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WATER MANAGEMENT IN INDONESIA

In
ASEAN Workshop on Water Management and Climate Change towards Asia's Water-Energy-Food Nexus and SDGs
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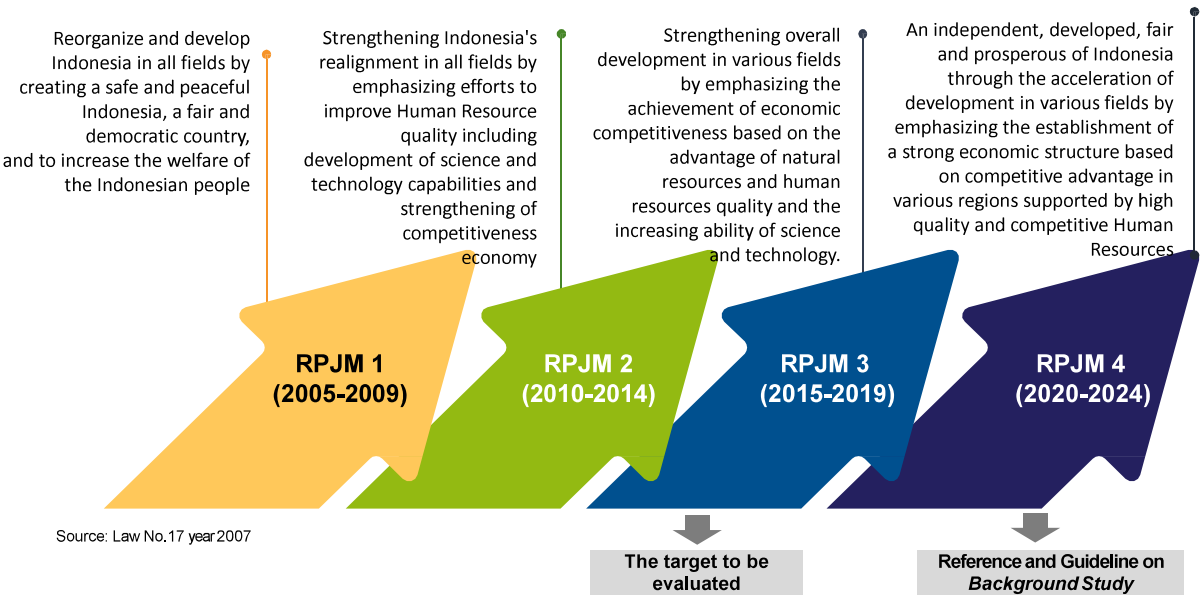
Outline

- Introduction: National Medium Term Development Plan and Technocratic Process
- Status and Challenges
- 7 Seven Quick Win for Integrated Water Resource Management

National Medium Term Development Plan



THE TARGET OF RPJMN 4:

Realizing an economy productive that grows and increase, sustainably inclusive, based on regional competitive advantage, and has resistance with shocks caused by changes in internal and global strategic environments

TECHNOCRATIC CONCEPTUAL DESIGN

Dimension \ Pillar	High Productivity	Inclusive	Sustainable
Development of Human Resources Quality	GDP, WORKER PRODUCTIVITY, LIFE EXPECTANCY	INCOME PER CAPITA, GINI INDEX, POVERTY RATE	PUBLIC SAVINGS, DEPENDENCY RATIO, IKLH AND GH EMISSION
Leading Sector Development			
Development of Regional Competitive Advantages			

EVALUATION OF RPJMN 3 · RPJPN 2005-2025 · SDGs 2030 · INDONESIAN VISION 2045

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STATUS AND CHALLENGES OF WATER MANAGEMENT IN INDONESIA

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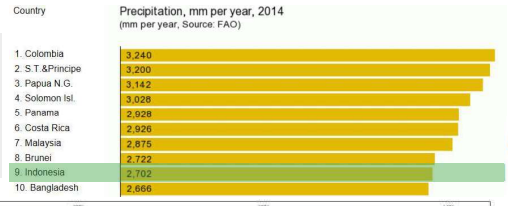
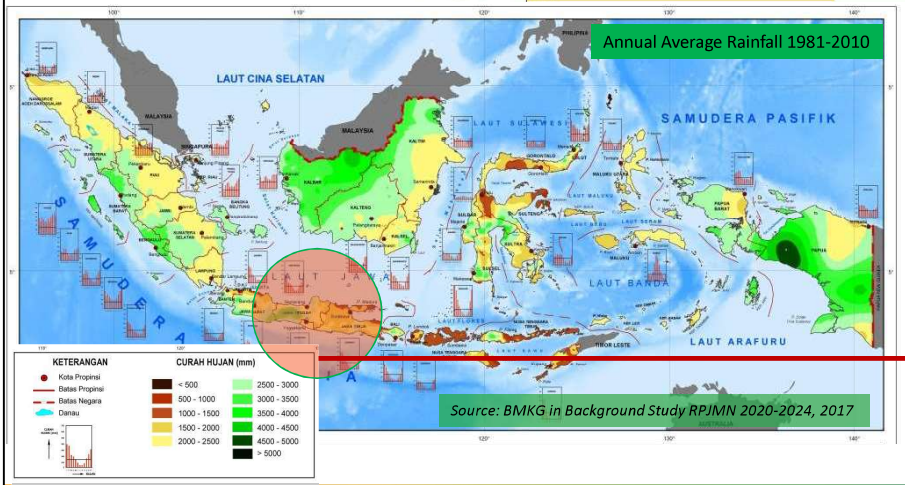
Abundant Surface Water but Unequal Distribution

“

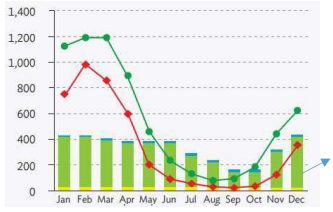
Indonesia has abundant of water resources; Yearly precipitation **2700 mm** make Indonesia **rank-9** for country with the highest precipitation in the world (Source: FAO, 2014)





However,..

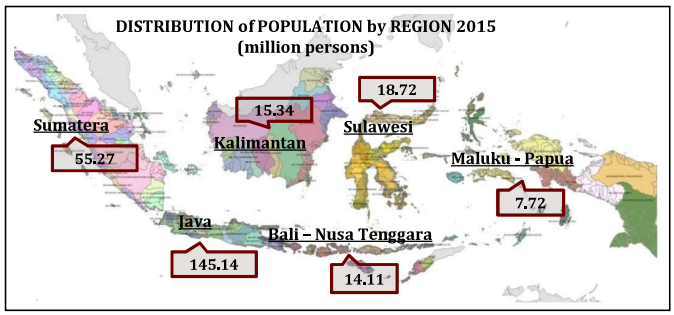
- Uneven distribution creates shortage in some areas, while surplus in others
- Huge differences between dry and rainy season exist



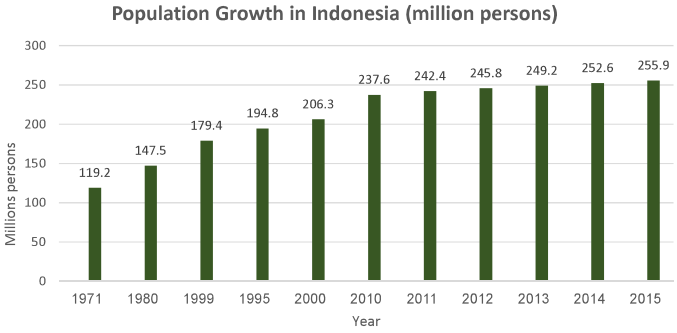
Sample:
Yearly Flow Variation in Bengawan Solo Rivers

Source: ICCSR Bappenas, 2010

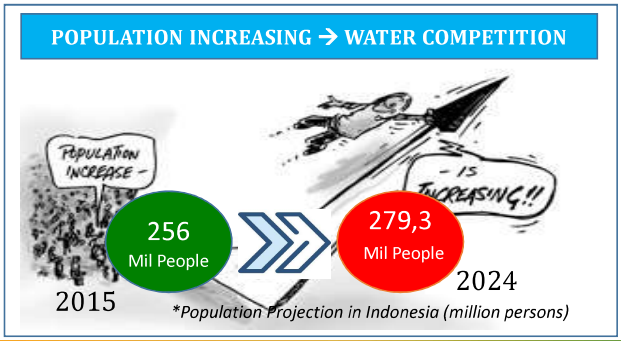
High Population Growth and Uneven Distribution Affect Water Balance Condition



Source: BAPPENAS, processed from Statistics Indonesia 2015



Source: BAPPENAS, processed from Statistics Indonesia (various years)

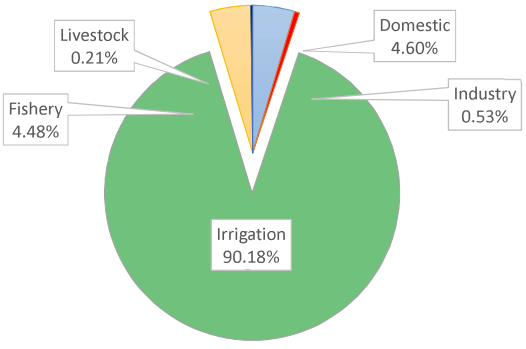


- Increasing population (1.3% per year) → **Need more water for live**
- Java: inhabited by nearly 60% of total population.
- 140 millions people live in Java in 2015 with average population density of more than 500 people/km^2 (MPWPH, 2016)

Irrigation Dominates Water Usage

"Saving some portion from irrigation will create opportunity for others"

Water Usage of Surface Water



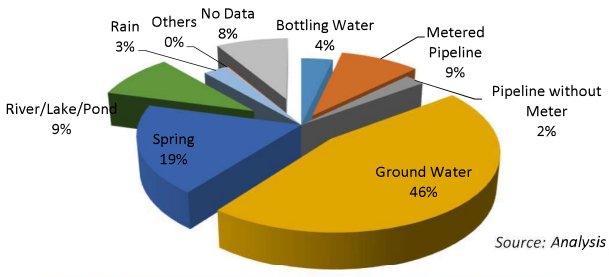
Source: Bappenas from various data, 2017

"Investment on raw water infrastructures are critically needed"

This water balance map based on a prediction of domestic water demand (2024) versus current the built-in raw water supply infrastructure (2018)

Basic assumptions for water demand:
- Calculated from the total population (BPS) per City/Regency then classified the type of city
- Standard Metropolitan water requirements 210 lpcd; Big City 150 lpcd; City Medium 100 lpcd; Small Town 75 lpcd

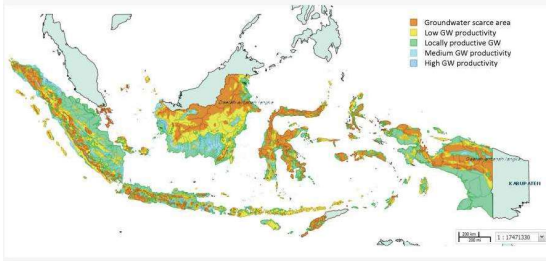
..and almost 50% of domestic use sources from ground water



Source: Analysis from data PODES 2014

Groundwater: Sufficient but Vulnerable to Over Exploitation

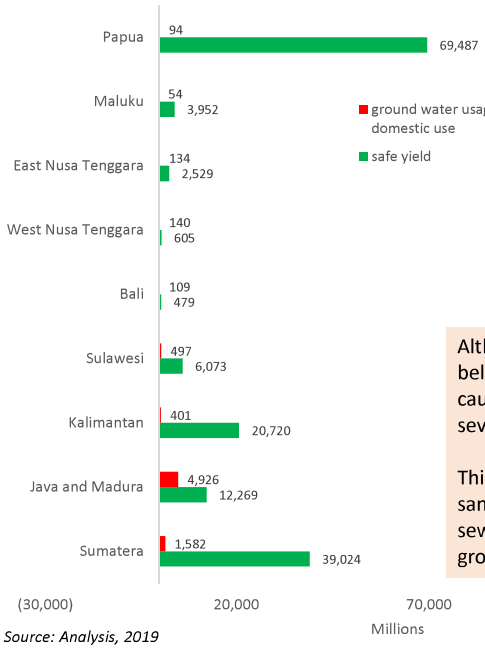
the **most productive groundwater basins** can be found toward the **north of Java** and **Sumatera**, and toward the **south of Kalimantan** and **Sulawesi**.



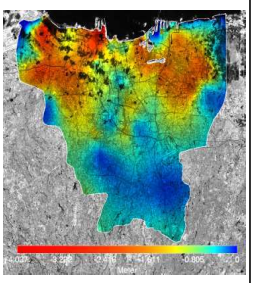
Region	Number of basins	Area (km²)	Quantity (million m³/year)		
			Unconfined	Confined	Safe Yield
Sumatera	65	272,843	123,528	6,551	39,024
Java and Madura	80	81,147	38,851	2,046	12,269
Kalimantan	22	181,362	67,963	1,102	20,720
Sulawesi	91	37,778	19,694	550	6,073
Bali	8	4,381	1,577	21	479
West Nusa Tenggara	9	9,475	1,908	107	605
East Nusa Tenggara	38	31,929	8,229	200	2,529
Maluku	68	2,583	11,943	1,231	3,952
Papua	40	26,287	222,524	9,098	69,487
Total	**421**	**907,615**	**496,217**	**20,906**	**155,137**

Source: Country Water Assessment, ADB, 2016

Safe Yield vs Domestic Use (2018)



Source: Analysis, 2019



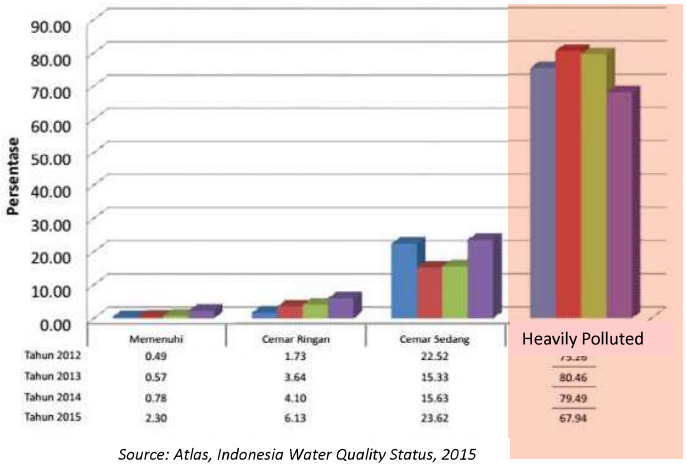
Land Subsidence in North Coast of Jakarta
(1-15 cm/year)

Although groundwater used for domestic is far below safe yield, uncontrolled abstraction can cause land subsidence and water shortage in several areas, such as North Coast of Java.

This situation, coupled with inadequate sanitation facilities (only 2,5% coverage of the sewerage system) lead to deterioration of groundwater quality.

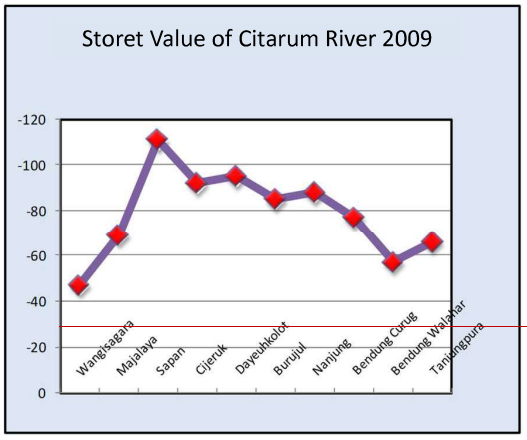
Water Quality: We Heavily Rely on Heavily Polluted River

River Quality



Source: Atlas, Indonesia Water Quality Status, 2015

"More than 65% rivers are heavily polluted (670 samples)



Threshold for heavily polluted river (-31)

Source: Cita Citarum, 2010

Irrigated **420,000 Ha** paddy field

Supplies Bulk Water for: Bandung, Cimahi, Cianjur, Purwakarta, Bekasi, Karawang, Jakarta

Power Supply of 1.400 MW for Java-Bali

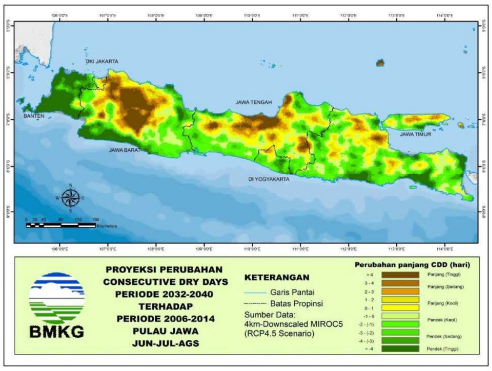
Total Population in the basin **15,303,758 (50% Urban)**
(Data BPS 2009)

GDP in CITARUM River Basin (2010) is USD $ 3.4 Million (4% GDP Indonesia)
(BPS West Java Province 2011)

Climate Change: Measures for Adaptation are Urgently Needed

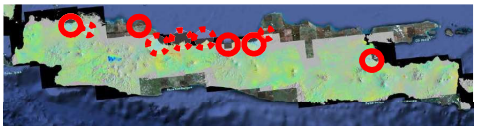
> Water management (water storage, agriculture, flood control, raw water supply) need to be adapted

In the future, the number of **consecutive dry days** will increase in June-July-August.



And the number of **extreme rain events** (>50 mm) will increase in December-January-February.

Big cities in the coastal areas are threatened by sea level rise due to global warming.



Location of cities threatened by **sea level rise in North Coastal of Java**

Source: Analysis from MPWPH, 2016

SEVEN QUICK WINS FOR WATER RESOURCES MANAGEMENT IN INDONESIA

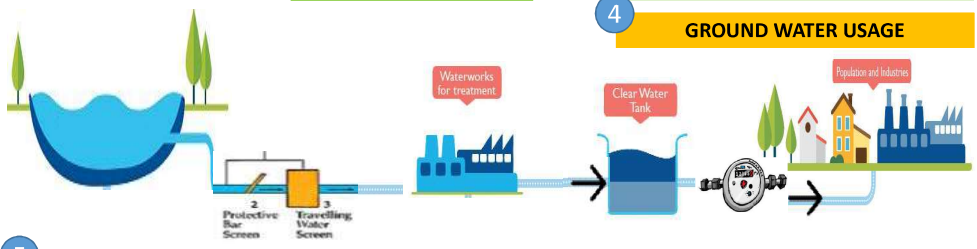
SMART CHOICE : Seven Programs for Quick Win

Water Safety Plan (WSP)

Managing Water from Source to the Consumer

Concept

1. WATER AVAILABILITY
2. WATER DEMAND AND SUPPLY
3. DRINKING WATER TREATMENT, DISTRIBUTION, AND SERVICES
4. GROUND WATER USAGE
5. WATER SUPPLY INSTITUTIONAL, REGULATION, AND FINANCE



Challenges

1. Needs 90 m^3/s pipe water supply (2024) to achieve universal access.
2. 33% national Non Revenue Water (2015)
3. 38 m^3/s idle capacity in Production Unit and 6 m^3/s in Distribution Unit (2017)

Policy Direction

Acceleration of Supplying Bulk/Drinking Water that Safety from Source to the Consumer with Quality and Quantity Needed

a. Optimization water resource from dam
b. Rehabilitation and building the new water supply infrastructure, Water Treatment Plant (WTP), also distribution system, especially in agglomeration, industry, and high poverty area.
c. Idle capacity usage of water supply infrastructure and optimalization of WTP for urban drinking water
d. The new distribution network development of urban drinking water
e. Construction of small scale storage and practical drinking water technology for outermost island, including the SWRO (Sea Water Reverse Osmosis) and Rain Water Harvestiong technology usage.
f. Development of Regional SPAM and investing scheme with business entity involve
g. The regulation solving and institutional strengthening of bulk/drinking water management
h. Increased community awareness of water-saving behavior

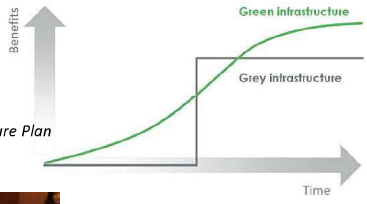
Green Infrastructure

Challenges

1. Land use changes into impermeable surface leads to increased run-off
2. High cost grey infrastructure
3. Deteriorating eco-life
4. Unintegrated green approach into existing plans and managements

Phasing of Green Infrastructure and Grey Infrastructure Benefits

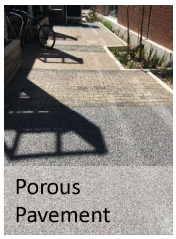
Source: New York City Green Infrastructure Plan



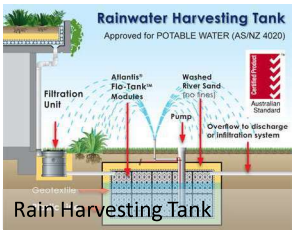
MoU Indonesia-European Investment Bank (EIB) on Green Infrastructure Development. October, 13th 2018

Policy Direction

a. Lowland restoration
b. Reforestation through social forestry, public open space, and rehabilitation
c. Piloting green infrastructure approach for urban and coastal flooding management, drainage system, water quality management, and water conservation (groundwater recharge).
d. Water for renewable energy


Porous Pavement

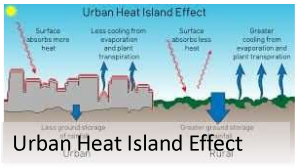

Sediment Pools



Rain Harvesting Tank


Constructed Wetland


Rain Garden

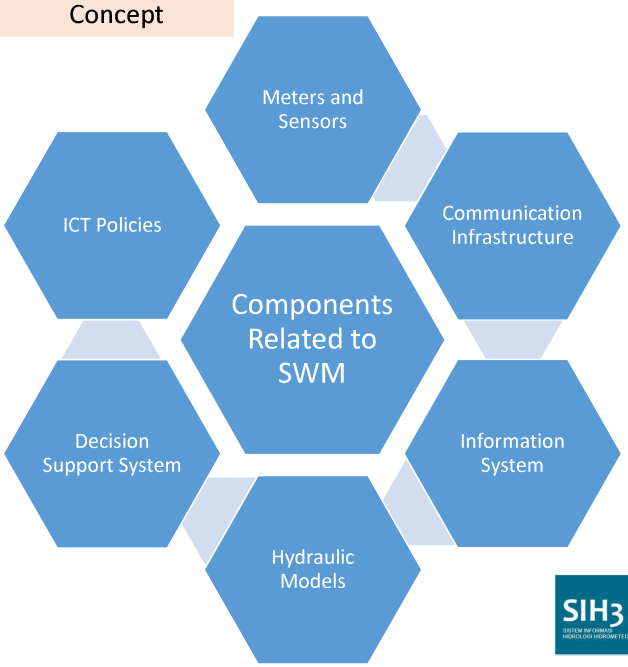


Urban Heat Island Effect

Source: Water Sensitive Urban Design, Public Health Notes, and Atlantis Rainwater Harvesting Tank

Smart Water Management

Concept



Challenges

1. Unaccountable water usage
2. Unreliable and unavailable data
3. Partial data management
4. Inconsistency in application of new technology

Policy Direction

Efficiency improvement system on water supply and integrated water management through the technology utilization.

a. Advanced decision support system for water distribution and quality
b. Conservation, prevention, and law enforcement on water quality
c. Optimization of current information system for hydrology, hydrometeorology, and hydrogeology (SIH3)
d. Integrated early warning system for water related hazard

Water for Food Security and Nutrition

Challenges

1. In year 2030, urban areas in Java are predicted will become 40%
2. Impact: 2.1 million hectare of productive irrigated area will decrease

(*Source: Country Water Assessment - ADB, 2016*)

Vision

MASTERPLAN STRATEGY FOR FARMING DEVELOPMENT 2015-2045

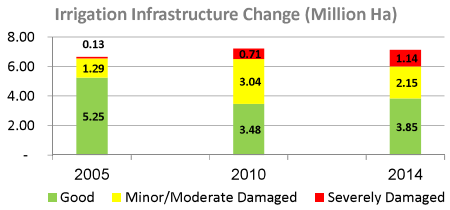
2015-2019	2020-2024	2025-2045
Rice Surplus > 10 Million Ton for Food Stock	Rice Export > 5 Million Ton	Rice Stock 20 Million Ton Rice Export 15 Mil. Ton

Source: Ministry of Agriculture

DIRECTION ON DEVELOPMENT 2005-2025

Demand management to overcome water deficit in Java by:

- Developing irrigation outside Java
- Increasing water productivity



Policy Direction

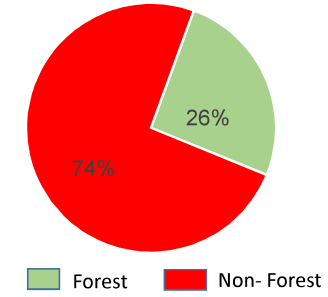
a. Sustainable water management and conservation, from central government to local government to ensure water quality and water quantity for food security and nutrition in the future.;
b. Comprehensive policy to determine the right priority for FSN;
c. Placing the most needed (susceptible and marginalized) in policy and action;
d. Improving irrigation management and farming management to overcome water deficit by increasing efficiency and resilience of farming system;
e. Knowledge and technology;
f. Inclusive and effective governance; and
g. Promoting a right-based to water for FSN.

Multi-Purpose Storage for WFFE
(Storage for Water, Food, Flood, Energy)

Challenges

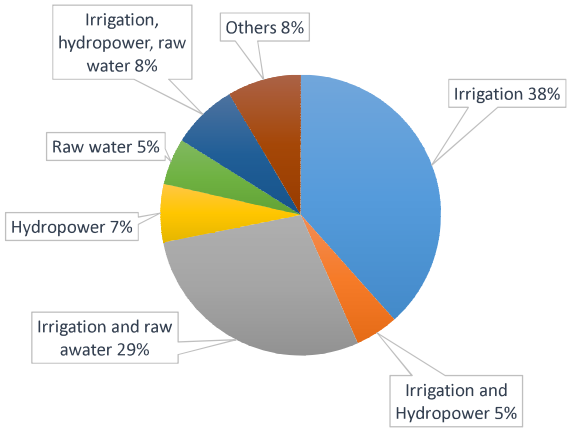
1. Around 50% dams are built only for single purpose
2. More than 50% of dam > 20 years old
3. Sedimentation problem

% of Forest Area in Reservoir Catchment in Indonesia



Source: BIG 2018

Existing Dam are Mostly Single Purpose



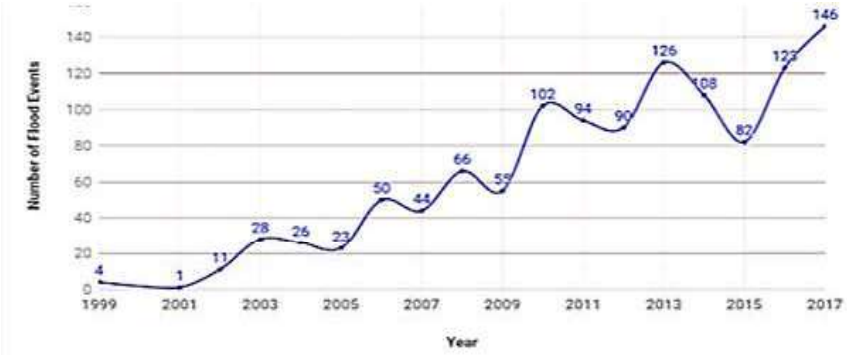
Source: MPWH 2018

Policy Direction

a. Existing Dams
   - Dam upgrading for new purposes and maintaining level of service
   - Innovative management scheme for O&M improvement
   - Community based catchment management
b. New Dams
   - Innovative financing scheme
   - International protocol utilization for better preparation
   - Multipurpose based

Disaster Resilience Infrastructure

Trend of Flood Occurrence in 92 cities in Indonesia



Challenges

1. High intensity disaster (earth quake, tsunami, volcano eruption, flood)
2. Deterioritation of water resource infrastructure caused by natural disaster
3. Higher scale and impact of loss from year to year
4. More burden on national financial to reconstruct damaged water resource infrastructure

Policy Direction

a. Structural Mitigation : Construction of disaster resilient water resources infrastructure

b. Non Structural Mitigation
- Disaster resilience based development
- Spatial planning enforcement
- Early warning system

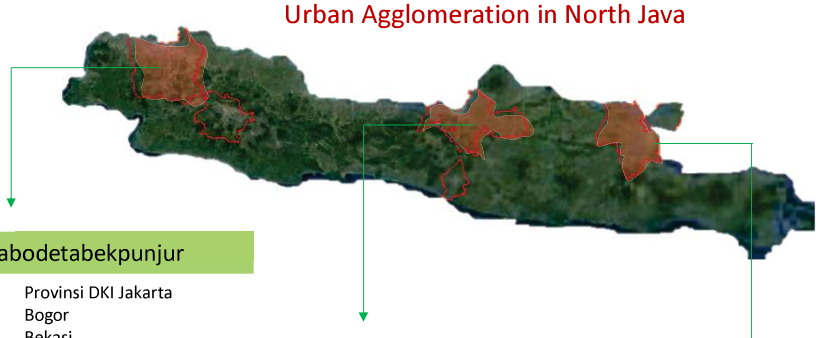
c. Funding & Regulation framework
- Zoning system
- Building code
- Infrastructure insurance
- Natural disaster bond

North Java Integrated Coastal Development

Challenges

1. Mangrove area decrease causes abrasion
2. Coastal flooding
3. Land Subsidence worsen flood
4. Drought and lack of water storage results to water scarcity
5. Climate change causes tidal flood
6. Waste disposal decrease fisherman revenue
7. Population growth increases land needs

Urban Agglomeration in North Java



Jabodetabekpunjur
- Provinsi DKI Jakarta
- Bogor
- Bekasi
- Depok
- Tangerang
- Tangerang Selatan
- Kabupaten Cianjur

Kedungsepur
- Kendal
- Demak
- Semarang
- Salatiga
- Grobogan

Gerbangkartasusila
- Gresik
- Bangkalan
- Mojokerto
- Surabaya
- Sidoarjo
- Lamongan

Policy Direction

Integrated coastal development zone in North Java Cities:
a. Solution for flood and tidal flood through polder system
b. Development of land, sea, and air infrastructure
c. Solution of raw water limitation and water quality improvement
d. Renewable energy potency (water and sun)
e. Conservation and extention of vegetation ecosystem
f. Development of fishery and maritime industry

Source: Dechatlon 2017

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Thank You