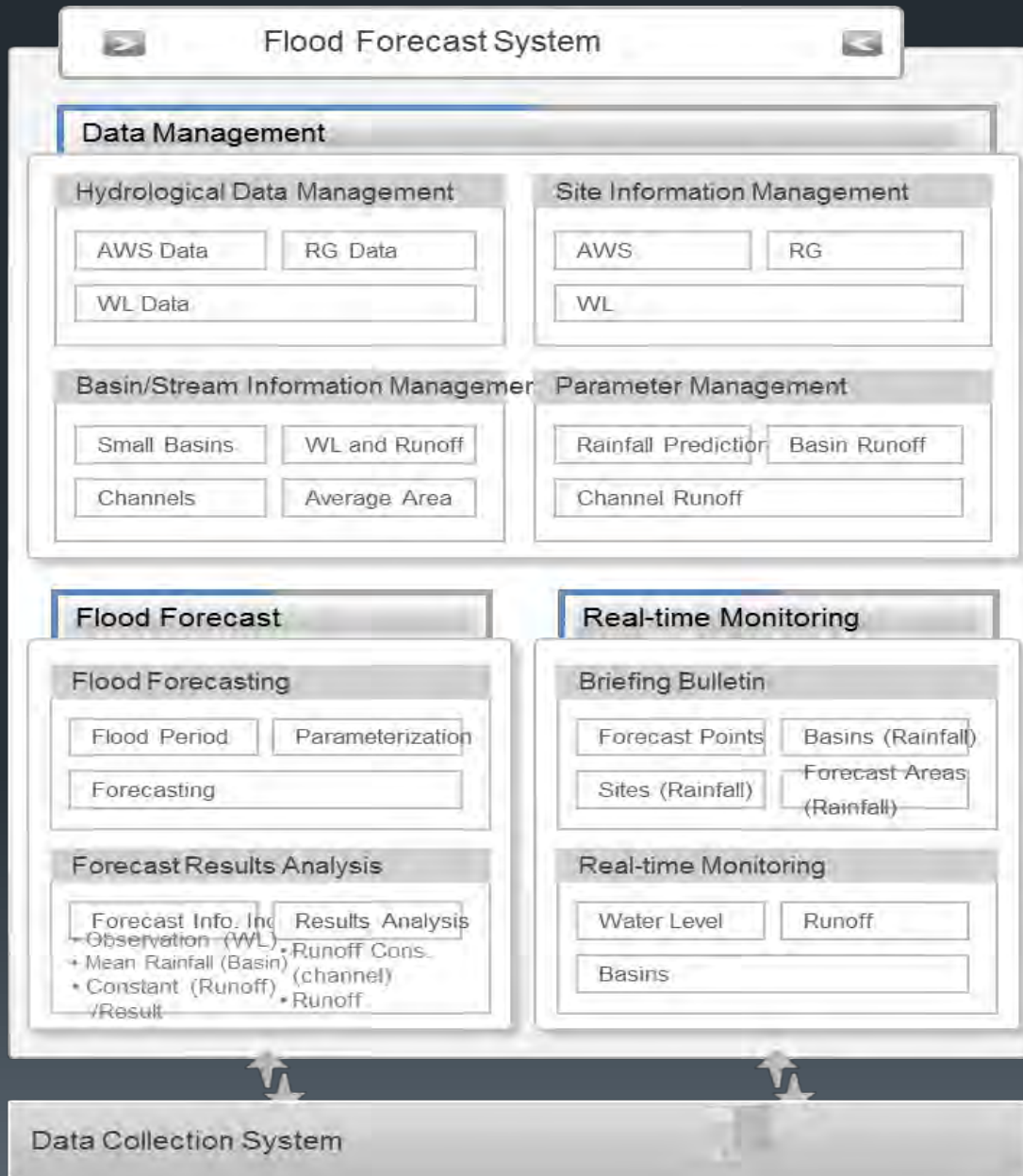


Location Map of EFCOS Stations

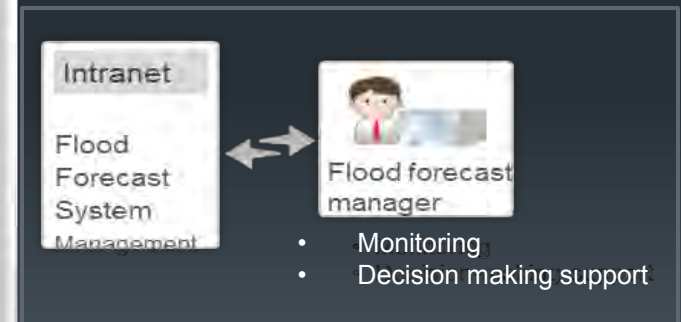
7 Rainfall Stations
11 Waterlevel Gauging Stations



FLOOD FORECASTING SYSTEM:



PAGASA DIC



FLOOD FORECASTING SYSTEM:

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

The screenshot displays the Flood Forecasting System (FFS) GUI. The main window shows a topographic map of the Manila area, with a pink-shaded watershed boundary. Various monitoring points are marked on the map with colored icons: yellow squares for Weir Points (WP), cyan squares for Weir Points with Dammed Reservoirs (WP[DRR]), orange triangles for Weir Points with KOICA (WL[KOICA]), green triangles for Weir Points with MMDA (WL[MMDA]), and purple triangles for Weir Points with UNDP (WL[UNDP]). Key locations labeled include San Mateo, Marikina, Pasig, and Taguig. The sidebar on the left contains several functional sections:

- Flood Forecast** / **Data Management**
- Flood Event**: Flood Event
- Parameters**: Modification R5, Parameters for Excess Rainfall, Forecasted Rainfall, Parameters for Basin Runoff, Parameters for Channel Routing
- Runoff and Routing**: Calculations of Runoff and Routing, Hydrograph, CSV Output, Transfer to EWS
- Hydraulic Model (FLDWAV)**: Preparation of Input File, Modification Input File, Hydraulic Routing, Hydrograph, CSV Output

At the bottom left, there is a table for Flood Event Information:

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

The bottom left corner features the KOICA logo and text: Korea International Cooperation Agency.

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

WP DRR

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

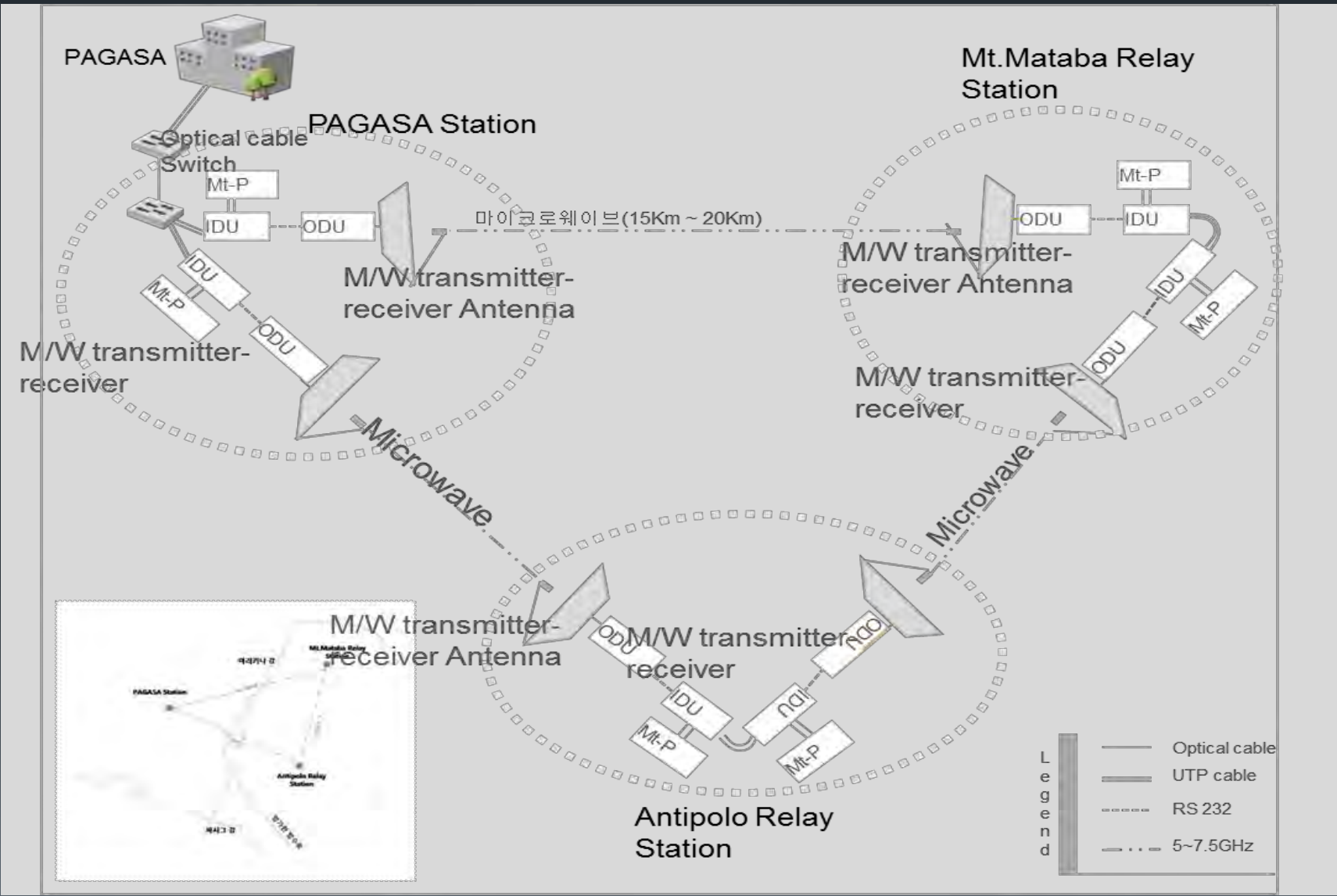
Status	Warning Post	TimeStamp	Warning Level			Alert Time	Alert WL	Alarm Time	Alarm WL	Critical Time	Critical...	Remarks
			Forecast	Current	Control							
Issue	Sto Nino				2							
Stop	Marcos Highway				2							

Selective SMS

Submit Cancel

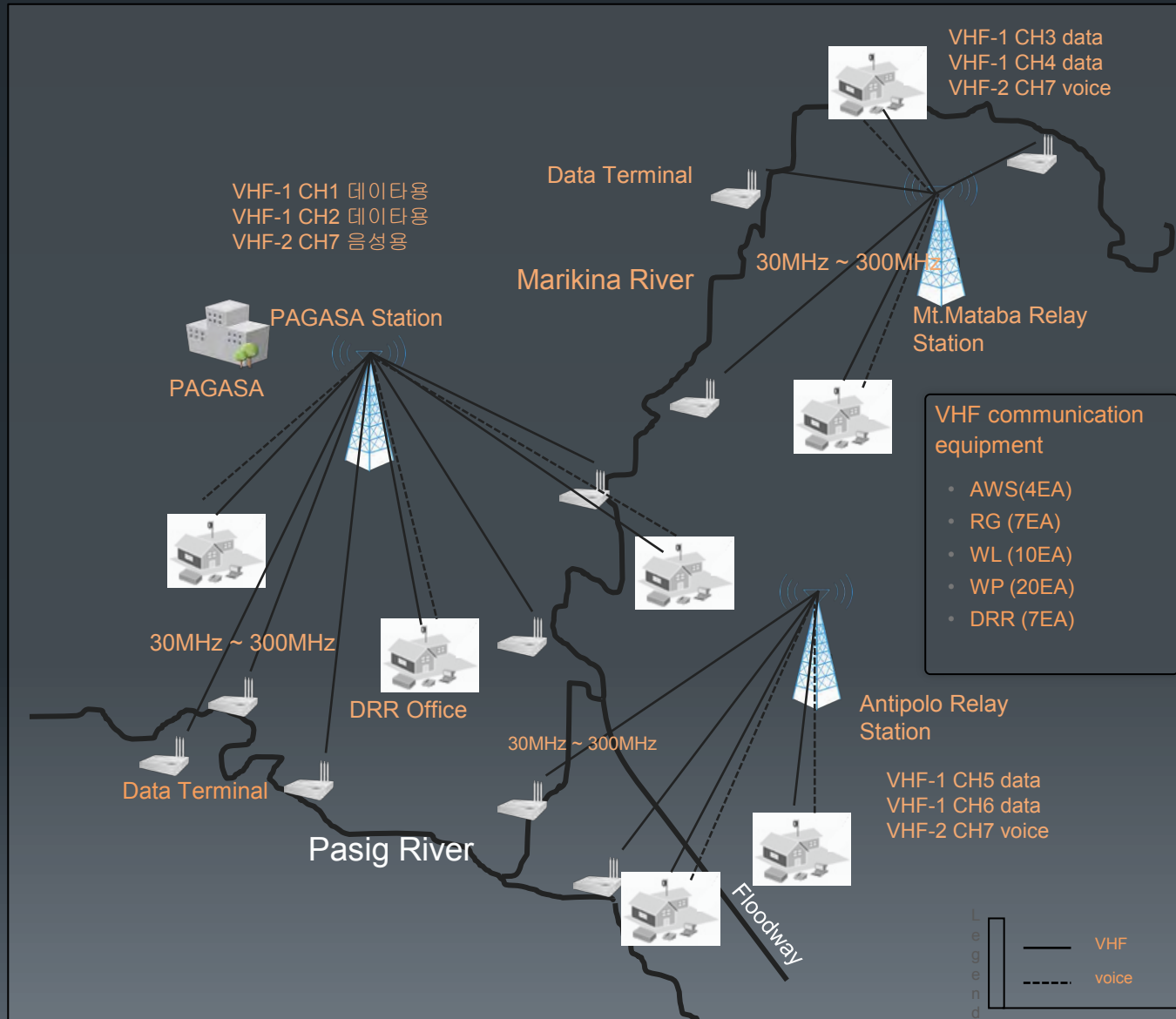
COMMUNICATION SYSTEM:

Microwave Communication



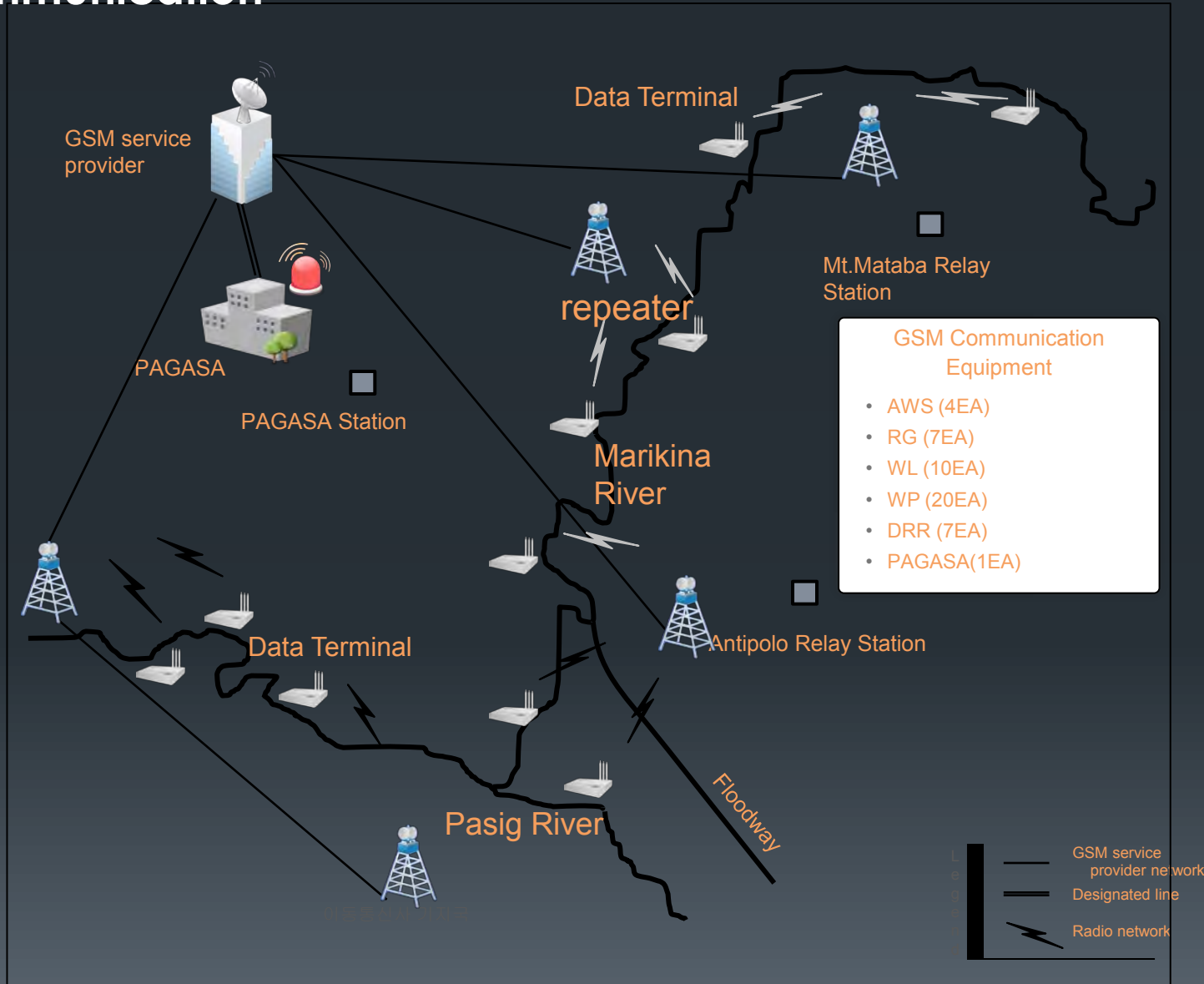
COMMUNICATION SYSTEM:

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

18 Feb. 19 Feb. 20 Feb. 21 Feb. 22 Feb. Extended Weather Forecast Summary

PAGASA-DOST @dost_pagasa
 #NCP_PRSD 18 February 2016 02:13PM
 Light to moderate #rains affecting #Quezon(Sen-Nalor, Real), #Bulacan... #Imene/607Zap/mL

PAGASA-DOST @dost_pagasa
 #V6_PRSD @ 11:07 AM 18 Feb 2016
 Light to moderate r... affecting over #Cebu(Lapu-lapu, Cordova) & nearby... #Imene/611Zap/ML

PAGASA-DOST @dost_pagasa
 Tweet to @dost_pagasa

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

PAGASA Philippine Atmospheric, Geophysical and Astronomical Services Administration

Time: 2014/09/19 01:40

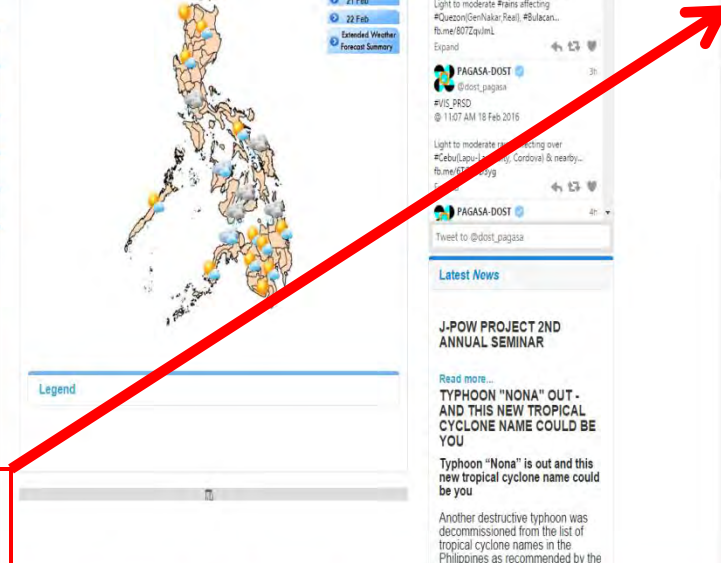
Water Level Map

Search Time: 2014/09/19 01:40

Legend: Critical (red triangle), Alarm (orange triangle), Alert (yellow triangle), Normal (green triangle), No Data (grey triangle), Up (blue arrow), No Changes (grey arrow), Down (red arrow)

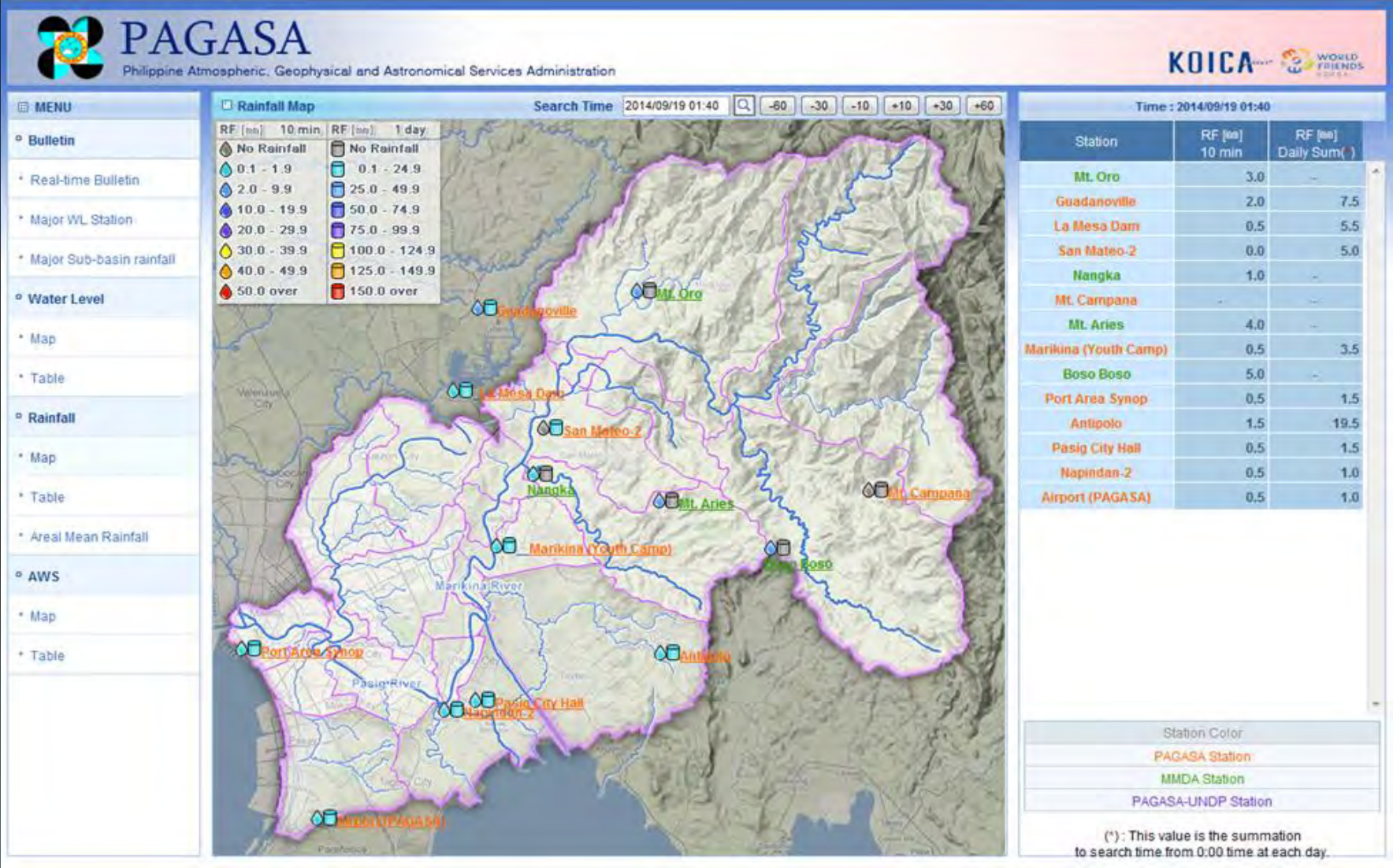
Station	WL (El.m)	Alert (El.m)	Alarm (El.m)	Critical (El.m)
Montalban	22.66	22.40	23.96	23.80
Burges	27.36	27.48	27.96	28.40
San Mateo-1	16.69	16.80	18.00	20.00
Nangka	16.17	16.50	17.10	17.70
Mindanao	32.48	33.00	34.00	35.00
Tomasna Bridge	13.74	17.26	18.26	19.26
Sto Nino	13.60	15.00	15.00	17.00
Marcon 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
Maginisan-2	11.42	13.00	14.00	15.00
Maginisan-1	11.44	13.00	14.00	15.00

Station Color: PAGASA Major Station (blue), MMDA Major Station (orange), PAGASA Station (green), MMDA Station (red), PAGASA-UNDP Station (purple)



**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



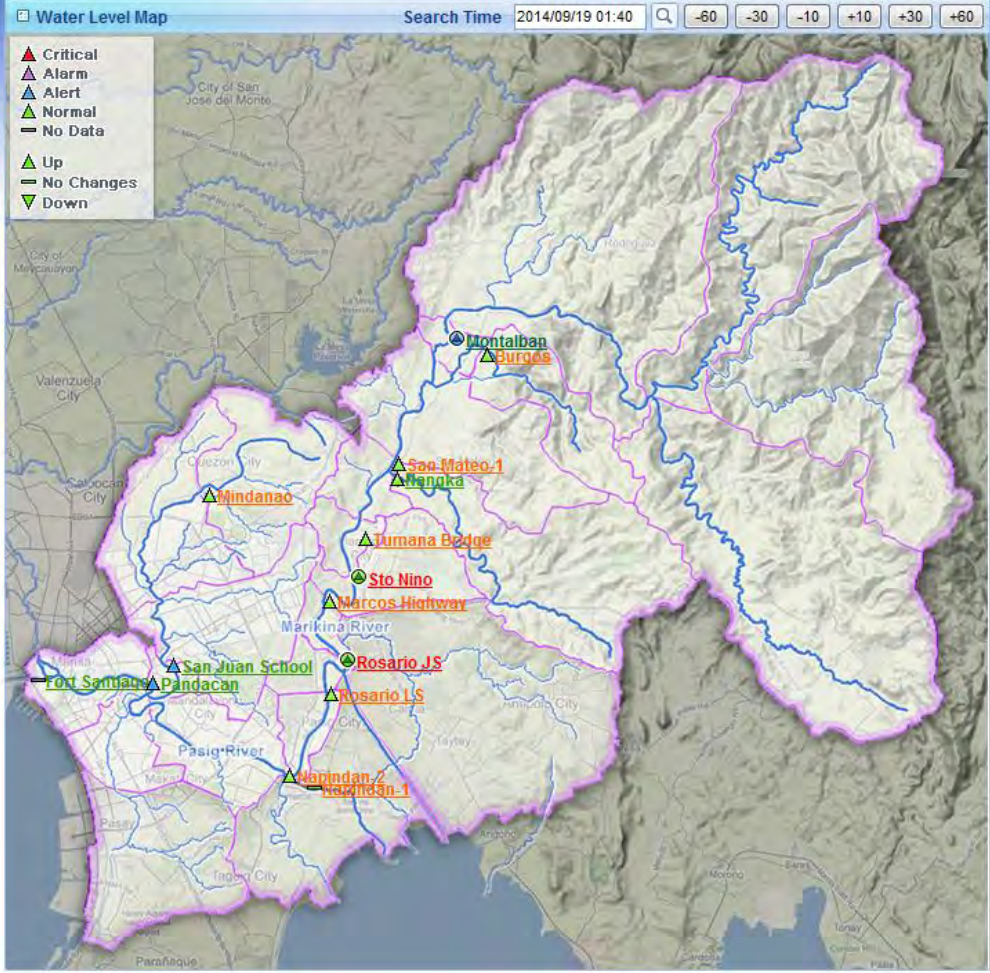
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Philippine Atmospheric, Geophysical and Astronomical Services Administration

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)
Montalban	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

- Map
- Table

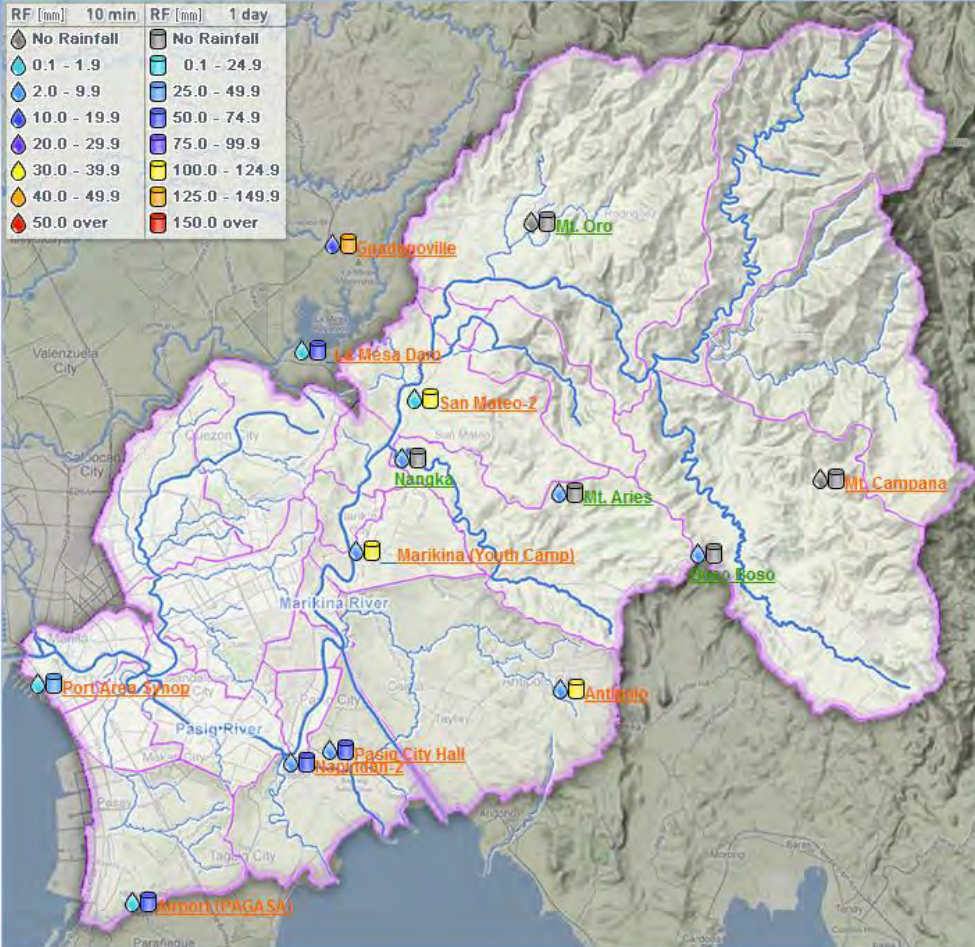
AWS

- 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	0.1 - 24.9	25.0 - 49.9	50.0 - 99.9
2.0 - 9.9	25.0 - 49.9	50.0 - 99.9	100.0 - 124.9
10.0 - 19.9	25.0 - 49.9	50.0 - 99.9	125.0 - 149.9
20.0 - 29.9	25.0 - 49.9	50.0 - 99.9	150.0 over
30.0 - 39.9	25.0 - 49.9	50.0 - 99.9	
40.0 - 49.9	25.0 - 49.9	50.0 - 99.9	
50.0 over	25.0 - 49.9	50.0 - 99.9	



Time : 2014/09/19 05:40

Station	RF [mm] 10 min	RF [mm] Daily Sum(*)
Mt. Oro	0.0	-
Guadalupeville	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

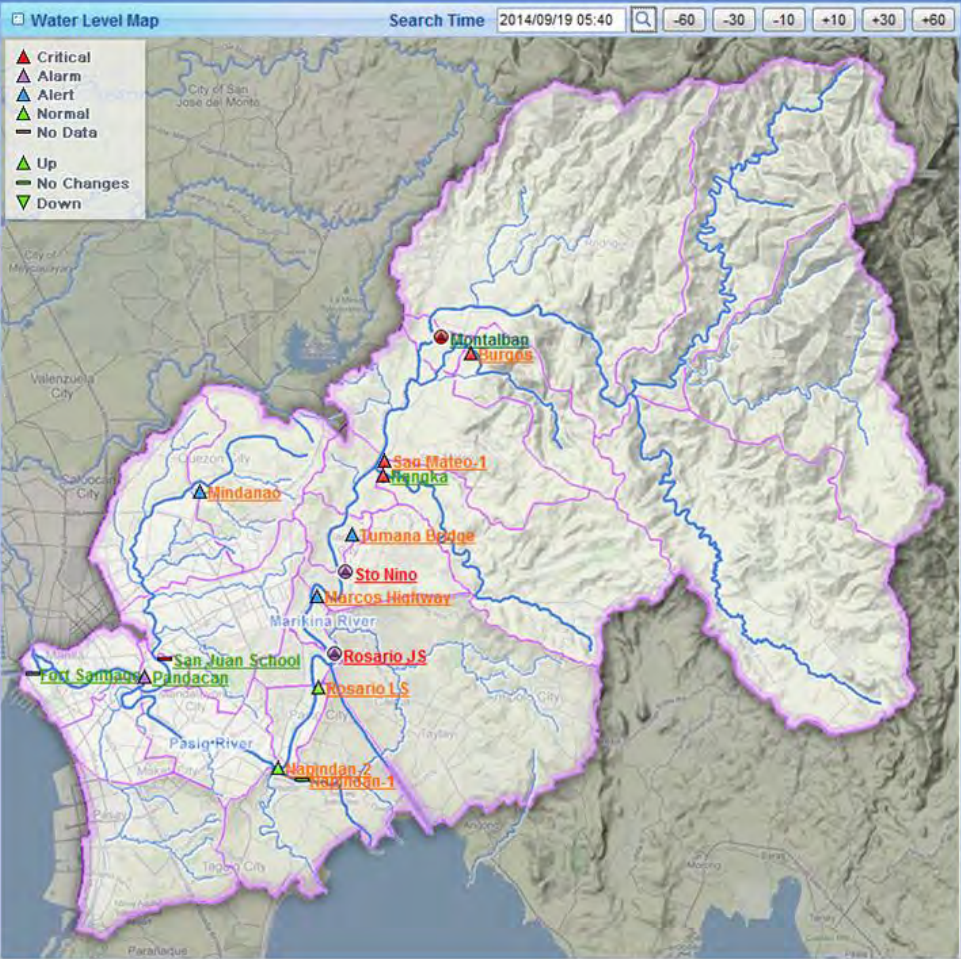


PAGASA

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

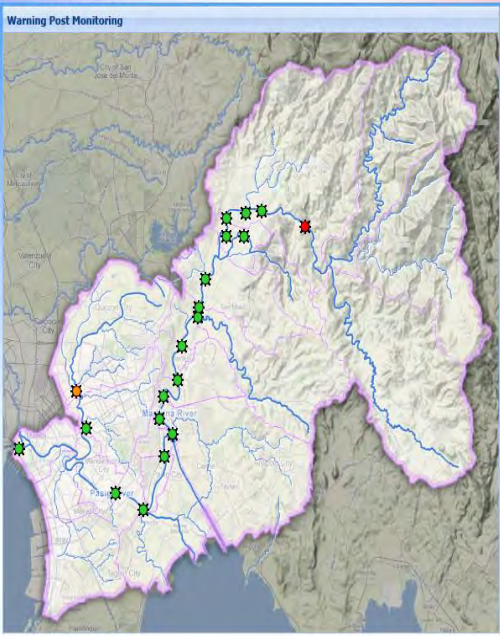


Time : 2014/09/19 05:40

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	

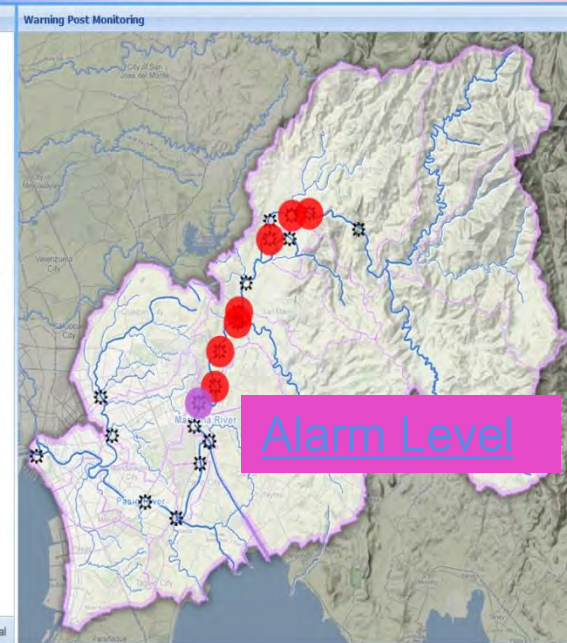
- Menu
- Early Warning System
 - Warning Post
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Local Time : 2014-09-22 18:18

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	--	--

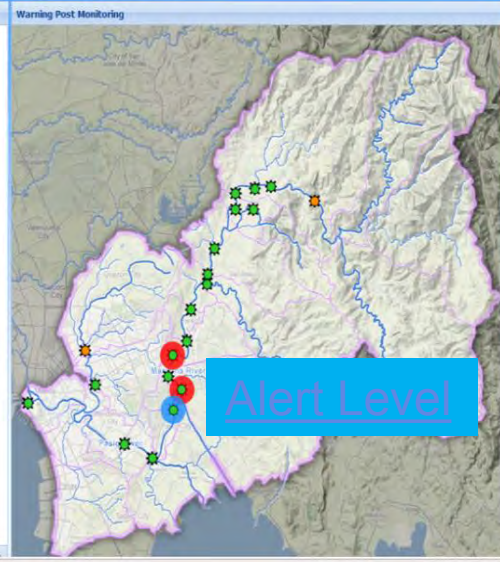
- Menu
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- SMS
 - SMS Management
 - SMS Send
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 - Status Data
- Full Screen
 - Full Screen



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	--	--

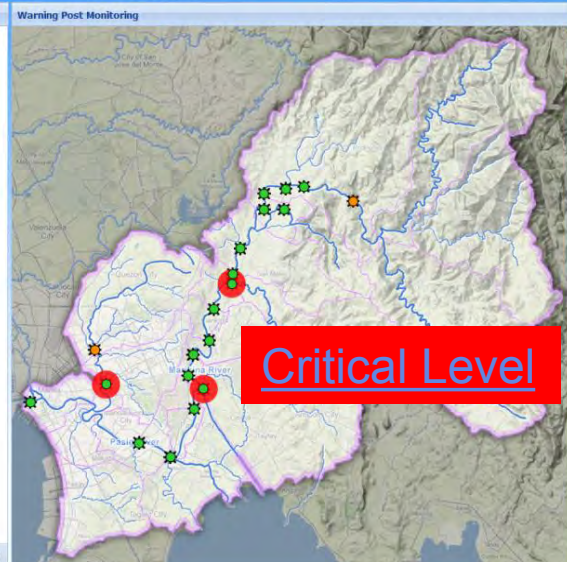
- Menu
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- SMS
 - SMS Management
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- Status Inquiry
 - Status Equipment
 - Status Data
- Full Screen
 - Full Screen



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	--	--

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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	DID NOT REACHED FLOOD WARNING LEVELS		
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

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 - Report SMS
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 - SMS Management
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- [-] Status Inquiry
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 - Status Data
- [-] Full Screen
 - Full Screen

Criteria

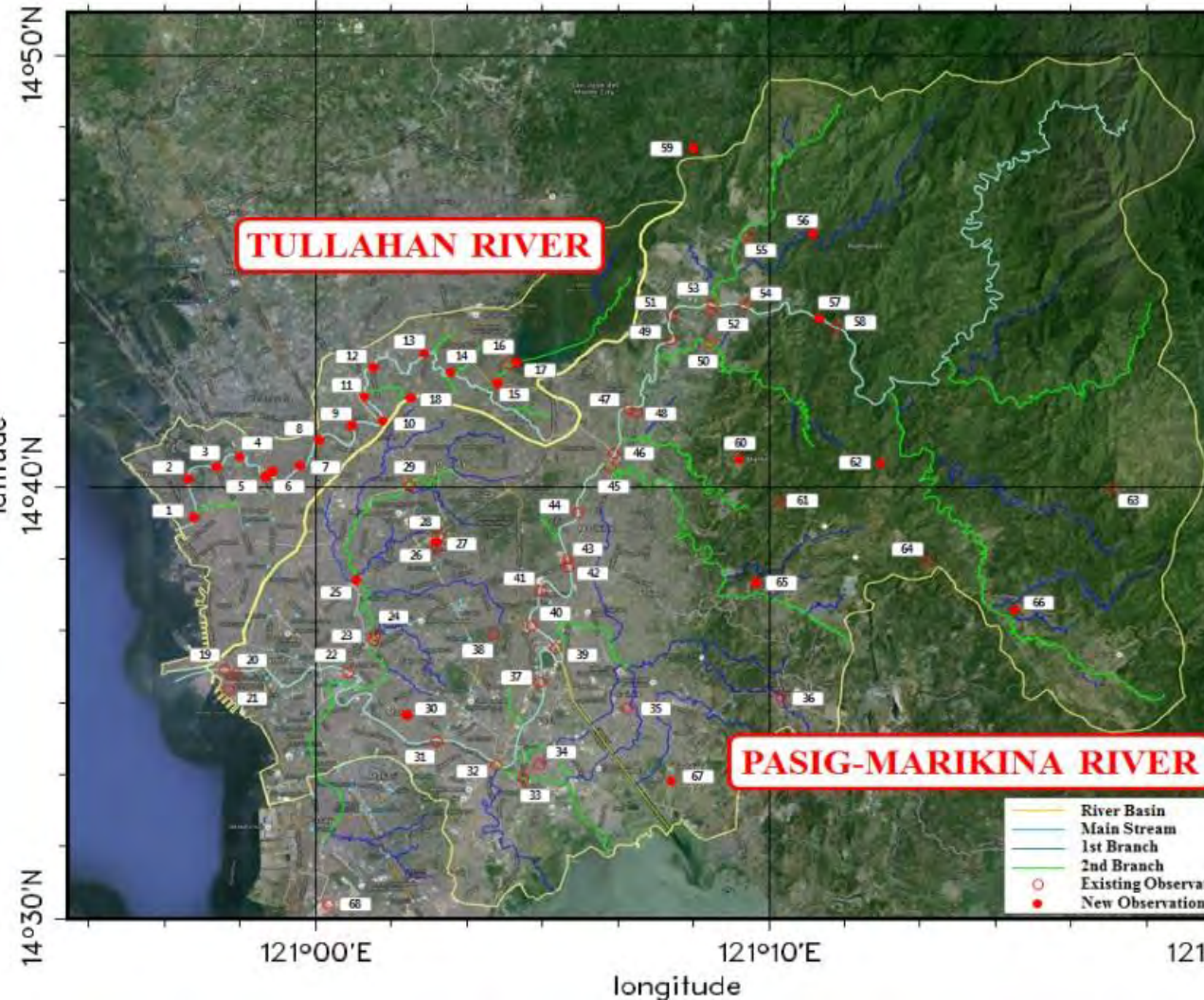
Station: From (yyyy-mm-dd): To (yyyy-mm-dd): SEQ: Name: Status: Level:

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”

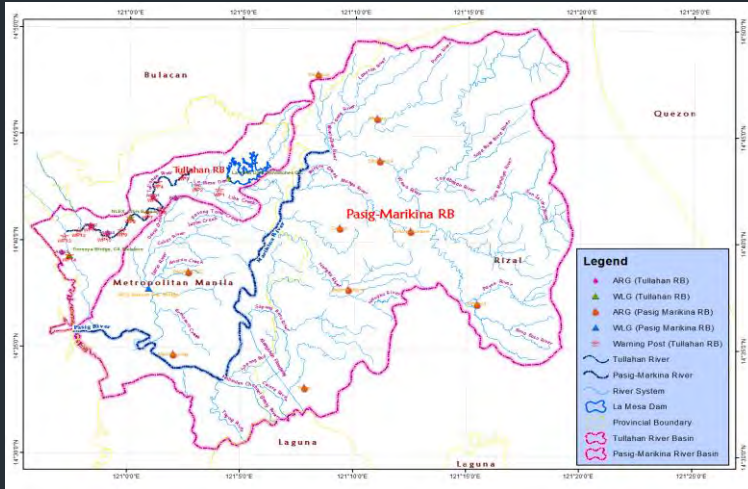


No.	NAME	EXISTING	NEW	Longitude	Latitude
1	Tanayya Bridge, C4, Malabon	WP, WLG		120°57'25.33"E	14°50'17.60"N
2	Gov. W. Pascual Avenue	WP		120°57'59.20"E	14°40'10.30"N
3	Tinajasos Bridge, Marcelo H. del Pilar Street	WP		120°57'47.12"E	14°40'26.17"N
4	Philippine National Railways Equipment Depot	WP, ARG		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°59'41.19"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° 1'24.28"E	14°43'7.27"N
15	Commonwealth Avenue, North Fairview	WP		121° 1'59.86"E	14°42'8.78"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	Barangay Hall San Bartolome QC	ARG		121° 1'24.45"E	14°42'32.32"N
19	Fort Santiago	WLG		120°58'1.63"E	14°55'45.29"N
20	Fort San Diego	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° 1'10.82"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° 2'30.53"E	14°58'29.40"N
27	PAGASA-DIC	ARG		121° 2'30.80"E	14°58'32.52"N
28	PAGASA-Science	ARG		121° 2'30.98"E	14°58'42.51"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° 2'41.55"E	14°34'5.68"N
32	Napindan-2	WP, ARG, WLG		121° 3'50.57"E	14°33'50.53"N
33	Napindan-1	WLG		121° 3'53.70"E	14°33'15.69"N
34	Paag City Hall	DRR, ARG		121° 4'53.54"E	14°33'54.28"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°36'56.38"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	Martins (Youth Camp)	ARG		121° 8'29.57"E	14°38'19.98"N
44	Tanayya Bridge	WP, WLG		121° 8'47.45"E	14°39'23.14"N
45	Nangla	WP, ARG, WLG		121° 6'51.00"E	14°40'25.00"N
46	San Mateo-1	WP, WLG		121° 6'35.04"E	14°40'46.37"N
47	San Mateo-2	WP, ARG		121° 6'52.79"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° 8'40.52"E	14°43'18.96"N
51	Rodriguez-1	WP, WLG		121° 7'49.23"E	14°43'59.49"N
52	Rodriguez-2	DRR		121° 8'44.18"E	14°43'56.53"N
53	Rodriguez-3	WP		121° 8'46.26"E	14°44'07.90"N
54	Estero del Rodriguez	WP		121° 8'50.00"E	14°44'14.79"N
55	M. Oro	ARG		121° 9'35.40"E	14°45'48.00"N
56	Miscap		ARG	121°10'39.20"E	14°45'48.61"N
57	Site Wawa		ARG	121°11'17.50"E	14°45'48.84"N
58	Wawa Dam	WP, WLG		121°11'29.86"E	14°45'58.72"N
59	Micabud		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	Bugong 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°55'9.95"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!