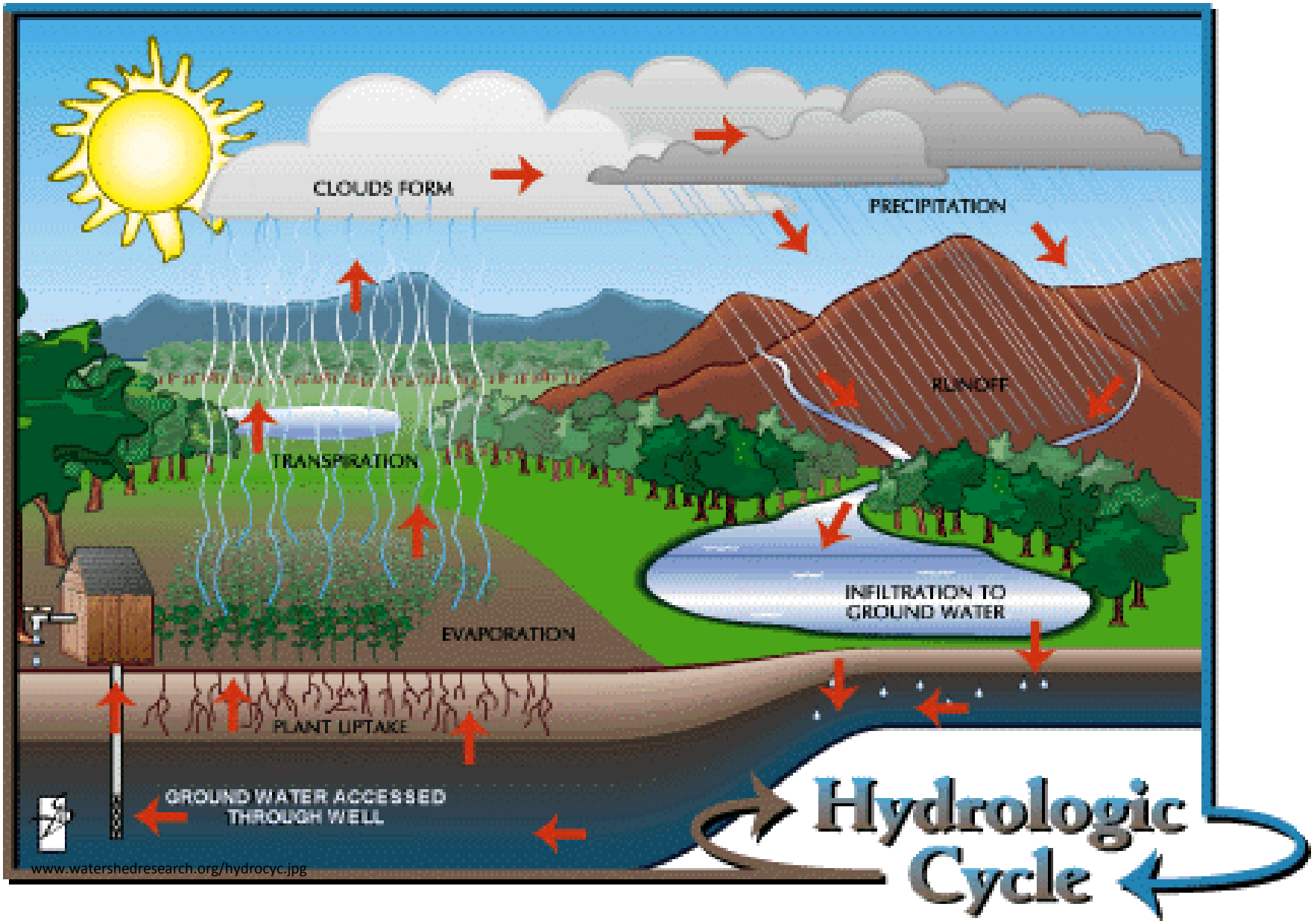
ENVIRONMENTAL RESEARCH AGENDA FOR THE HYDROSPHERE


CLOUDS FORM
PRECIPITATION
RUNOFF
TRANSPIRATION
INFILTRATION TO
GROUND WATER
EVAPORATION
PLANT UPTAKE
GROUND WATER ACCESSED
THROUGH WELL
Hydrologic
Cycle
www.watershedresearch.org/hydrocyc.jpg

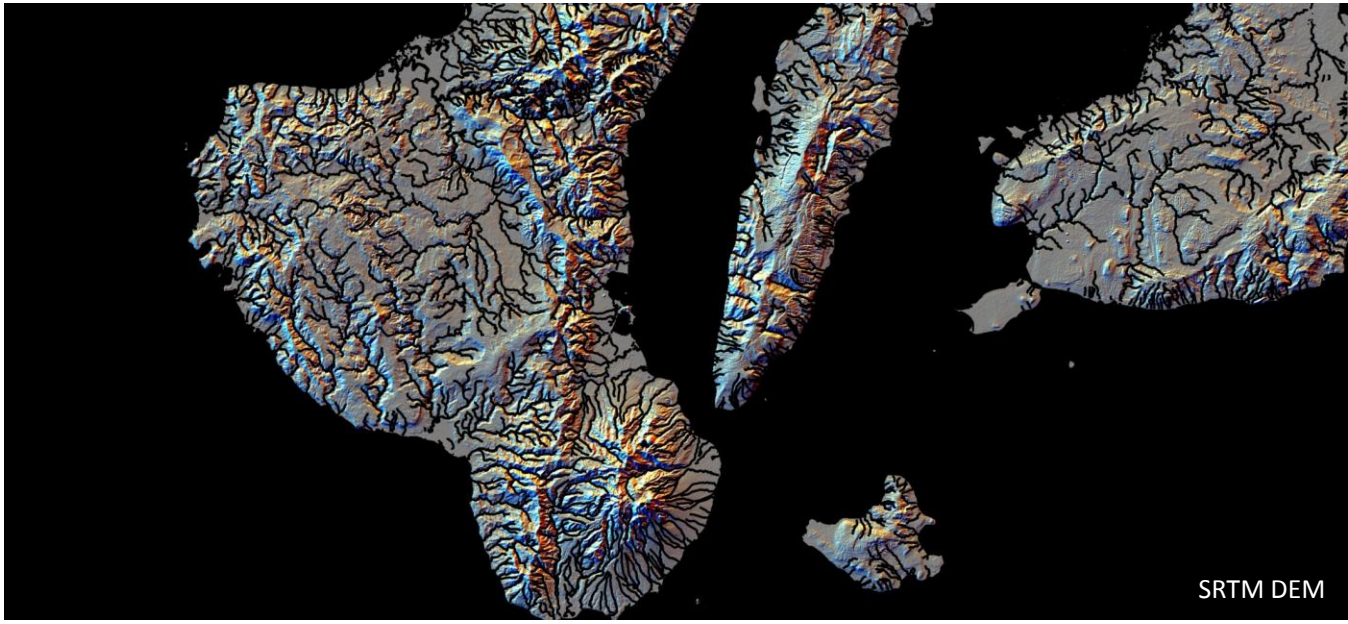
Important Institutions in Hydrologic Data Collection and Analysis

DENR-EMB, NWRB, LWUA-WDs, MWSS, DOH, BFAR, NEDA, PAGASA, DILG, NDRRMC, DENR-MGB, NAMRIA, DA-BSWM, NIA, DPWH-BRS, DOST, HEIs, International Funding Agencies

HYDROLOGY ISSUES	Information Needs	Data Available	Contribution of R&D
WATER QUALITY ISSUES I Degradation of freshwater resources	Watershed characterization; historical flows; upstream erosion estimates; current states of (400+) rivers; hydrologic data	IWAVE Matrix of hydrological gaps; NEDA-MDGF study on water resources vulnerability to climate change; Network of automated weather stations; watershed characteristics in GIS format; database of water information from BRS, NWRB, LWUA, EMB and UPNIGS;	Online water quality database, groundwater quality, groundwater vulnerability maps coastal water quality data, ocean circulation/residence time calculation, coastal water utilization soil type hydrologic interpretation, up to date land use maps, streamflow vs. precipitation data regional interpretation of groundwater usage, water utilization data of agriculture sector
WATER QUALITY ISSUES II Degradation of coastal waters	sediment load of river discharges; pollution/toxicity load of rivers; coastal developments, hydrologic data		
WATER QUANTITY ISSUES I Flooding	topographic/hydrologic maps, computer models, hydro-meteorologic data		
WATER QUANTITY ISSUES II Water scarcity	groundwater characteristics, watershed delineation, hydro-meteorologic data		

Priority Research Areas for Water Quality

- State of Philippine lakes, rivers, groundwater and coastal waters
- Pollution load calculation and modeling
- Advances in water quality treatment



2010 BOD Loading per area (MT/year/ha)

LEGEND: *Watershed Boundaries*

- *Manila Bay*
- *Laguna de Bay*
- *Municipal Boundary*

BOD Loading per area (MT/year/ha)

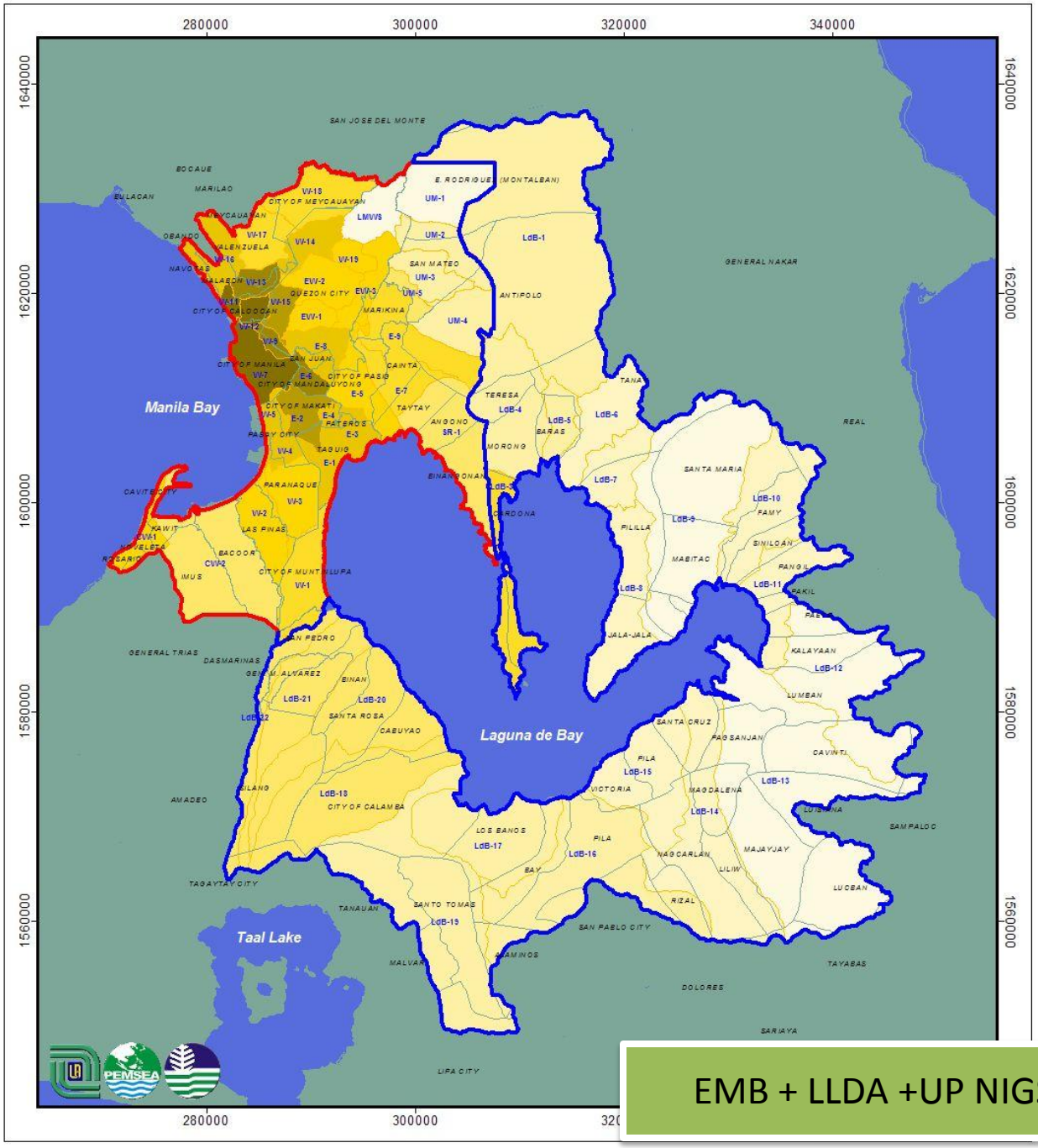
- 0 - 0.06
- 0.06 - 0.14
- 0.14 - 0.29
- 0.29 - 0.51
- 0.51 - 0.91
- 0.91 - 1.19
- 1.19 - 1.57
- 1.57 - 2.21
- 2.21 - 3.37
- 3.37 - 5.53

Manila Bay Sub-basin

CW-1	Cavite-Rosario
CW-2	Cavite-Kawit
E-1	Taguig
E-2	Makati
E-3	Pateros
E-4	Bonifacio
E-5	Pasig
E-6	Mandaluyong-San Juan
E-7	Taytay
E-8	Quezon South
E-9	Cainta-Marikina
EW-1	Quezon Central
EW-2	Quezon North
EW-3	Quezon East
LMWS	La Mesa Watershed
UM-5	San Mateo
SR-1	Rizal South-West
UM-1	Rodriguez
UM-2	Maly
UM-3	Ampid
UM-4	Nangka
W-1	Muntinlupa
W-11	Dagat-Dagatan
W-12	Caloocan A
W-13	Malabon-Tullahan
W-14	QC-Novaliches
W-15	Quezon West
W-16	Navotas
W-17	Valenzuela
W-18	Caloocan B
W-19	Malabon
W-2	Las Pinas
W-3	Paranaque
W-4	Pasay-NAIA
W-5	South Manila
W-7	Central Manila
W-9	Sampaloc

Laguna de Bay Subbasins

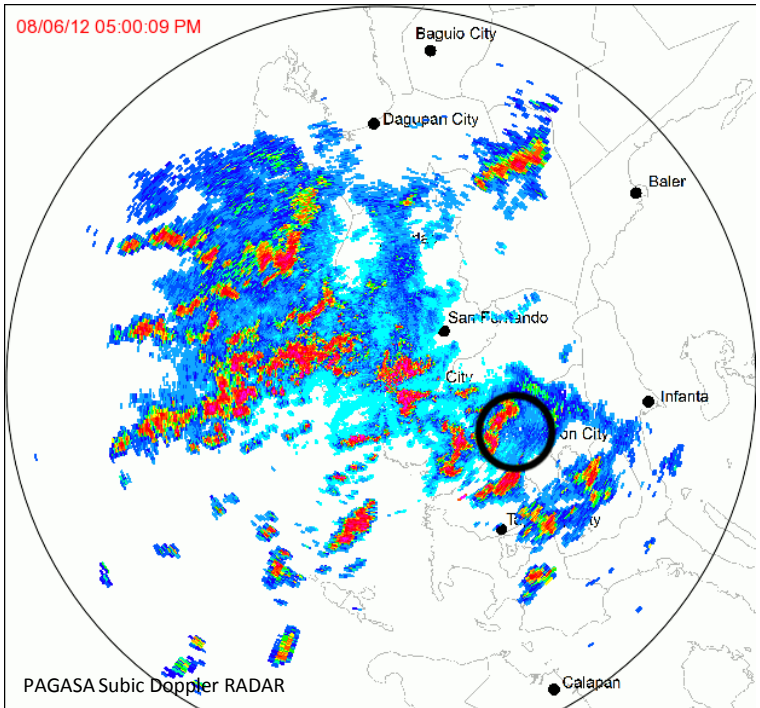
1	Marikina
2	Mangahan
3	Angono
4	Morong
5	Baras
6	Tanay
7	Pililla
8	Jala-jala
9	Sta. Maria
10	Siniloan
11	Pangil
12	Caliraya
13	Pagsanjan
14	Sta. Cruz
15	Pila
16	Calauan
17	Los Ba±os
18	San Juan
19	San Cristobal
20	Sta. Rosa
21	Bi±an
22	San Pedro
23	Muntinlupa
24	Taguig

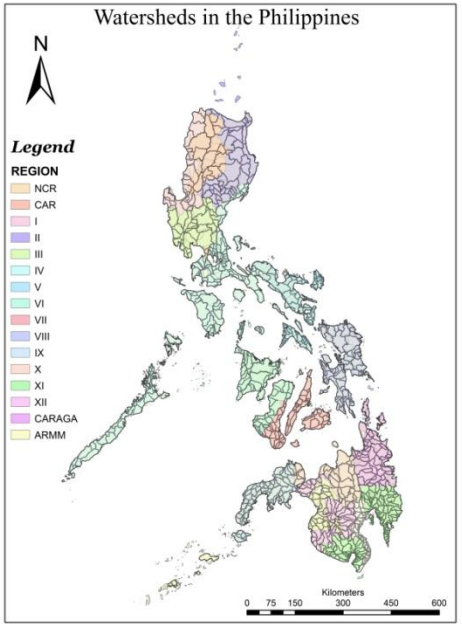


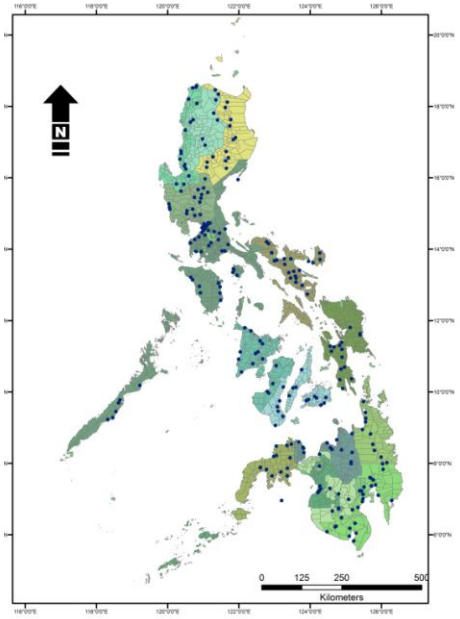
EMB + LLDA +UP NIGS

Priority Research Areas for Flooding

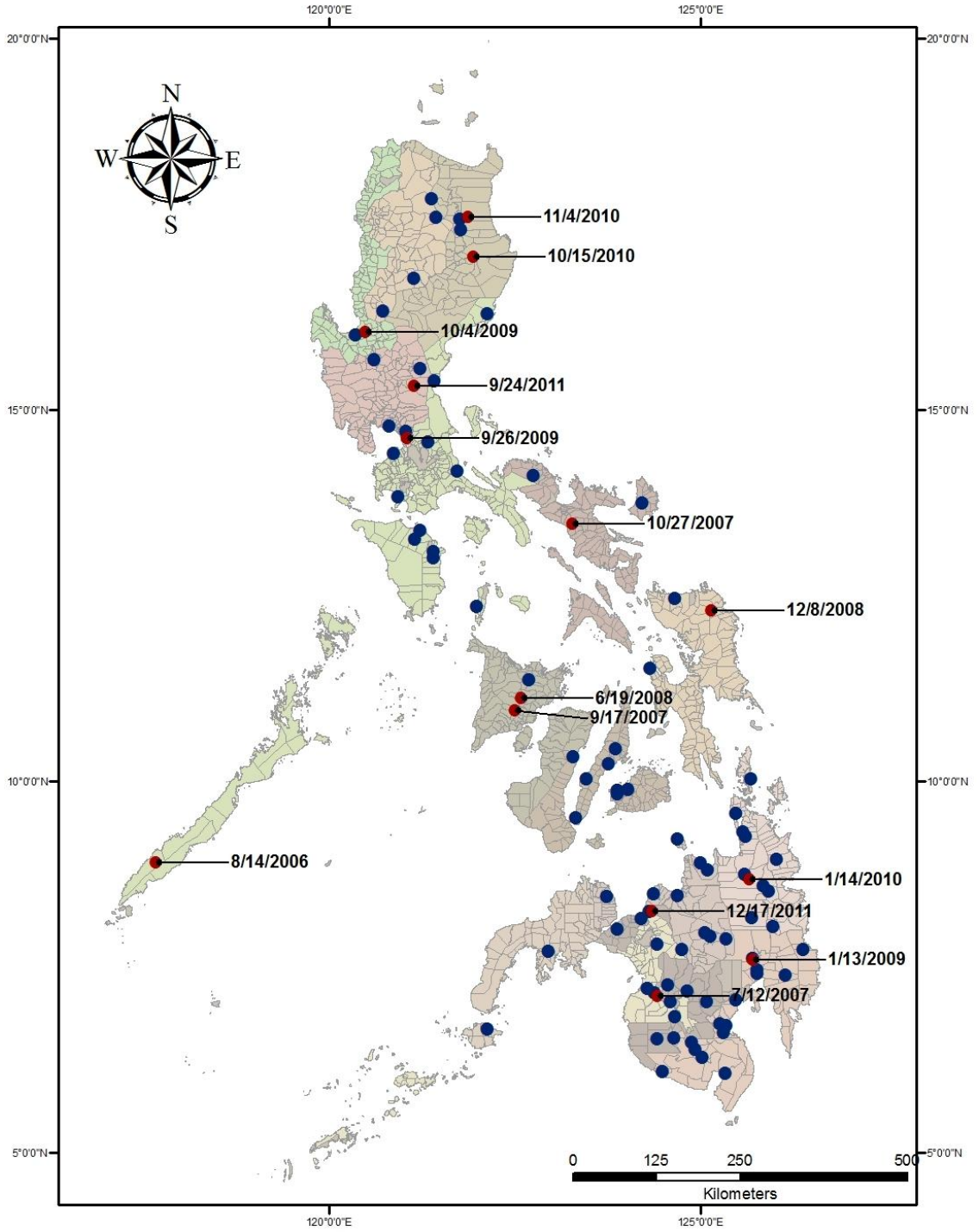
- Rainfall/flood modeling and forecasting
- High-resolution topographic mapping
- Recurrence interval of extreme events



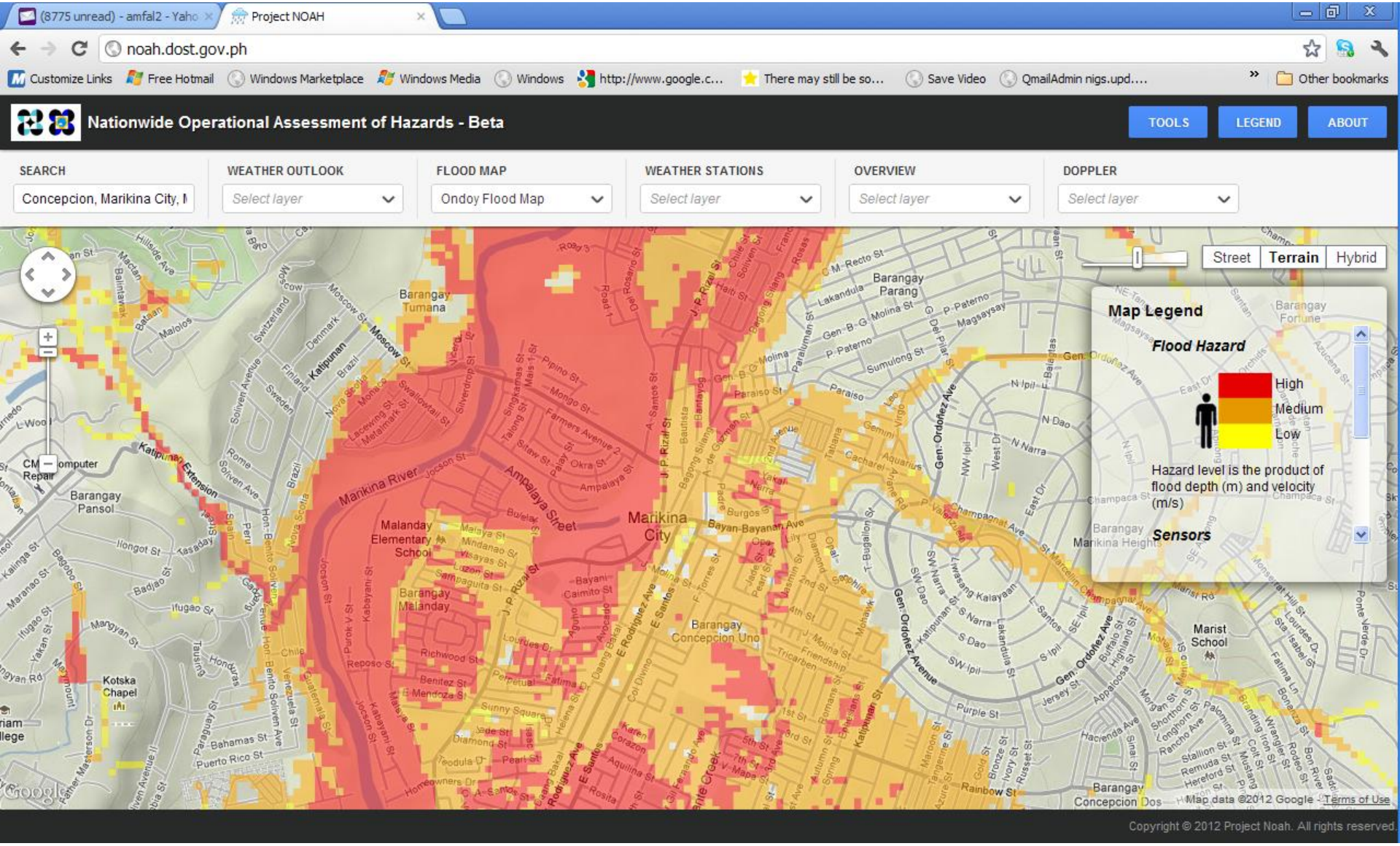




Mapping of significant flooding in the Philippines from 2006-2011



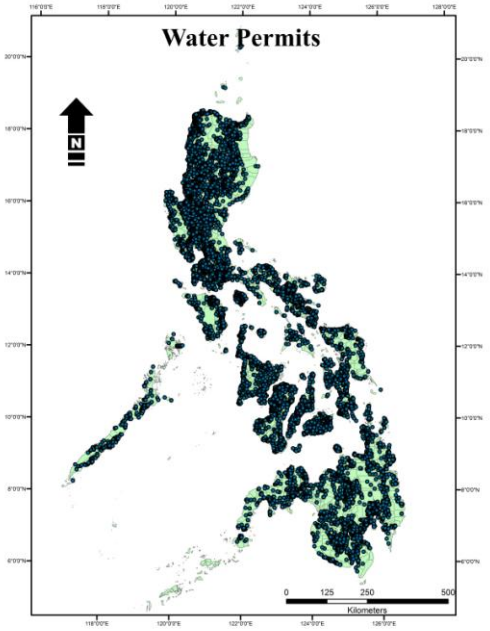
OCD + BRS +UP NIGS

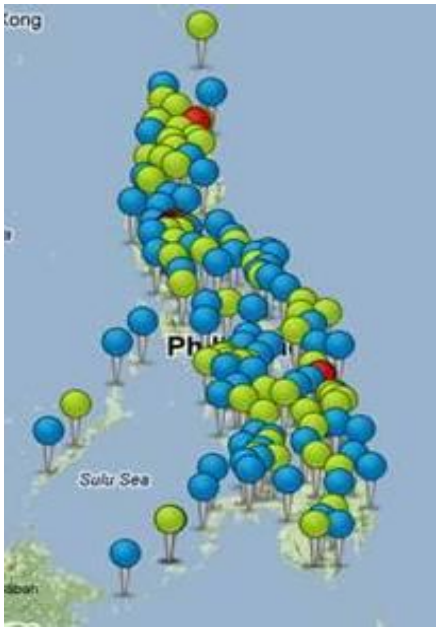


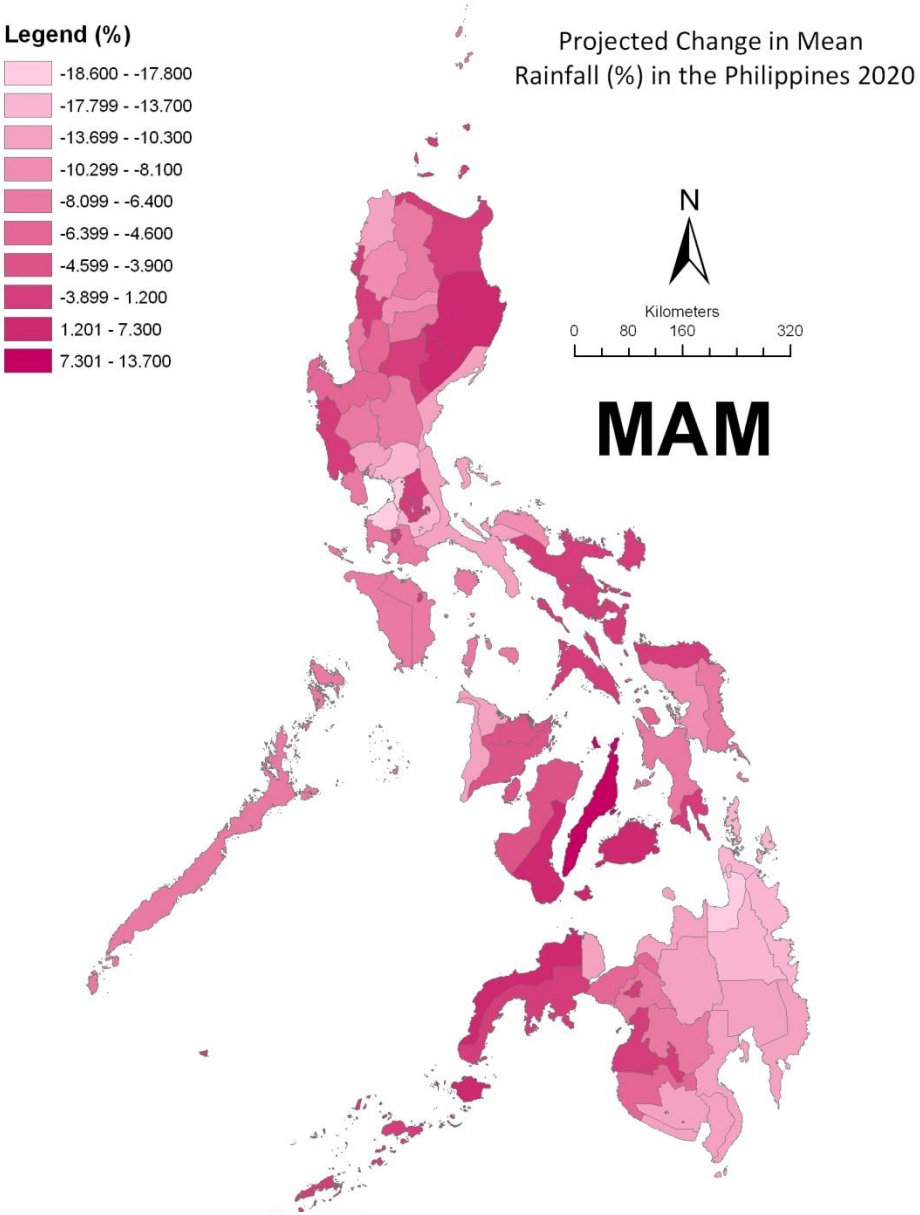
DOST's Project NOAH

Priority Research Areas for Water Scarcity

- Revisiting the Philippine Climate Types classification
- Annual rainfall accounting
- Surface and groundwater resource assessment
- El Nino/Climate Change effective adaptation measures







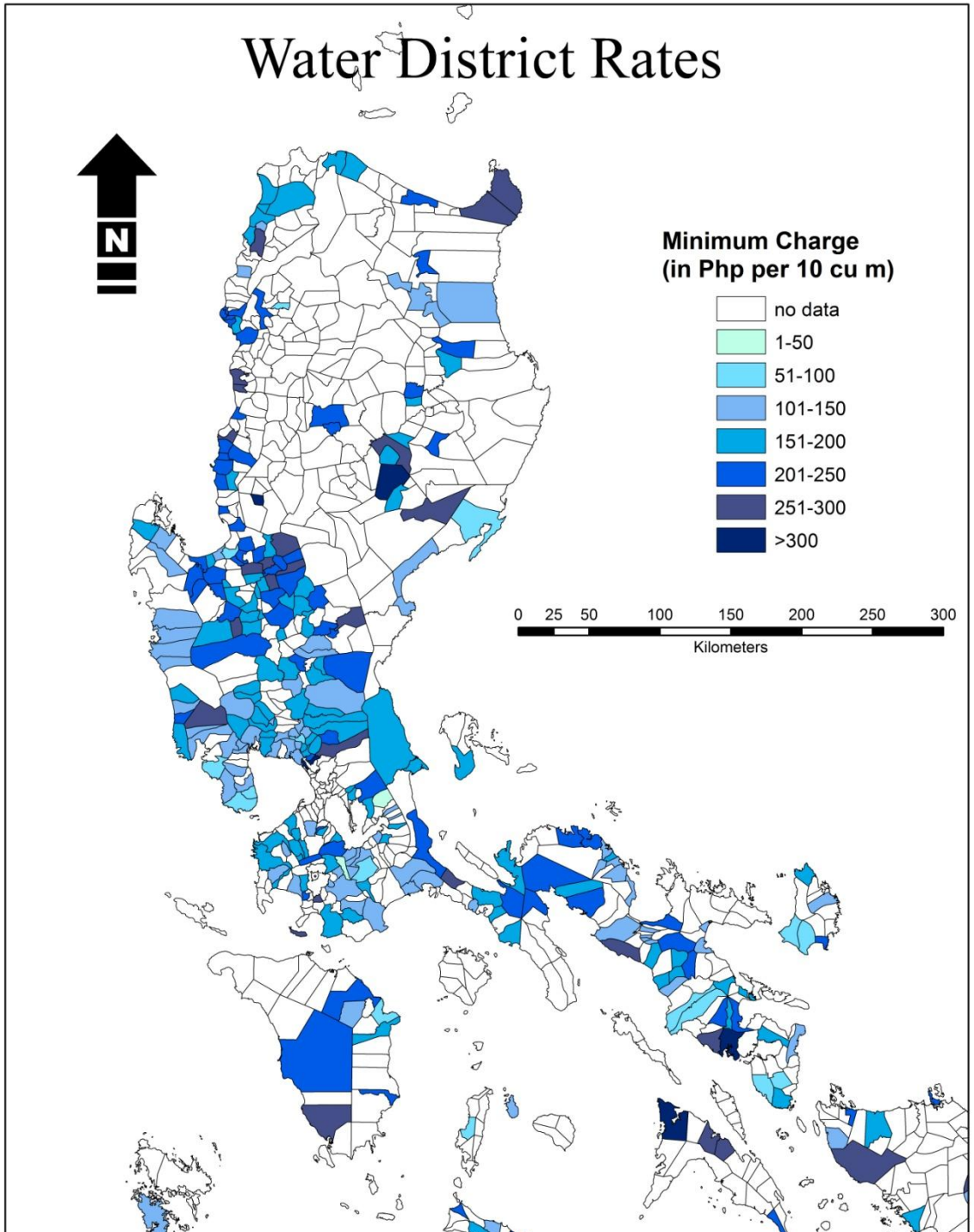
Projected Change in Mean Rainfall (%) in the Philippines 2020

TOP 10 PROVINCES WITH MOST DECREASE IN RAINFALL

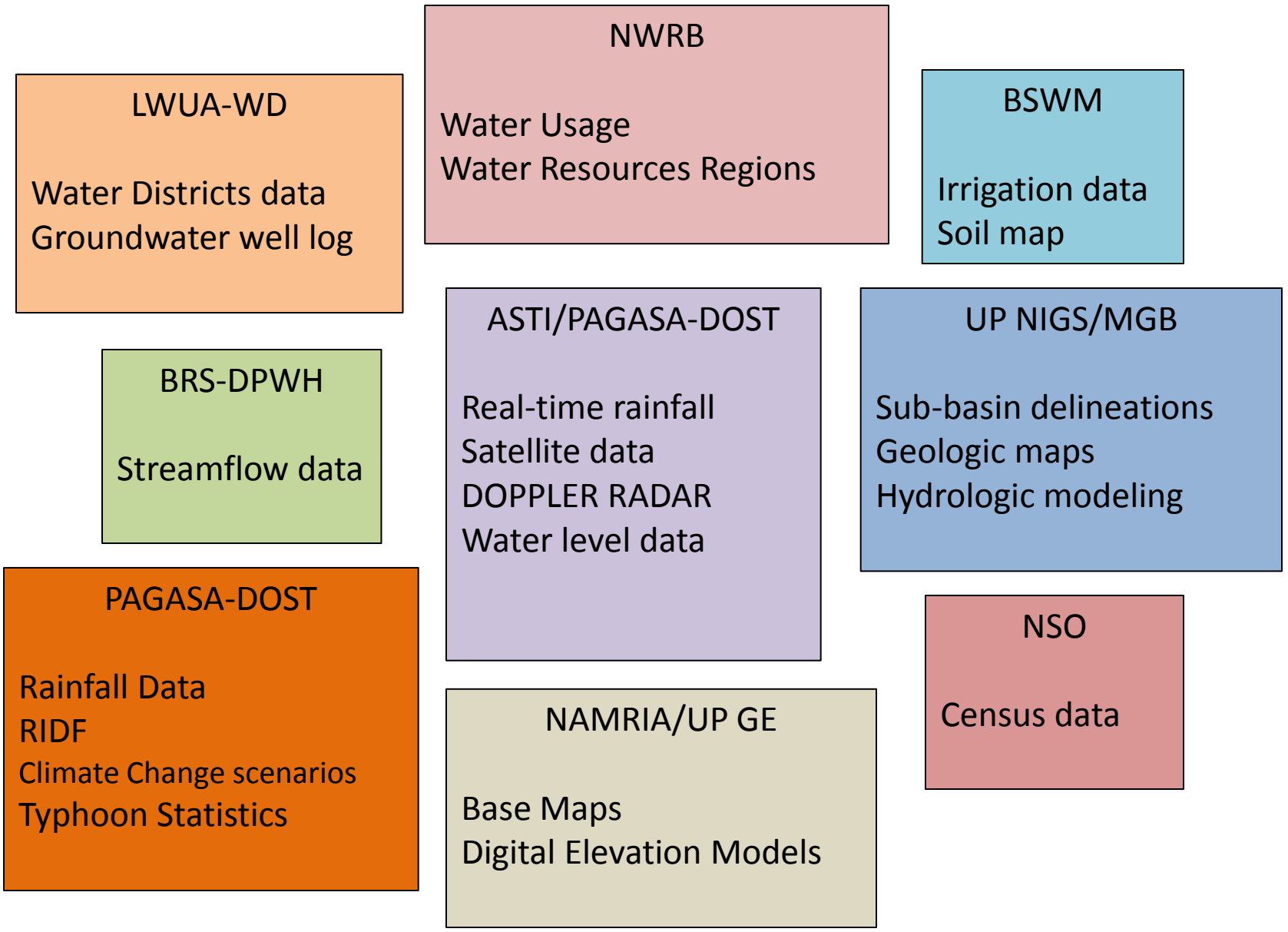
PROVINCE	% Change
Cavite	-18.6
Agusan del Norte	-18
Metro Manila	-17.8
Bulacan	-16.4
Rizal	-15.4
Surigao del Norte	-14.8
Laguna	-14.3
Agusan del Sur	-14.3
Surigao del Sur	-13.7
Bukidnon	-12.5

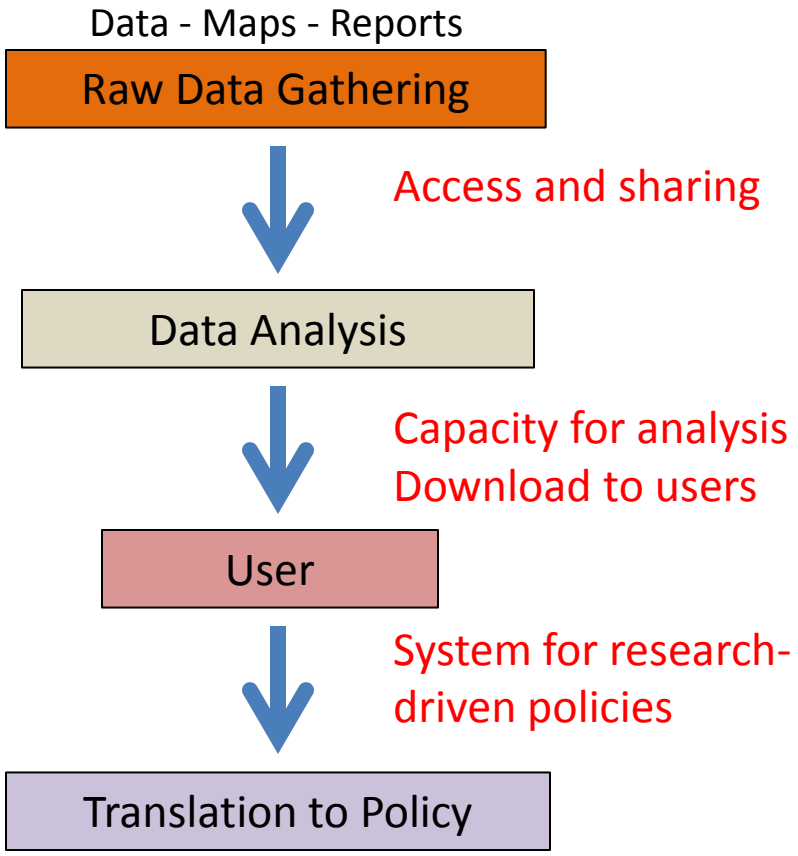
PAGASA

Price of water per municipality



NSO+ LWUA


NWRB
Water Usage
Water Resources Regions
LWUA-WD
Water Districts data
Groundwater well log
BSWM
Irrigation data
Soil map
ASTI/PAGASA-DOST
Real-time rainfall
Satellite data
DOPPLER RADAR
Water level data
UP NIGS/MGB
Sub-basin delineations
Geologic maps
Hydrologic modeling
BRS-DPWH
Streamflow data
PAGASA-DOST
Rainfall Data
RIDF
Climate Change scenarios
Typhoon Statistics
NSO
Census data
NAMRIA/UP GE
Base Maps
Digital Elevation Models



A SCHEME FOR DATA SHARING

- A central clearinghouse for government data
- Ease of upload/download of data
- Pay-per-use policy
- Rules for data use

Ex. NAMRIA's GEOportal, JICA-funded NWIN, ASTI-eSCIENCE GRID

end

Research Institutions – NGAs Collaboration

1. Data Sharing
2. Research needs of NGAs
3. Priority Sites/Fields
4. Research Budget from NGAs
5. Sharing of expertise/Database of experts
6. Downloading of research output to NGAs