LEMBAGA ILMU PENGETAHUAN INDONESIA
(INDONESIAN INSTITUTE OF SCIENCES)

LIPI

EXPECTED RESEARCH COLLABORATION (FROM LIPI & INDONESIAN)

Flood Risk Knowledge Enhancement

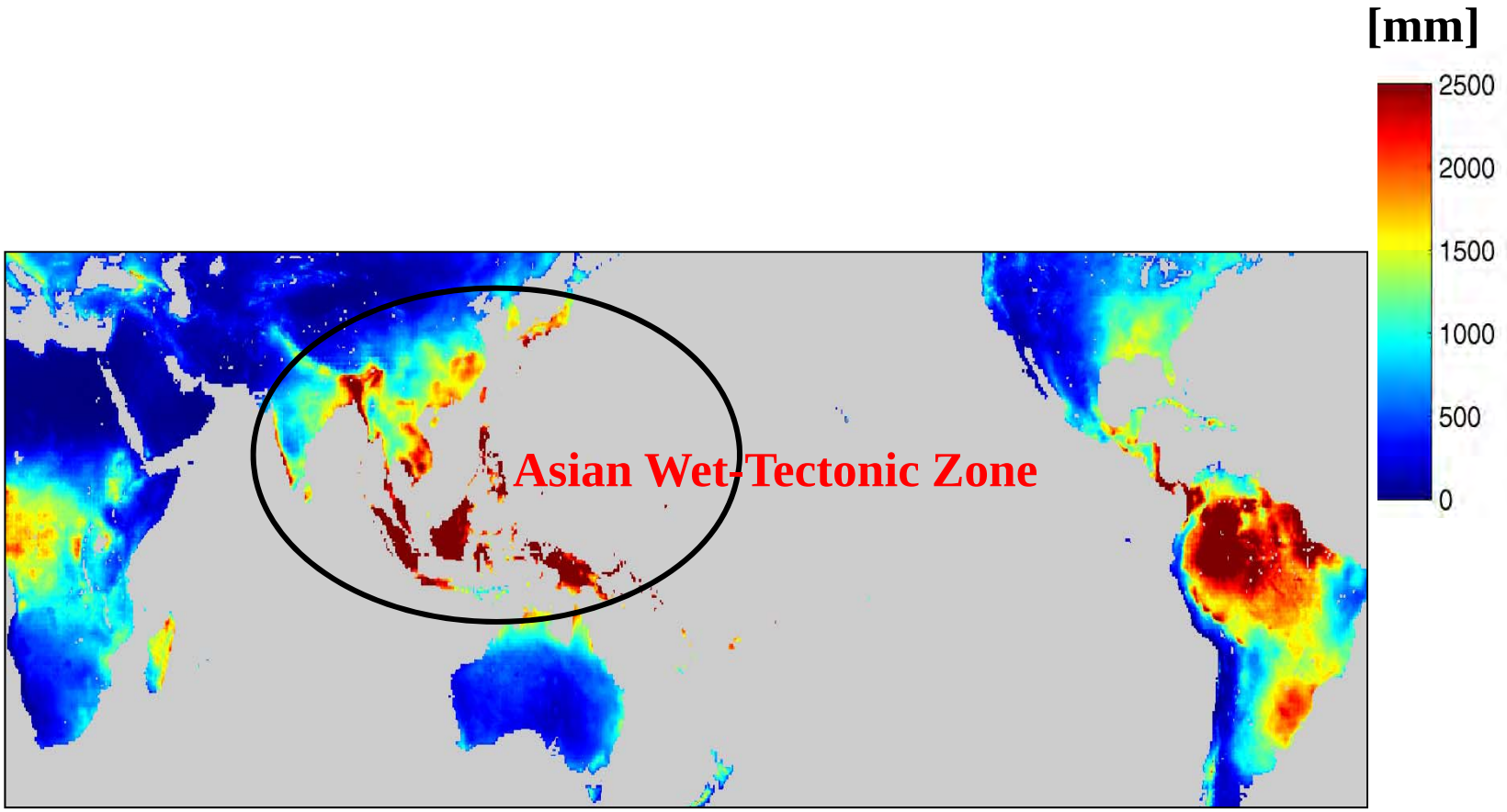
"Sensitivity of Flood Inundation to Rainfall Variability and Soil Water Storage at a Tropical Large River Basin"

Apip
Inland Waters Disaster Mitigation Research Group,
Research Center for Limnology,
Indonesian Institute of Sciences (LIPI)

INTRODUCTION

As Monsoon Asian Countries, Indonesia has high rainfall and Located at Tectonic Zone

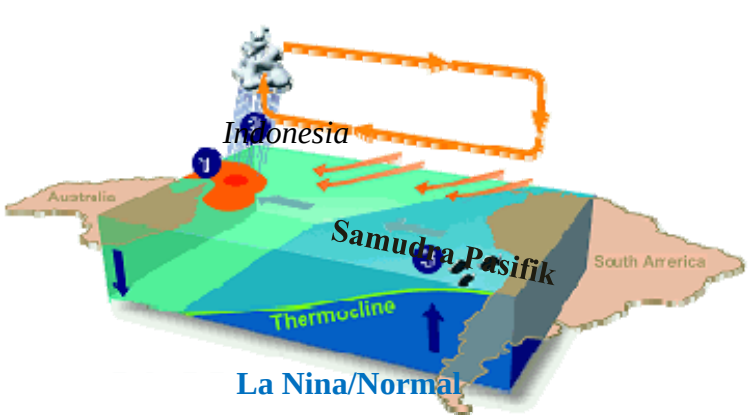
Annual Precipitation of the past 8 years (TRMM, NASA)

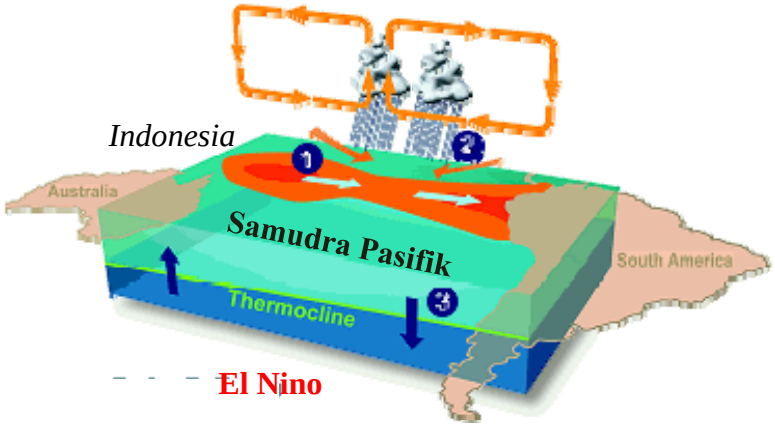


Data sources: http://sedac.ciesin.org/gateway/access.html and http://trmm.gsfc.nasa.gov/publications_dir/potential_landslide.html.

INTRODUCTION

Dynamic Interaction between Ocean & Atmospheric System at two regions (Pacific Ocean & Indian Ocean) Affects the Climate Variability & Extreme Weather in Indonesia through El Nino and La Nina



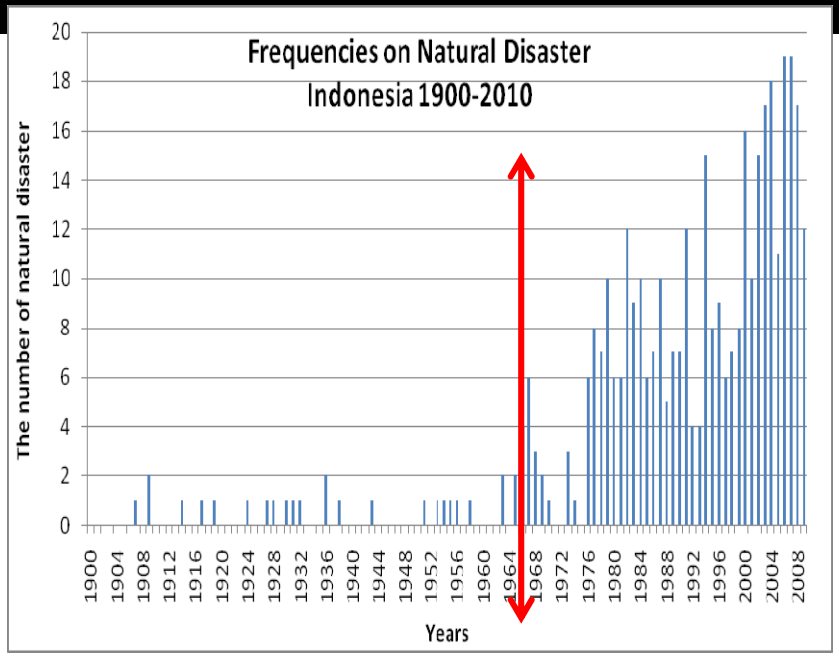


El Nino Influences Indonesian Rainfall Anomalies & Drought Property Particularly during JJA-SON Seasons

La Nina Influences Indonesian Rainfall Anomalies & Flood Property Particularly during DJF-MAM Seasons

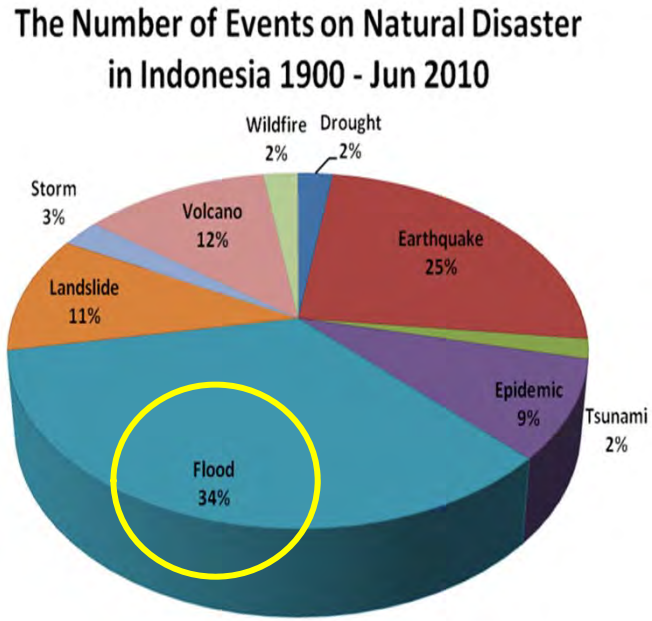
INTRODUCTION

Total Event



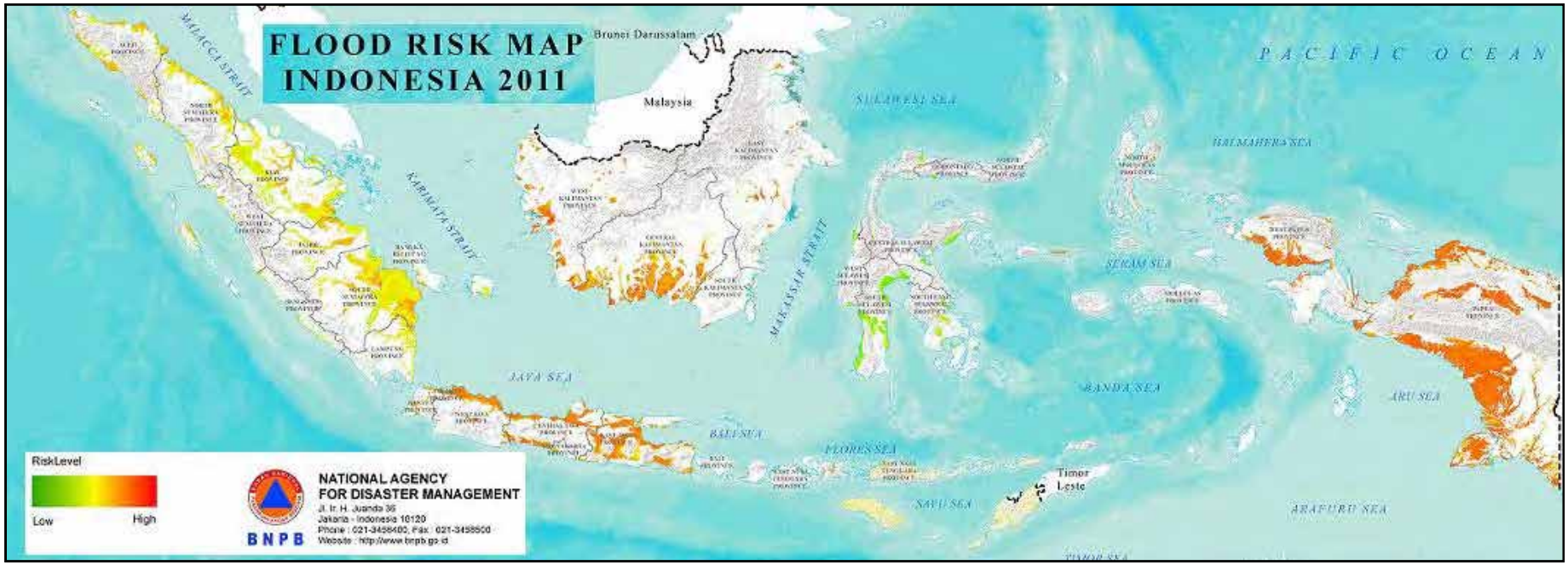
Multi Disasters - Multi Hazard - Multi Risk

Dominant Type



Source: BNPB (National Agency for Disaster Management), 2010

Spatial Distribution of Flood (Flood Inundation, Storm Surge) Risk



Flood F

Considers the Dominant Type of Disaster, Change in the Frequency of Occurrence, Level of Damage/Losses, Future Condition, Research Program in Indonesia (LIPI)

WP4 of JASTIP RESEARCH PROGRAM is Expected to be Addressed for Water-Related Disaster Research Topic in Especially for Flood Risk Knowledge Improvements

MAIN CAUSES OF FLOOD

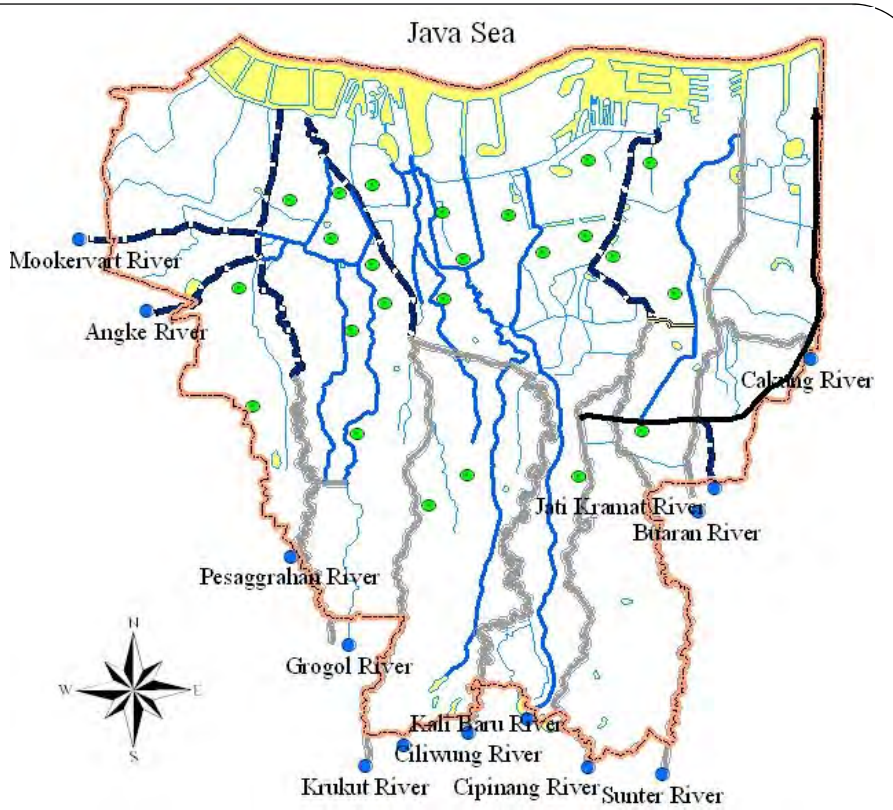
Jakarta Floods

Jakarta 's geographical and topographical setting as a Delta City makes it vulnerable to flood problems, this is due to:

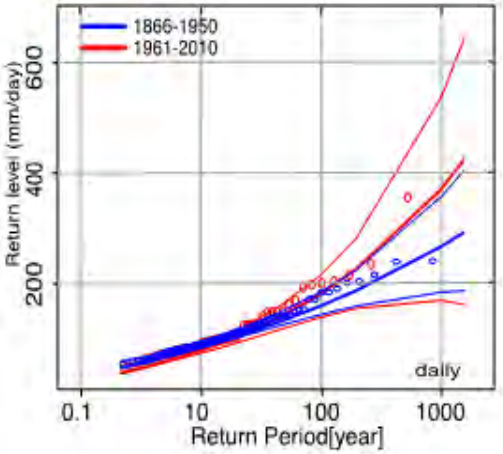
1. Traversed by 13 rivers to Jakarta Bay
2. Part of Northern Jakarta lies in lowlands and frequently influenced by tidal condition causing backwater.

This condition is exacerbated by external factors:

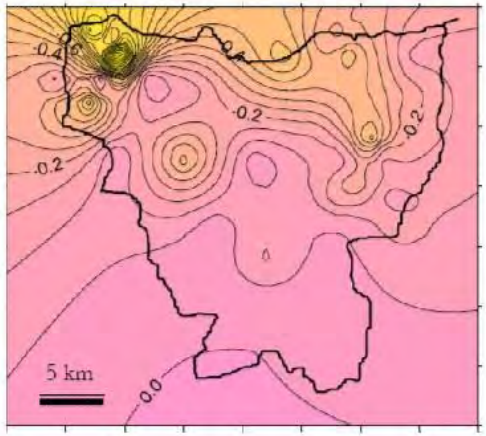
1. **Climate change**: sea level increase and changes in rainfall property
2. **Continuous land subsidence** at a rate of as much as 10 cm/year in certain part of north Jakarta
3. Increase of impervious areas (Rapid Landuse Change)
4. Fragment design without taking into account future development



13 Rivers/Macro channel



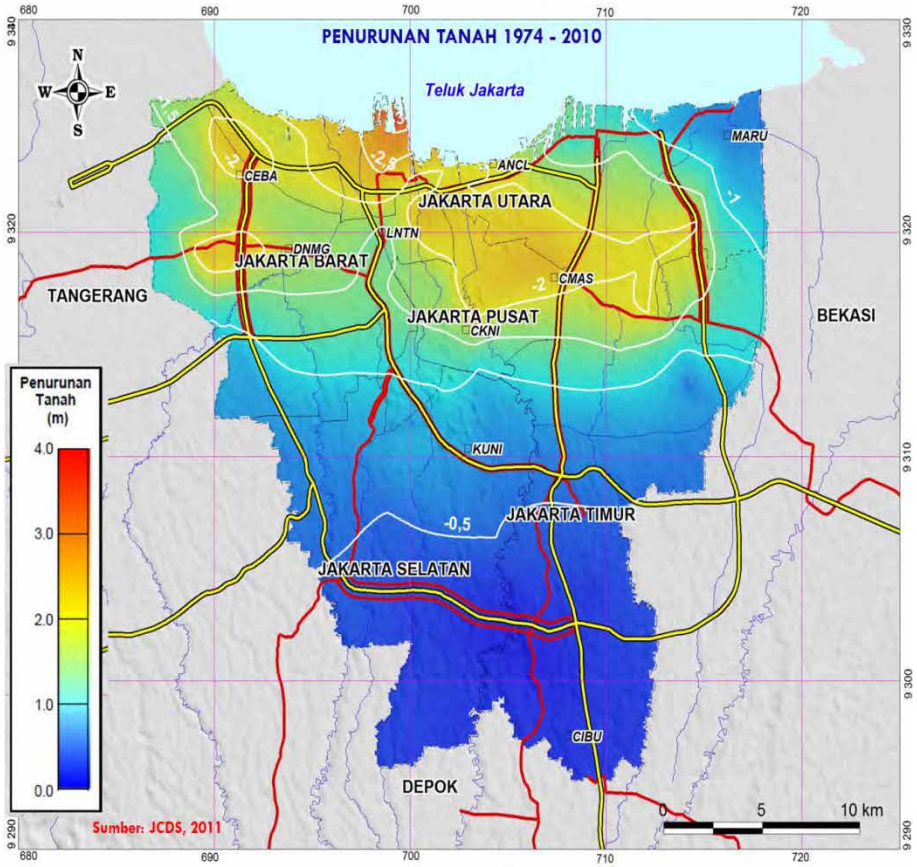
Changes on Rainfall Extremes(Siswanto, 2014)



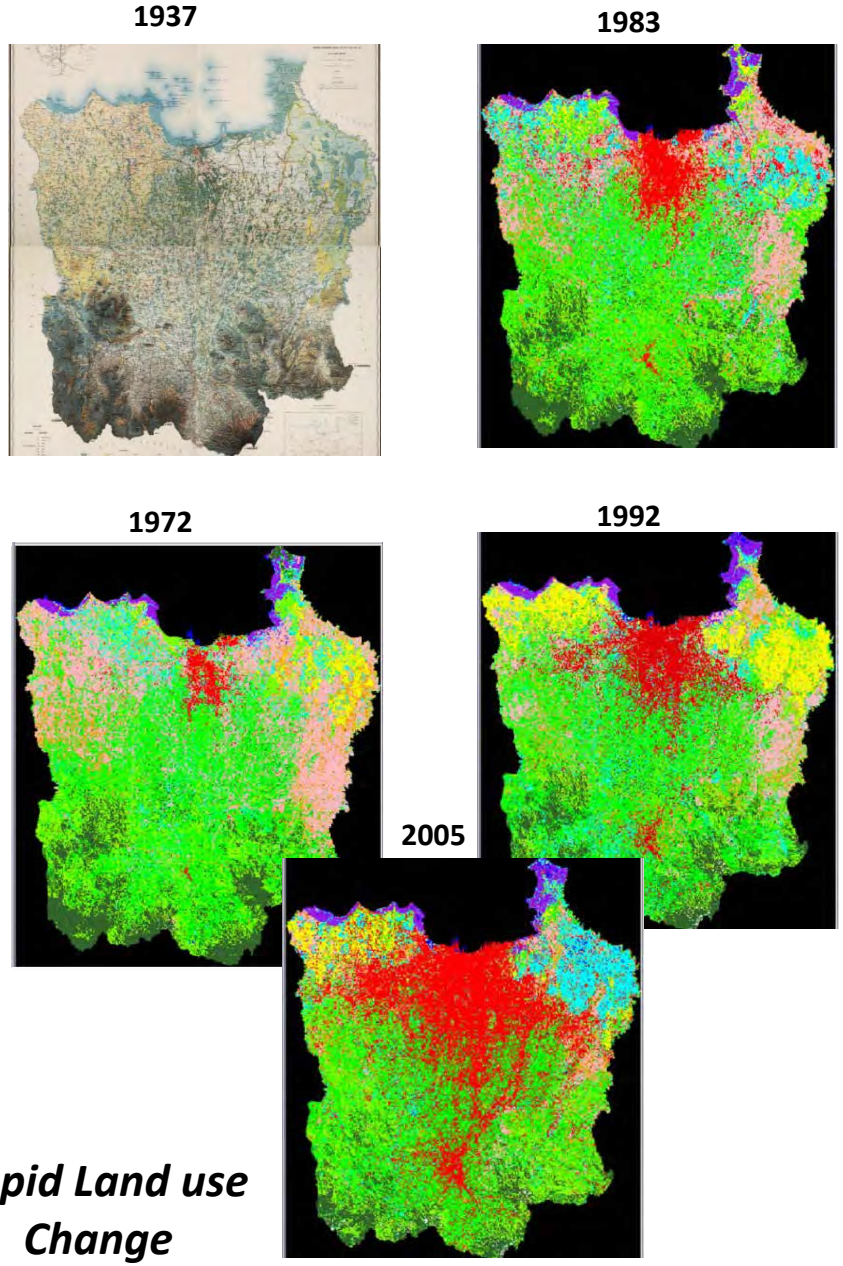
Land subsidence 1991-1997 (Irzal F, 2013)

MAIN CAUSES OF FLOOD

Jakarta Flood



Land Subsidence



Rapid Land use Change

MAIN CAUSES OF FLOOD

Jakarta Flood

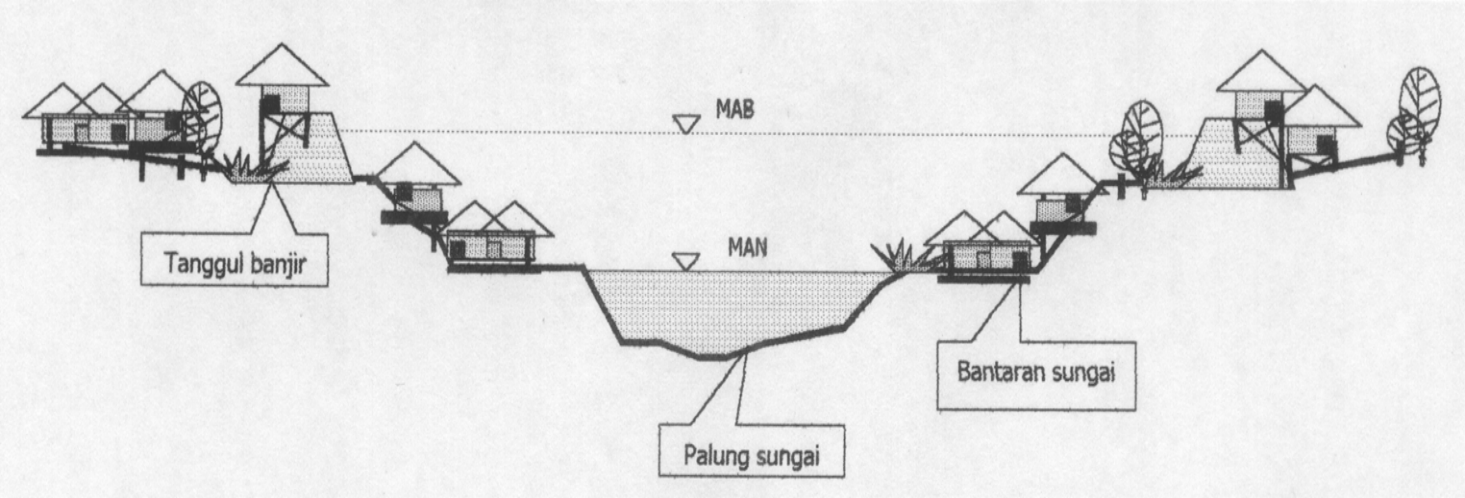
Sea Level Rise

Source: Ministry of Public Works, 2008

MAIN CAUSES OF FLOOD

Jakarta Flood

High Vulnerability



PENYEMPITAN PENAMPANG ALIRAN SUNGAI AKIBAT HUNIAN DI DAERAH BANTARAN SUNGAI

Current
Jakarta Flood Mitigation

CURRENT

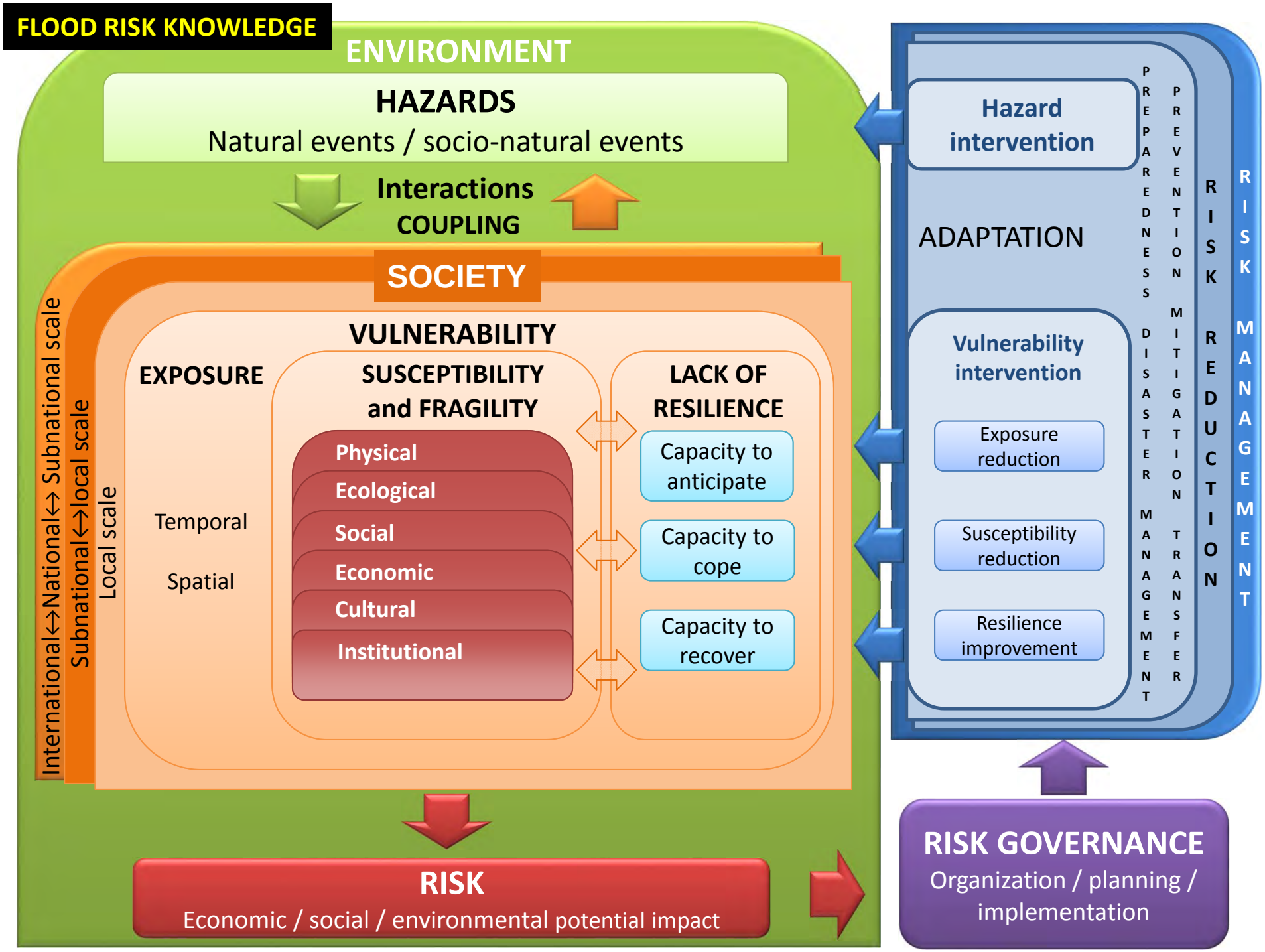
1. Completion of East Flood Canal construction
2. Construction of interconnection West Flood Canal and East Flood Canal
3. Dredging and normalisation of vital canals/rivers/lakes/polders under the Jakarta Emergency Dredging Initiative Project
4. Reconstruction and capacity improvement of pumps
5. Construction and heightened of sea embankments to anticipate the in sea level rise and land subsidence in North Jakarta.
6. Resettlement of illegal housing along rivers/lakes and river widening
7. Development Jakarta Flood Early

Jakarta Emergency Dredging Initiatives (JEDI)

Not only for flood control but for redeveloping and redesigning the area, increasing green open space and supporting the

FLOOD RISK KNOWLEDGE

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability}$$

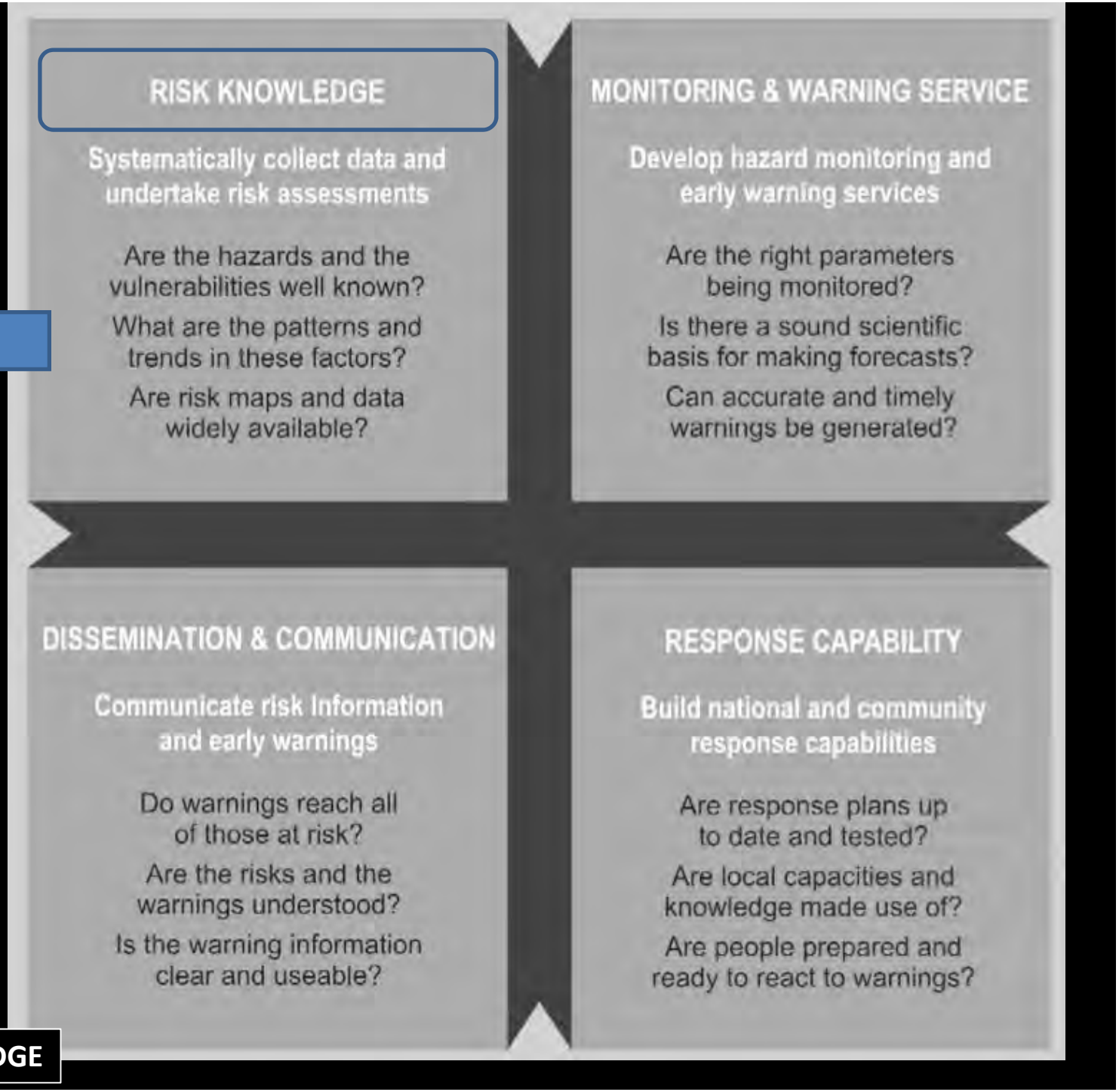

FLOOD RISK KNOWLEDGE
ENVIRONMENT
HAZARDS
Natural events / socio-natural events
Interactions
COUPLING
SOCIETY
International↔National↔ Subnational scale
Subnational↔local scale
Local scale
VULNERABILITY
EXPOSURE
Temporal
Spatial
SUSCEPTIBILITY and FRAGILITY
Physical
Ecological
Social
Economic
Cultural
Institutional
LACK OF RESILIENCE
Capacity to anticipate
Capacity to cope
Capacity to recover
RISK
Economic / social / environmental potential impact
RISK MANAGEMENT
RISK REDUCTION
Hazard intervention
ADAPTATION
Vulnerability intervention
Exposure reduction
Susceptibility reduction
Resilience improvement
PREPAREDNESS
DISASTER MANAGEMENT
PREVENTION
MITIGATION
TRANSFER
RISK GOVERNANCE
Organization / planning / implementation

General Concepts of Early Warning Systems

1. **Risk Knowledge (Understanding)**
2. Monitoring & Warning Service
3. Dissemination & Communication
4. Response Capability

1. Flood Hazard Characteristic (Spatially & Temporally) needs to be well known

2. Flood Risk Quantification (Map) with high spatial resolution is expected to be obtained



Source: UN ISDR

FLOOD RISK KNOWLEDGE