



ASIAN DEVELOPMENT BANK



# Proposed Enhanced Water Security Investment Project (EWSIP)

**National Workshop**

**9 October 2019**

# AGENDA

- Workshop Agenda
- Strategic Framework for EWSIP
- EWSIP Approach and Tools (STT and IFRM)
- EWSIP and ESP Linkages and Outcomes

**STT:** Source to Tap

**IFRM:** Integrated Flood Risk Management

**EWSIP:** Enhanced Water Security Investment Project

**ESP:** Engineering Services Project

# AGENDA

## ➤ **Workshop Agenda**

➤ Strategic Framework for EWSIP

➤ EWSIP Approach and Tools (STT and IFRM)

➤ EWSIP and ESP Linkages and Outcomes

### Agenda Event 1: 9 October 2019

Time	Activities	Facilitator	Participants/ Location
13:00 – 13:30	Registration	EWSIP-ADB	All
13:30 – 13:40	Opening Remarks	Director of Water Resources System Development	All, Plenary room
13:40 – 13:50	Opening Remarks	Director of Drinking Water Supply System Development, DGHS	All, Plenary room
13:50 – 14:30	Introduction of EWSIP: Innovations and Lessons learned: <ul style="list-style-type: none"> <li>Flood Risk Management (FRM)</li> <li>Source to Tap (STT)</li> </ul>	EWSIP-ADB	All, Plenary room
14:30 – 15:00	Panel discussion on Source to Tap (STT) approach as proposed in EWSIP: Challenges, Opportunities, Key lessons	Facilitated panel with BAPPENAS, Directorate General of Water Resources (DGWR), Directorate General of Human Settlements (DGHS), and ADB	All, Plenary room
15:00 – 15:15	<b>Coffee Break</b>		

Time	Parallel Session Flood Risk Management	Parallel Session Source to Tap Participants																				
15:15 – 17:30	Knowledge Sharing by EWSIP International Partners: <ul style="list-style-type: none"> <li>Earth Observation for Enhanced Water Security (LAPAN)</li> <li>Sustainable Water Resources Infrastructure through Nature Based Solutions in Cimanuk-Cisanggarung Basin (Deltares)</li> <li>Upstream watershed protection through UPLAND measures (International Fund for Agricultural Development)</li> <li>Towards Enhanced Resilience in Water Resources (TA 9191: Building Climate Change Resilience in Asia's Critical Infrastructure with Regional perspective)</li> </ul>	Knowledge Sharing by EWSIP i) STT Framework, ii) Smart-water Management, and iii) Asset Management Information System  Facilitated group work to verify subproject components at 8 STT locations. <table border="1"> <thead> <tr> <th>STT</th> <th>Location</th> <th>STT</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Keureuto</td> <td>5</td> <td>Bener</td> </tr> <tr> <td>2</td> <td>Lau Simeme</td> <td>6</td> <td>Sidan</td> </tr> <tr> <td>3</td> <td>Dadi Muria RWS</td> <td>7</td> <td>Tamblang</td> </tr> <tr> <td>4</td> <td>Jragung</td> <td>8</td> <td>Tukad Unda</td> </tr> </tbody> </table>	STT	Location	STT	Location	1	Keureuto	5	Bener	2	Lau Simeme	6	Sidan	3	Dadi Muria RWS	7	Tamblang	4	Jragung	8	Tukad Unda
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Who	Balai/DGWR/Dinas Prov/EWSIP-ADB	Balai <sup>7</sup> /PDAM/Dinas Province/Kabupaten, EWSIP-ADB																				
Location	SUMATERA	JAVA																				
18:00 – 20:00	<b>Dinner</b>																					

## Agenda Event 2: 10 October 2019

Time	Parallel Session Flood Risk Management	Parallel Session Source to Tap Participants																				
09:00 – 12:00	<p>Discussions by groups on subproject readiness, constraints, and opportunities.</p> <ul style="list-style-type: none"> <li>• Cimanuk Cisanggarung River Basin</li> <li>• Jratunseluna River Basin</li> <li>• Belawan Ular Padang River Basin</li> <li>• Mahakam River Basin</li> </ul>	<p>Discussions by groups on subproject readiness, constraints, and opportunities at 8 STT locations.</p> <table border="1"> <thead> <tr> <th>STT</th> <th>Location</th> <th>STT</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Keureuto</td> <td>5</td> <td>Bener</td> </tr> <tr> <td>2</td> <td>Lau Simeme</td> <td>6</td> <td>Sidan</td> </tr> <tr> <td>3</td> <td>Dadi Muria RWS</td> <td>7</td> <td>Tamblang</td> </tr> <tr> <td>4</td> <td>Jragung</td> <td>8</td> <td>Tukad Unda</td> </tr> </tbody> </table>	STT	Location	STT	Location	1	Keureuto	5	Bener	2	Lau Simeme	6	Sidan	3	Dadi Muria RWS	7	Tamblang	4	Jragung	8	Tukad Unda
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Location	SUMATERA	JAVA																				

Time	Activities	Facilitator	Participants/ Location
12:00 -12:15	Key take away per group Conclusions and Next Steps	Participants BAPPENAS	All, Plenary room
12:15 – 12:30	Conclusion and Closing Remarks	Head, Subdit of Cooperation	All, Plenary room
Who	Balai/DGWR/Dinas Prov/EWSIP-ADB	Balai <sup>9</sup> /PDAM/Dinas Province/Kabupaten, EWSIP-ADB inputs from TA 9191- Building Climate Change Resilience in Asia's Critical Infrastructure	
Location	JAVA		
12:30 – 13:30	<b>Lunch</b>		

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# RPJMN 2020/2024 Infrastructure Priorities

## PEMERATAAN (3T)

## PUSAT PERTUMBUHAN

## URBAN

### Penyediaan Pelayanan Dasar

Akses Perumahan dan Permukiman yang Layak dan Terjangkau

Pengelolaan Air Tanah, Air Baku dan Air Minum Berkelanjutan

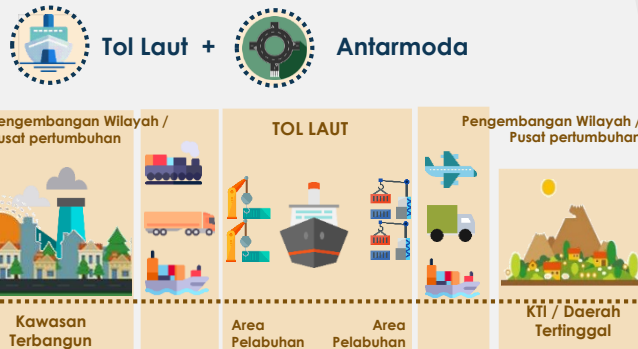
Akses Sanitasi Aman

Keamanan dan Keselamatan Transportasi

Ketahanan Kebencanaan Infrastruktur

### Infrastruktur Mendukung Sektor Unggulan

#### Konektivitas



- Waduk Multipurpose dan Modernisasi Irigasi
- Pengembangan Terpadu Wilayah Pesisir
- Aksesibilitas Daerah Tertinggal

#### Sektor Unggulan



### Infrastruktur Perkotaan (Smart City)

- Smart Housing
- Smart Mobility
- Smart Environment
- Smart Disaster Management
- Smart Economy
- Smart People
- Smart Government

### Energi, Ketenagalistrikan dan TIK

#### Pembangunan Energi dan Ketenagalistrikan

- Energy Equity** : Rasio Elektrifikasi dan Kualitasnya(SAIDI dan SAIFI) serta Bahan Bakar untuk Memasak
- Energy Security** : Pembangunan Infrastruktur Energi (Pembangkit listrik, Smart Grid, Jaringan pipa gas, dan kilang)
- Environmental Sustainability** : Pengembangan EBT dan Efisiensi Energi



- Restrukturisasi sektor ketenagalistrikan (redefinisi tupoksi PT PLN)
- Kebijakan harga dan subsidi
- Insentif daerah (bagi hasil dari pembangunan infrastruktur energi)

#### Pembangunan TIK:

- Pemerataan infrastruktur dan akses TIK
- Pemanfaatan/utilisasi TIK di dunia usaha,
- Pemanfaatan/utilisasi TIK pada bidang pemerintahan dan layanan publik



- Peningkatan kapasitas industri TIK dalam negeri
- Peningkatan kapasitas SDM TIK dan literasi digital masyarakat
- Dukungan regulasi dan kebijakan

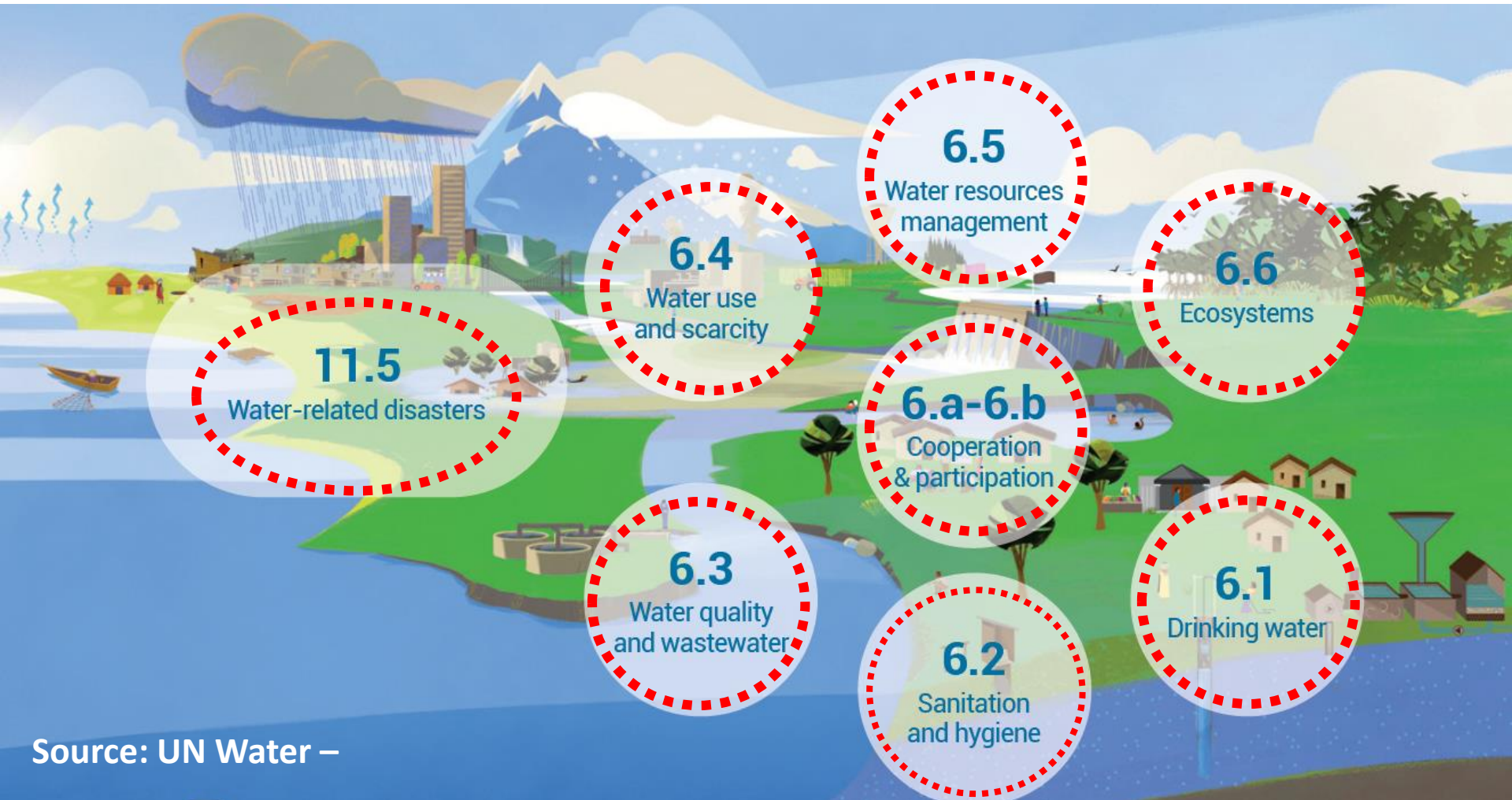
## Rencana Pembangunan Jangka Menengah Nasional (RPJMN) National Long-Term Development Plan

# BAPPENAS Quick-Win Programs





# Water Security: Linkages through the SDGs

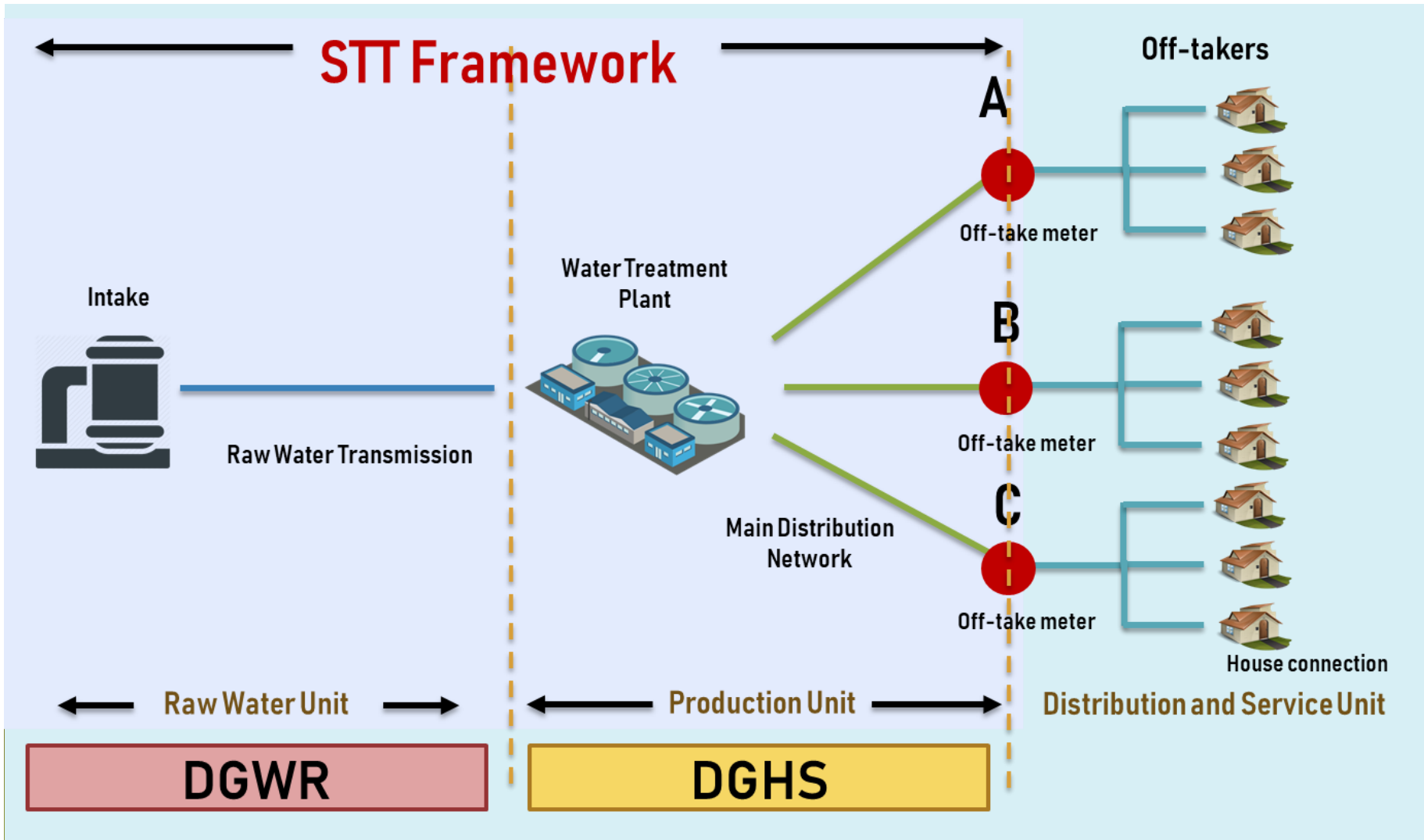


Source: UN Water –

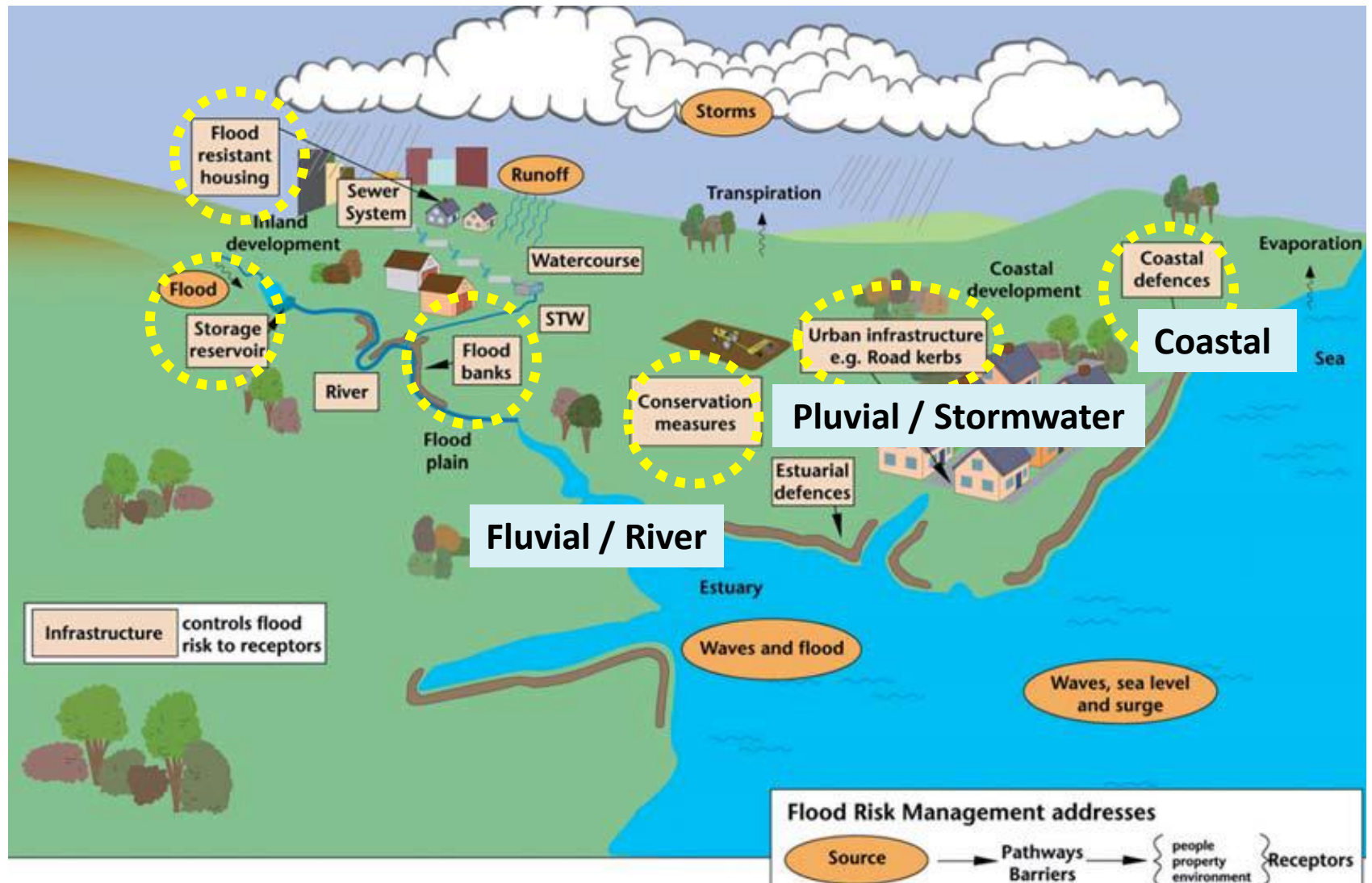
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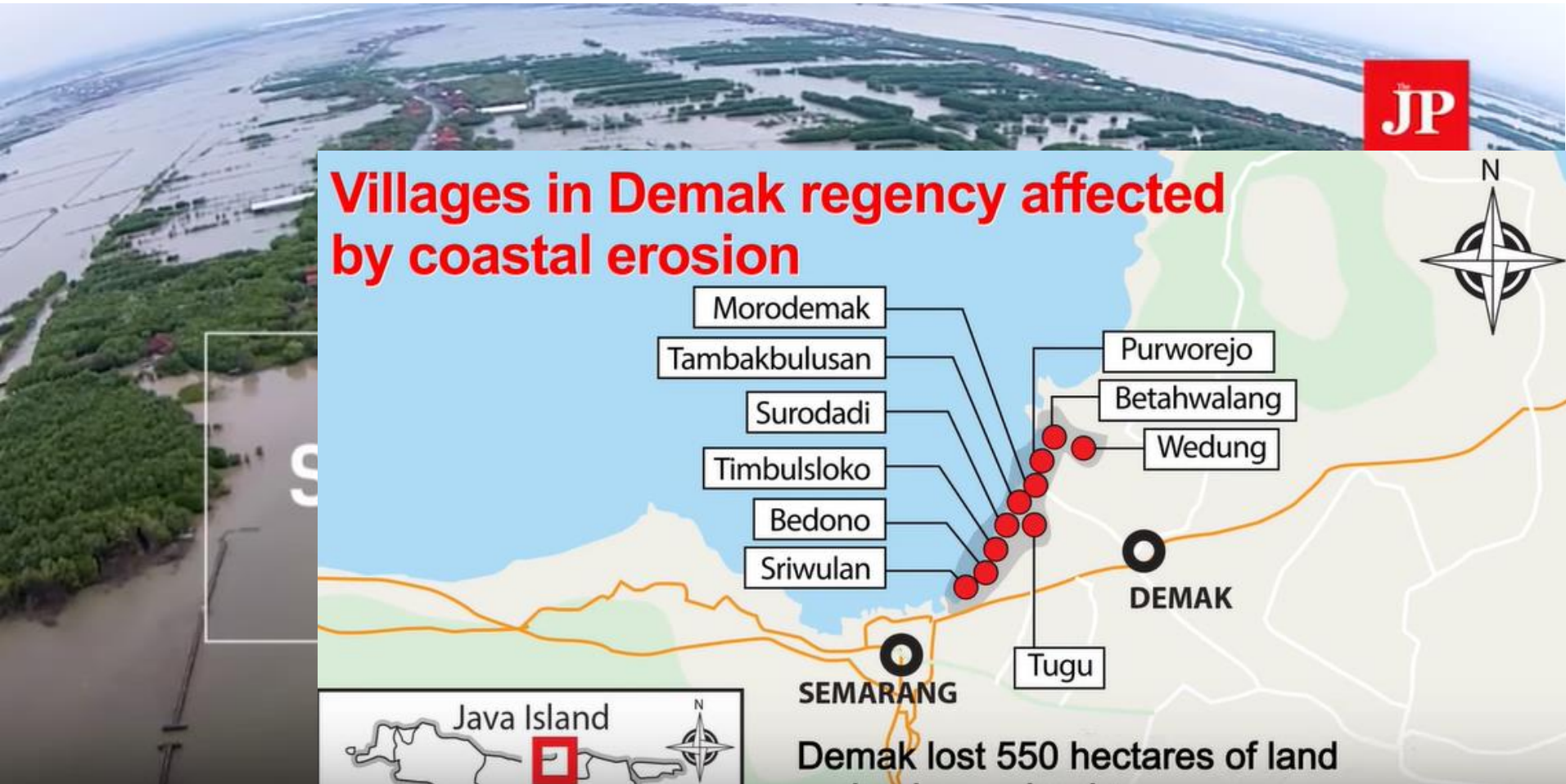
# Source-to-Tap Framework



# Integrated Flood Risk Management Framework



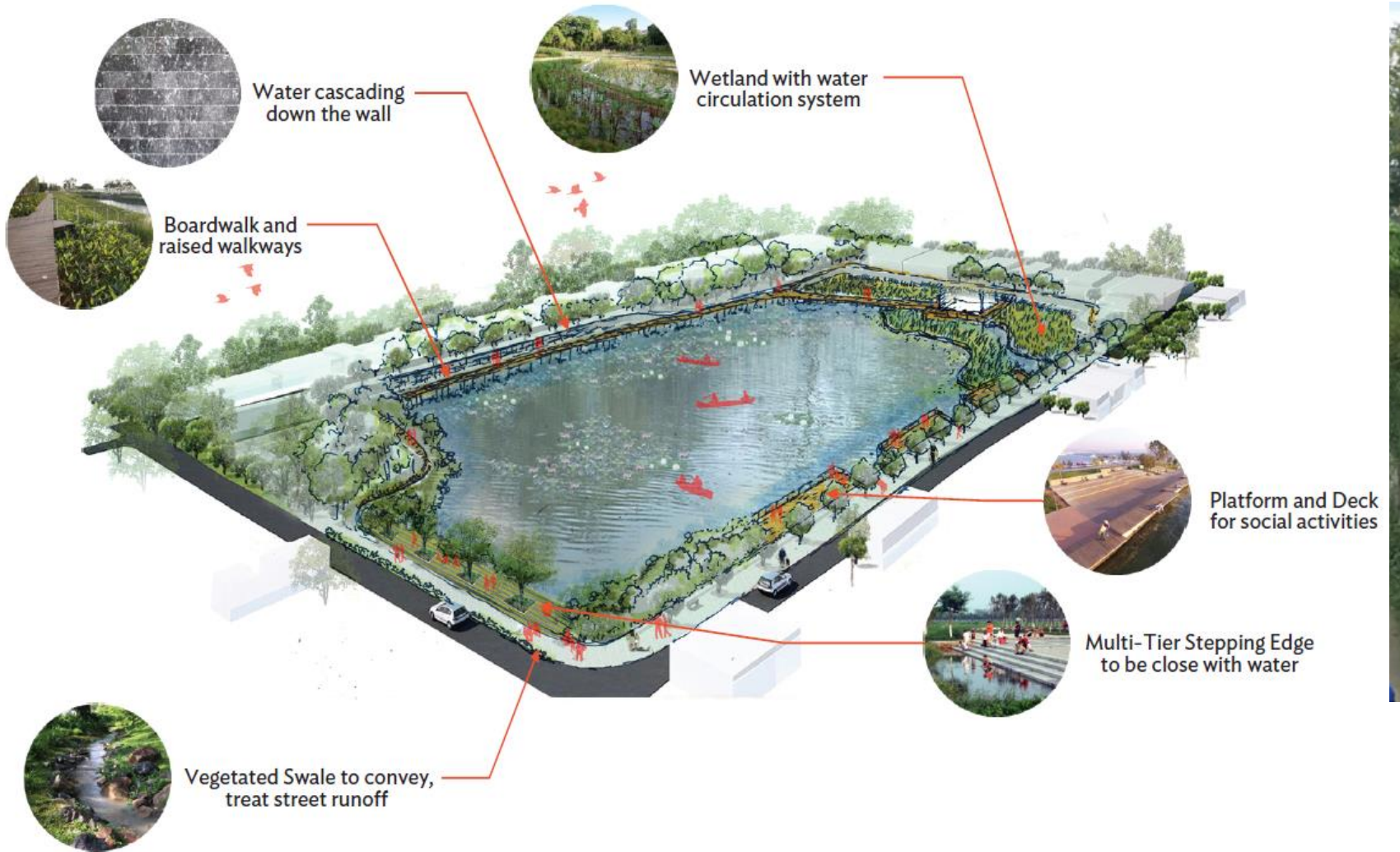
# Climate Change / Coastal Processes



# Land Subsidence



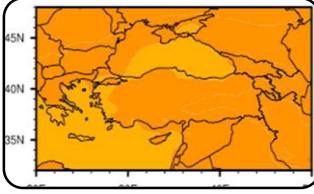
# Nature Based Solutions



# AGENDA

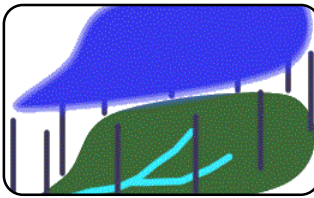
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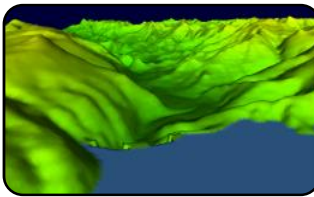
## Climate Change Modelling: TA 9191

- *Scope:* Climate change projections and anomalies
- *Database:* Temperature, Precipitation and Evaporation



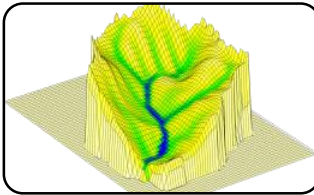
## Hydrologic Modelling: EWSIP

- *Scope:* Evaluation of Rainfall to Runoff processes
- *Database:* Hydromet. network (BWS/PUSAIR), LULC (ESA)



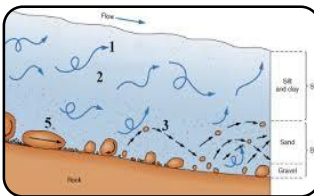
## Hydraulic Modelling: EWSIP

- *Scope:* Evaluation of Runoff to River hydraulics (1D/2D)
- *Database:* Flow gage network, DEM (BIG), Validate (ESA)



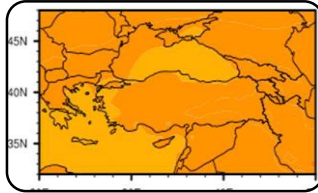
## Erosion Modelling: ESA

- *Scope:* Sediment yield from the watershed
- *Database:* RUSLE / MUSLE parameters



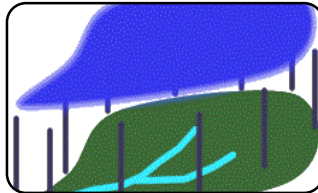
## Sediment Yield and Watershed Management: IFAD

- *Scope:* Sediment yield along the watershed system
- *Database:* Sediment characterization, WOCAT (World Overview of Conservation Approaches and Technologies)



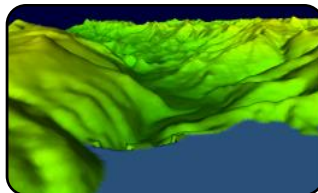
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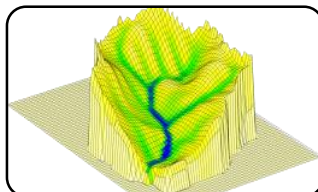
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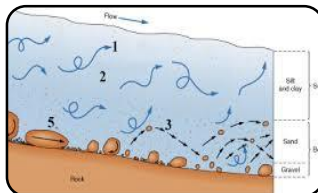
### Water Allocation Management: EWSIP

- *Scope:* Evaluation of Optimized Water Supply
- *Database:* Reservoir Inflow/Storage, Distribution, Demand



### Erosion Modelling: ESA

- *Scope:* Sediment yield from the watershed
- *Database:* RUSLE / MUSLE parameters



### Sediment Yield and Watershed Management: IFAD

- *Scope:* Sediment yield along the watershed system
- *Database:* Sediment characterization, FAO-WOCAT (World Overview of Conservation Approaches and Technologies)

# EWSIP: Scenario Analysis

- ➡ - SC1: Existing conditions without FRM projects
- ➡ - SC2: BBWS proposals for FRM
- ➡ - SC3: EWSIP enhancements for FRM
- ➡ - SC4: SC3 with climate change (2030 and 2050)

# EWSIP / ESP STT Portfolio

INDONESIA  
EWSIP-ESP SOURCE TO TAP (STT) PORTFOLIO

## Contribution of STT to Drinking Water supply

By 2030: 10 – 30%

By 2050: 10 – 20%

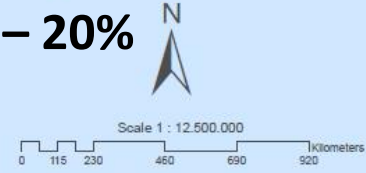
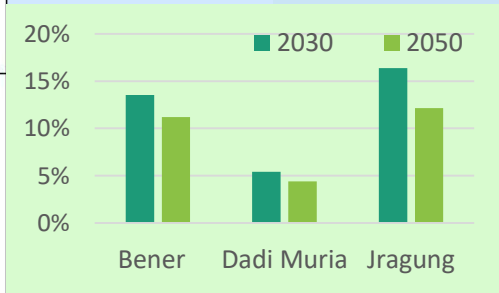
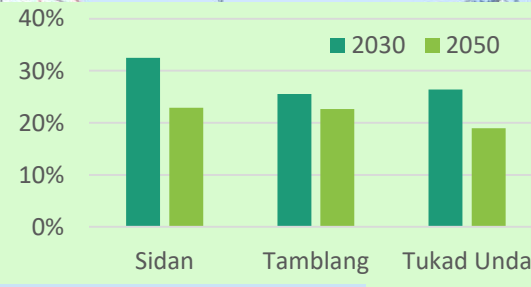
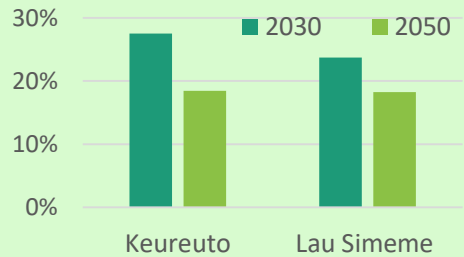
Keureuto Reservoir

Lau Simeme Reservoir

Bener Reservoir

Jragung Reservoir & Dadi Muria RWS

Sidan, Tamblang, Tukad Unda Reservoirs



# EWSIP / ESP IFRM Portfolio

**Buildings and People: FRM 1 (Risk) – FRM 2 (No Risk)**

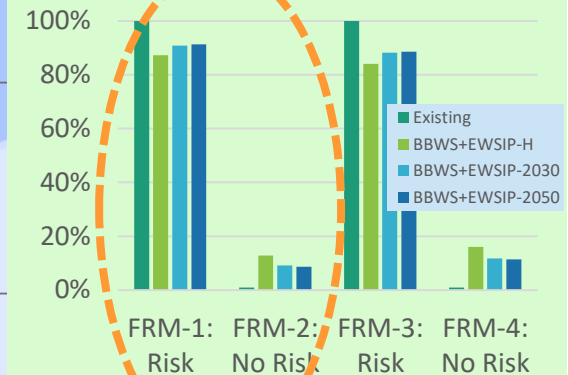
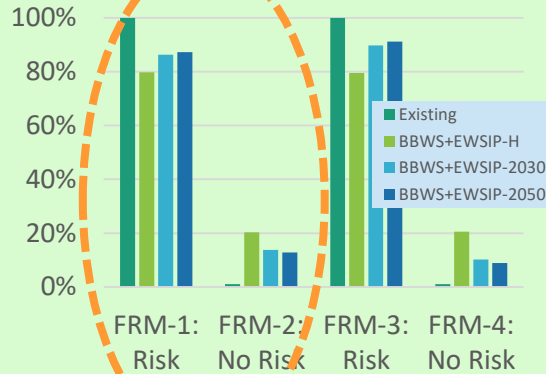
**Agriculture Areas: FRM 3 (Risk) – FRM 4 (No Risk)**

**Contribution of IFRM to reduction in FR**

**Buildings and People: 20% - 30%**

**Agriculture areas: 10% - 20%**

**Belawan  
Ular Padang**

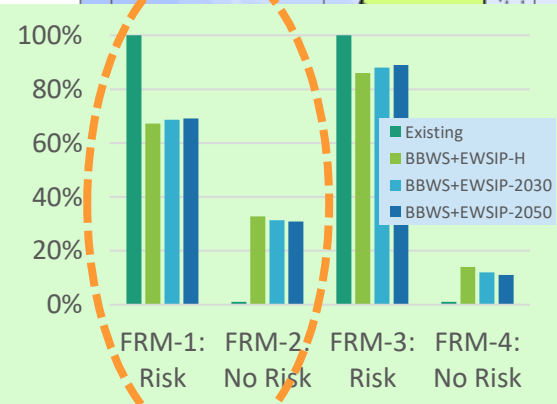


**Mahakam**

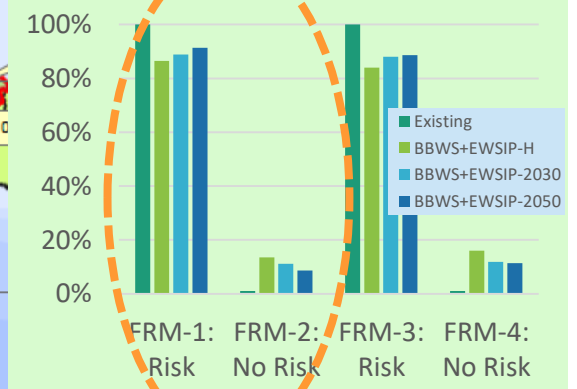
- 03 PADANG
- 04 CIMANUK
- 05 CISANGGARUNG
- 06 BABAKAN
- 07 SERANG
- 08 LUSI
- 09 WULAN
- 10 JUANA
- 11 MAHAKAM
- 12 KARANGMUMUS

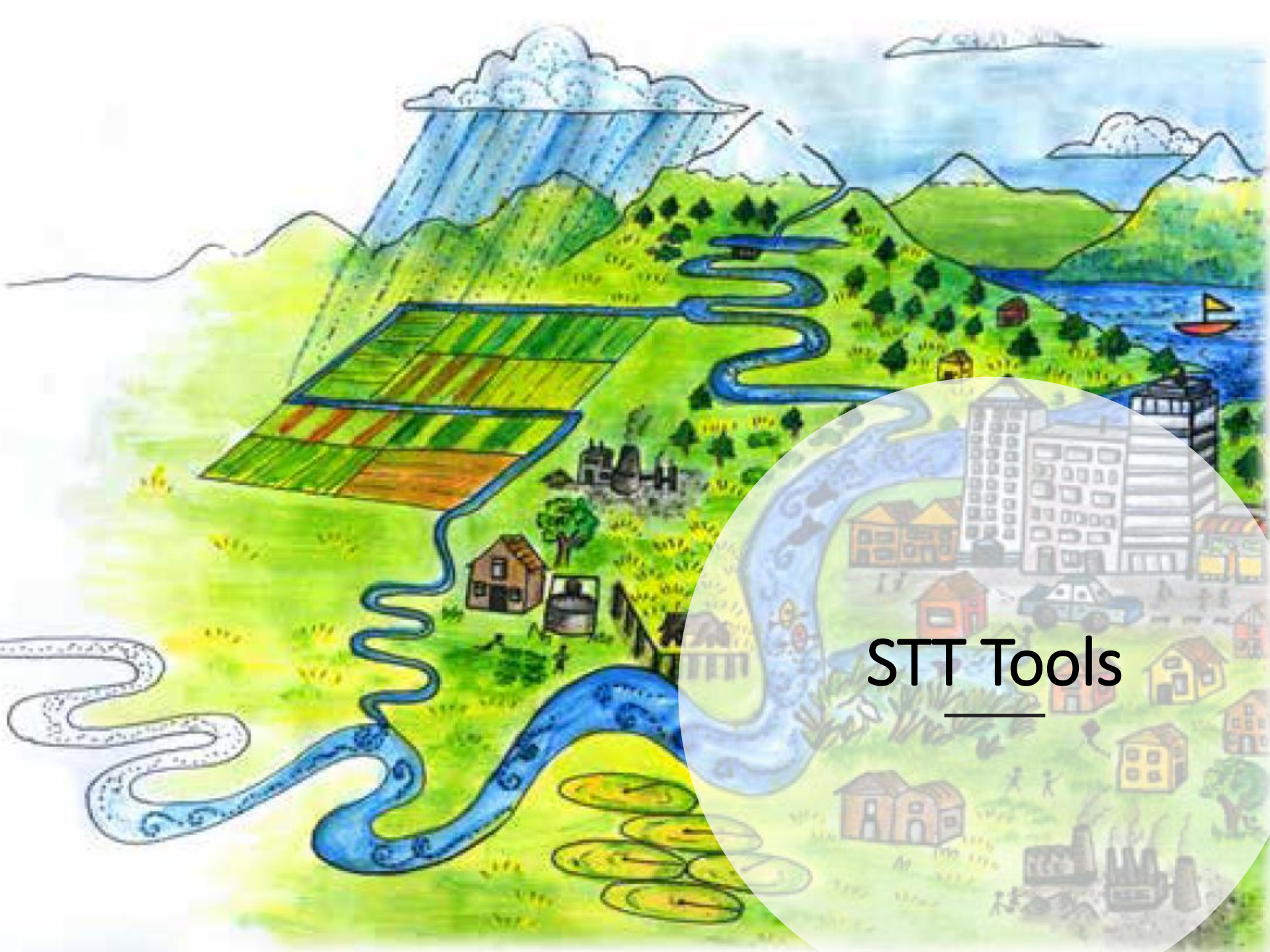
**Legend :**  
 ● City  
 — Province Bound  
 — River  
 — River Basin Bound

**Jratun  
Seluna**



**Cimanuk  
Cisanggarung**





STT Tools

# European Space Agency (ESA) - Geo4IRBM

1. Hydrologic characterization: Rainfall to Runoff
2. Soil Erosion / Sediment yield characterization:  
Reservoir storage
3. Crop intensity characterization: Irrigation Water  
Demand and Consumption

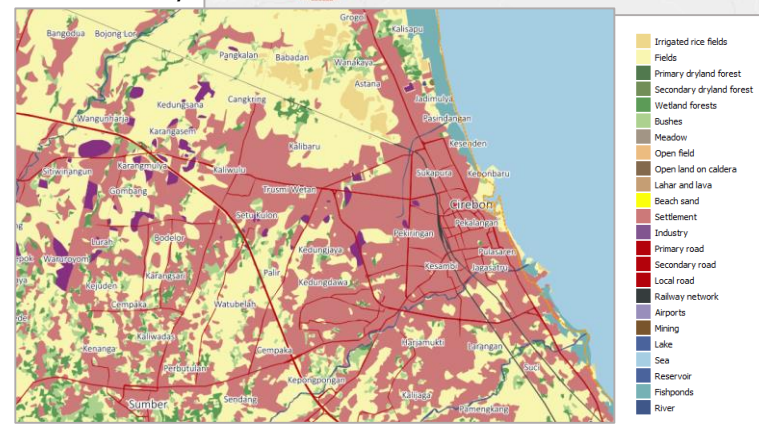
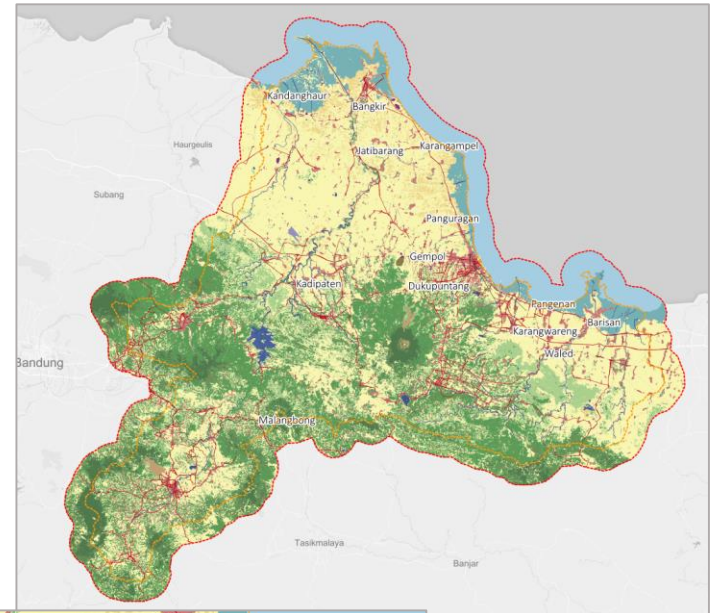
# 1. Hydrologic Characterization

## Land Cover Maps

Applied for:

- Hydrological and hydrodynamic models to optimize water management, as information on terrain roughness
- Reference for Potential soil erosion modelling, Land Cover Changes mapping, Cropping intensity mapping, Ecosystems mapping

Land Cover map for Cimanuk-Cisanggarung WS



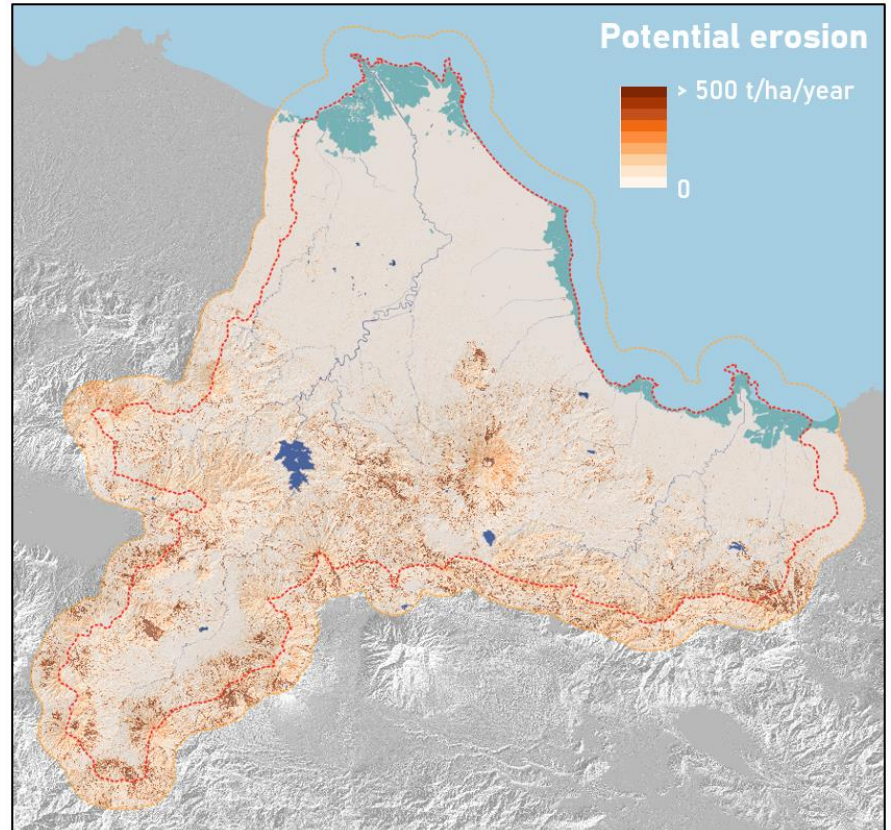


# 2.1 Soil Erosion Characterization

## Potential Soil Erosion Maps

Applied for:

- Delimitation of areas endangered with high erosion (consequence of deforestation and lava flows)
- Delimitation of areas endangered with landslides (possible influence on streams flows and floods occurrences)
- Sediment yield modelling



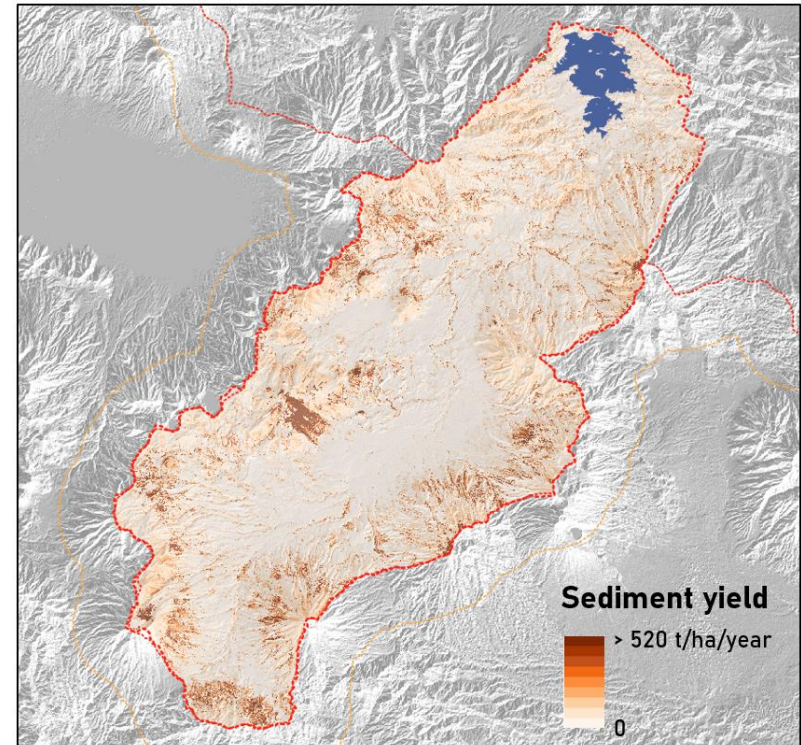
# 2.2 Sediment Yield Characterization

Jatigede Reservoir

## Sediment yield modelling

Applied for:

- Determination of expected lifespan of selected reservoirs
- Support in prioritisation of investments connected water supply assurance for agriculture
- Support in initial definition of infrastructural countermeasures against silting of reservoirs

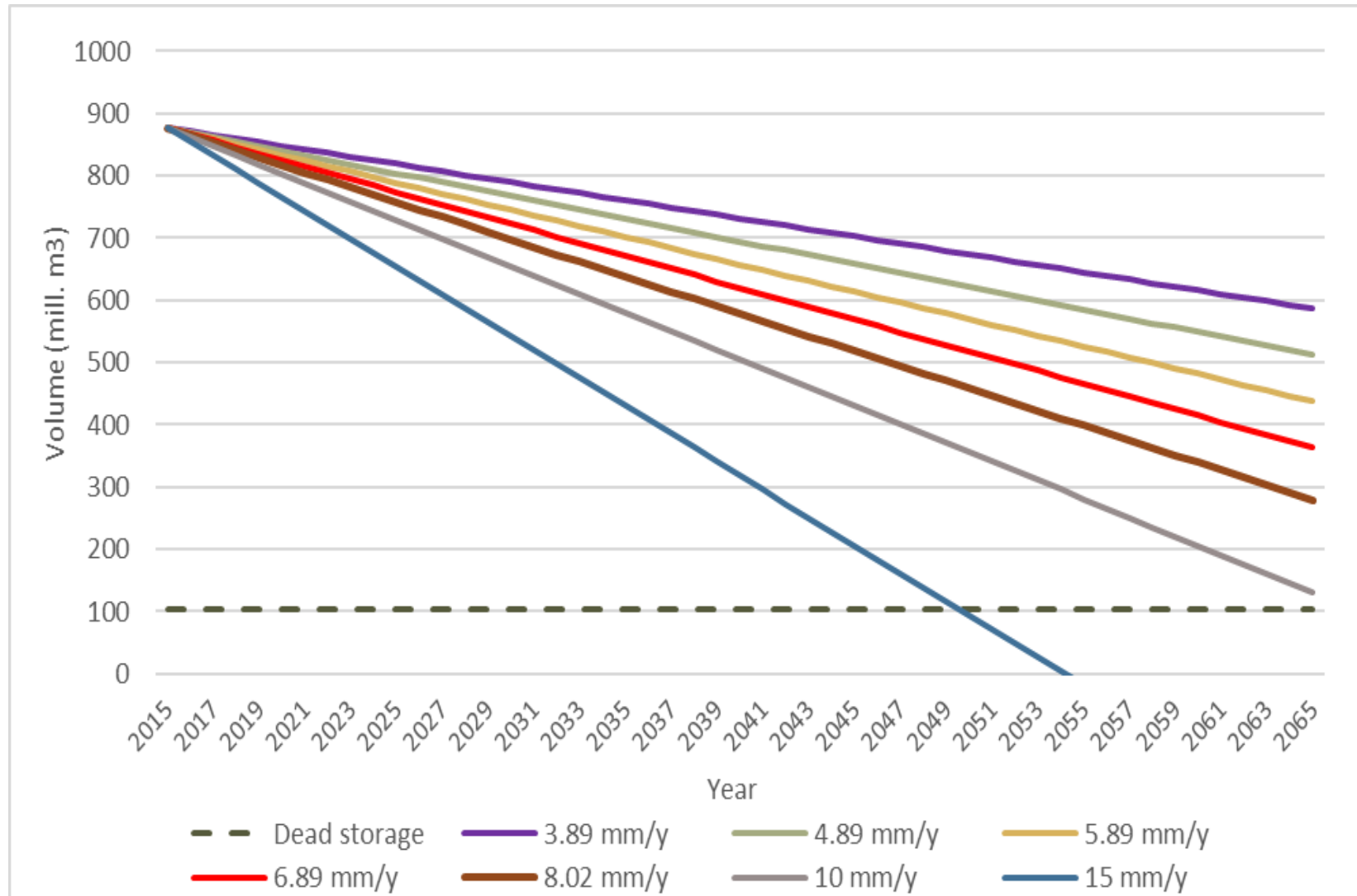


### Jatigede Reservoir

Capacity: 800Mm<sup>3</sup>  
Basin area: 1490.59km<sup>2</sup>

Scenario	Sediment yield		Reservoir fill time
	t/year	m <sup>3</sup> /year*	years
Current annual precipitation	12,300,000.94	10,271,439.12	95.41
5% precipitation increase	12,988,612.14	10,823,843.45	90.54
10% precipitation increase	13,663,773.87	11,386,478.22	86.07
15% precipitation increase	14,342,117.80	11,951,764.83	82

# 2. Sediment Yield Characterization



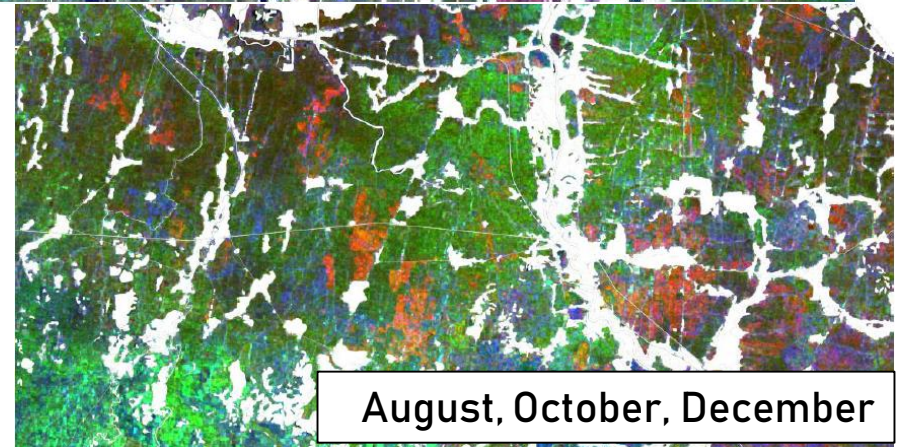
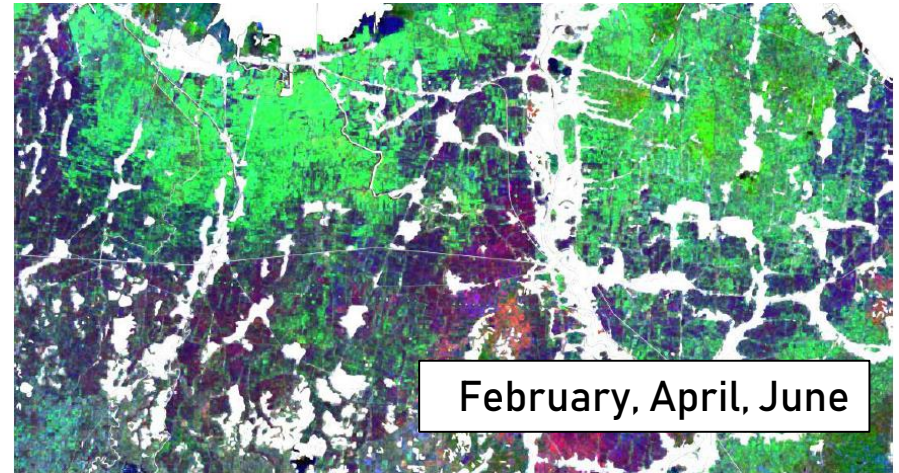
# 3. Crop Intensity Characterization

Crop intensity in agricultural areas driven by the difference in color composition caused by:

- water coverage on the fields
- different types of crops cultivated

## Benefits:

- Assess coverage of agriculture area
- Estimates on crop patterns and crop water requirements
- Assess irrigation water demand



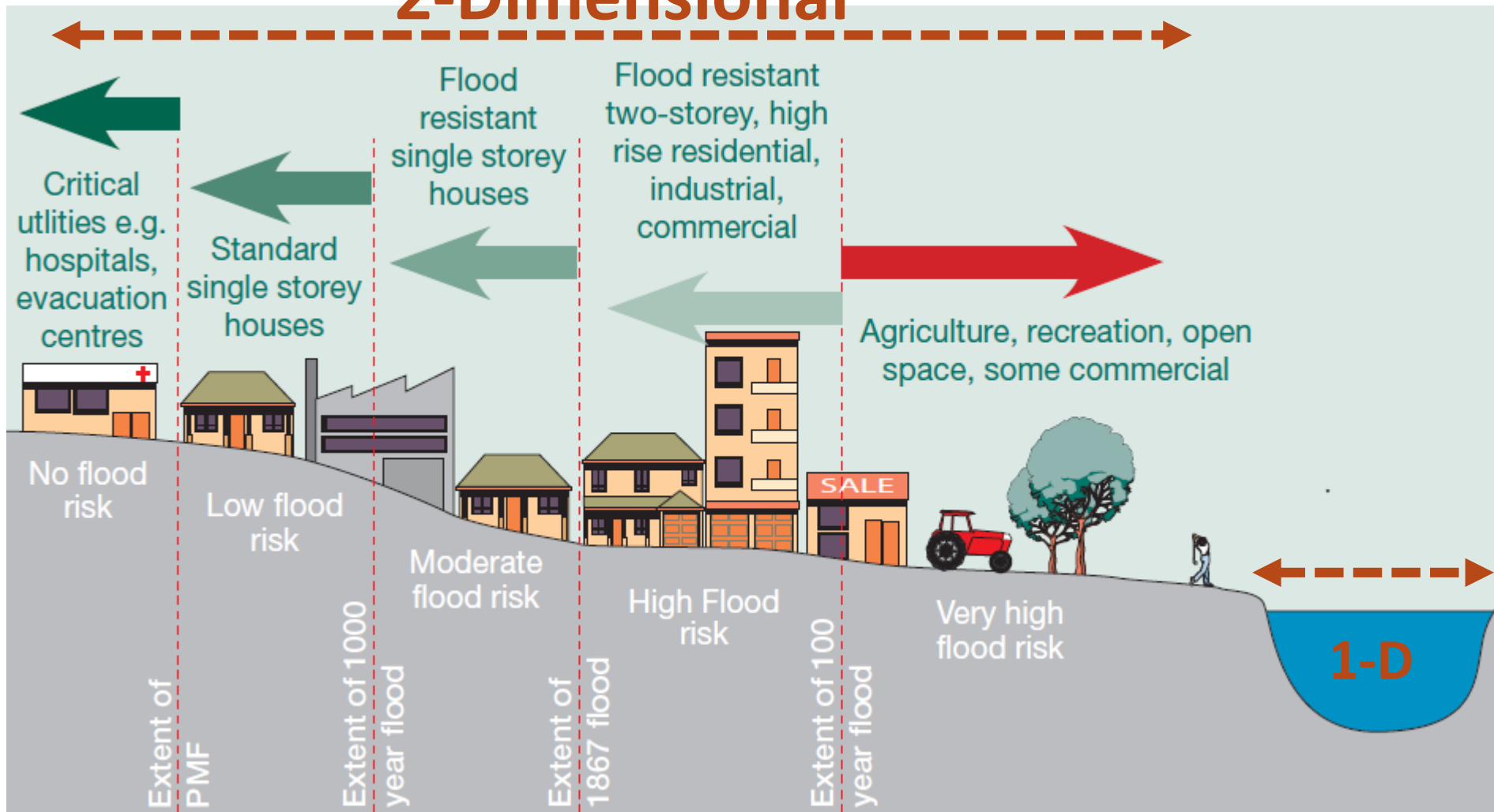


# IFRM Tools

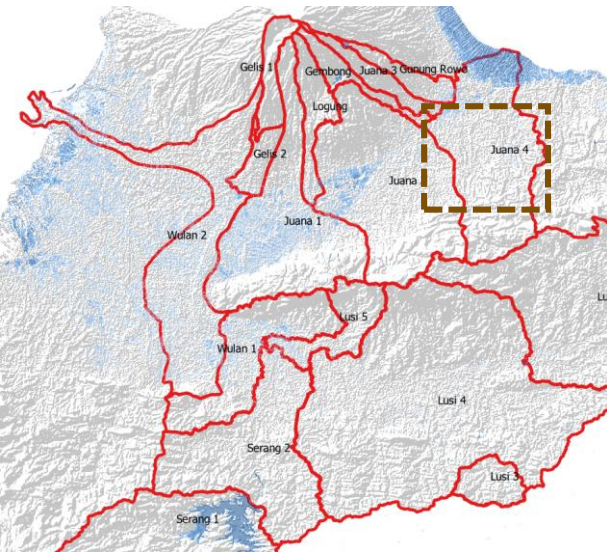
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# Enhanced Flood Risk Protection

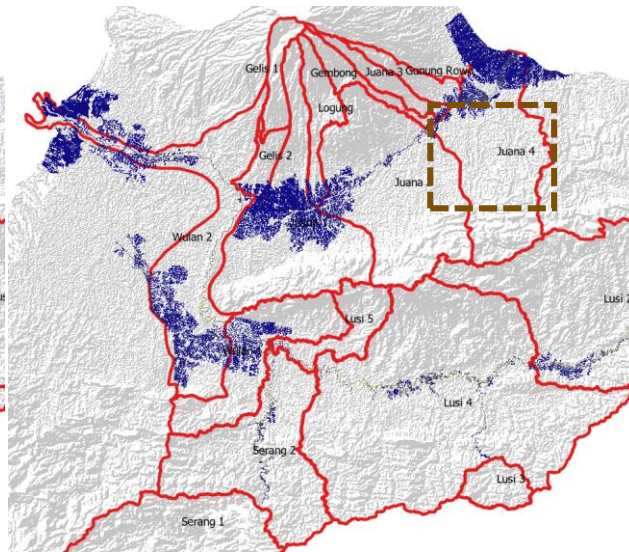
## 2-Dimensional



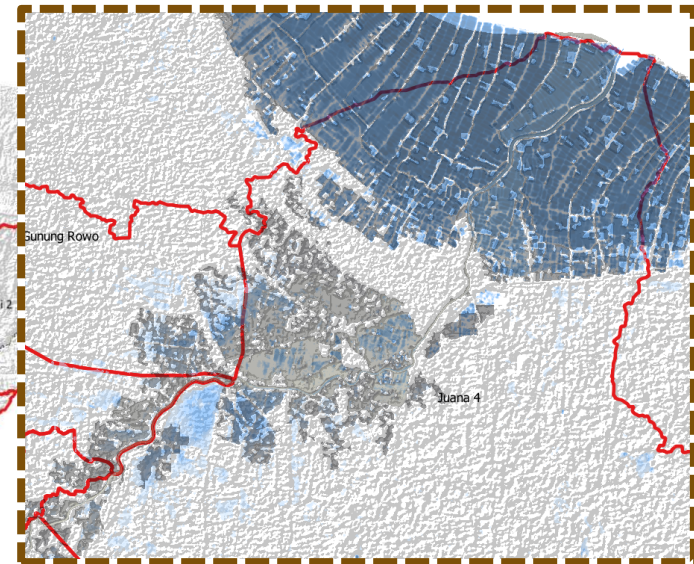
# ESA-Geo4IRBM Water Surface Map-Validation / Evaluation of Water Extent in 2D hydraulics



Geo4IRBM Water Surface Map



2D Flood Model EWSIP (Q25)



Comparison of Geo4IRBM Water Surface Map and 2D Flood Model EWSIP (Q25)

ESA – Sentinel  
images:  
Water extent



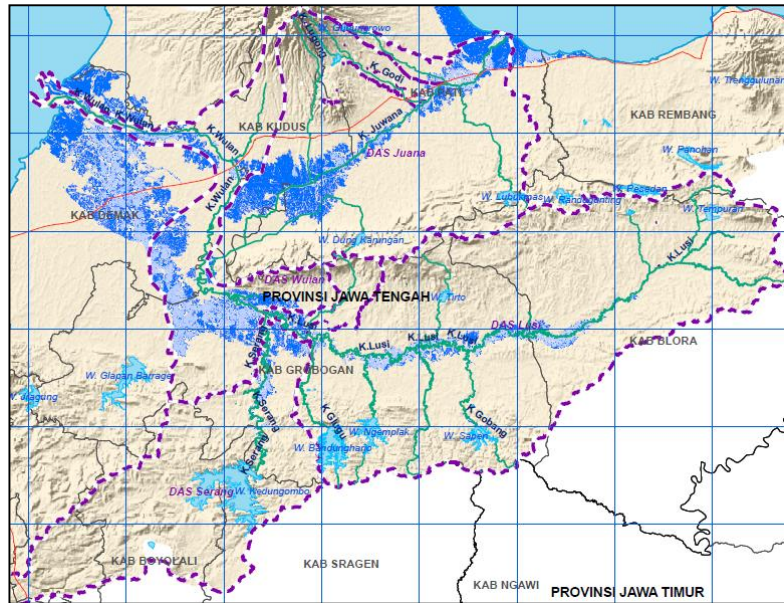
EWSIP – 2D  
Hydraulic models



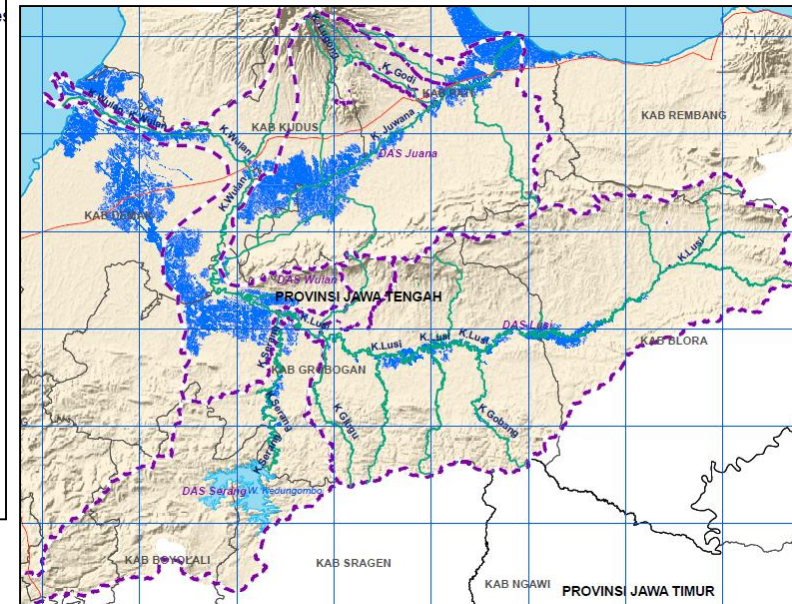
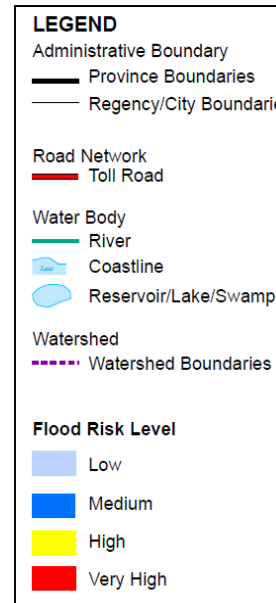
EWSIP – 2D  
Hydraulic models  
validated via ESA

# Flood Risk – 2D Hydraulics (Extent – Hazard – Risk)

- Scenarios: 1 and 4
- Flood Hydrographs: 5-year, 25-year
- Map: Flood Risk



(a) Flood Risk Map Scenario 1



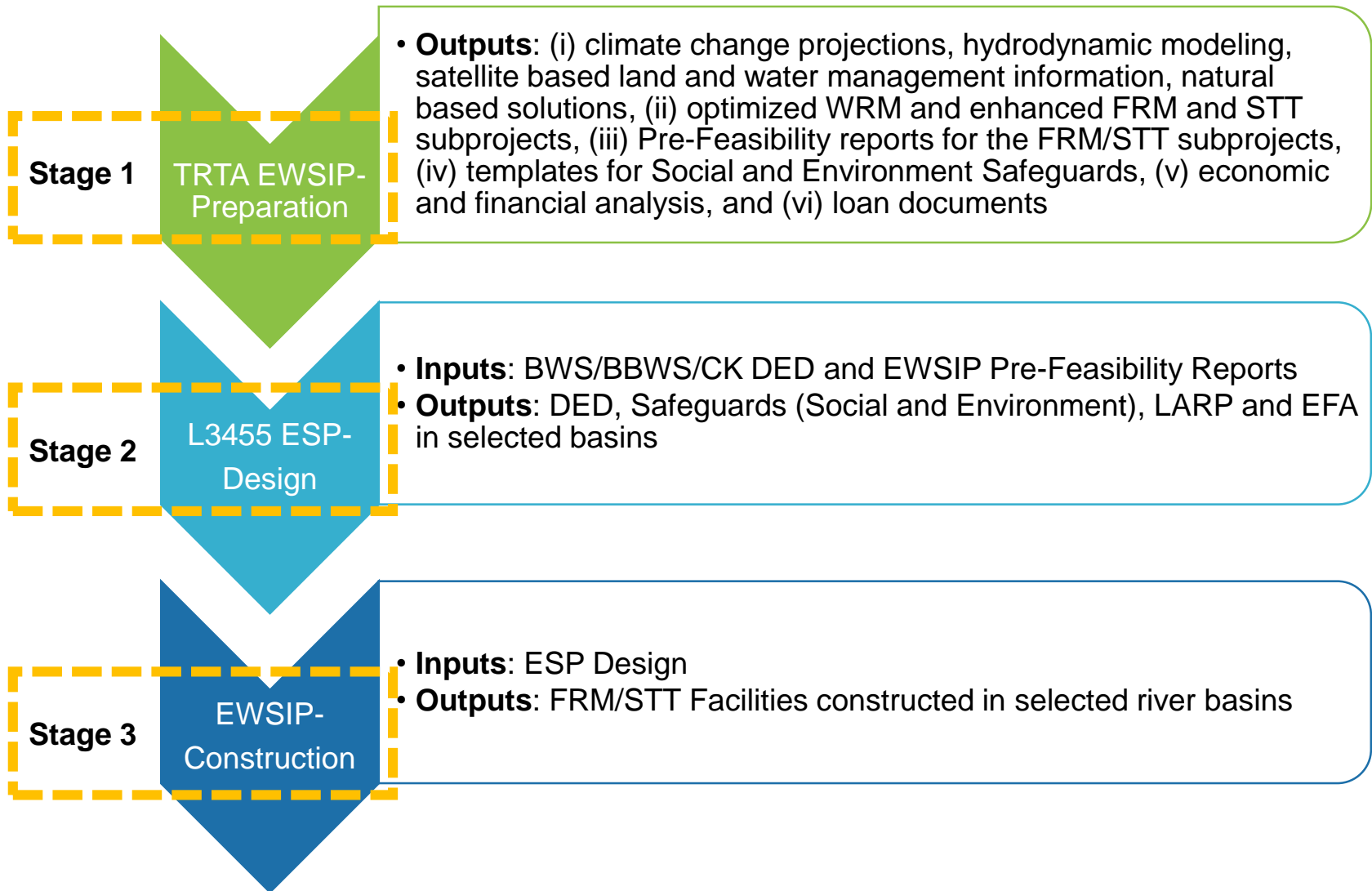
b) Flood Risk Map Scenario 4



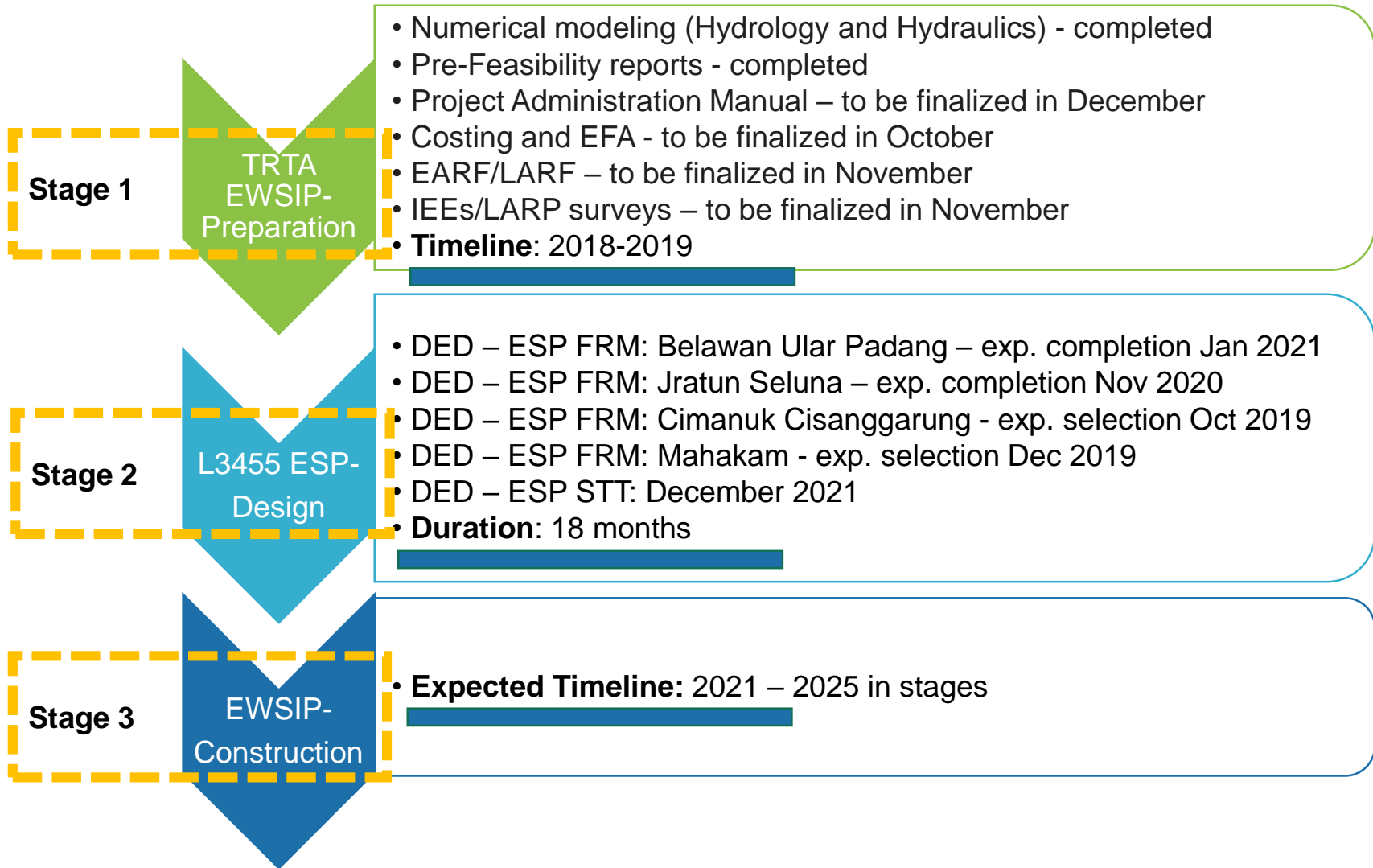
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# EWSIP and ESP Linkages



# EWSIP and ESP Implementation Period



# Feasibility/Master Plan Guidance for STT/IFRM

- **Technical**

- ➔ • Numerical modelling in hydrology/hydraulics/sediment yield/climate change
- ➔ • Surveys in geotechnical/land use-land cover/households/assets
- ➔ • Topographic mapping (DEM, River-bathymetry, LIDAR-floodplain, pipeline route)
- ➔ • Analyses for structures/soil mechanics/foundations

- **Safeguards (Environment and Social)**

- **Economic and Financial Analyses**

**Flood Risk Management – improved level of protection**

**Water Allocation Management – improved level of delivery**



ASIAN DEVELOPMENT BANK



# Proposed Enhanced Water Security Investment Project (EWSIP)

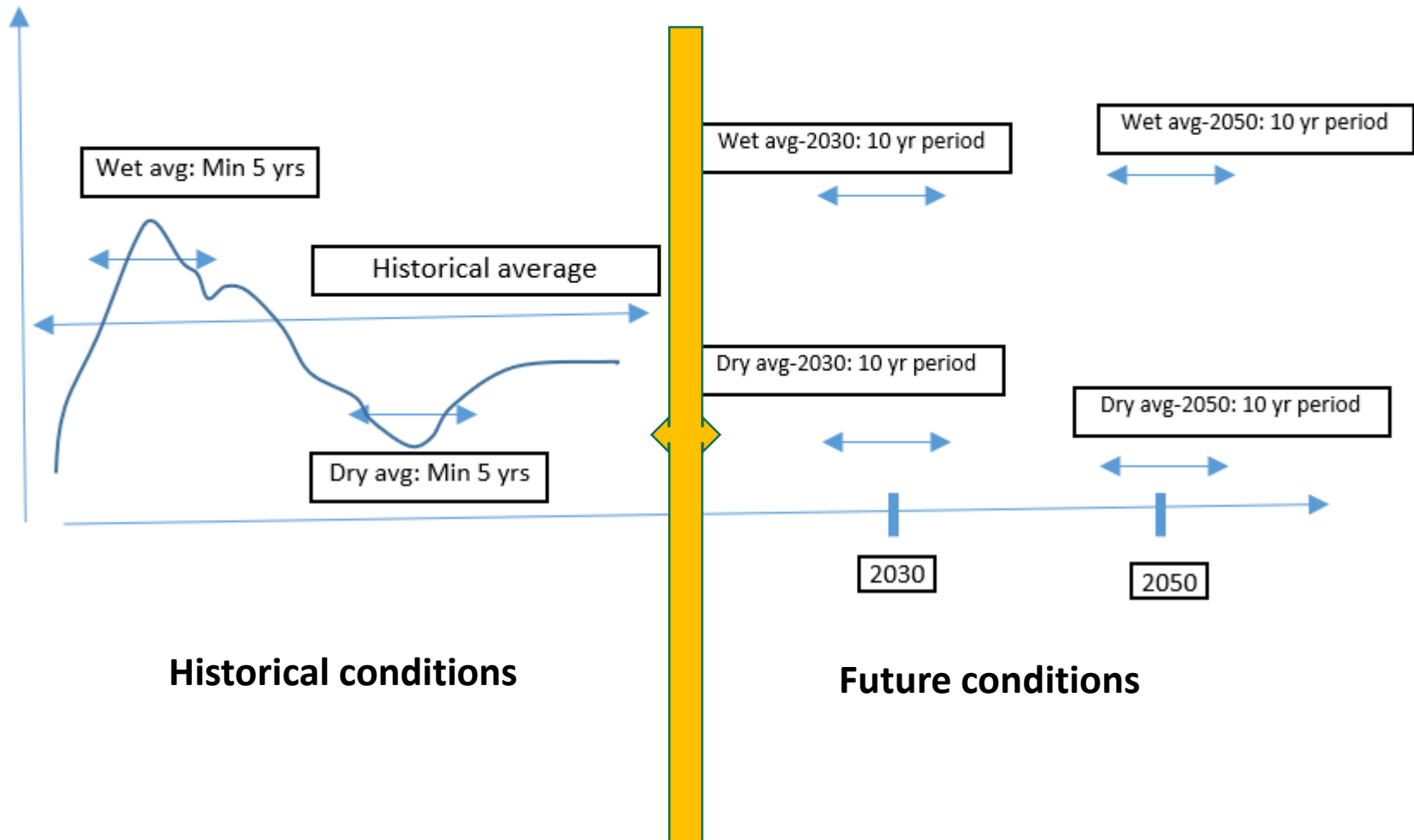
**Terima Kasih..**

### Agenda Event 1: 9 October 2019

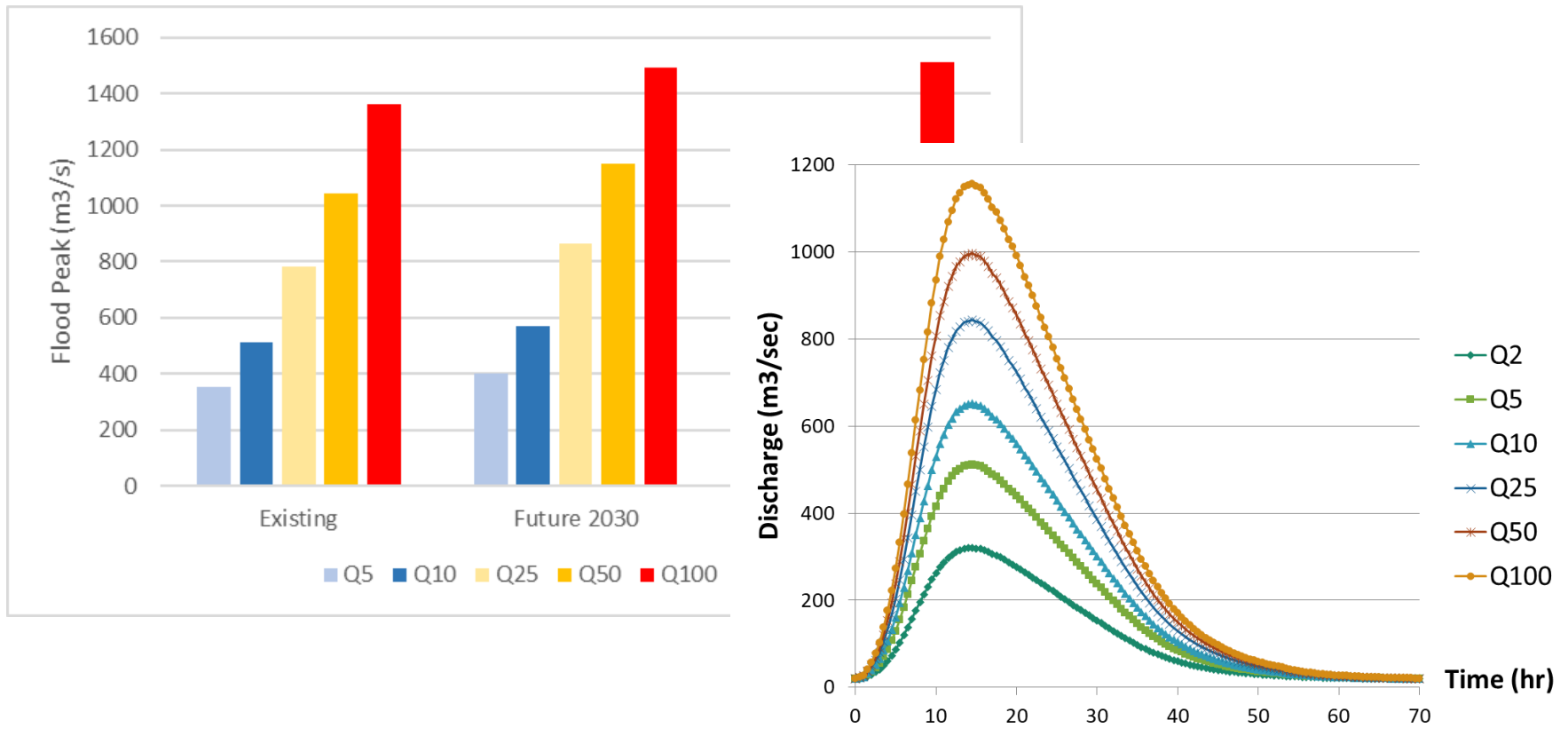
Time	Activities	Facilitator	Participants/ Location
13:00 – 13:30	Registration	EWSIP-ADB	All
13:30 – 13:40	Opening Remarks	Director of Water Resources System Development	All, Plenary room
13:40 – 13:50	Opening Remarks	Director of Drinking Water Supply System Development, DGHS	All, Plenary room
13:50 – 14:30	Introduction of EWSIP: Innovations and Lessons learned: <ul style="list-style-type: none"> <li>Flood Risk Management (FRM)</li> <li>Source to Tap (STT)</li> </ul>	EWSIP-ADB	All, Plenary room
14:30 – 15:00	Panel discussion on Source to Tap (STT) approach as proposed in EWSIP: Challenges, Opportunities, Key lessons	Facilitated panel with BAPPENAS, Directorate General of Water Resources (DGWR), Directorate General of Human Settlements (DGHS), and ADB	All, Plenary room
15:00 – 15:15	<i>Coffee break</i>		

Time	Parallel Session Flood Risk Management	Parallel Session Source to Tap Participants																				
15:15 – 17:30	Knowledge Sharing by EWSIP International Partners: <ul style="list-style-type: none"> <li>Earth Observation for Enhanced Water Security (LAPAN)</li> <li>Sustainable Water Resources Infrastructure through Nature Based Solutions in Cimanuk-Cisanggarung Basin (Deltares)</li> <li>Upstream watershed protection through UPLAND measures (International Fund for Agricultural Development)</li> <li>Towards Enhanced Resilience in Water Resources (TA 9191: Building Climate Change Resilience in Asia's Critical Infrastructure with Regional perspective)</li> </ul>	Knowledge Sharing by EWSIP i) STT Framework, ii) Smart-water Management, and iii) Asset Management Information System  Facilitated group work to verify subproject components at 8 STT locations. <table border="1"> <thead> <tr> <th>STT</th> <th>Location</th> <th>STT</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Keureuto</td> <td>5</td> <td>Bener</td> </tr> <tr> <td>2</td> <td>Lau Simeme</td> <td>6</td> <td>Sidan</td> </tr> <tr> <td>3</td> <td>Dadi Muria RWS</td> <td>7</td> <td>Tamblang</td> </tr> <tr> <td>4</td> <td>Jragung</td> <td>8</td> <td>Tukad Unda</td> </tr> </tbody> </table>	STT	Location	STT	Location	1	Keureuto	5	Bener	2	Lau Simeme	6	Sidan	3	Dadi Muria RWS	7	Tamblang	4	Jragung	8	Tukad Unda
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Who	Balai/DGWR/Dinas Prov/EWSIP-ADB	Balai <sup>7</sup> /PDAM/Dinas Province/Kabupaten, EWSIP-ADB																				
Location	SUMATERA	JAVA																				
18:00 – 20:00	<i>Dinner</i>																					

# Water Availability Hydrographs: Existing conditions and Future projections



# Flood Hydrographs: Existing conditions and Future projections - IFRM





# Hydraulic Modelling: Integrated Flood Risk Management

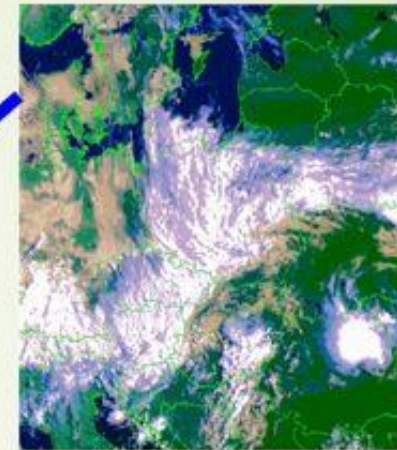


Remote automatic weather station in Switzerland

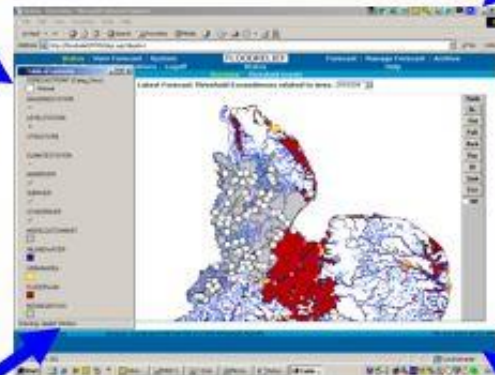
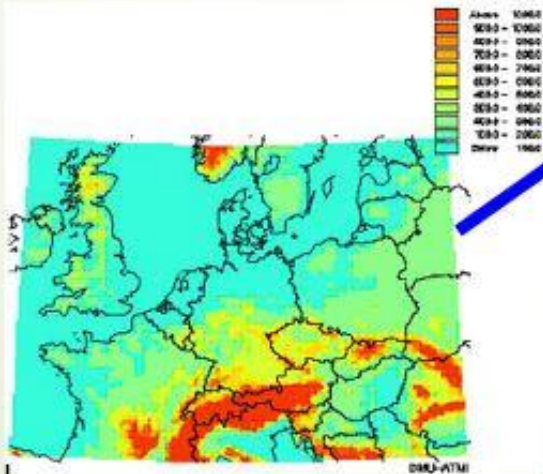
Real-time Precipitation  
And Flow



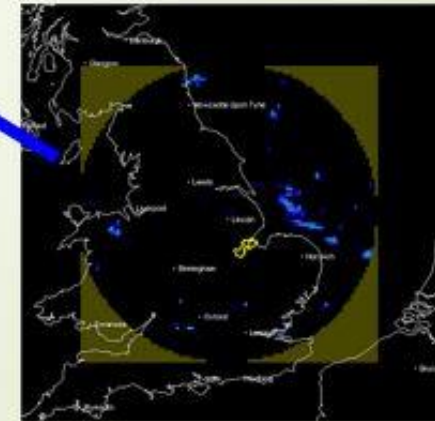
Satellite



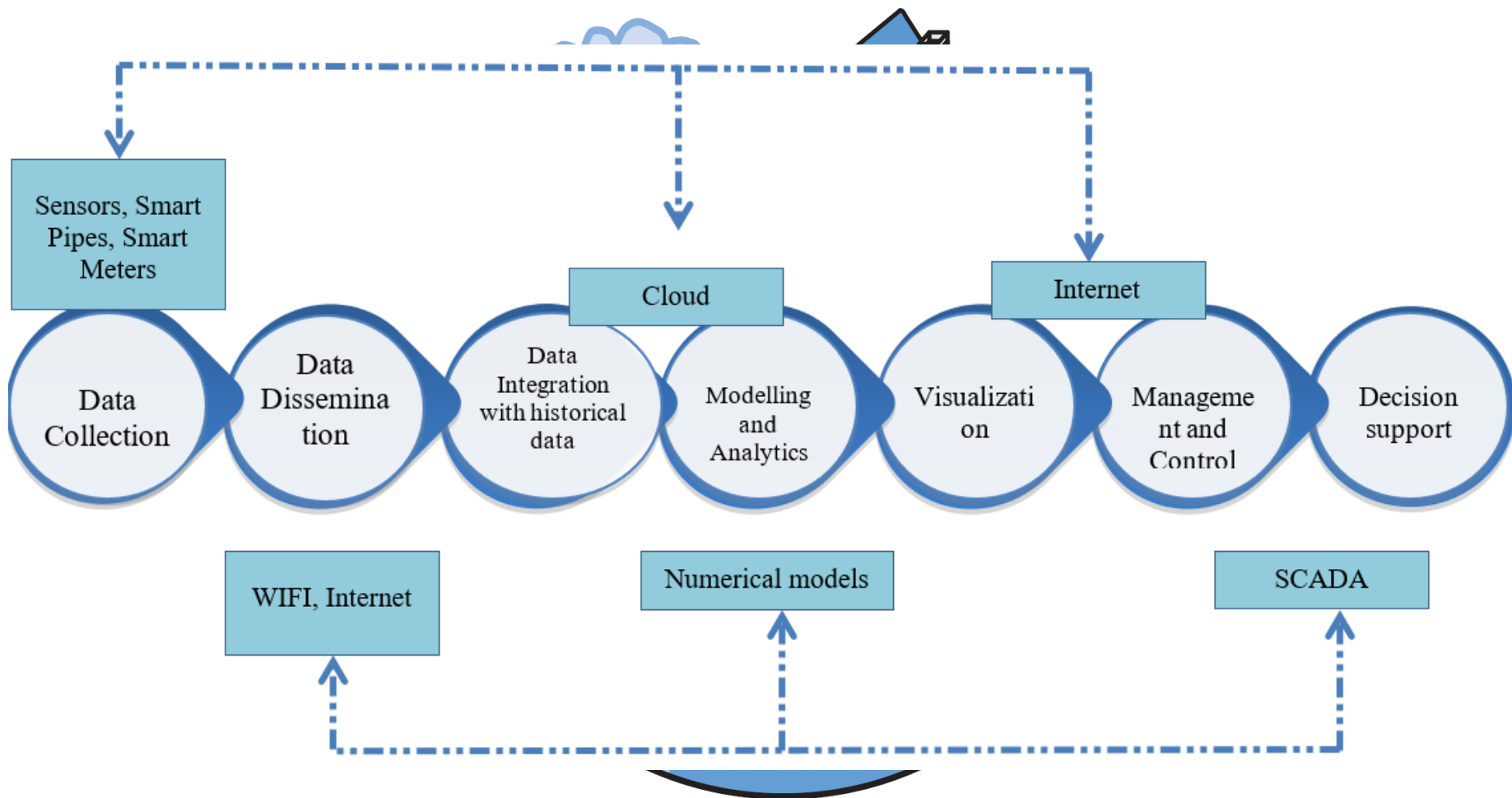
Meteorologic  
Forecast



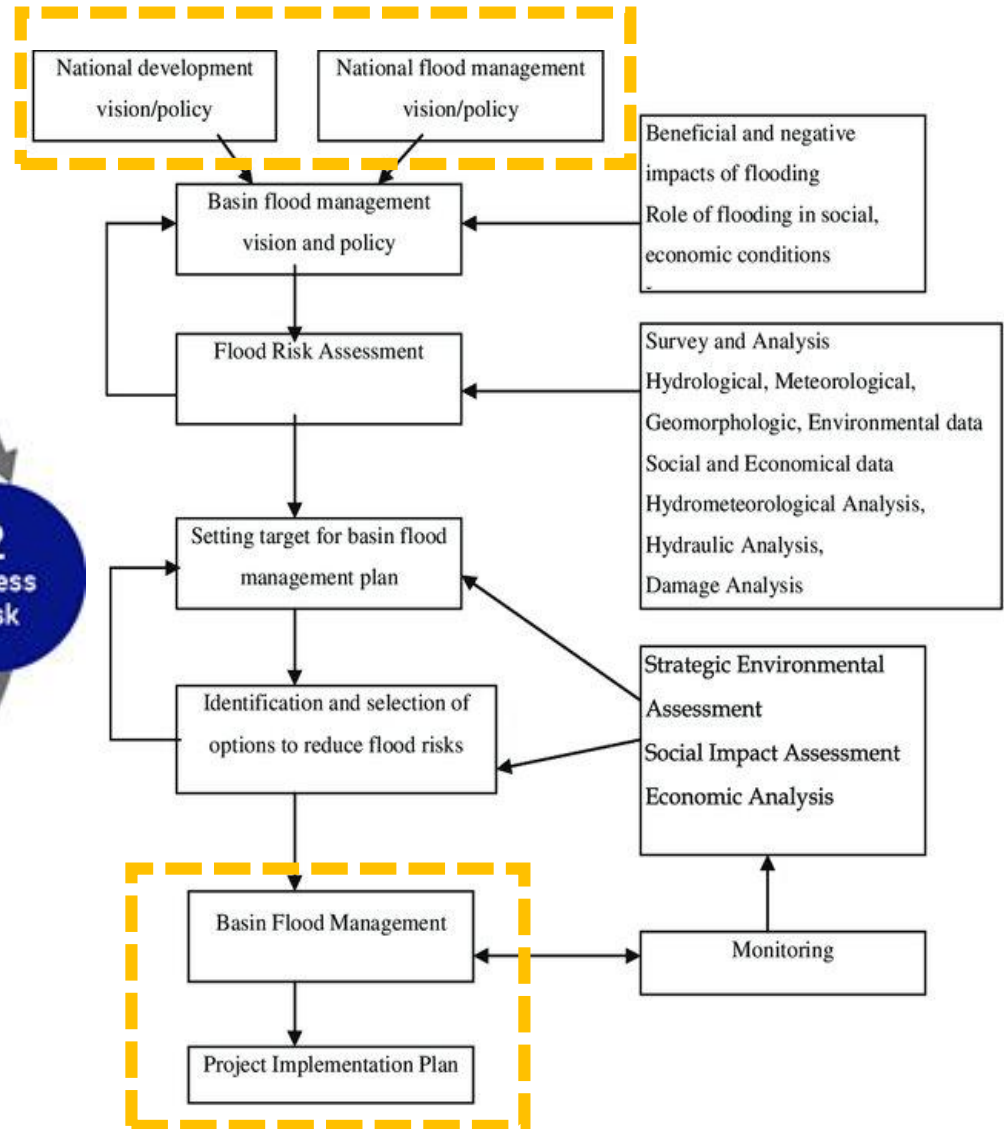
Radar

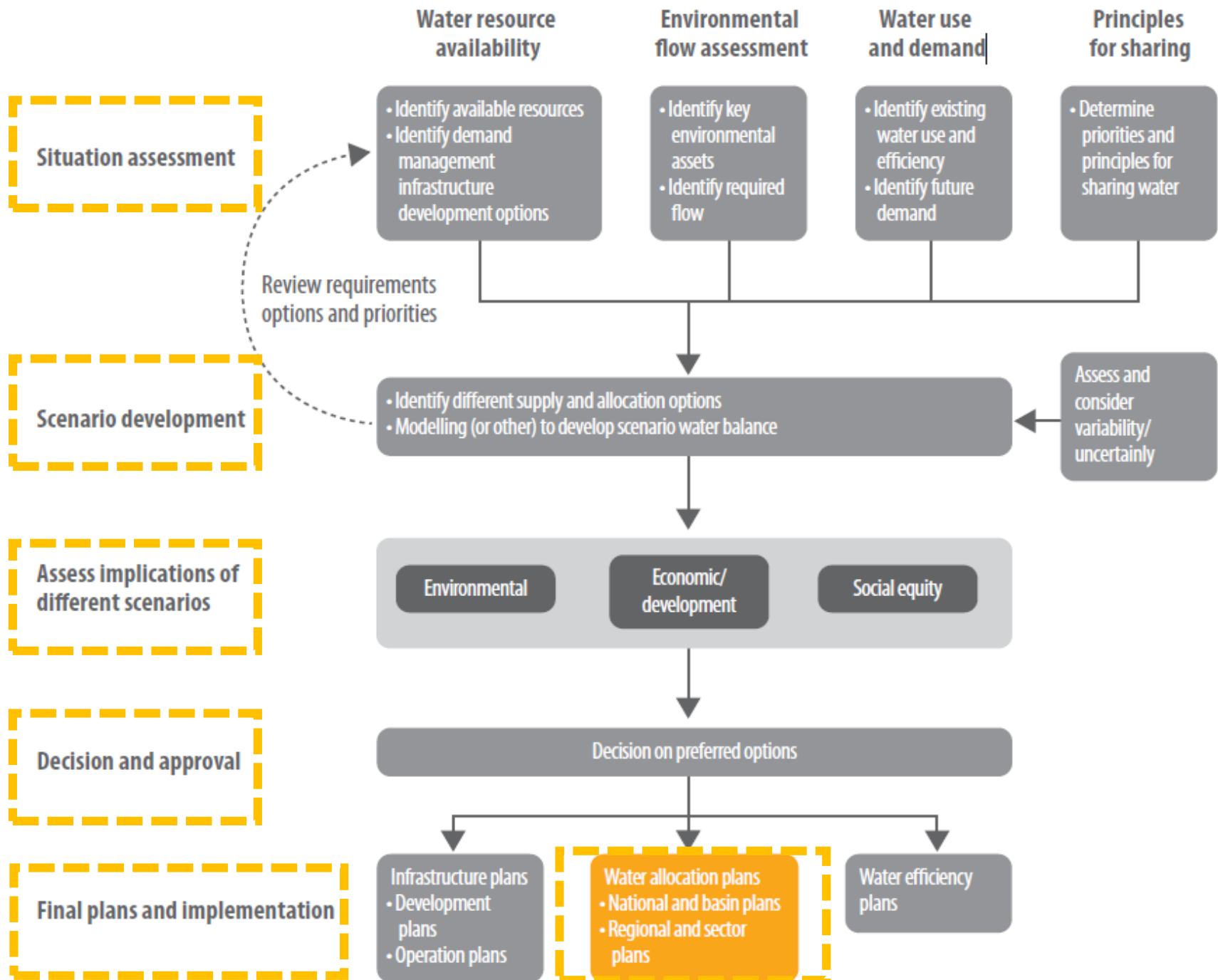


# Hydraulic Modelling: Integrated Reservoir/WTP/Water network



# Integrated Flood Risk Management Plan







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