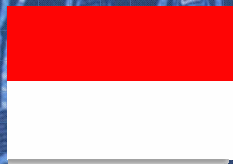


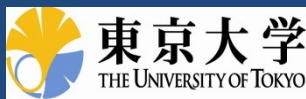


# GEOSS Asian Water Cycle Initiative

## Country Activities



# INDONESIA



### Country Report

Kusuma, MSB, et.al. Water Res Eng, FCEE, ITB





# Project Design Matrix : Progress

 **INDONESIA**

## ▶ **Activities :**

- ▶ Research : Improvement of data base and assessment method
- ▶ Education : Improvement of curriculum of water resources engineering study program
- ▶ Training : Improvement of assessment tools
- ▶ Community services : Contribution to problem solving of local people

## ▶ **Partners**

- National and local level
  - Government
  - Private
  - Local people
  - Universities and research institution
- Overseas level
  - Association//Group : GEOSS-ACWI
  - Universities : Tokyo University
  - Donor institution : APN (last proposal failed → might be caused by missed one cv of team member)

▶ **Kusuma, MSB, et.al, Water Res Eng, FCEE, ITB**



# Project Design Matrix : Progress

 INDONESIA

- ▶ **Research (Foccus on Citarum River):**
  - ▶ Study of Runoff Control Effect in Upper Citarum Watershed Rivers (Cisangkuy, Citarik, Cikapundung) to South Bandung Flood
  - ▶ Evaluation of Water Resources Management System for Climate Change Adaptation
  - ▶ Spatial Model of Risk Analysis in Determining Flood Control Criteria (Case study: Upper Citarum River Basin), 2013
  - ▶ Training : Improvement of assessment tools
  - ▶ Community services : Contribution to problem solving of local people



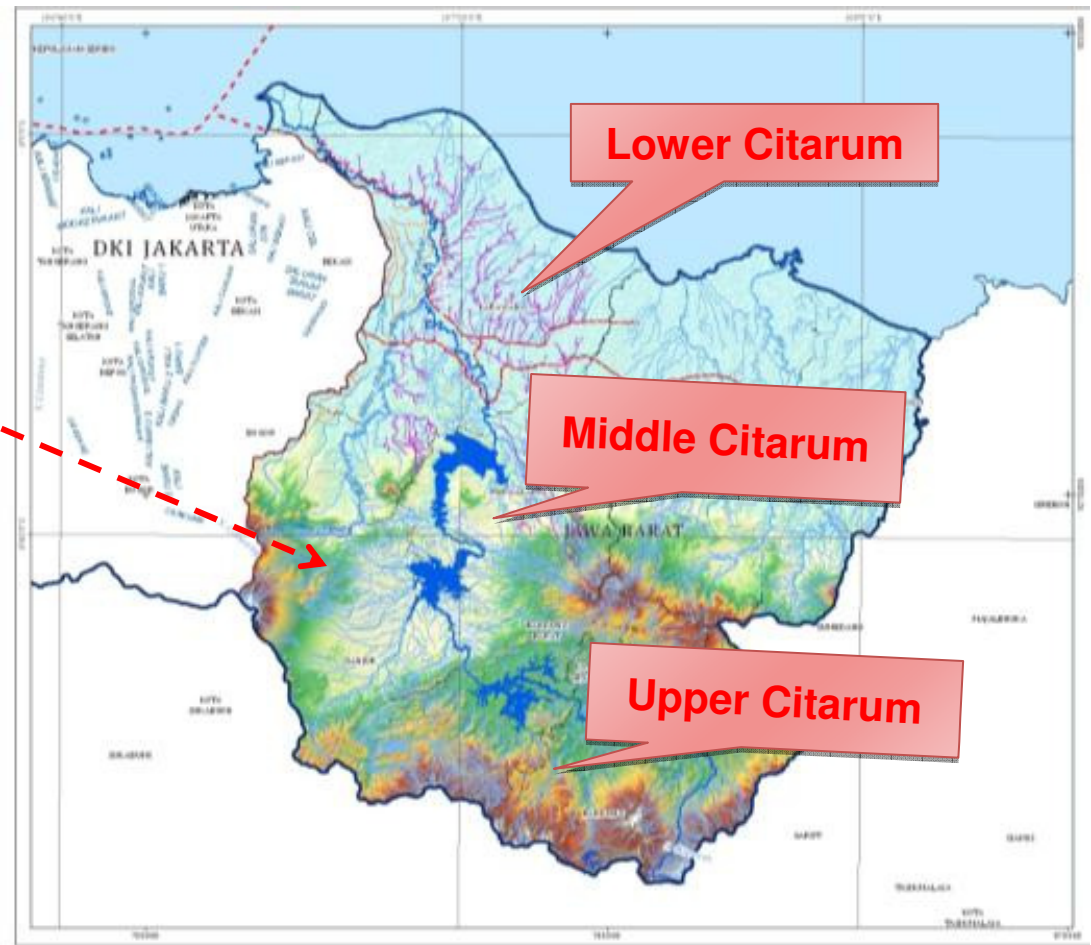
## Education and Capacity Building

- ▶ Collaboration of ITB, PU, Local Government and DGHE)
  - ▶ Undergraduate Study Program of Water Resources Engineering and Management of ITB is entered the second year.
  - ▶ Adopting climate change issues to update several courses that are related to hydrometeorology parameters.
  - ▶ Development of Field Laboratory of Hydrology
- ▶ Data sharing and Training
  - AWCI Training Course on Improved Bias Correction and Downscaling Techniques for Climate Change Assessment including Drought Indices (2013)
  - Planned: Climate change impact assessment techniques including hydrological modeling in cold region basins, Pakistan (2014)



# Study Area : Citarum River

 **INDONESIA**

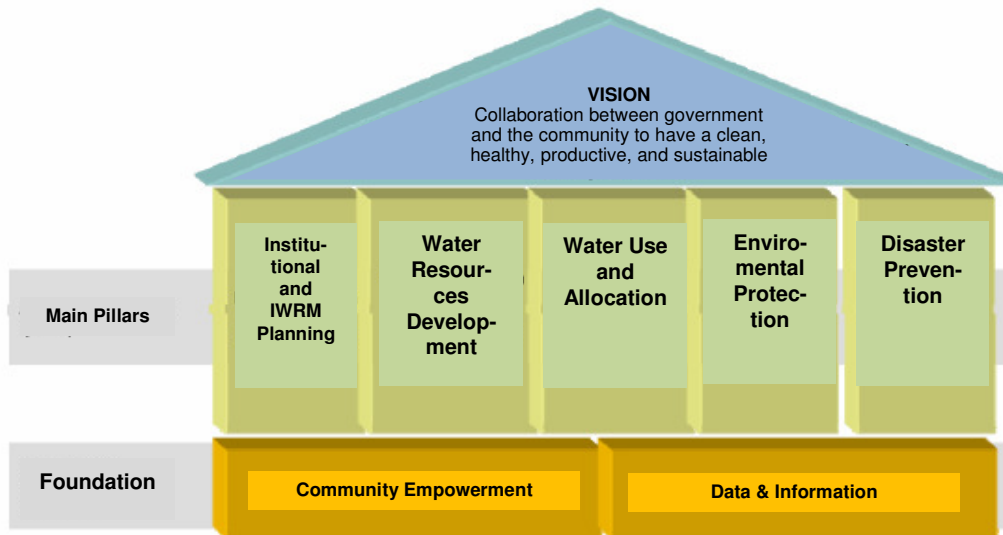


**Citarum River  
Basin, West Java.  
*Indonesia***



# Citarum Frame Work

INDONESIA



Source: citarum.org

| Institution              | Data                      | Land Use       | Infrastructures            |                         |                     |
|--------------------------|---------------------------|----------------|----------------------------|-------------------------|---------------------|
|                          |                           | Dev Plan       | Water Infrass              | Dis Risk Red            | Others              |
| BMKG                     | HydroMet                  |                | HydroMet Obs               | Early Earning           |                     |
| Agriculture              | Soil Char                 |                | Rice Field                 |                         |                     |
| ESDM                     | G Water and Geology       |                | GW Well and Spring Water   |                         |                     |
| LAPAN                    | Sat/Aero Mapping          |                |                            |                         |                     |
| BIG                      | Topography/GIS            |                |                            |                         |                     |
| Public Work              | River/Water Infrast       |                | Drainage, W Supply Waste W | Flood Control           | Building, Transport |
| Min of State Own Company | Reservoir OM/Water Supply |                | Hydro P                    |                         |                     |
| Local Government         | Land Use/SocEco           | Implementation | Drainage                   | Recovery, Crisis Center | Others              |
| BAPPENAS                 | Nat Dev Plan              | Integration    |                            |                         |                     |
| BNPB                     | Disaster Risk Reduct P    |                |                            | Shelter, Training       |                     |
| Min Environment          | Water/CA Quality          |                | Monitoring                 |                         |                     |
| Min of Forestry          | Forest performance        |                |                            |                         |                     |
| Min of Education         |                           |                |                            | Curriculum, Research    |                     |
| Min of Welfare           |                           |                |                            | Recovery                |                     |

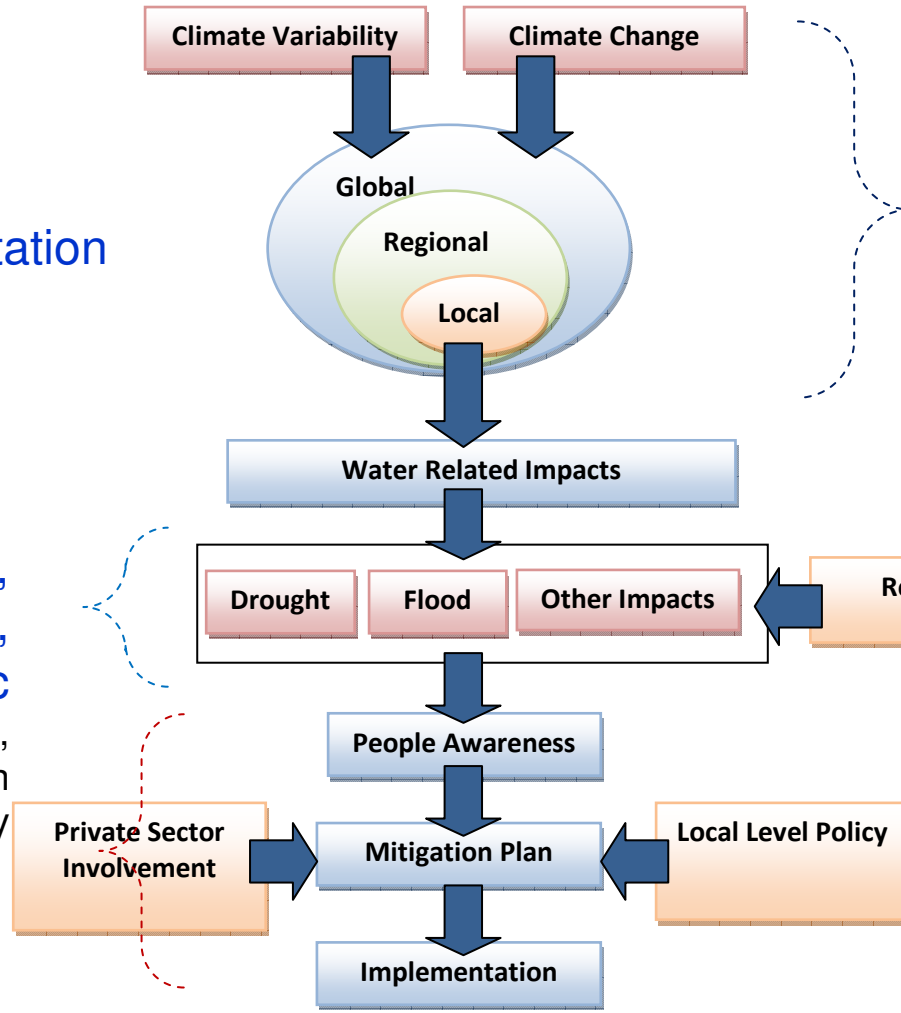
Stake holder in data sharing



# Collaboration Opportunities

INDONESIA

Curent Presentation



International/National Funding Institution Program Cooperation

AWCI, Tokyo/  
Japanese University and Other Institution

Downscaling of climatology data and scenarios

Indonesian Universities and Research Institution

Join research on particular themes

BAPPENAS, BAPPEDA

Join research on particular themes



# Existing Condition

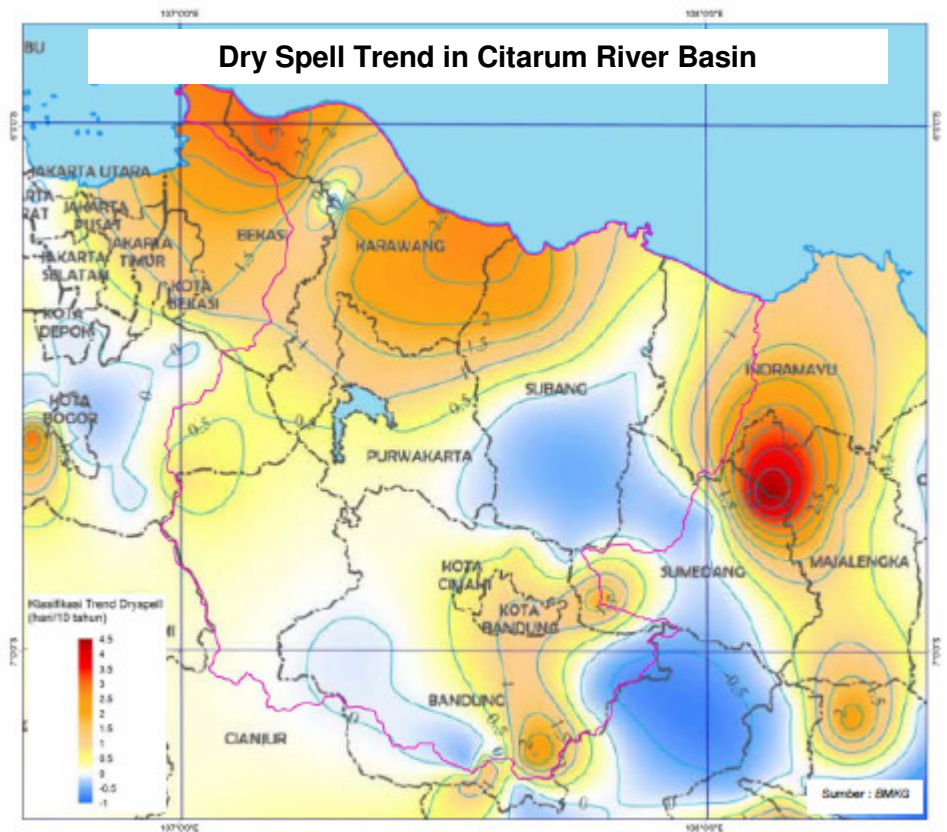
 INDONESIA

- ▶ Existing Problem
  - ▶ Floods : upstream (Bandung City) and downstream area (Kerawang etc)
  - ▶ Drought : Upstream and Downstream
  - ▶ Water quality : Three cascade reservoir, Upstream (Bandung) and downstream (Kerawang etc).
  - ▶ Water allocation : constraint/conflict among three cascade reservoir with different purposes priority (Hydropower, irrigation and raw water for industry/housing). Water pricing issue.
  - ▶ Lack of data and reliable analytical method.
- ▶ Influences of landuse changes and climate changes to the above problem



## Drought

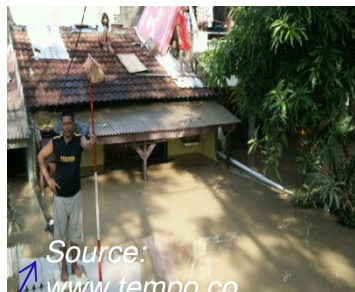
- ▶ Dry spell trends in the downstream of Citarum such as Bekasi, Karawang, and Indramayu Regency shows an increasing pattern.
- ▶ Most of irrigation area in West Java is located in the downstream of Citarum River Basin, with total area about 200,00ha. Prolonged drought in this basin might disturb Indonesian rice production



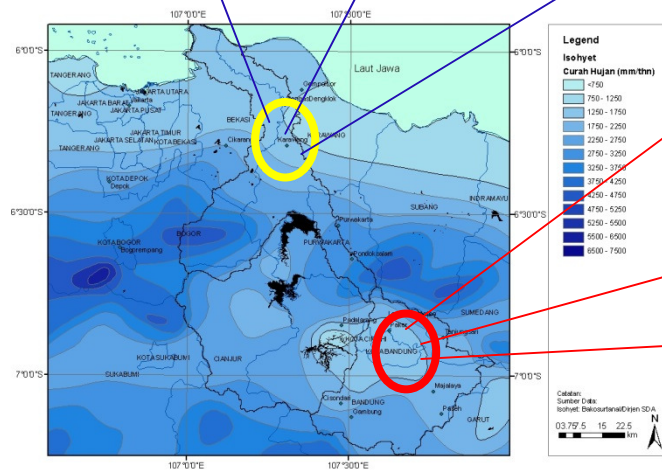
Source: citarum.org

# Existing Condition

 **INDONESIA**



One weeks flooded in Jatiasih, Bekasi due to dike breach of Citarum River downstream of Jatiluhur Reservoir in 2013



Three weeks flooded in Dayeuh Kolot, previously natural flood plain area of upstream Jatiluhur Reservoir, 2013



1986 Before normalization



1994 Partial normalization



2001 Nearly final normalization



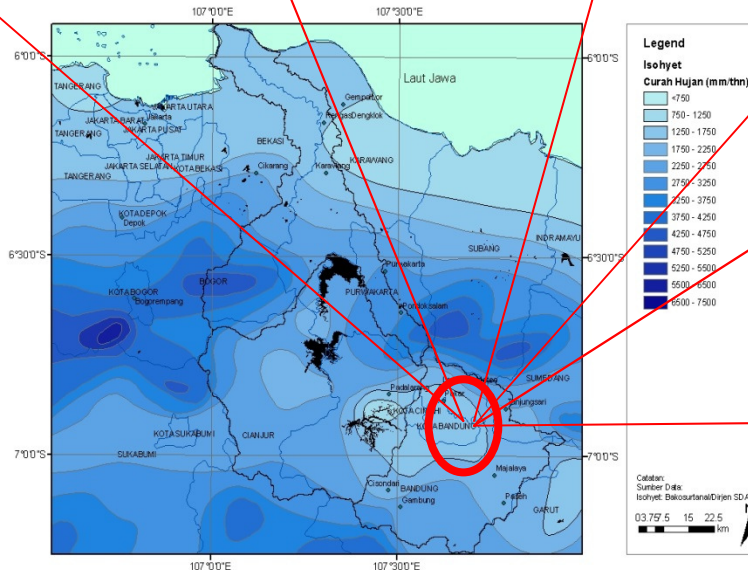
2003 Final normalization



2005 After normalization



2010 After normalization



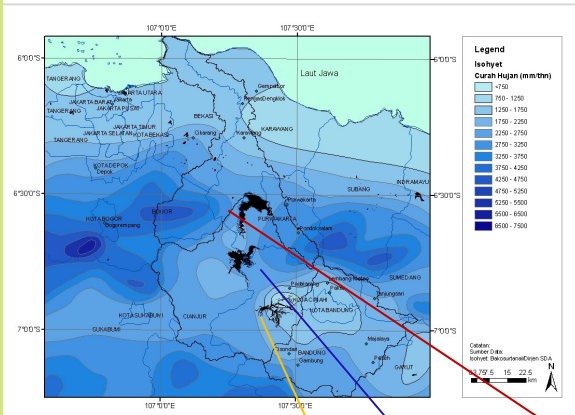
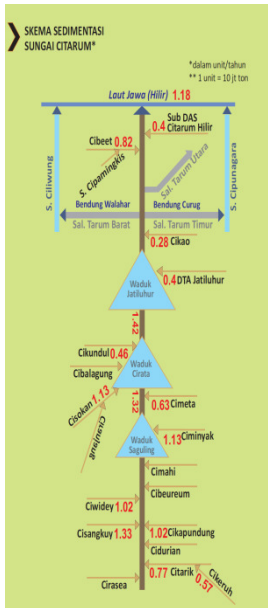
Engineering solution is only a short term as there is socio engineering solution required for the following problem :

- ▶ Erosion and sedimentation
- ▶ Solid waste
- ▶ Land use change
- ▶ Water supply/allocation



# Existing Condition

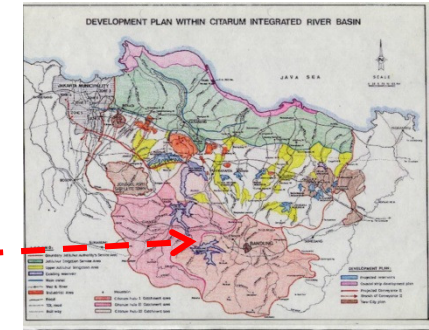
INDONESIA



Average annual sedimentation rate  
**8 million m<sup>3</sup>/year** → flood in rainy season  
and water scarcity in the dry season  
(ASER 2008, BPLHD)

**Jatiluhur Dam during drought event in 2013**, Source: [voaindonesia.com](http://voaindonesia.com)

**Jatiluhur Dam during flood event in 2010**, Source: [nasional.news.viva.co.id](http://nasional.news.viva.co.id)



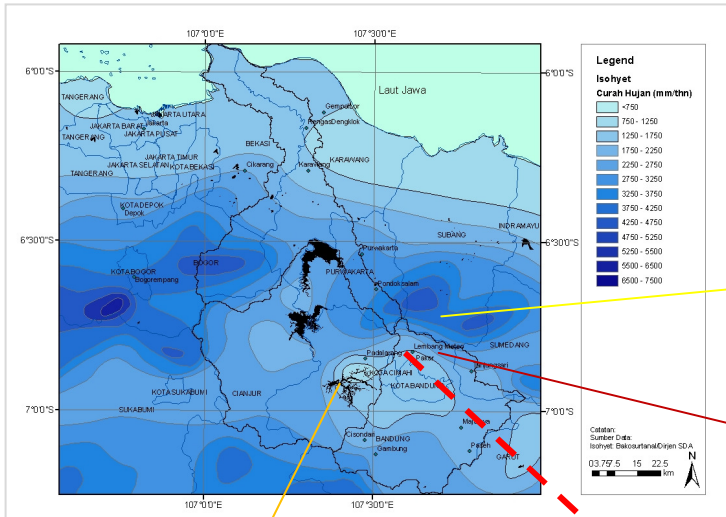
Three Cascade Reservoir of Citarum River (Flood, Irrigation, Power, Raw Water and Aqua Culture)

► Kusuma, MSB, et.al, Water Res Eng, FCEE, ITB



# Existing Condition

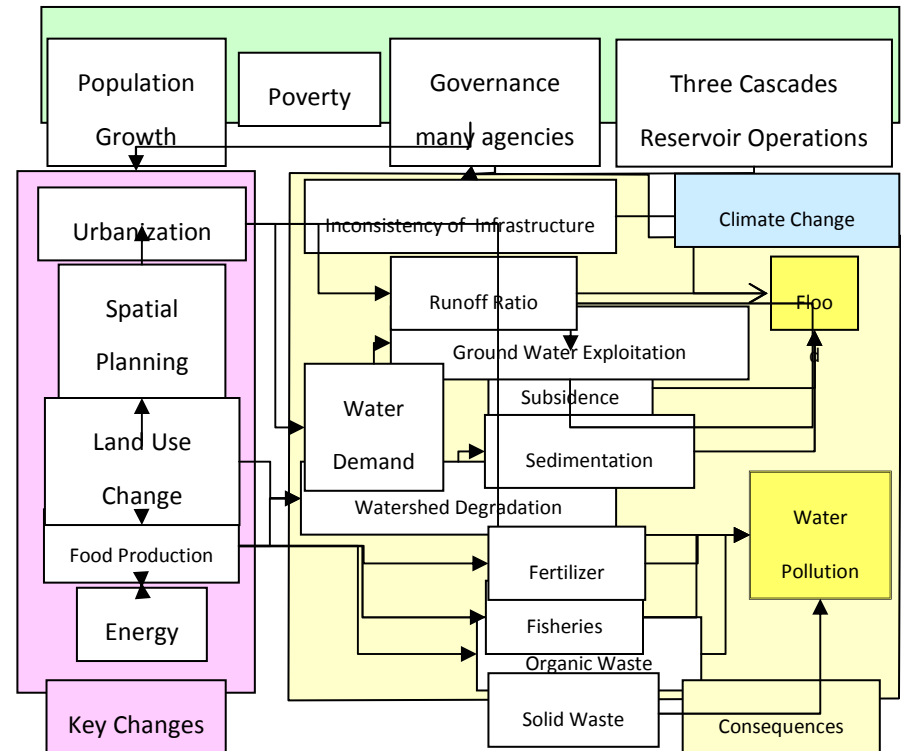
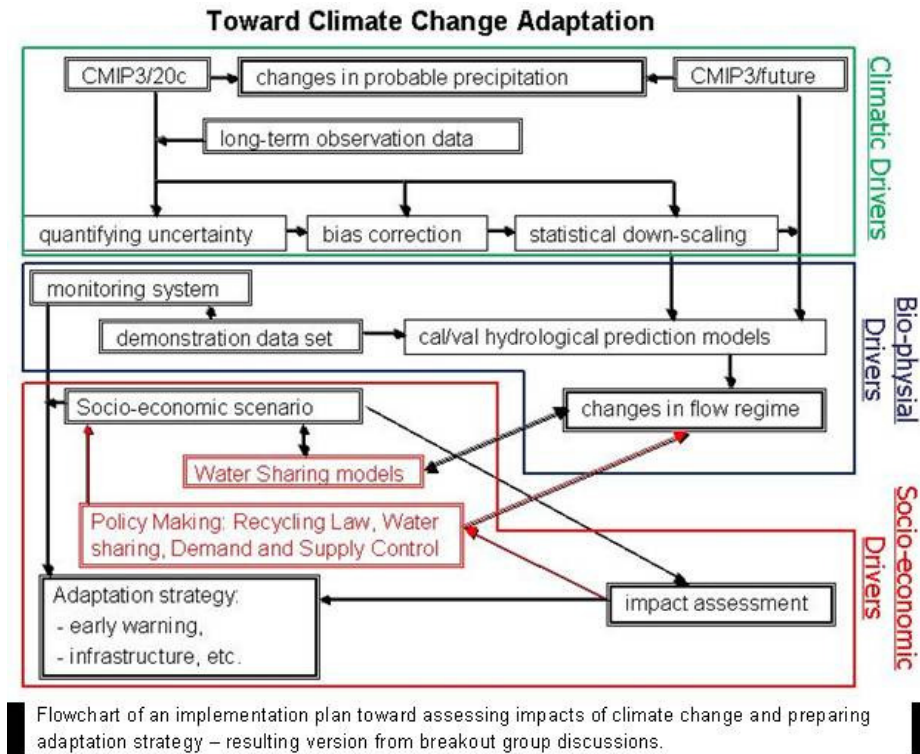
**INDONESIA**





# Current Related Research Scheme

INDONESIA



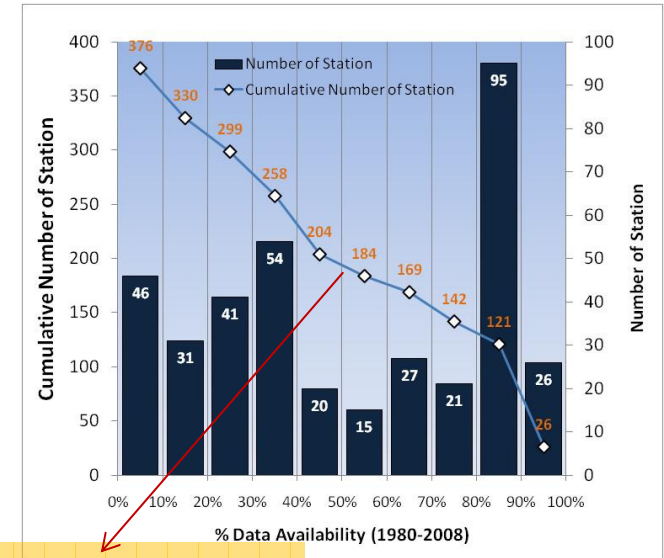
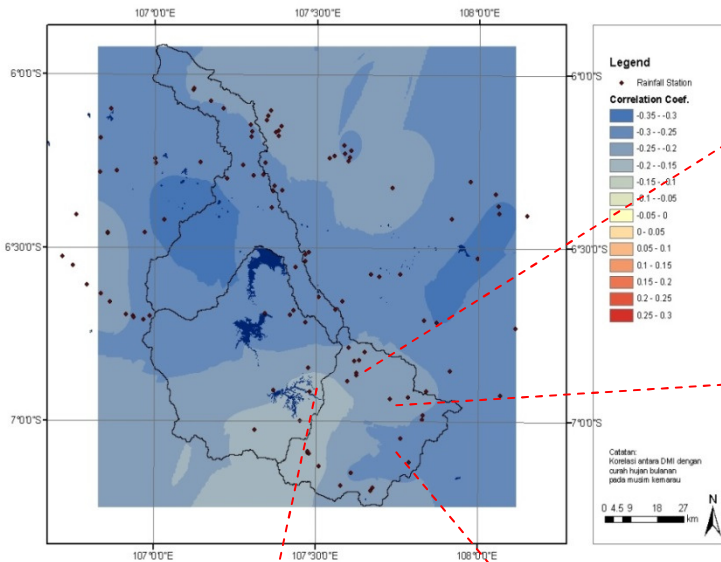
White paper of Climate Change Adaptation Scenario (Koike T, Univ of Tokyo, AWCI, Nov 2010)

Characteristics of Water-Nexus in the Citarum River Basin (Koike T et al, WS, Bandung, 26J2013)



# Project Design Matrix : Progress

INDONESIA



Data Availability <50%  
(192stations)

Data Availability >70%  
(142 stations)

Data Availability >90%  
(26stations)

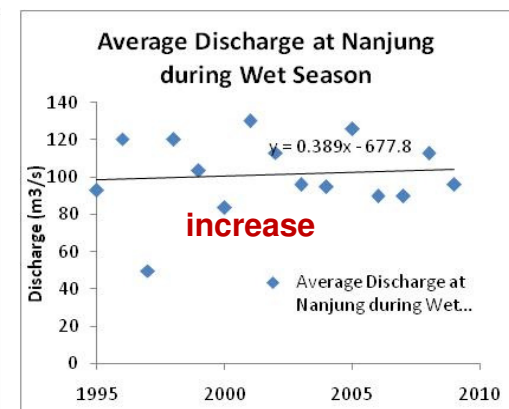
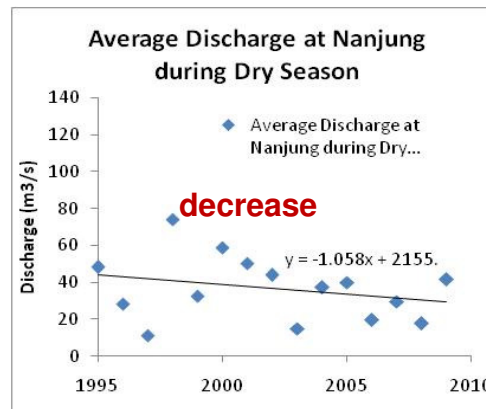
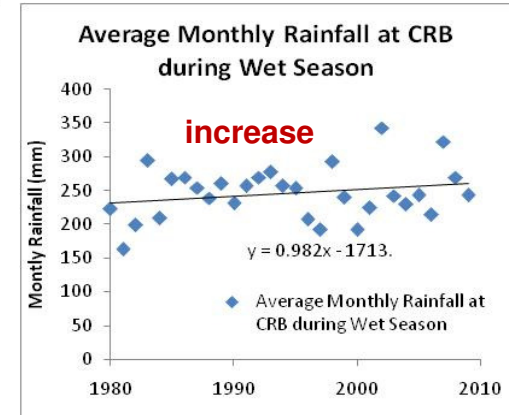
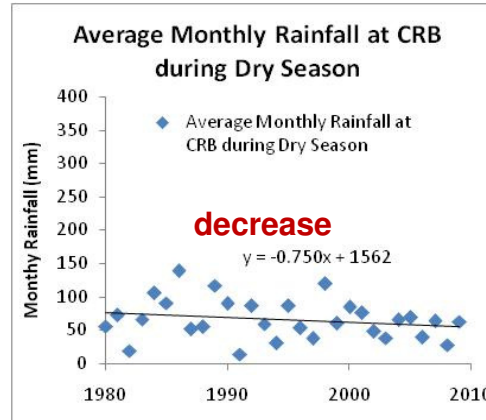
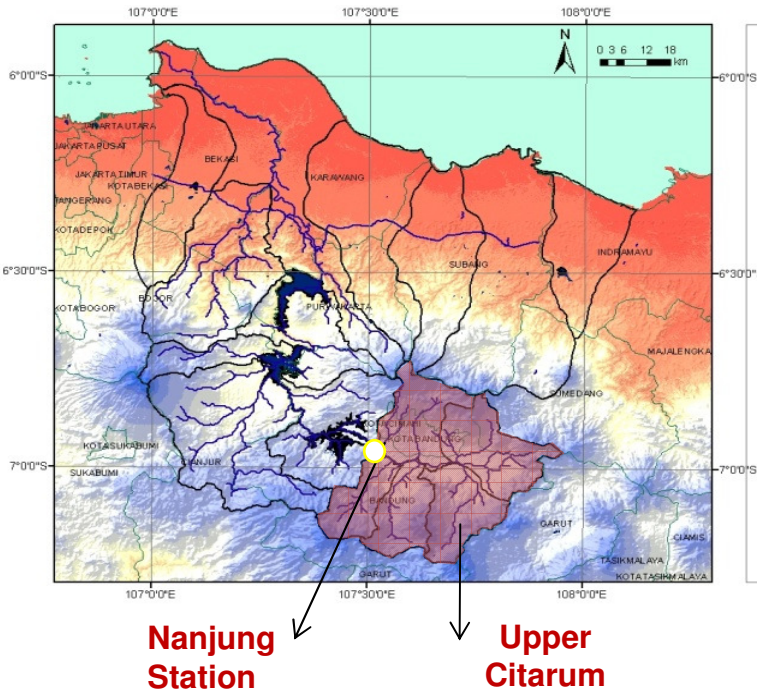


Data observation ; varies from one station to another. From **376 rainfall stations**, 26 stations (6.9% ) has very good data record with data availability more than 90%, 142 stations (37.8% ) have relatively good data records with data availability more than 70% and 192 stations (51.2%) have bad data records with data availability less than 50%.

► Kusuma, MSB, et.al, Water Res Eng, FCEE, ITB

Rain fall

Discharge

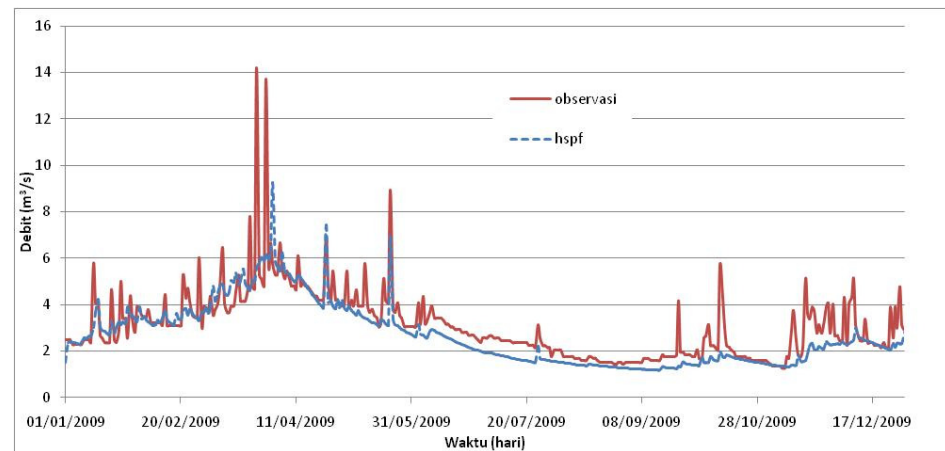
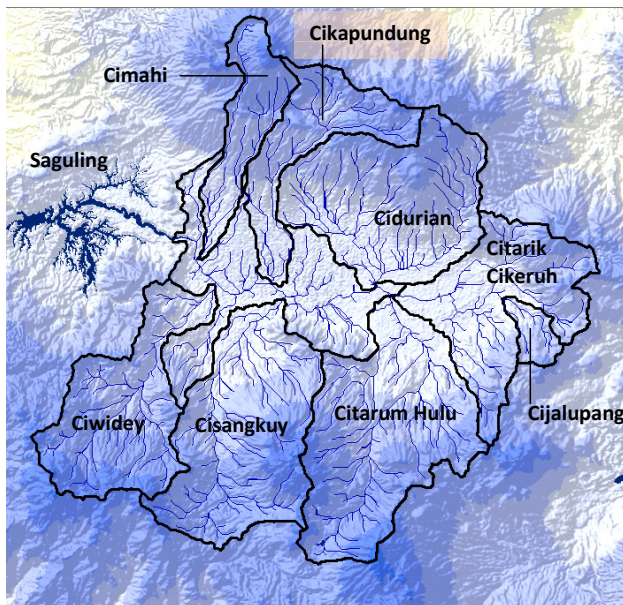


## Climate Change impact Rainfall and river discharge trend

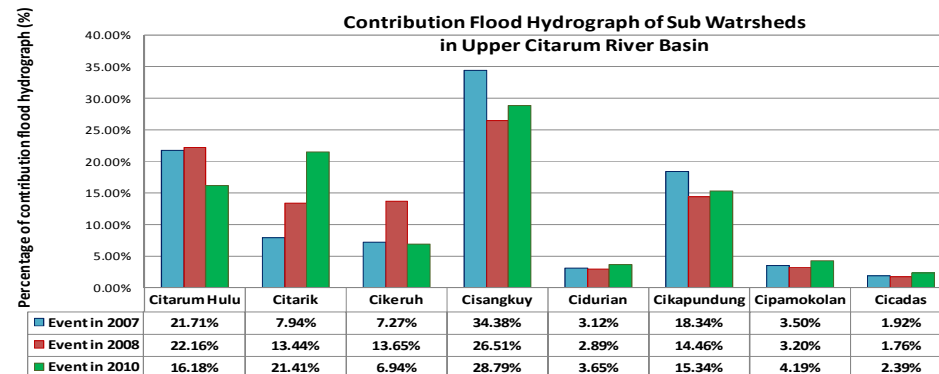
Average rainfall and discharge trend : increasing in wet season and decreasing in dry season



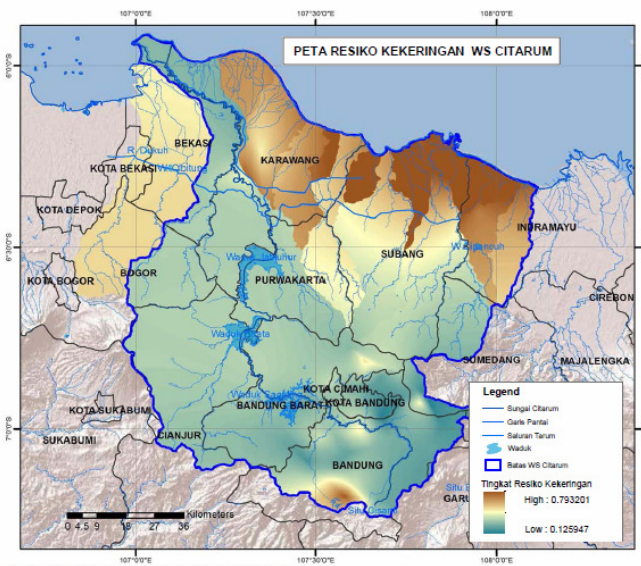
## Evaluation of Application Unit Hydrograph Method for Non Uniform Rainfall and Contribution of each tributary river



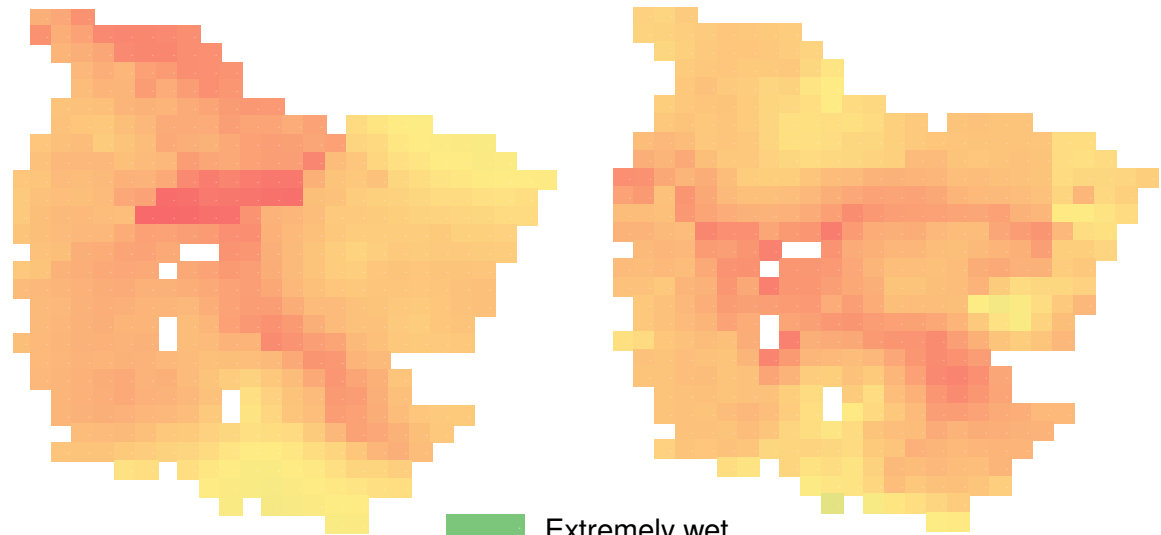
- Unit hydrograph model less than observation
- Southern part have contribute more than nothern part



## Comparison of SPI (Standardized Precipitation Index) and PDSI (Palmer Drought Severity Index)

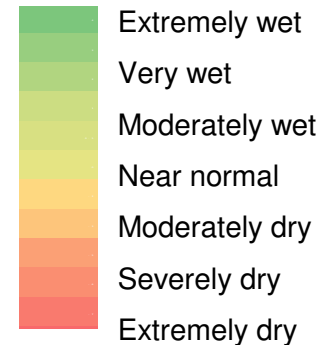


Sumber: PSDA Provinsi Jawa Barat & Hasil Analisa RCMU Bappenas

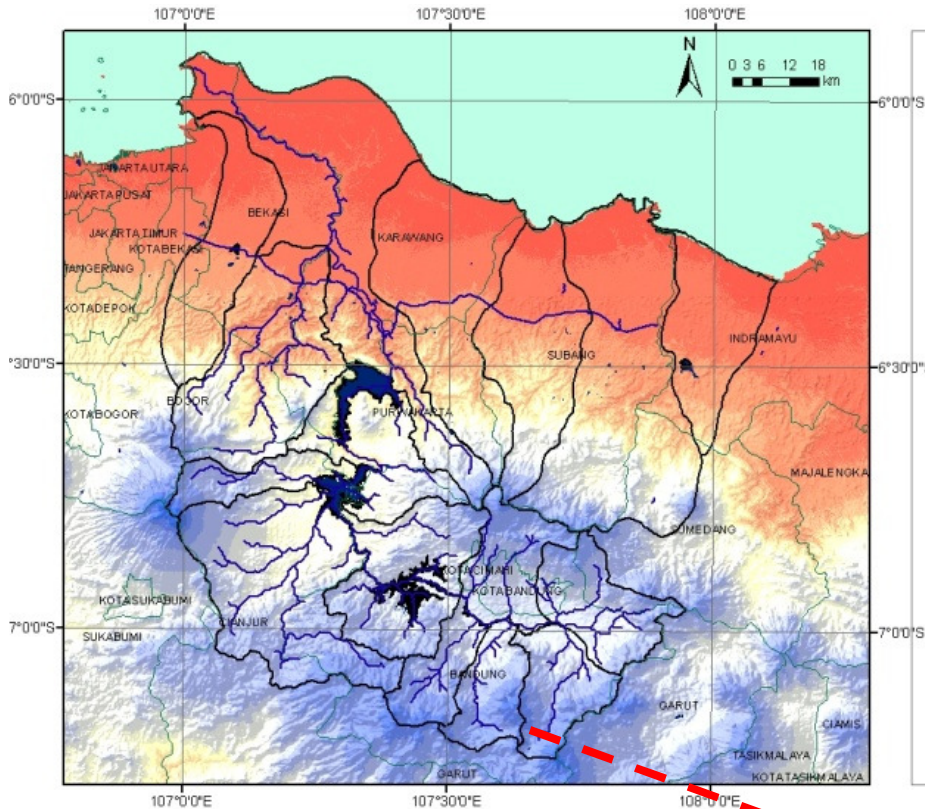


SPI 3-month

PDSI



PDSI more related to the observed drought in 1997



Cisanti Lake, The Most of Upstream of Citarum River Basin, : No Local Fish

### Action Plan of Citarum River Quality Improvement

- ▶ Lead Institution Gov of West Java Province
- ▶ Team work : BPLHD and ITB
- ▶ Stakeholder/funding support : BBWSC and Local Govt

### Pilot Project of the action plan for improving Citarum Environment Improvement

- ▶ 55 Eco Village in Citarum River Basin
- ▶ Sustainable village development
- ▶ Agriculture, water quality, solid waste, forest management and biodiversity.





# Summary

 **INDONESIA**

- Socio engineering solution is required to achieve appropriate solution for Citarum River Basin
- Data base development is compulsory to improve results reliability and in this case national and international cooperation is required
- Improvement of assessment method/tools is necessary to support future program



 **INDONESIA**

**Thank You**  
Arigatou  
Terimah kasih