

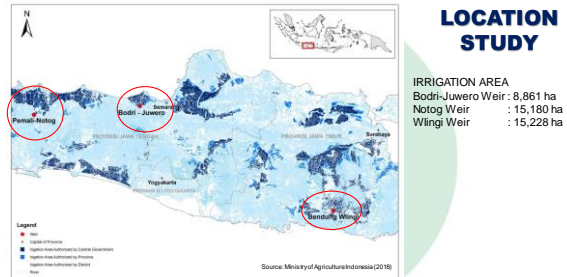
# ASSESSMENT OF CLIMATE CHANGE IMPACTS USING HYDROLOGICAL DROUGHT INDEX

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3<sup>rd</sup> World Irrigation Forum  
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1



## LOCATION STUDY

IRRIGATION AREA  
Bodri-Juwero Weir : 8,861 ha  
Nalog Weir : 15,180 ha  
Wing Weir : 15,228 ha

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4

## OUTLINE

- Introduction
- Location of study
- Methods
- Climate change projections
- Hydrological drought index
- Correlation between hydrological drought and climate change impact
- Conclusions

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2

## METHODS

Climate Change Scenario

Hydrological Drought Index

- Climate change impact on rainfall in the future is projected using the worst scenario Representative Concentration Pathways (RCP) 8.5
- The monthly rainfall is projected until the year of 2045 using ensemble of seven models commonly used by Indonesian Agency for Meteorology, Climatology and Geophysics, those are CNRM CM5, CNRM RCA, CNRM v2 RegCM, CSIRO MK3.6, EC EARTH, GFDL ESM, and IPSL.
- To project discharge, empirical projection method is used with observation rainfall and potential evaporation obtained from Potential Evaporation Climatic Research Unit Time Series (CRU TS) version 4.01

Based on the seven projected monthly discharge models, a set of hydrological drought index are computed using the Standardized Runoff Index (SRI) method with moving average of 1, 3, 6, and 12 months

Table 1. Drought Categories from SPI/SRI

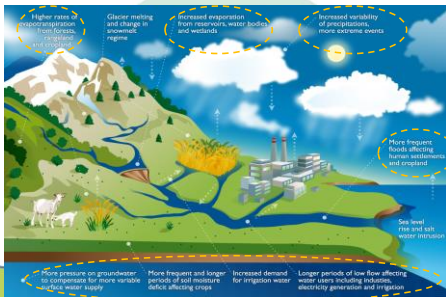
Index	Drought Category
0 to -0.99	Mid Drought
-1.00 to -1.49	Moderate Drought
-1.5 to -1.99	Severe Drought
-2.00 or less	Extreme Drought

Source : Mc. Kee et al., 1993

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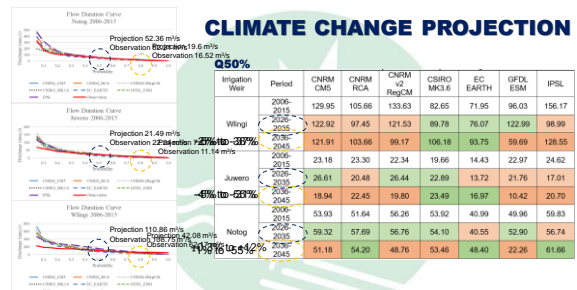
5

## INTRODUCTION



3

## CLIMATE CHANGE PROJECTION

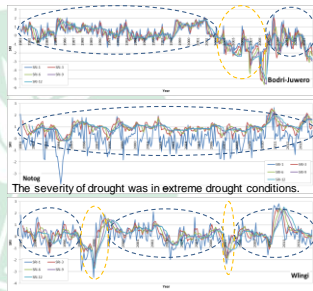


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6

### HYDROLOGICAL DROUGHT INDEX

The calculation of the hydrological drought index using the SRI method is carried out on 1, 3, 6, 9, and 12 months' time scales by using observed monthly discharge data from river gauging stations at each irrigation weirs.



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7

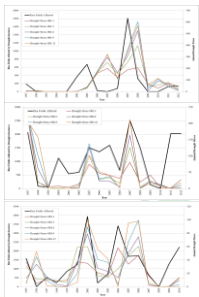
### CONCLUSION

- The validation of present data confirms that the drought severity and stress of hydrological drought index follows the same pattern of climate change impact on the area of rice field affected by drought.
- The best correlations are achieved for drought stress of SRI-12, SRI-1, and SRI-3 for Bodri Juwero, Notog, and Wlingi irrigation weirs consequently.
- The projected hydrological drought index for the next 30 years at the three irrigation weirs in Java identifies an increasing of drought severity with longer drought duration and worse severity, and consequently more area of irrigated of rice fields will be affected by drought.
- Extreme drought in Bodri-Juwero irrigation area is predicted twice with duration of two years, while extreme drought at Notog and Wlingi irrigation weirs will occur more frequently compared to the historical drought.
- Adaptive strategy should be developed to maintain irrigation productivity under these predicted drought condition.

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10

### CORRELATION BETWEEN HYDROLOGICAL DROUGHT AND CLIMATE CHANGE IMPACT



SRI	Stress		
	Bodri-Juwero	Notog	Wlingi
1	27.3%	70.8%	48.8%
3	29.3%	61.1%	52.9%
6	30.8%	49.4%	49.5%
9	33.3%	36.4%	47.8%
12	33.8%	32.0%	40.0%

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8

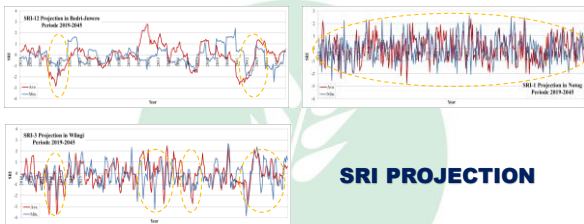
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11

### SRI PROJECTION



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9