AWCI SESSION, 12TH AOGEO SYMPOSIUM, 3/11/2019, CANBERRA, AUSTRALIA

[NATIONAL REPORT]

PLATFORM ON WATER RESILIENCE AND DISASTERS IN THE PHILIPPINES

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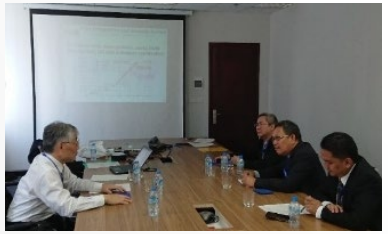
NATIONAL REPORT ON THE PLATFORM ACTIVITY

Progress of Platform Activity

- **1st Plenary Meeting** — Concept sharing
  13/3/2017, Metro Manila — Platform formulation
- **2nd Plenary Meeting** — Data sharing guideline
  15/6/2017, Metro Manila — Data list creation
- **Representative Meeting** — Data list confirmation
  18/9/2017, Hanoi
- **Individual Meeting** — Secretariat assignment
  7-9/2/2018, Metro Manila — Data collection
- **Individual Meeting** — Secretariat assignment
  12-13/3/2018, Metro Manila — HLPW outcome document
- **Stakeholders Meeting** — Data upload
  18/5/2018, Davao
- **11th GEOSS Symposium** — Regional coordination
  24-26/10/2018, Kyoto
- **3rd Plenary Meeting** — Activity update implementation
  7/2/2019, Metro Manila



Concept of Platform

Proposed Platform on Water Resilience and Disasters
as part of the National Platform for Disaster Risk Reduction
(draft)

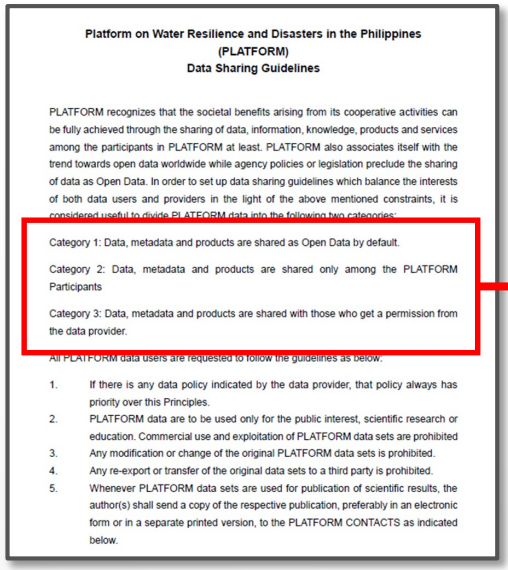
Vision
Platform envisions a future wherein decisions and actions for reducing water-related disaster risk are well supported by coordinated, comprehensive and sustained risk communication.

Mission
To realize its Vision, Platform works to connect the demand for sound and timely decisions and actions taken by policy-makers and local communities with the supply of disaster risk information that is generated from integrated risk assessment and risk change identification based on well archived data and statistics. In doing so, Platform strengthens data integration and analysis functions by facilitating data and information accessibility and application to decisions and actions within and across many different stakeholders.

Scope
Decisions and actions for reducing risk on water-related disasters, including floods, landslides and droughts, rely, and will continue to rely, on the ability of expert communities to collect and archive data from various sources and combine these with social and economic analyses. Platform strengthens experts' capability of data collection and archiving, integrated assessment and risk change identification and stakeholders' capacity for making maximum use of these data and information provided from the experts. Platform contributes to institutional and infrastructural design and investment including land use management and climate change adaptation (static approach) and to effective response and recovery (dynamic approach).

Implementation Strategy and Schedule
Platform follows the IFI spiral-up implementation strategy and works in tandem with International Decade for Action, "Water for Sustainable Development", 2018-2028. In its demonstration phase, Platform focuses on two river basins, the Pampanga and the Davao; develops data integration and analysis functions by which the stakeholders work together with science communities at local and national levels; creates actionable information supporting in policy-making and community of practice; reflects integrated data and information to institutional and infrastructure designs and community actions;

Data Sharing Guideline



Platform on Water Resilience and Disasters in the Philippines
(PLATFORM)
Data Sharing Guidelines

PLATFORM recognizes that the societal benefits arising from its cooperative activities can be fully achieved through the sharing of data, information, knowledge, products and services among the participants in PLATFORM at least. PLATFORM also associates itself with the trend towards open data worldwide while agency policies or legislation preclude the sharing of data as Open Data. In order to set up data sharing guidelines which balance the interests of both data users and providers in the light of the above mentioned constraints, it is considered useful to divide PLATFORM data into the following two categories:

Category 1: Data, metadata and products are shared as Open Data by default.

Category 2: Data, metadata and products are shared only among the PLATFORM Participants

Category 3: Data, metadata and products are shared with those who get a permission from the data provider.

All PLATFORM data users are requested to follow the guidelines as below:

1. If there is any data policy indicated by the data provider, that policy always has priority over this Principles.
2. PLATFORM data are to be used only for the public interest, scientific research or education. Commercial use and exploitation of PLATFORM data sets are prohibited
3. Any modification or change of the original PLATFORM data sets is prohibited.
4. Any re-export or transfer of the original data sets to a third party is prohibited.
5. Whenever PLATFORM data sets are used for publication of scientific results, the author(s) shall send a copy of the respective publication, preferably in an electronic form or in a separate printed version, to the PLATFORM CONTACTS as indicated below.

Category 1:
Fully open

Category 2:
Among Platform

Category 3:
With permission

AO GEO
Earth Observations for Asia-Oceania

GEO GLOWS

Asian Water Cycle Initiative

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The 3rd Plenary Meeting of Platform

7th, Thursday, February, 2019
Luxent Hotel, Quezon City, Metro Manila

78 participants from 28 offices

Agency	Office/Division
DPWH	UPMO-FCMC
	Regional Office III
	Regional Office XI
DOST	PAGASA
	PHIVOLCS
	PCIEERD
	Regional Office II
	Regional Office III
	Regional Office XI
DENR	NAMRIA
	Regional Office XI
DILG	WSSPMO-OPDS
DND	OCD
	Regional Office XI
DSWD	
LGA	
MGB	
NEDA	Regional Office III
	Regional Office XI
NWRB	
PSA	
NIA	
UP Los Banos	
UP Diliman	
UP Mindanao	
Univ. of Tokyo	EDITORIA
ICHARM	
Typhoon Committee	

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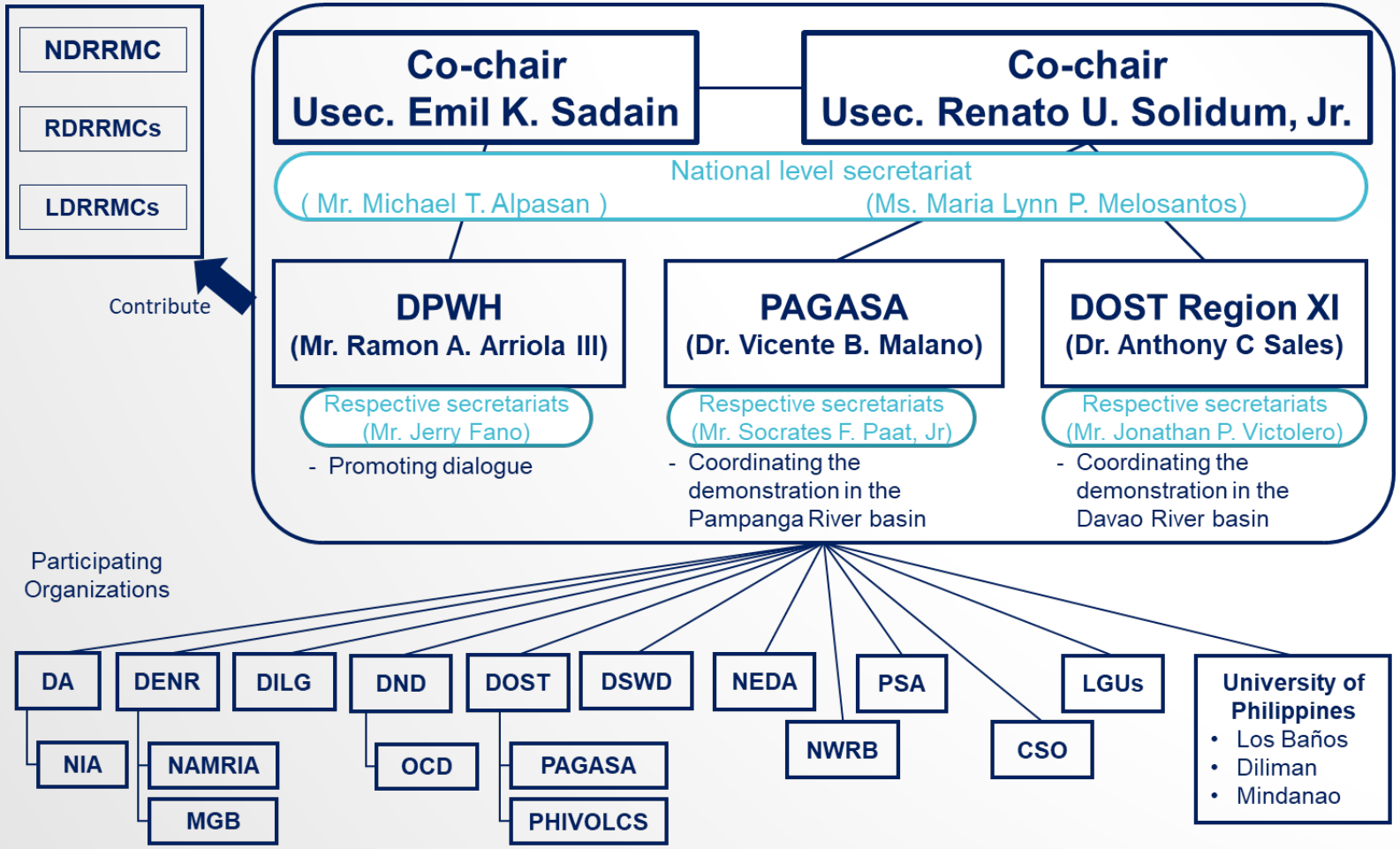
Institutional Structure



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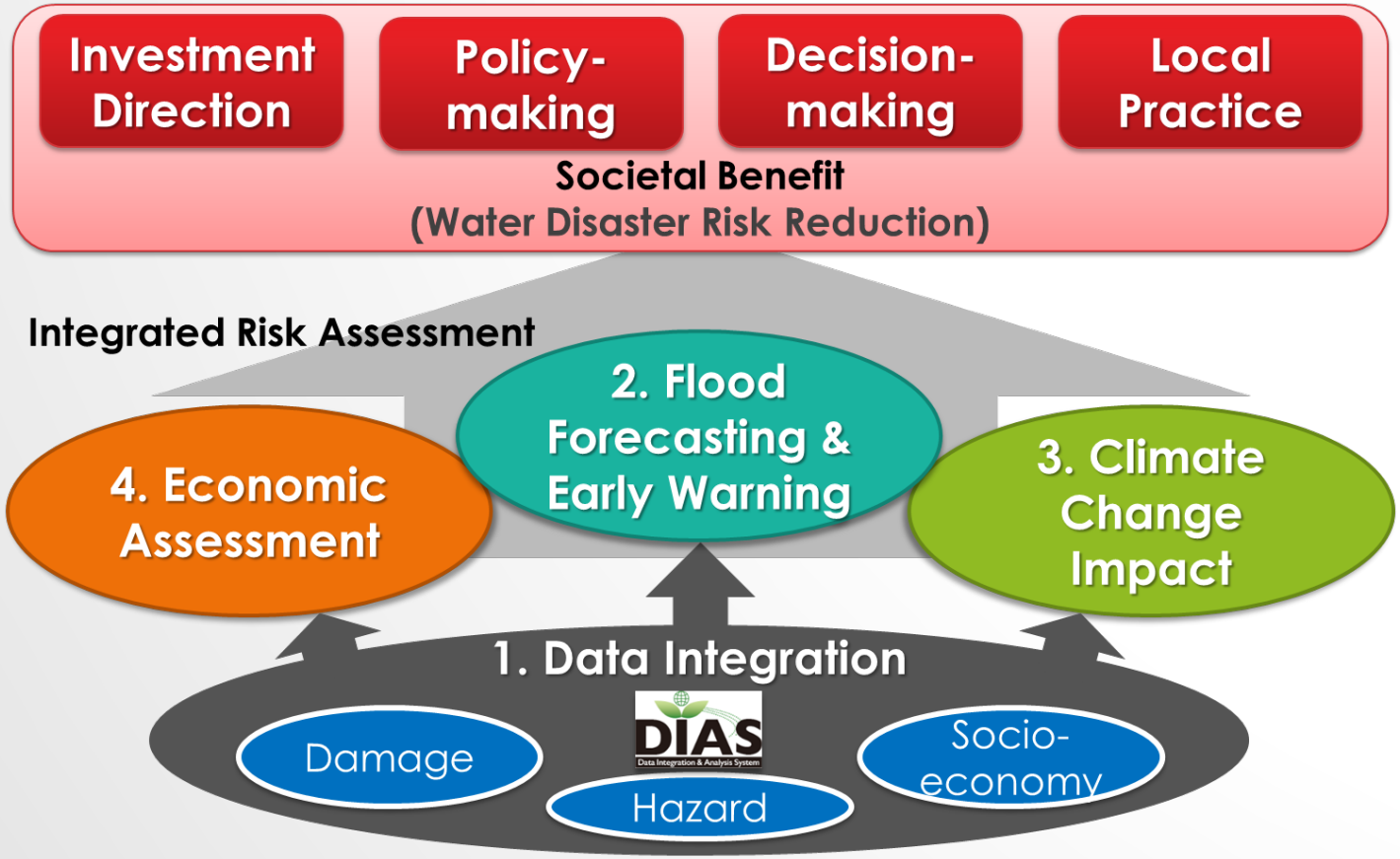
Activity Plan



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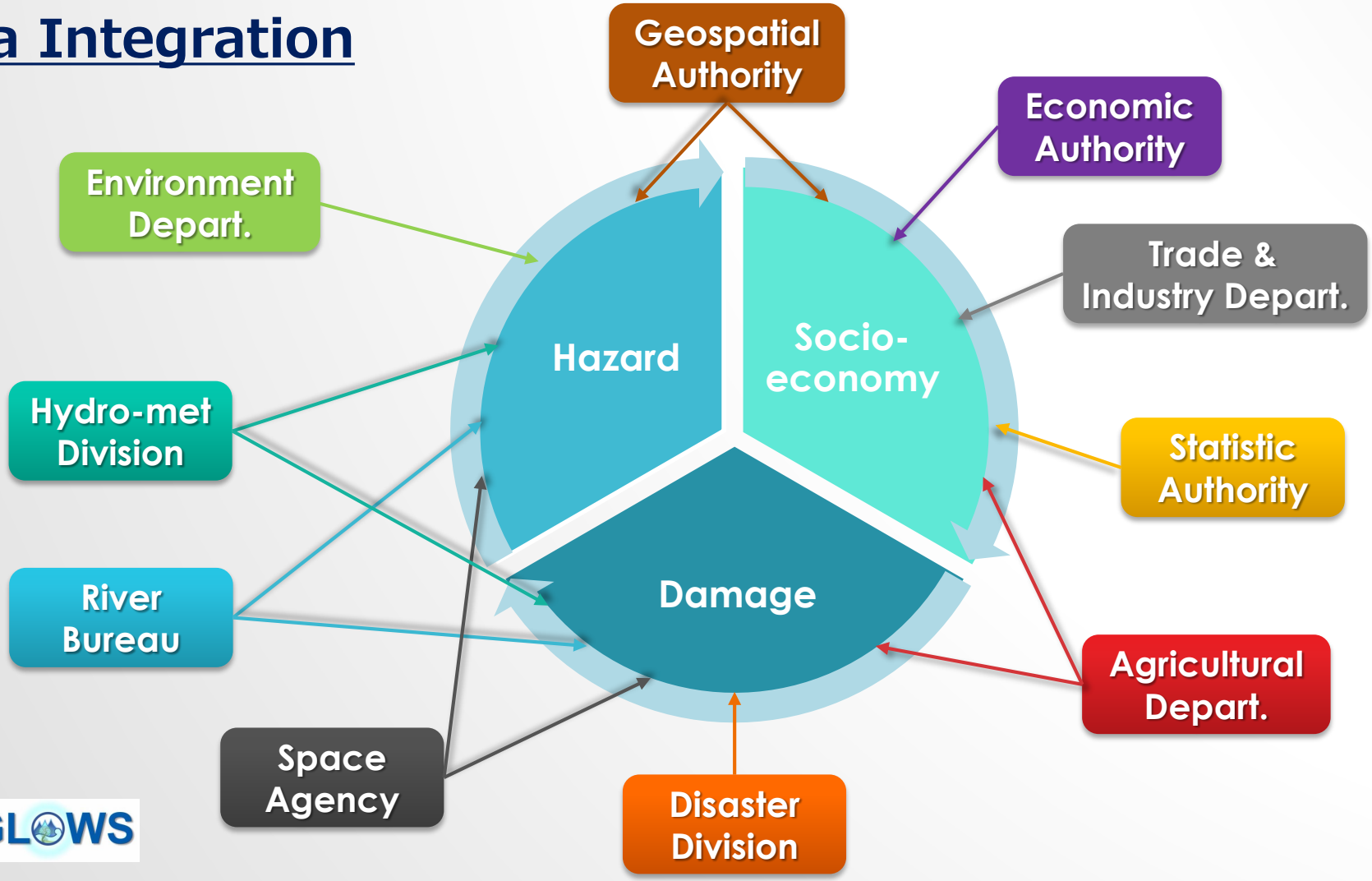
1. Data Integration



Overall

- Sci. & Tech. Depart.
- LGU

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1. Data Integration

Damage

Data	Source of information
Casualties & missing person	OCD
Num. of affected people	OCD
Agricultural damage	DA
Housing damage	OCD
Damage to critical infrastructure	DPWH, LGU
Direct economic loss other than agricultural loss	LGU NEDA

Hazard

Data	Source of information
DEM (LiDAR)	UP Mindanao
DEM (ifSAR)	NAMRIA
Hydromet data	PAGASA, ASTI, DREAM
Inundation depth (LiDAR)	UP Diliman, UP Mindanao
Inundation depth (interview)	PAGASA
Rainfall	PAGASA
River flow	DPWH, UP Mindanao
River cross section	DPWH, UP Mindanao
Tidal level	NAMRIA

Socioeconomic

Data	Source of information
Land use	LGU, DOST
Agriculture	PSA, DA
Population	PSA
Infrastructure	DPWH/LGU
Industry	DTI
Commerce	DTI
Drainage facility	DPWH/LGU
Information	PSA, NEDA
Sectoral Regional GDP	PSA
Sectoral employed population	PSA
Tax revenue	BIR
Land price	City Assessors Office

Collected

Metadata Template

Category	Data	Source of information	Data Type	Specification
Hazard	DEM (LiDAR)	UP Mindanao	Grid	Year: Area: **Davao River basin** Spatial Resolution: **10m** Elements:
	DEM (ifSAR)	NAMRIA	Grid	Year: Area: **Davao River basin** Spatial Resolution: **5m** Elements:
	Rainfall	PAGASA	Time series (Point) ☑ Digital ☐ Paper	Name(s) or Total number: **10** Period: **1980-2016** Temporal Resolution: **Daily** Elements: **Meteorological observation**
	Meteorological data	PAGASA	Time series (Point) ☑ Digital ☐ Paper	Name(s) or Total number: **10** Period: **1980-2016** Temporal Resolution: **Daily** Elements: **Meteorological observation**
	Water level	PAGASA DPWH UP Mindanao	Time series (Point) ☐ Digital ☐ Paper	Name(s) or Total number: Period: Temporal Resolution: Elements:
	River flow	PAGASA DPWH UP Mindanao	Time series (Point) ☑ Digital ☐ Paper	Name(s) or Total number: **1 (Davao, Lacson, Calinan)** Period: **2/2001 - 12/2017** Temporal Resolution: **occasional** Elements: **Field discharge measurement**
	River cross section	DPWH UP Mindanao	Geometry (Point) ☐ Digital ☑ Paper	Name(s) or Total number: **270** Period: **2003** Temporal Resolution: - Elements: **Field measurement**
	Tidal level	NAMRIA	Time series (Point) ☐ Digital ☐ Paper	Name(s) or Total number: Period: Temporal Resolution: Elements:
	Inundation depth (LiDAR)	UP Diliman	Map	Year: **2016** Area: **Davao City** Spatial Resolution: **1/500000** Elements: **Flood hazard map (100 year return period, 1.5m depth)**
	Inundation depth (interview)	PAGASA	Map/Point ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Dam operation	NIA	Time series (Point) ☐ Digital ☐ Paper	Name(s) or Total number: Period: Temporal Resolution: Elements:
Damage	Casualties & missing person	OCD	Statistics ☐ Digital ☐ Paper	Period: **2012, 2013, 2014, 2015, 2016, 2017 (event-base)** Area: **Region XI** Scale: ☐ Nation ☐ Region ☐ Province ☐ City ☐ Municipality ☐ Barangay Elements: **Dead, Injured, Missing**
	Affected people	OCD	Statistics ☑ Digital ☐ Paper	Period: **2012, 2013, 2014, 2015, 2016, 2017 (event-base)** Area: **Region XI** Scale: ☑ Nation ☑ Region ☑ Province ☑ City ☑ Municipality ☑ Barangay Elements: **Families, Persons**
	Agricultural damage	DA	Statistics ☑ Digital ☐ Paper	Period: **2010, 2011, 2012, 2014, 2015, 2016** Area: **Region XI** Scale: ☑ Nation ☑ Region ☑ Province ☑ City ☐ Municipality ☐ Barangay Elements: **Affected area, Production loss**
	Housing damage	OCD	Statistics ☑ Digital ☐ Paper	Period: **2012, 2013, 2014, 2015, 2016, 2017 (event-base)** Area: **Region XI** Scale: ☑ Nation ☑ Region ☑ Province ☑ City ☑ Municipality ☑ Barangay Elements: **Number of damage houses**
	Critical infrastructure damage	DPWH LGU	Statistics ☑ Digital ☐ Paper	Period: **2012, 2013, 2014, 2015, 2016, 2017 (event-base)** Area: **Region XI** Scale: ☑ Nation ☑ Region ☑ Province ☑ City ☑ Municipality ☑ Barangay Elements: **Estimated cost of infrastructure**
	Economic damage	LGU NEDA	Statistics ☑ Digital ☐ Paper	Period: **2012, 2013, 2014, 2015, 2016, 2017 (event-base)** Area: **Region XI** Scale: ☑ Nation ☑ Region ☑ Province ☑ City ☑ Municipality ☑ Barangay Elements: **Estimated cost of infrastructure and agriculture**
Socio-economy	Population	PSA	Grid/Statistics ☑ Digital ☐ Paper	Year: **1960, 1970, 1975, 1980, 1990, 1995, 2000, 2007, 2010, 2015** Area: **Region XI** Spatial Resolution: **Regional** Elements: **Population Census**
	Land use	LGU DOST NEDA DENR	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Agriculture	PSA DA DENR	Map/Statistics ☑ Digital ☐ Paper	Year: **2015, 2016, 2017** Area: **Nation** Spatial Resolution: **National** Elements: **Value of Production, Farm gate Price, Volume of Production**
	Infrastructure	DPWH LGU	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Industry	DTI	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Commerce	DTI	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Drainage facility	DPWH LGU	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Information	DPWH LGU	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:
	Sectoral regional GDP	PSA	Map/Statistics ☑ Digital ☐ Paper	Year: **2015, 2016, 2017** Area: **Region XI** Spatial Resolution: **Regional** Elements: **Sectoral region GDP at current prices & at constant 2000 prices**
	Sectoral employed population	PSA	Map/Statistics ☑ Digital ☐ Paper	Year: **2017, 2018** Area: **Nation** Spatial Resolution: **National** Elements:
	Tax revenue	DPWH LGU	Map/Statistics ☑ Digital ☐ Paper	Year: **2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018** Area: **Region XI** Spatial Resolution: **Regional** Elements: **Income tax, Gross income**
	Land price	PSA NEDA	Map/Statistics ☐ Digital ☐ Paper	Year: Area: Spatial Resolution: Elements:

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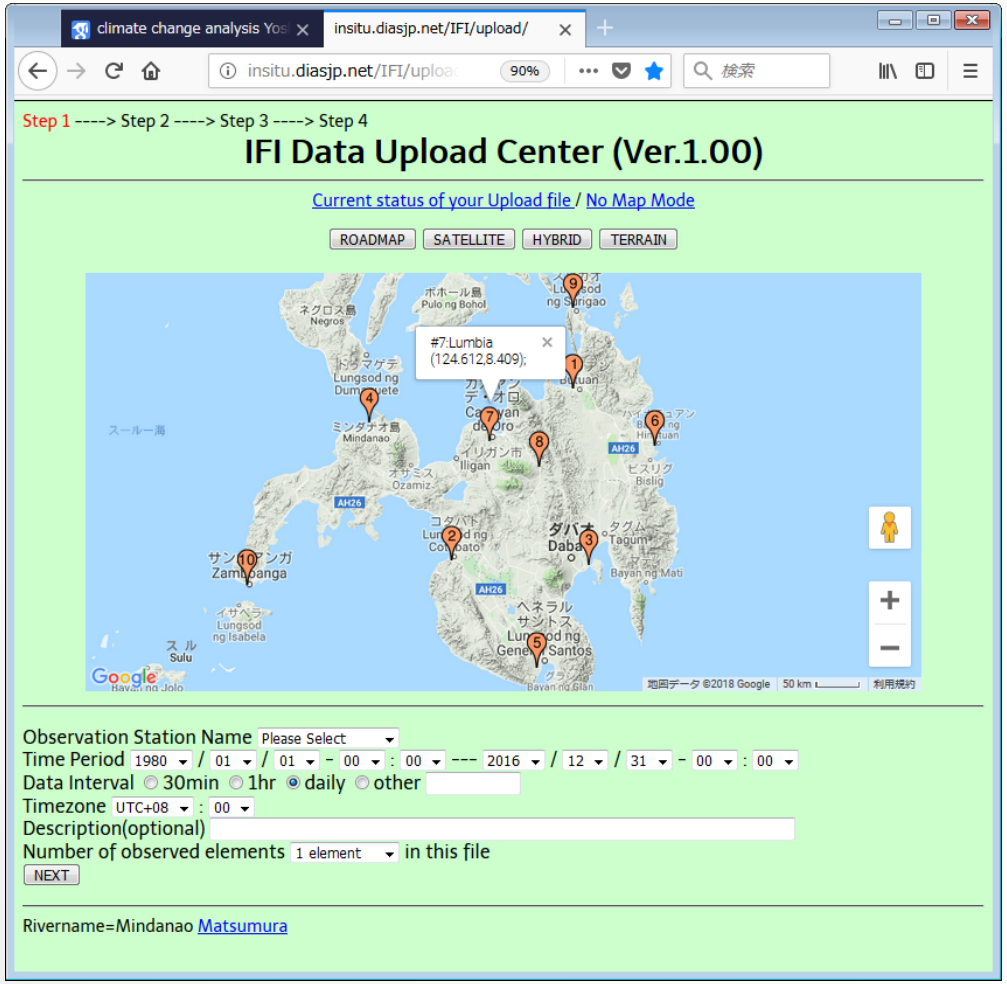
1. Web-based Data Uploading System

Input Item;

- Data Domain, Area, District :
- Category:
- Data Source
- Data Type
- Period
- Resolution



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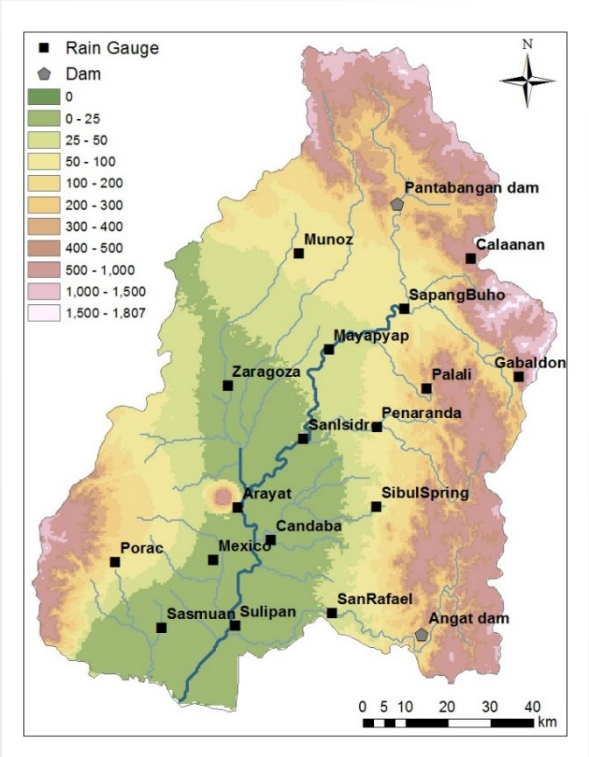
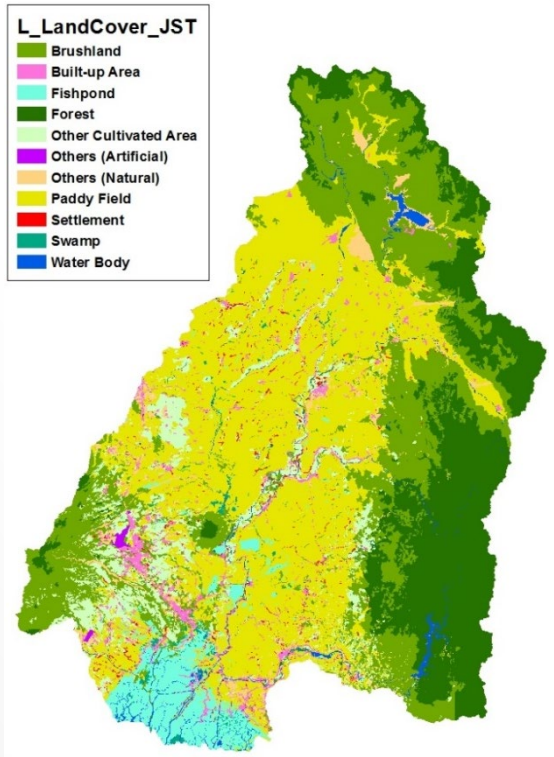
2. Flood Forecasting & Early Warning

Pampanga River basin

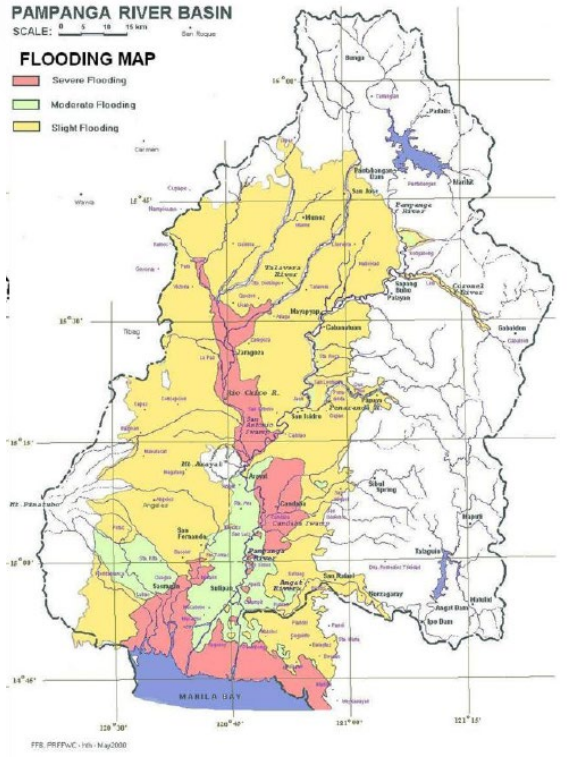
- Catchment Area: 10,434km^2
- River Length: 260km
- Annual Rainfall: 2,155mm
- Rain Gauge: 17 stations
- Water Level: 11 stations



Observation



Land use



Flood vulnerability

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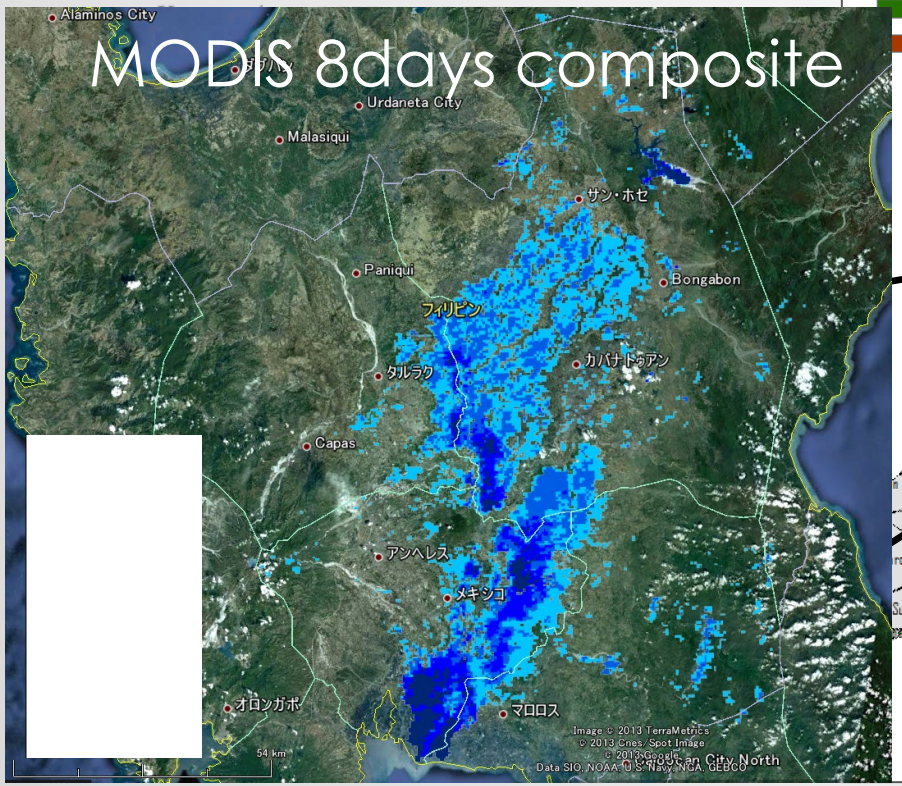
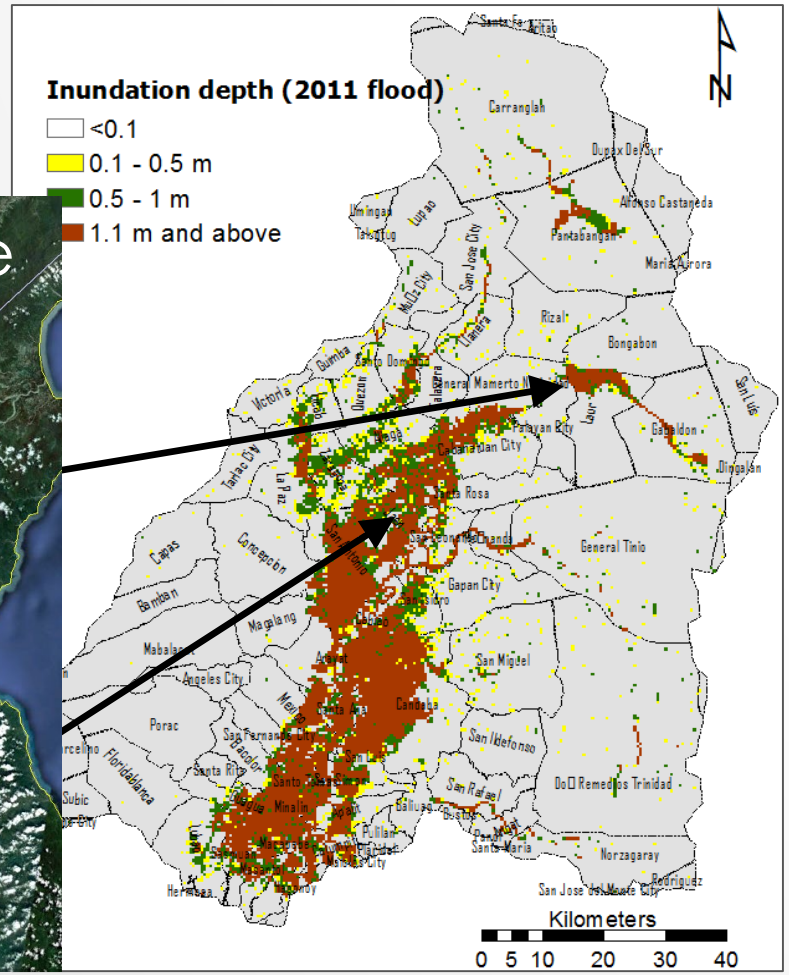
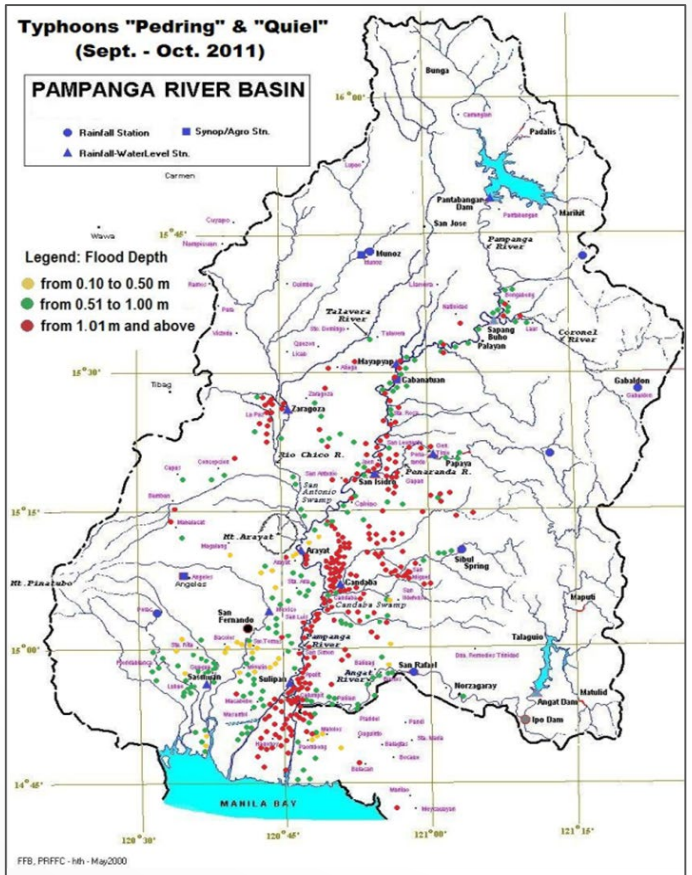
2. Flood Forecasting & Early Warning (Model Calibration)

	Unit	forest	crop	water
n_{river}	$m^{-1/3}s$	0.035	0.035	0.035
N	$m^{-1/3}s$	0.35	0.3	0.2
d	m	1.0	1.0	1.0







Estimated flood level (maximum) map during the event as per available reports from DRRMOs.
(source PRFFWC Post Flood Report 2011-2)

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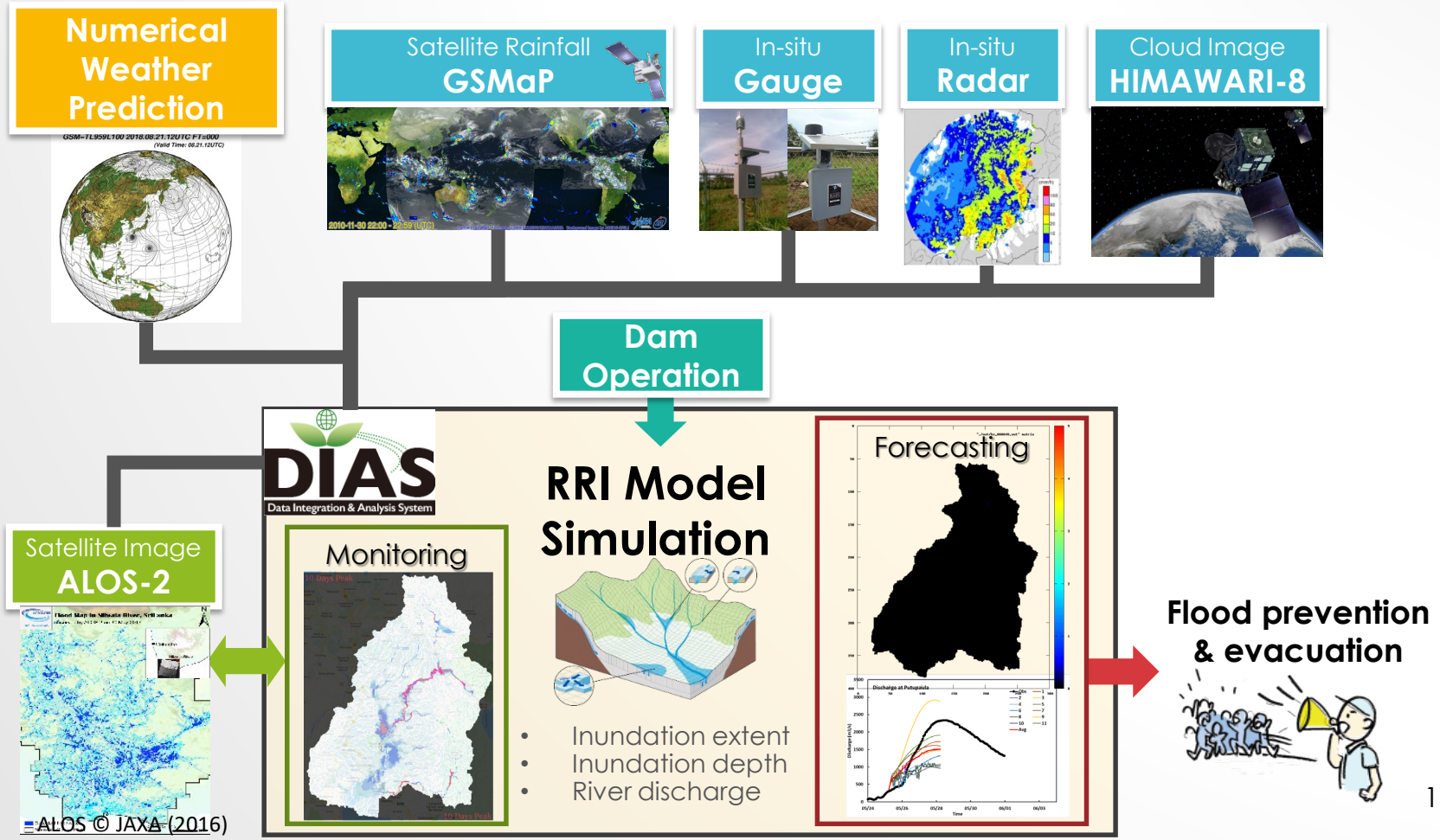
2. Flood Forecasting & Early Warning (Full Design)



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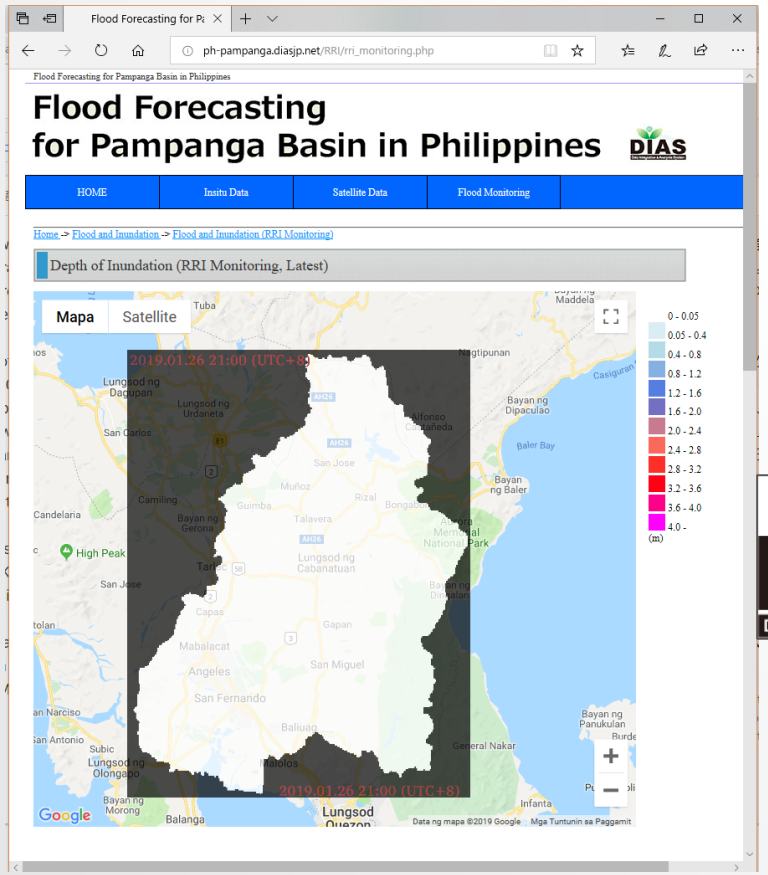
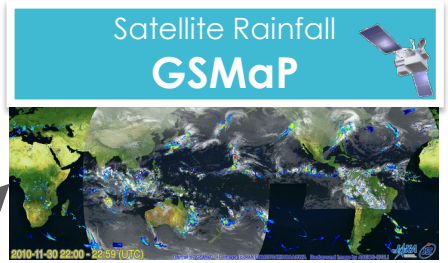
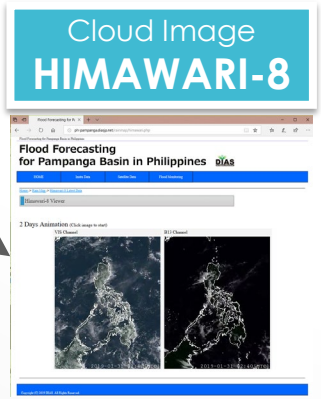
2. Flood Forecasting & Early Warning (Preliminary)



Realtime Access





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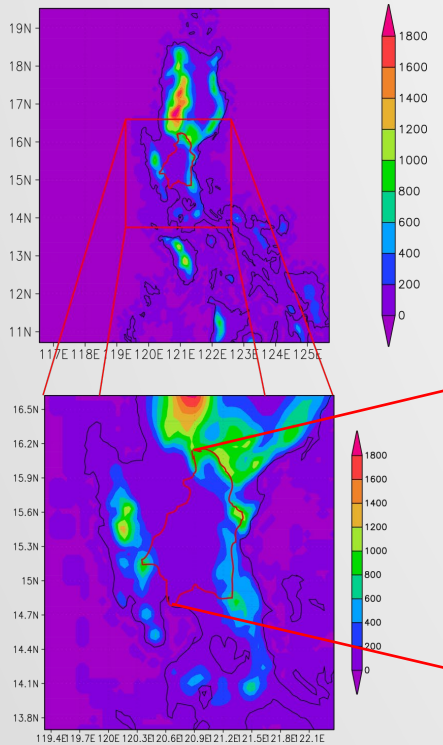
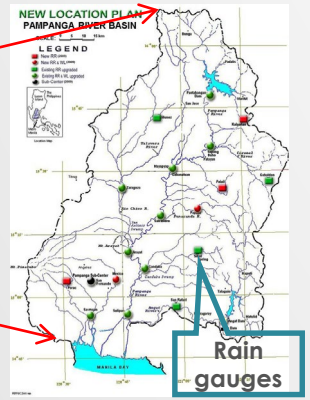
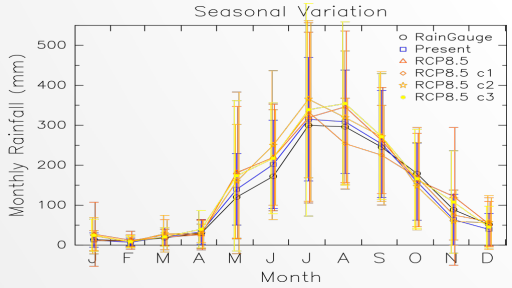
3. Climate Change Impact (Pampanga River Basin)



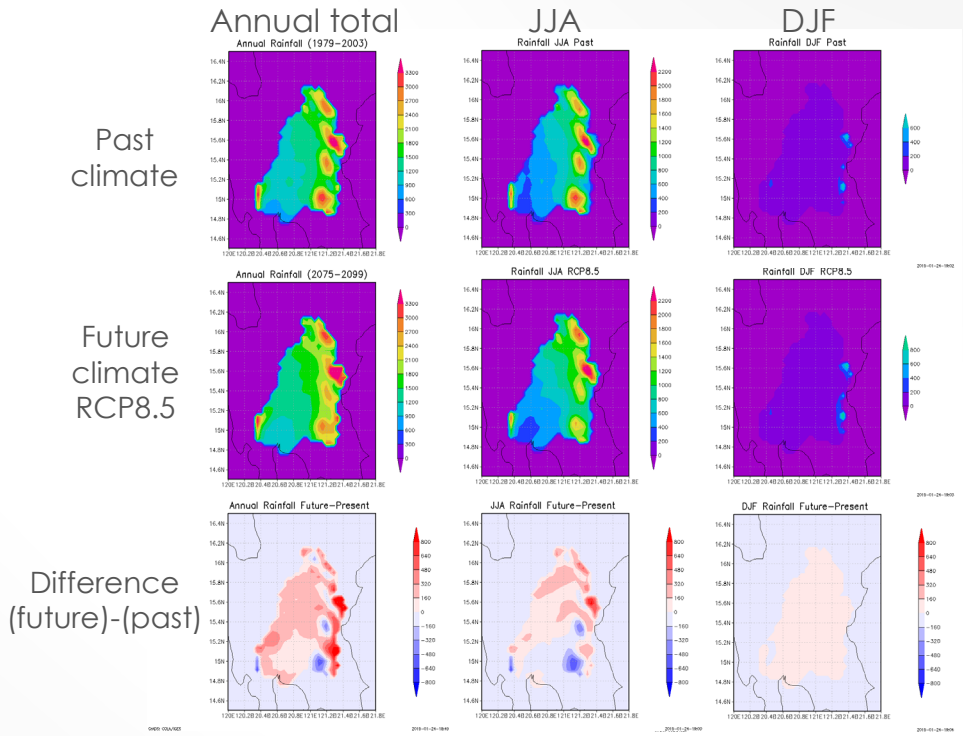
Weather Research and Forecasting (WRF) ver.3.4.1
Horizontal resolution: 15km/ 5km
Coordinate: 67×67×40 (outer), 67×67×40 (inner)
Cumulus parameterization: Grell 3D
Microphysics: WSM3class
PBL scheme: MYNN2.5
Surface: Thermal diffusion



Pampanga River Basin



Seasonal Variation of Rainfall
(a little increase, but not much)



Rainfall distribution in past and future climate

46% increase of 1/50 extreme rainfall
⇒One flood event causes more damage

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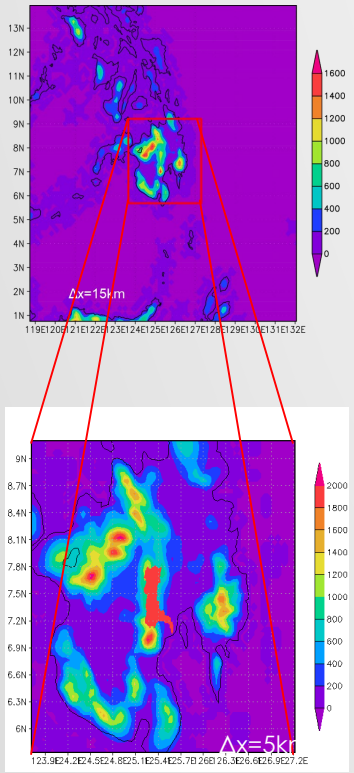
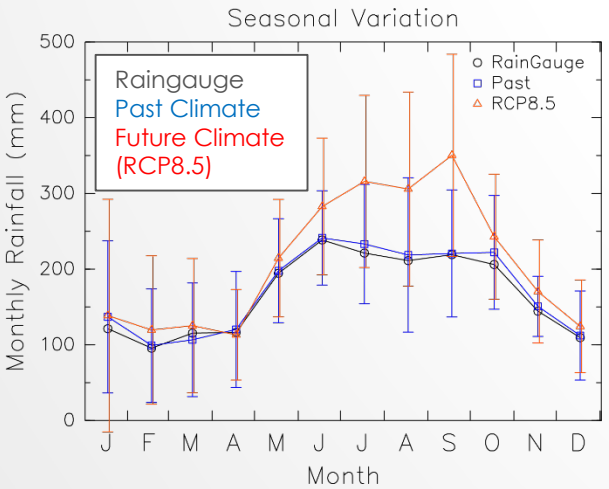
3. Climate Change Impact (Davao River Basin)

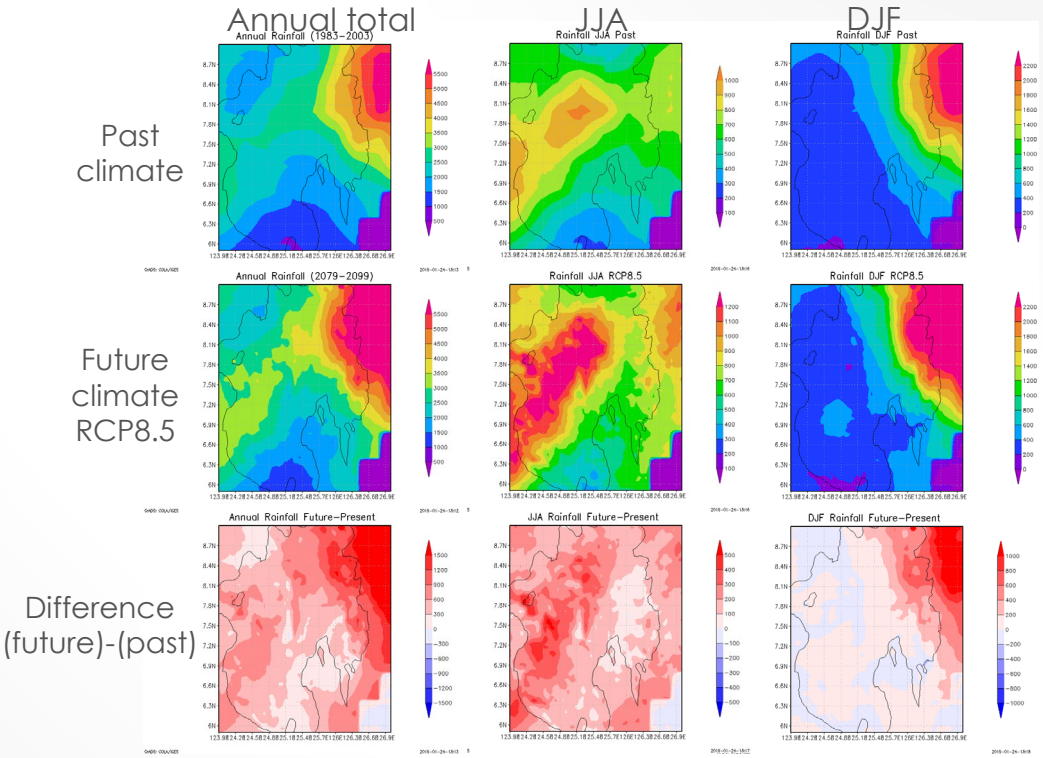


WRF model setting
Outer frame: 15km, 100x100
Inner frame: 5km, 79x79
Vertical layer: 40
Cumulus: Grell 3D

Davao River
Area: 1623 km^2
Length: 160 km



Seasonal Variation of Rainfall
(increase during July to September)



Rainfall distribution in past and future climate

33% increase of 1/50 extreme rainfall & July-September rainfall increase 45%
⇒Average discharge increases + one flood event causes more damage

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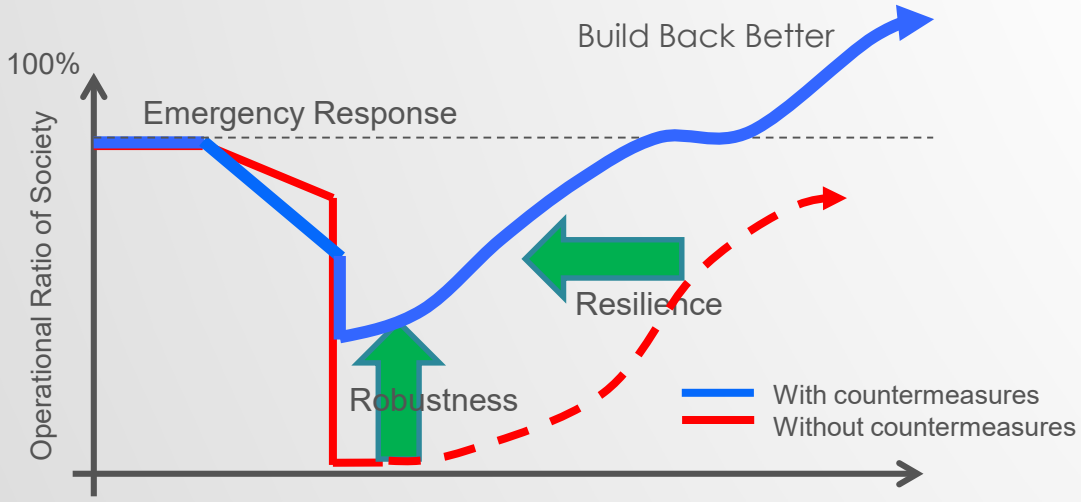
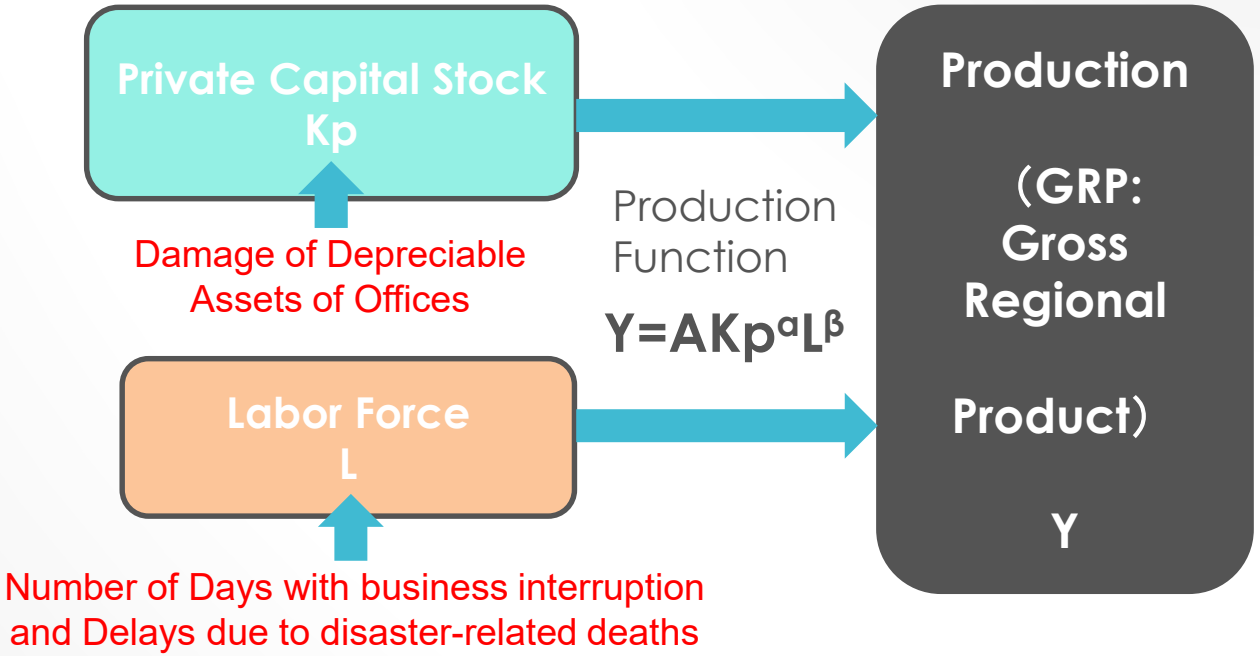
4. Economic Assessment





$$\Delta Y = Y_{after} - Y_{before} = (AK_{after}^{\alpha} L_{after}^{\beta}) - (AK_{before}^{\alpha} L_{before}^{\beta})$$

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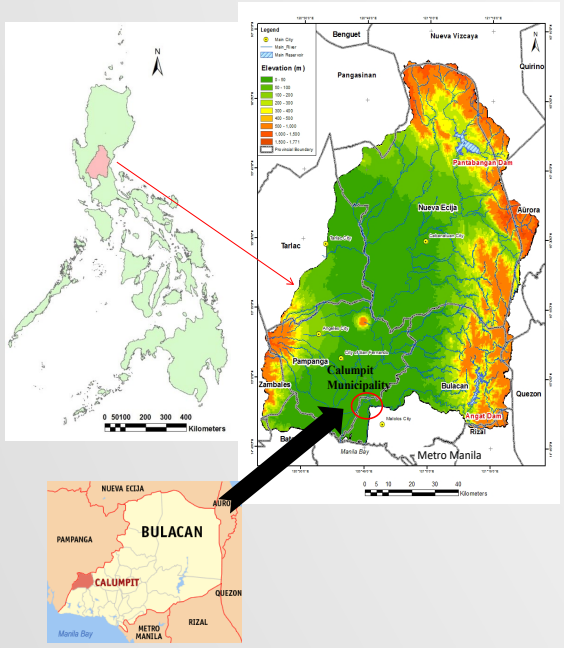
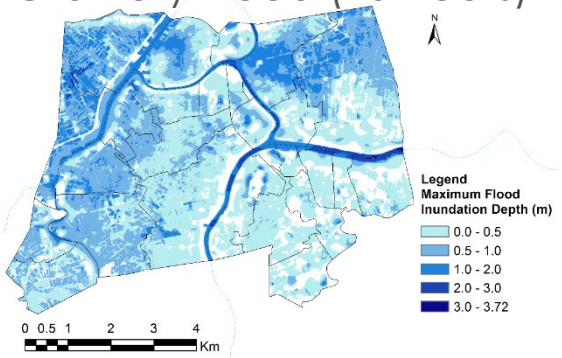
5. Contingency Planning



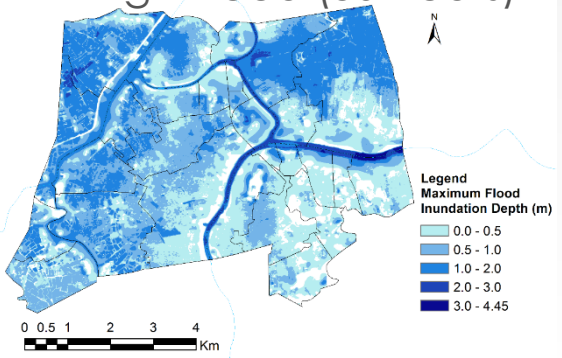
Pampanga River Basin:
Catchment Area: 10,434 km^2
River Length: 260 km
Average annual rainfall: 2155 mm/year

Calumpit Municipality:
Population: 112,007
Barangay(Local community unit): 29
Households: 22,402
Area: 5,625 ha

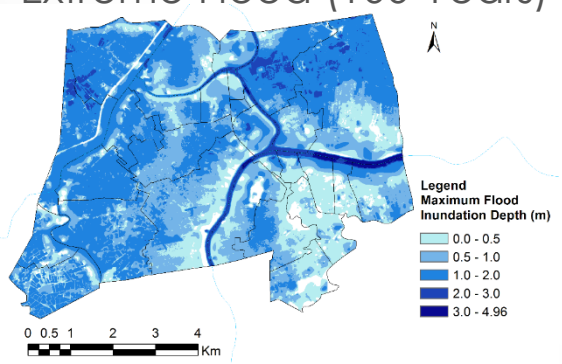
Ordinary Flood (10 Years)



High Flood (30 Years)



Extreme Flood (100 Years)



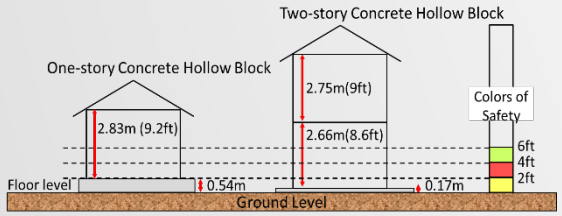
Interferometric Synthetic Aperture Radar (IfSAR) Data provided by NAMRIA, Philippines, was used in the calculation (grid size/ 5m).

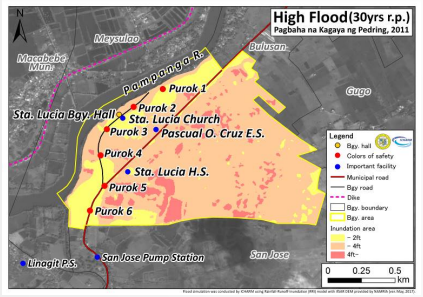
NATIONAL REPORT ON THE PLATFORM ACTIVITY

5. Contingency Planning

Google Earth Street View with inundation visualization (High Flood Case)

District-base analysis



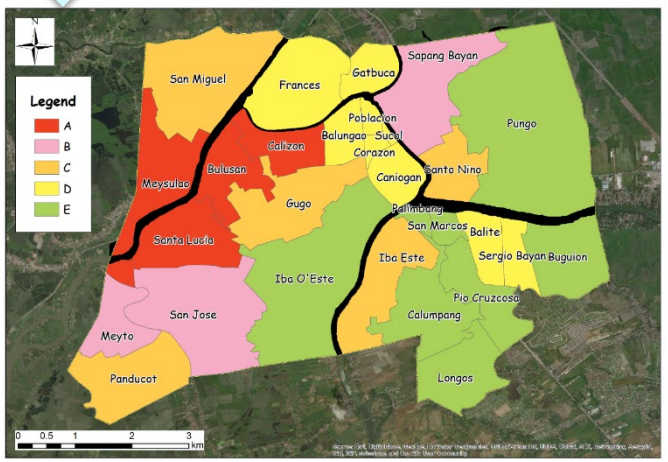


		100yrs	50yrs	30yrs	10yrs
① Lead time to start evacuation	1story	B	B	B	C
	2story	A	A	A	A
② Duration of evacuation	1story	A	B	B	C
	2story	A	A	B	B
③-1 Iundation depth at representative point		C	C	C	D
③-2 Inundation depth at Barangay Hall		D	D	D	E
④ Iundation deoth at evacuation centers		AA	AA	AA	AA
⑤ Distance to nearby evacuation centers		A	A	A	A
⑥ Interruption of transportation		B	C	C	C

Total Score

ID	Location	Sub-total 100yr		50yr		30yr		10yr		Total	
01	Sapang Bayan	A	32	A	31	B	29	C	24	B	116
02	Gatbuca	B	25	C	24	C	23	D	16	D	88
03	Frances	B	28	C	24	C	23	C	20	D	95
04	Meysulao	A	31	A	32	A	30	B	28	A	121
05	San Miguel	B	29	B	28	B	25	C	20	C	102
06	Sto. Nino	B	29	B	29	B	27	C	24	C	109
07	Calizon	A	34	A	31	B	29	B	28	A	122
08	Caniogan	B	27	C	23	C	20	D	17	D	87
09	Bulusan	A	33	A	33	A	31	A	30	A	127
10	Sta. Lucia	A	34	A	31	A	31	B	27	A	123
11	Meyto	A	31	B	29	B	28	B	27	B	115
12	Panducot	B	29	B	27	B	25	C	21	C	102
13	San Jose	A	32	B	28	B	28	B	26	B	114
14	Gugo	A	30	B	28	C	23	C	20	C	101
15	Pungo	C	20	D	18	D	18	E	12	E	68
16	Iba O'Este	D	17	E	14	E	14	E	14	E	59
17	Iba Este	B	29	B	29	B	26	C	24	C	108
18	Corazon	B	26	B	25	C	24	D	18	D	93
19	Poblacion	B	26	B	25	C	24	C	20	D	95
20	Balungao	B	26	B	25	C	24	D	17	D	92
21	Sucol	B	27	B	26	B	25	C	21	D	99
22	Balite	B	26	C	24	C	24	D	16	D	90
23	Sergio Bayan	B	26	B	26	C	23	D	16	D	91
24	Buguion	B	27	C	23	C	20	E	12	E	82
25	Palimbang	B	25	C	23	D	18	E	13	E	79
26	Pio Cruzcosa	D	17	E	13	E	11	E	11	E	52
27	San Marcos	C	24	C	22	C	23	D	15	E	84
28	Calumpang	D	15	E	11	E	11	E	10	E	47
29	Longos	B	26	C	22	D	18	E	12	E	78

Identify the flood hot spots



PROPOSAL OF CAPACITY DEVELOPMENT

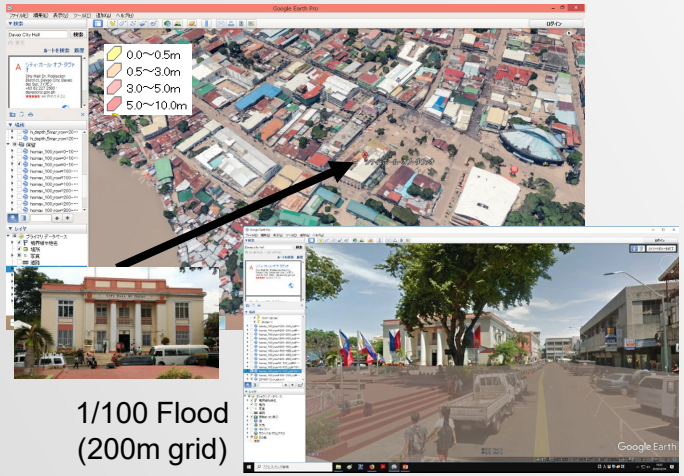
Activity Design

Experiencing Climate Change

Climate change impact assessment based on S&T

↓

Visualization



1/100 Flood (200m grid)

Experiencing Events

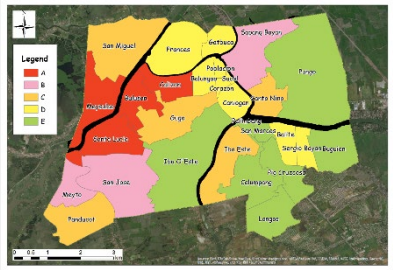
Infrastructure design

Strengthening Resilience

Predict climate change impact and scenario

↓

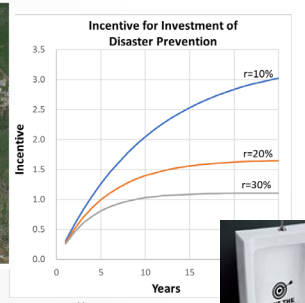
Resilient society beyond saving lives



Evacuation

Area **BCM**; **B**usiness **C**ontinuity **M**anagement

Resilient communities



"Nudging" psychological process to disaster risk

Incentive for investment

Toward the Prosperous Davao

Design a brilliant future

↓

Coordination with relevant ongoing energies

SAFE: S&T Action Frontline for Emergencies and Hazards Program

Be Climate Smart NOW

Groundwater use | Agriculture, Aquaculture and Natural Resources (AANR) | biodiversity

Setting All

DAVAO LIFE IS HERE

Attractive policy proposal

Bright tomorrow of Davao

AO GEO Earth Observations for Asia-Oceania

Asian Water Cycle Initiative

PROPOSAL OF CAPACITY DEVELOPMENT

Workplan of Capacity Development on Climate Change in Davao City

1. CC Orientation

Objective
- Contribution adaptation measures development
- Encouragement and coordination of multi-stakeholder engagement

Oct. 2019

Expected Output
- Activity design for CC adaptation
- Barangay-level damage data analysis

2. Platform Plenary Meeting

Objective
- Status sharing and update of the Platform activities among all members
- Discussion on further activities of Platform

Apr. 2020

Expected Output
- FF System for Davao RB
- Data integration examples

3. DIAS End-user Training

Objective
- To capacitate end-users on the know-how of DIAS
- To maximize the utilization of DIAS

2020

Expected Output
- Data uploading by stakeholders
- Data integration products

4. Policy & Benchmarking WS

Objective
- Contribution to local policy-making on CC
- Best practice on the importance, applicability and usability.

2020

Expected Output
- Policy proposal on CC adaptation to Mayor
- Community action

AO GEO Earth Observations for Asia-Oceania

GEO GL

Asian Water Cycle Initiative

PROPOSAL OF CAPACITY DEVELOPMENT

On-the-job training on the Full Operation of the Flood Forecasting and Early Warning System via DIAS

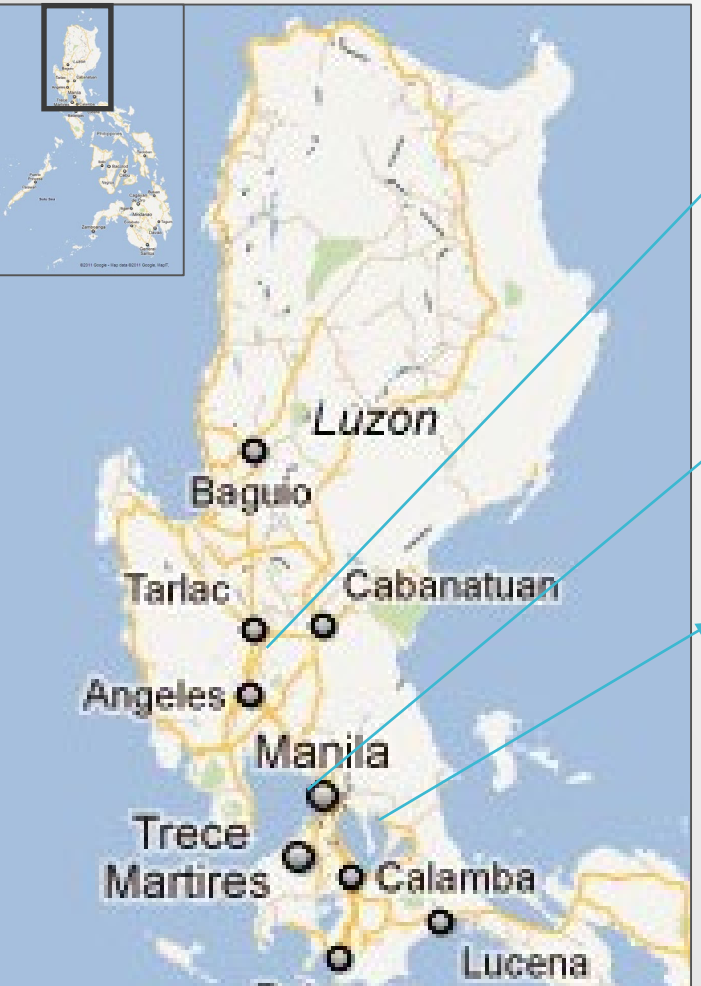
▼

Demonstration of the System Operation Via IEC and Flood Drill

Collaboration among Stakeholders (PAGASA, OCD R3, DPWH, DOST, LGU-Pampanga and LGU-Davao City, etc.)

PROPOSAL OF CAPACITY DEVELOPMENT

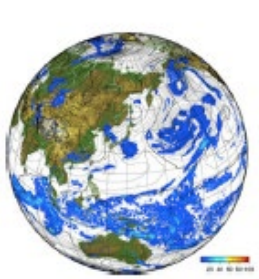
SATREPS: Development of Hybrid Water-Related Disaster Risk Assessment Technology for Sustainable Local Economic Development Policy under Climate Change in the Philippines (**2019-2024**)



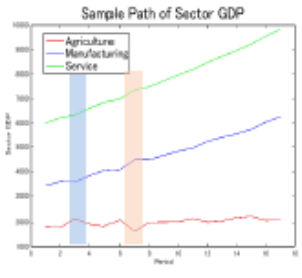
Pampanga River Basin

Pasig-Marikina River

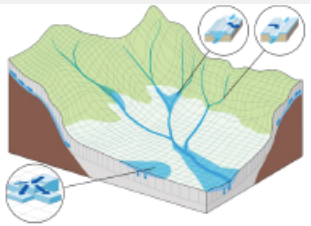
Laguna Lake and Surrounding Watersheds (24)



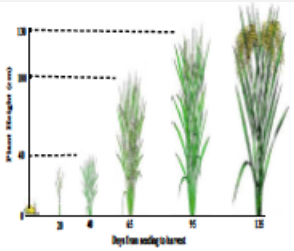
Climate Model



Socio-economic model



Hydrological model : Rainfall-Runoff-Inundation (RRI) Model developed by ICHARM



Agricultural model

FY2019	FY2020	FY2021	FY2022	FY2023	FY2024

1. Collect and Integrate Data (DIAS)
2. Assess Flood and Drought Risk
3. Assess Water-related Disaster Resilience
4. Propose Policy Recommendations for sustainable local economic Development

Capacity Development Activities:
Training Seminars in Japan and Philippines

1. Data upload and Download
2. Flood and Drought Risk Assessment
3. Water-related Disaster Resilience Assessment

Paris Agreement
Sendai Framework
SDGs **1** (Poverty), **2**(hunger), **6**(safe water),**11**(human settlements),**13**(climate change)

PHILIPPINE ROADMAP/STRATEGIC WAY FOR GLOBAL AGENDA

"Strengthening the Resilience of the Most Vulnerable Coastal Communities to Climate Change in the Philippines' Eastern Seaboard"
(GCF-Funded Project)
(2020-2022)

* Sendai Framework
* Paris Agreement 9, 10, 11
* SDGs 1, 2, 6, 11, 13, 14

SATREPS Hybrid Model for CC in the Philippines
(2019-2024)

* Sendai Framework
* Paris Agreement
* SDGs 1, 2, 6, 11, 13

AMBISYON NATIN 2040

Philippine Roadmap:
"Sustainable Development"

- ✓ Sendai Framework
- ✓ Paris Agreement
- ✓ 17 SDGs

CC and DRR SAFE project
(~2017)

* Sendai Framework
* Paris Agreement
* SDGs 6,11,13

oasis LOSS MODELLING FRAMEWORK

Oasis Project
(Flood and Insurance)
(2018-2021)

* Sendai Framework
* Paris Agreement 9 , 10, 11
* SDGs 1, 2, 11,13

AO GEO Earth Observations for Asia-Oceania

GEO GLOWS

Asian Water Cycle Initiative