

# Water Resources Management for Rice Production



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# Department of ABE UGM

[www.tpb.tp.ugm.ac.id](http://www.tpb.tp.ugm.ac.id)



## Land & Water Engineering

Irrigation Engineering, Water Management, Watershed Engineering, Agricultural Land Development and Evaluation.



## Agricultural Energy & Machinery

Agricultural Machinery, Energy in Agriculture, Agricultural Management Information System, Biosystems Informatics.



## Postharvest & Food Engineering

Food Engineering, Postharvest management, Agricultural products handling, and Environmental Agriculture Building Design.

### LABORATORIES

#### Land & Water Resource Eng.



#### Biophysics Engineering



#### Agricultural Energy & Machinery



#### Farm Structure Environment Eng.



#### Postharvest and Food Eng.





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# Do we have enough water?

Flood in rainy season



<https://www.dreamstime.com>

Drought in dry season



<https://www.shutterstock.com>



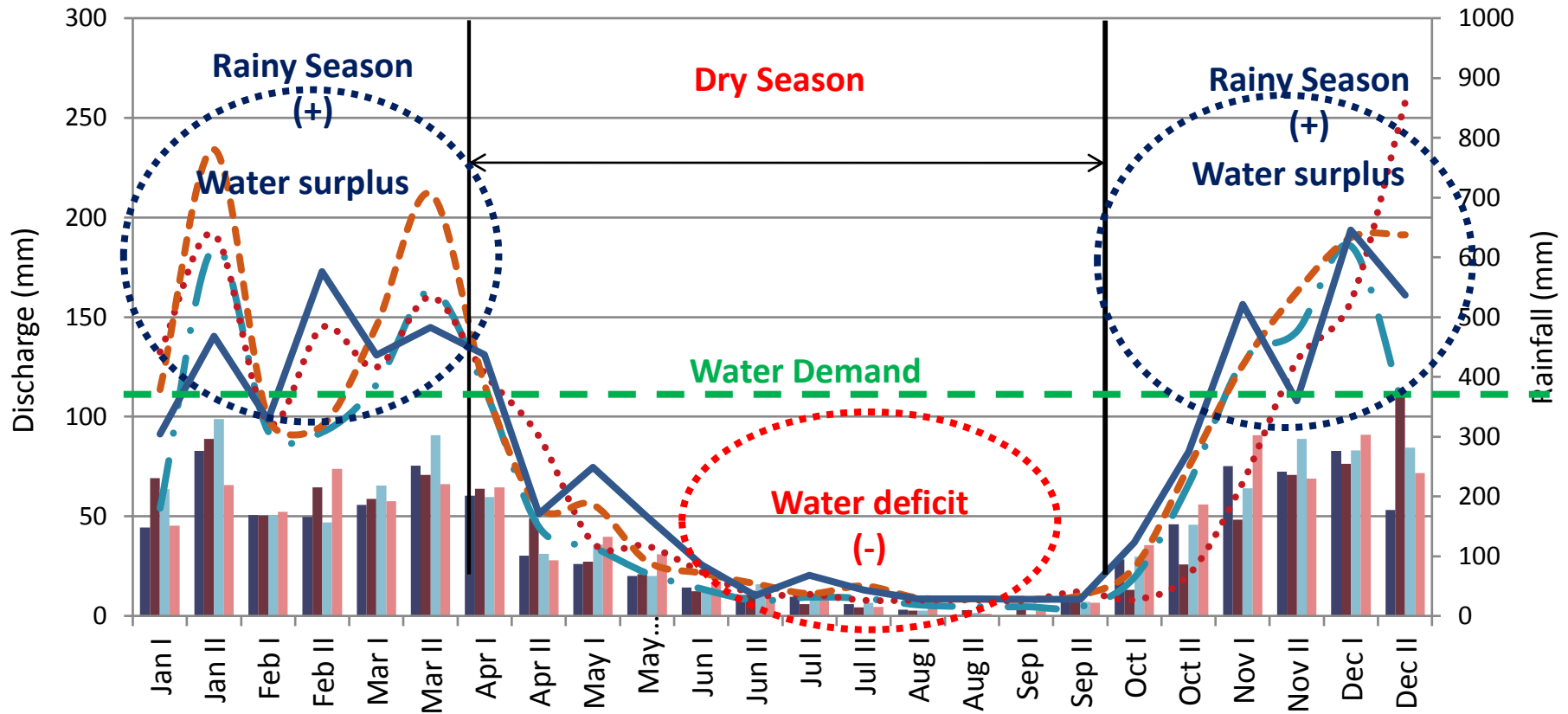
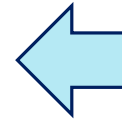
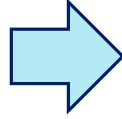
<https://banten.suara.com>



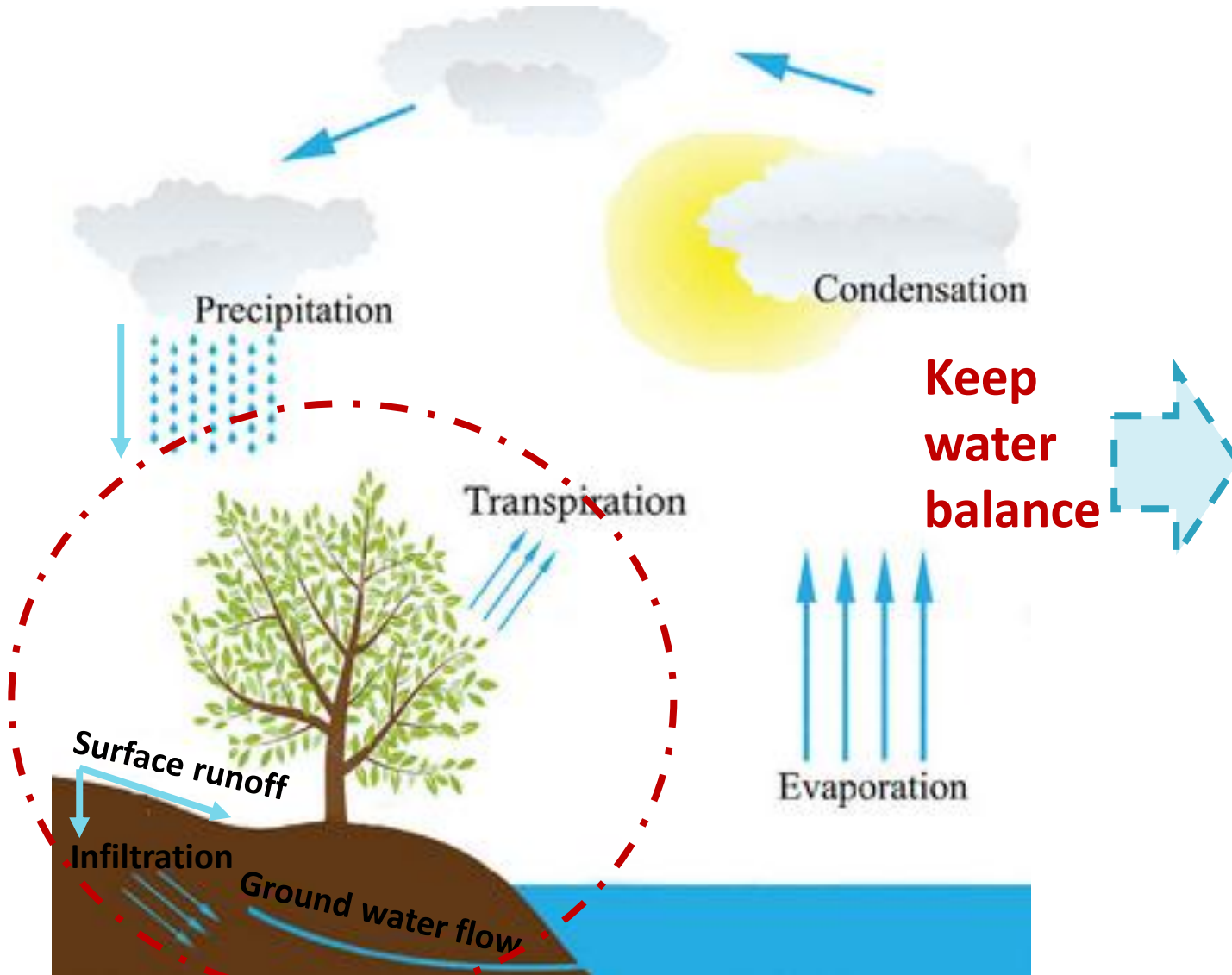
<https://nasional.republika.co.id/>

# Water Balance

## Yield Vs Demand



# Hydrologic Cycle

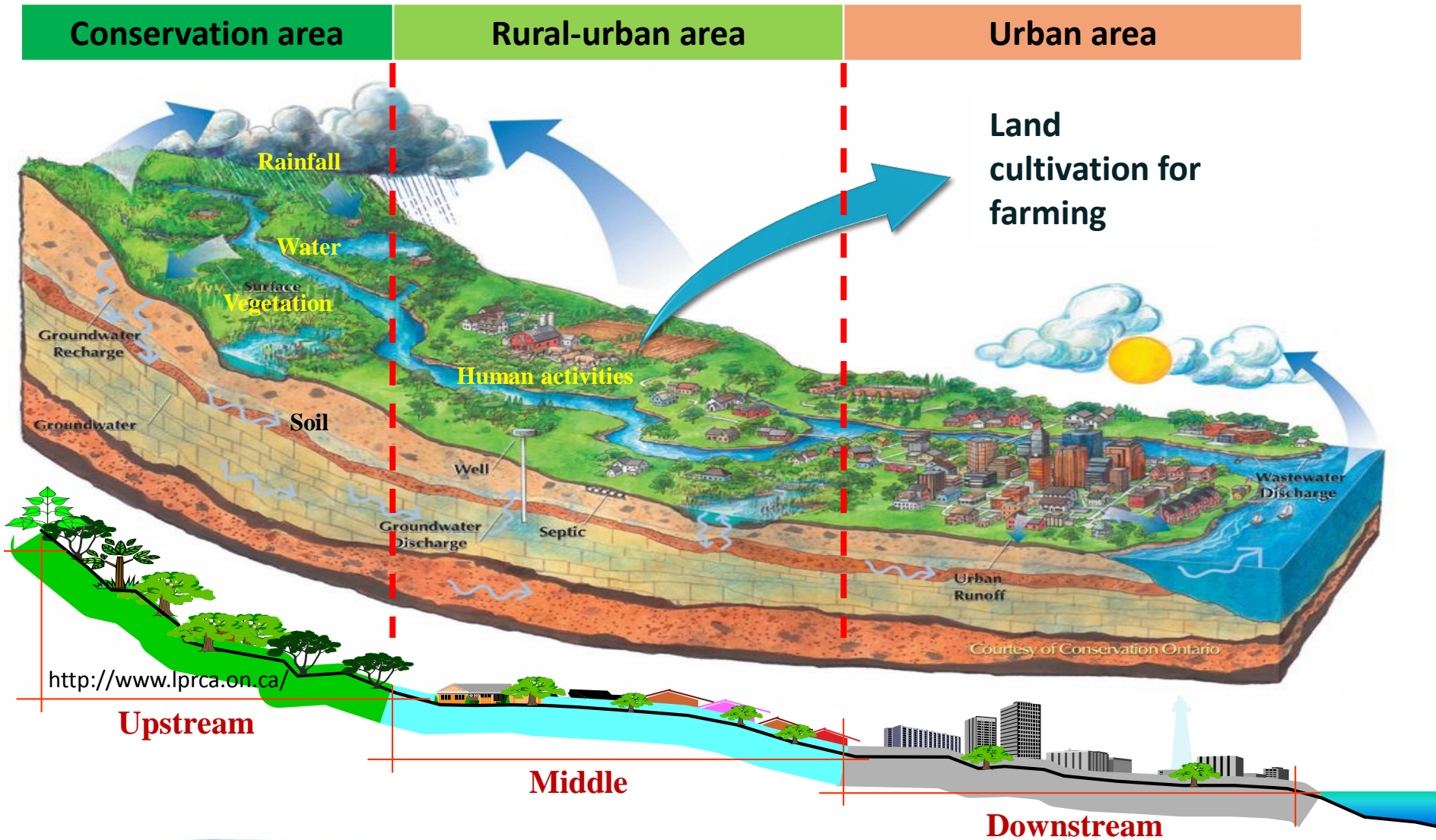


1. Increase infiltration

2. Increase ground water storage

3. Reduce surface runoff

# Water Resources Systems



# Water Resources Management (WRM)

human resources



conservation



Water Resources

storing



facility



Good in Management

Sufficient in Water Availability

Water Availability

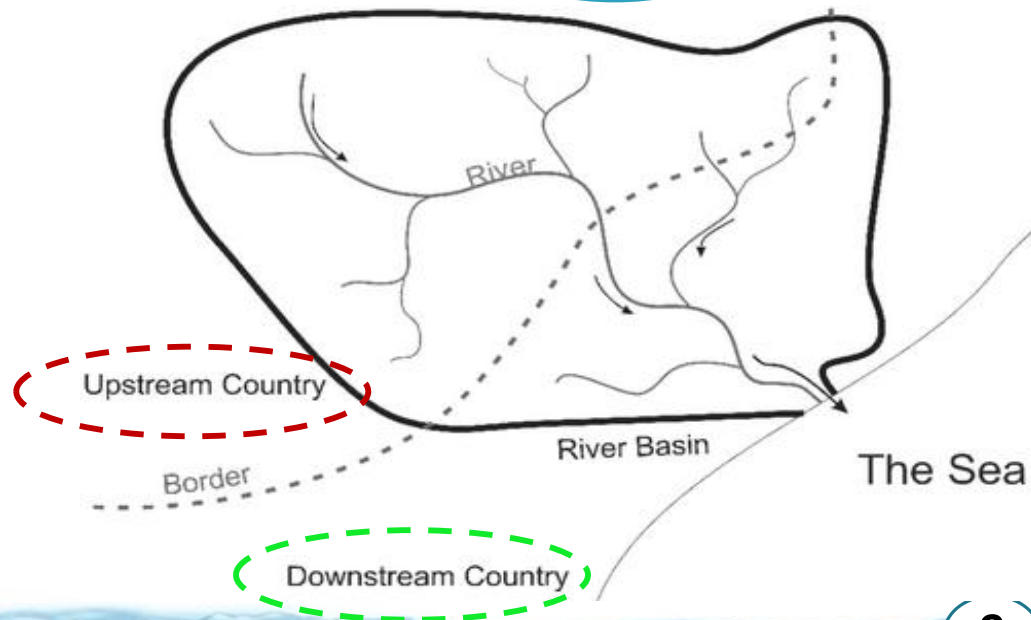
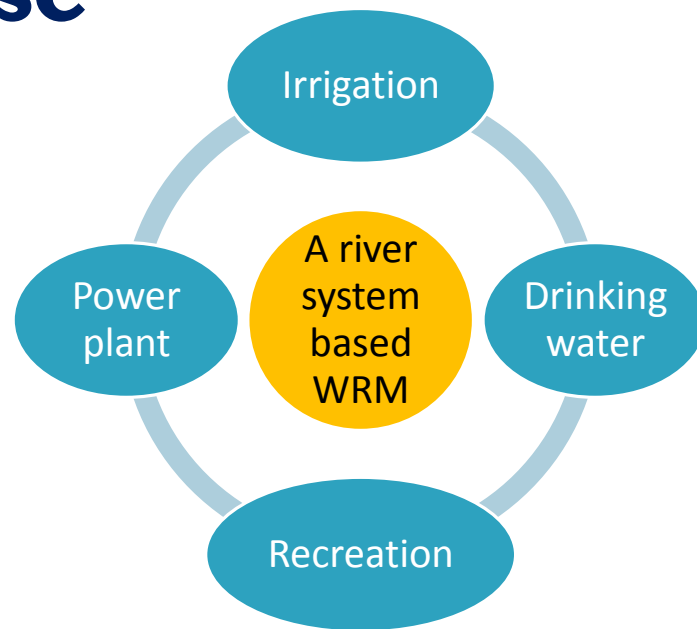
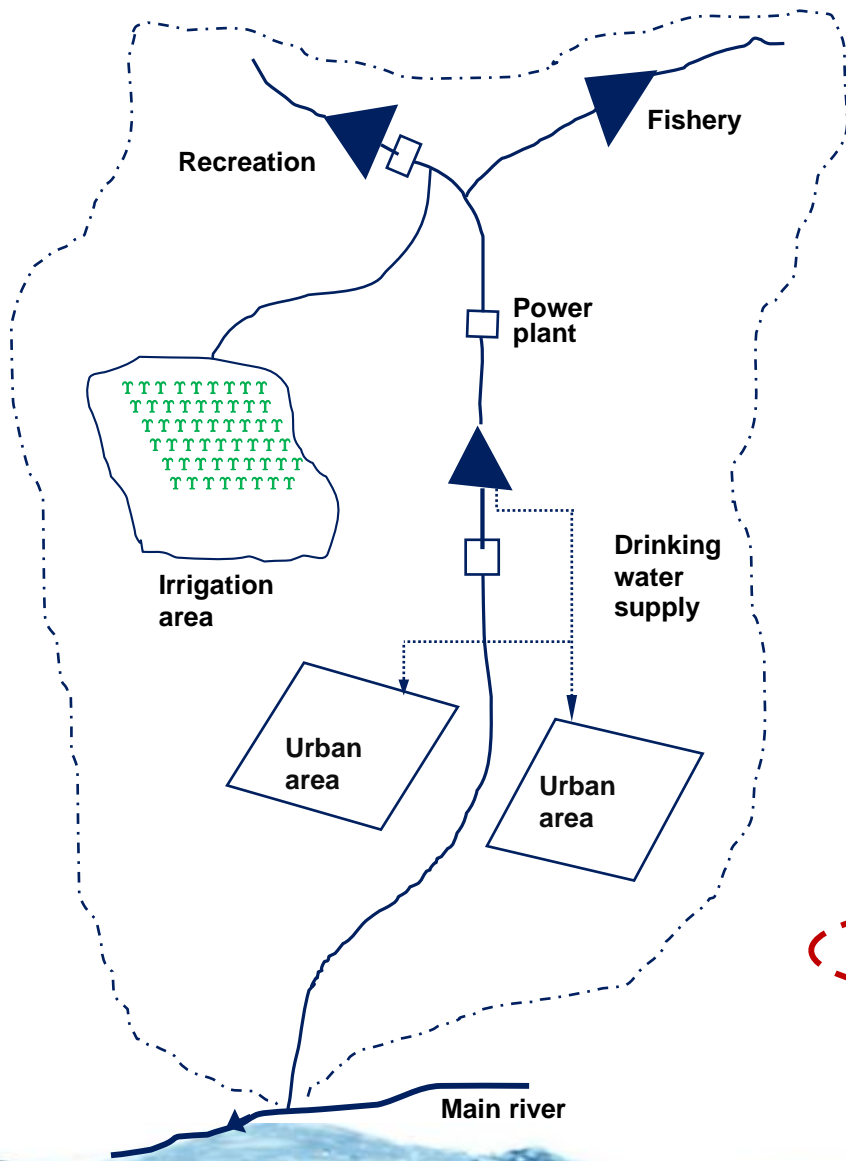


Water Demand

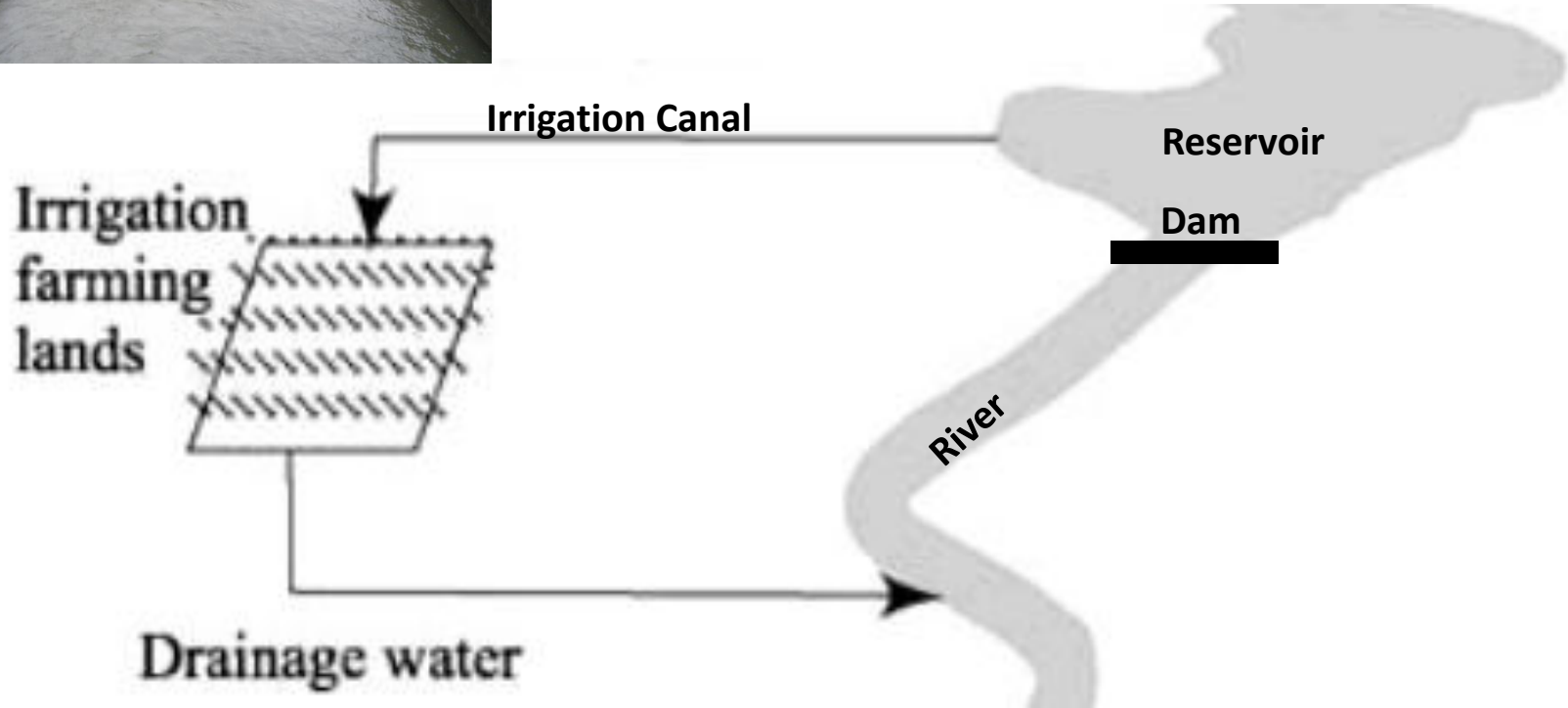




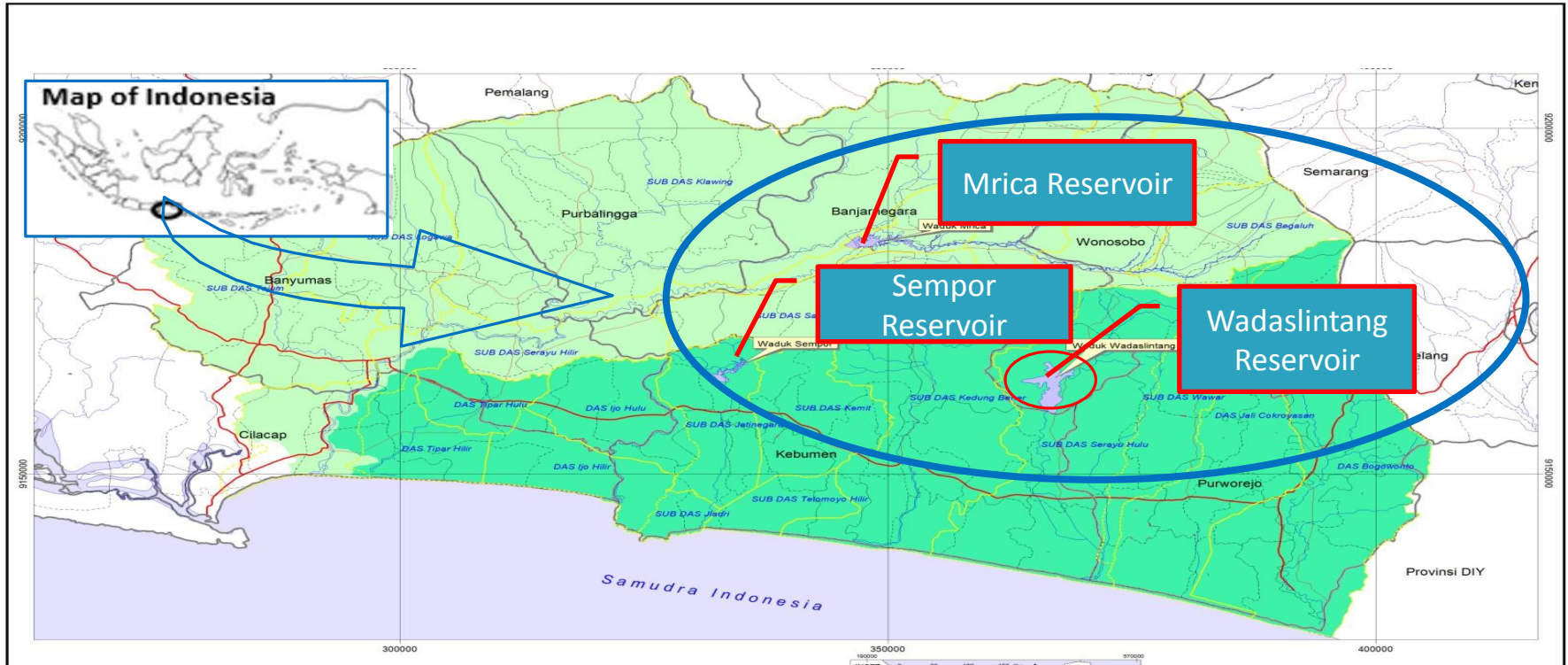
# WRM for Multi-Purpose



# Water Resources (WR) for Rice Production

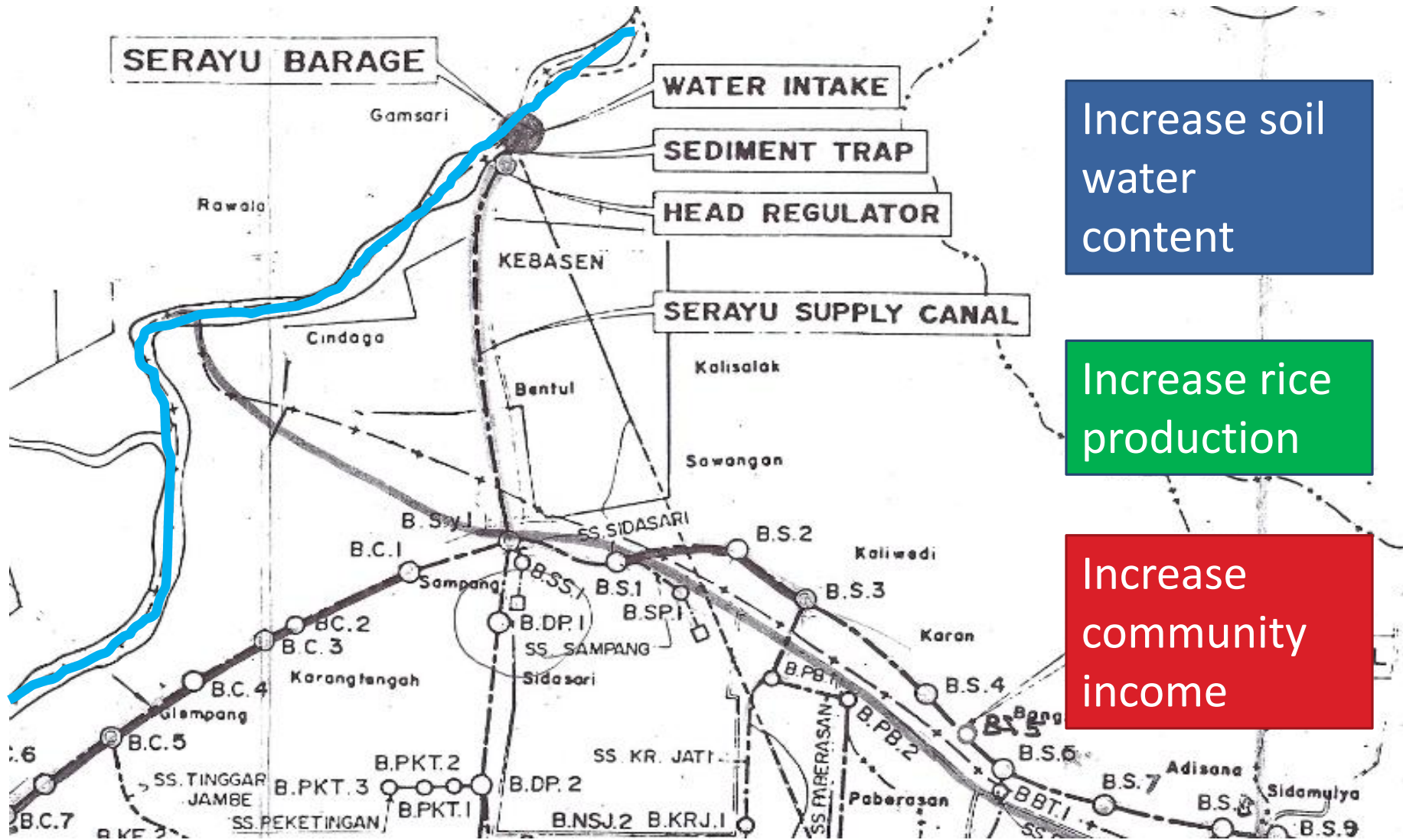


# WR Facility for Rice Production

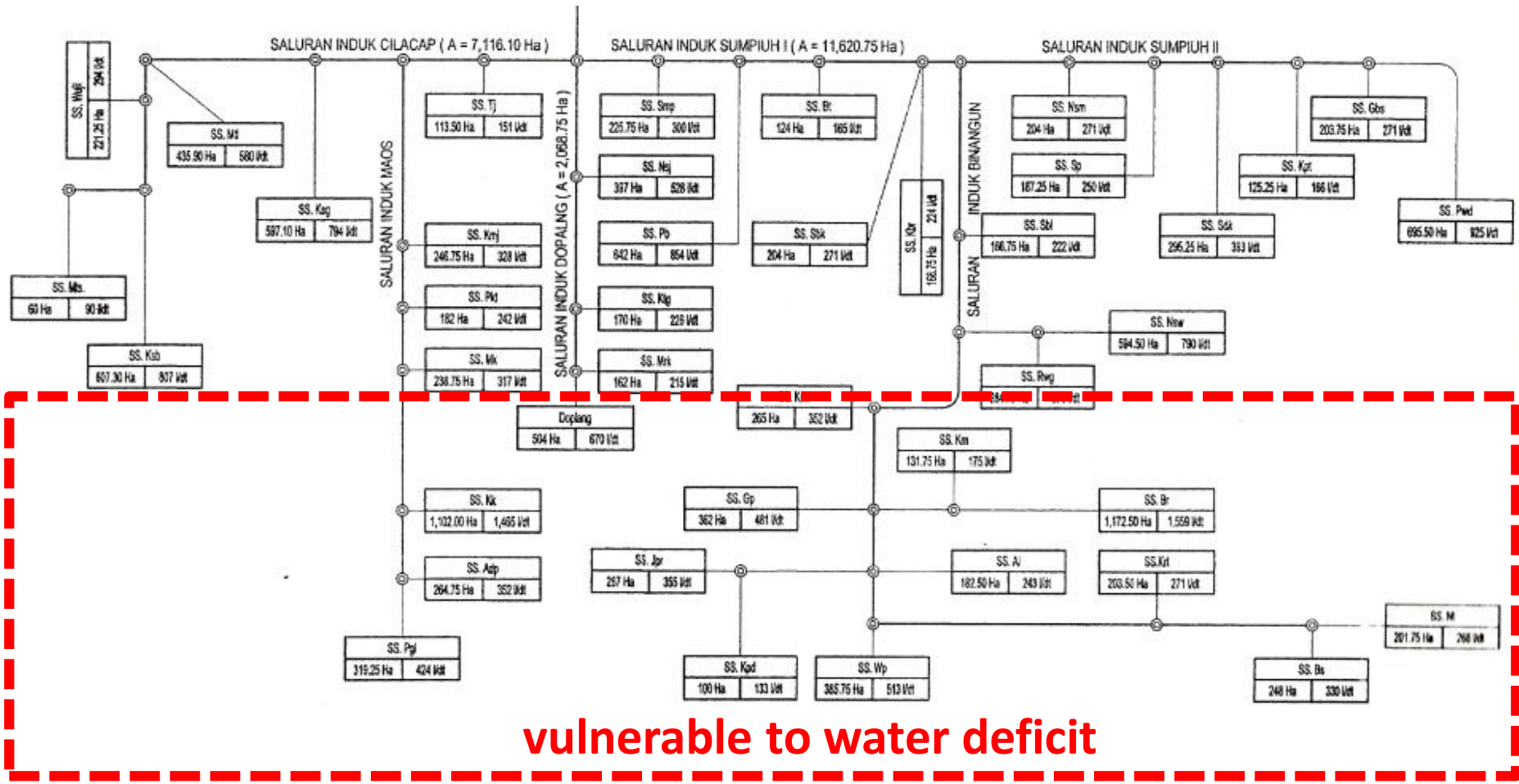


Reservoir	Capacity (mill. m <sup>3</sup> )	Catch. Area (ha)	Irrig. Area (ha)
Wadaslintang	443	19,250	30,000
Mrica	165	101,742.2	21,656
Sempor	46.5	4,416	6,485

# WR Network System



# WR Network System

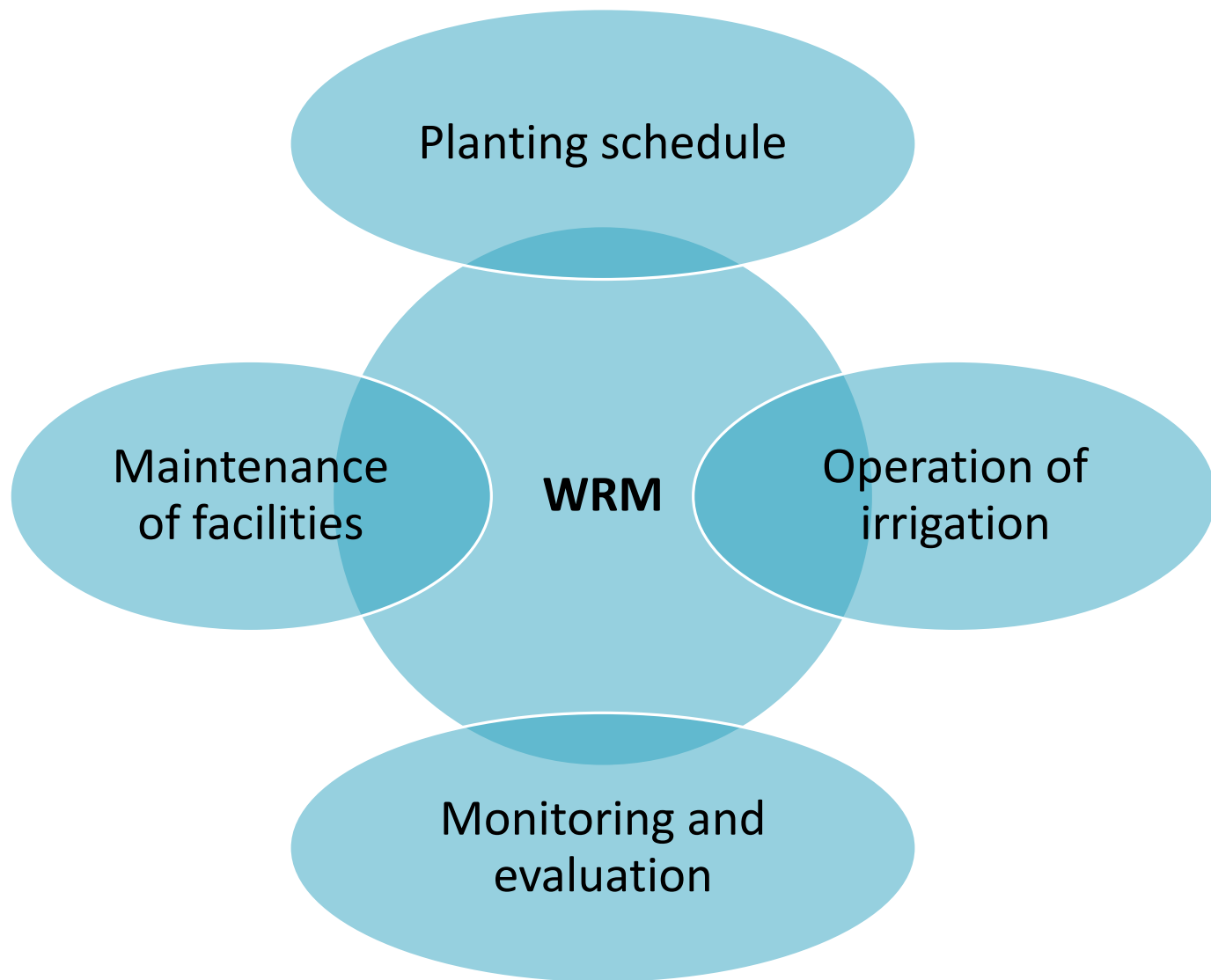


planning incompatibility

illegal water using

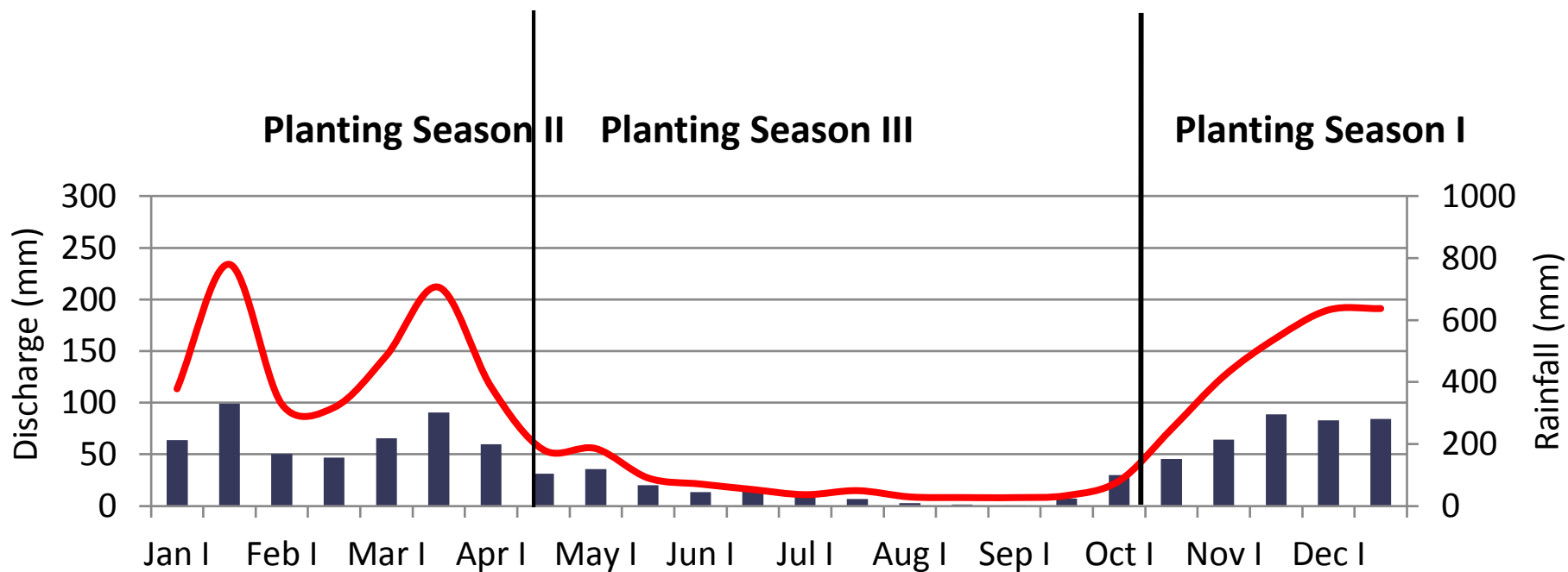
Leakage of canal

# WRM Application



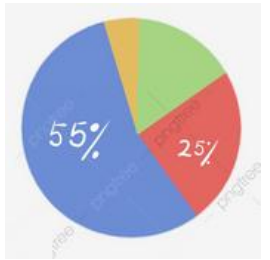
# Planting Schedule

	Planting season I	Planting season II	Planting season III
Water availability	High	High to moderate	Moderate to low
Type of crops	Rice	Rice	Dry land crops



# Operation of irrigation

## water use planning



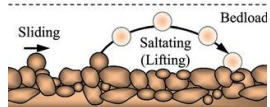
## water release



## water partition



## Sediment control





# Maintenance of irrigation facilities

## Planning



## Inventory



## Cleaning



## Repair

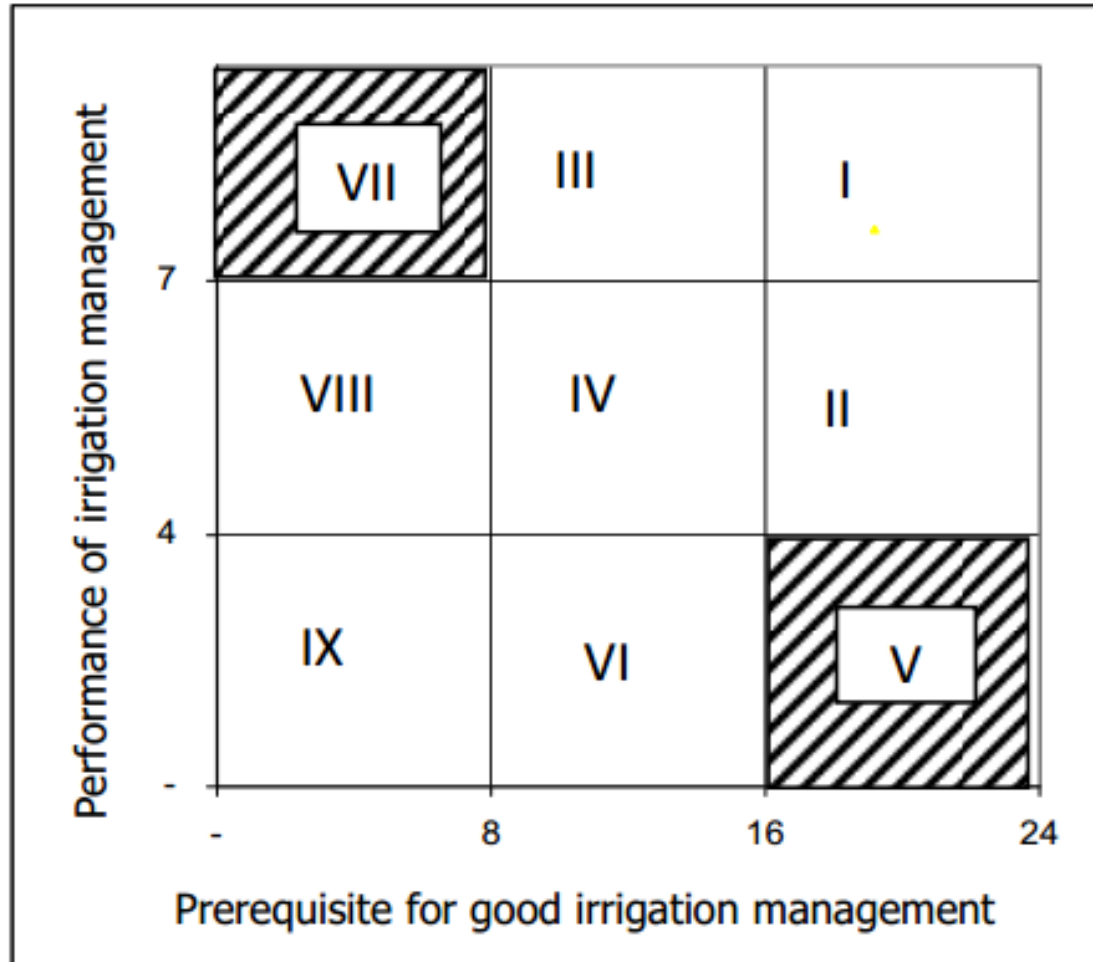


# Monitoring and evaluation

Indicator	Parameter	Weighting factor	score			
			1	2	3	4
Input	irrigation infrastructure and its function	4	Very bad	poor	average	good
	Water resource availability	3	poor	Average	good	
	Human resource availability	3	Not enough	enough	More than enough	
	Financial availability	2	Not available	Available but not enough	Available and enough	
	Institutional asset	1	Not available	Available but not enough	available and enough	
Process	Irrigation operation	3	poor	Average	good	
	Irrigation maintenance	2	poor	Average	good	
	Institutional condition	1	Non active	Not so active	Active	
Output	Water irrigation services	3	poor	average	good	
	Time of service	2	poor	average	good	
	Drainage system condition	1	poor	average	good	

ABE UGM, 2010

# Monitoring and evaluation



# Modernization of irrigation

## Automatic Water Level Monitoring System Based on Computer Vision Technology for Supporting the Irrigation Modernization



Lukas Wiku



Abipraya Wibawa Jati



Galih Wisnu Wismoyo

This study aims to build image-based (computer vision), real-time water level monitoring system. It works by automatically capturing canal gauge, identifying canal gauge in photos by color, measuring pixel length, and converting to actual water level.

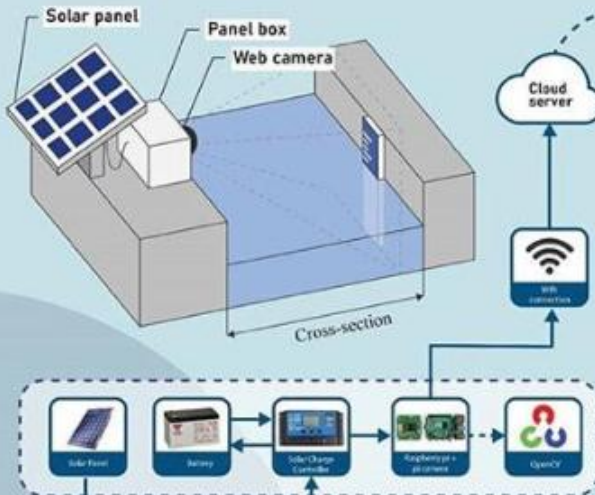
### Algorithm



### Result



The computer vision algorithm has successfully determined water level in a specific condition, but further development of a robust, all-weather water level monitoring system based on computer vision technology is needed.



Schematic and System Workflow



# WR Availability < Demand

**Crop planting modification**



SRI: System of Rice Intensification

**Additional water supply**



Suppletion from another source

