




CURRENT STATUS OF AGRICULTURAL WATER MANAGEMENT IN INDONESIA

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The growing issues need to be addressed

- ❖ Water scarcity and drought impacts on food crop production;
- ❖ Floods and submergence impacts on food crops;
- ❖ Optimizing water use to maximize profit and crop production through the best crop rotation in a year



Good water management

Crop water requirement

Depend on

- ❖ The optimum water content of the biomass to meet the optimum physiological processes in the plant tissues;
- ❖ Respiration and transpiration rates and usually related to the crop biomass or plant body surfaces; and
- ❖ Plant growth duration



Crop and varietal water requirement

Crop	Variety	Growth duration (days)	Crop water requirement (m³/ha)	Crop and land preparation (m³/ha)
Rice	Mekongga	125	6,250	7,909-8,519
	Ciherang	120	6,000	7,659-8,269
	Inpari 11	105	5,250	6,909-7,519
	Inpari 13	99	4,950	6,609-7,219
Corn	Sukmaraga	105	5,670	
	Bima-4	102	5,508	
	Lamuru	90	4,860	

Steps in agriculture water management

1. Evaluate water availability in one region within a year
2. Selecting crops to fit in one year rotation,
3. Choosing the most suitable crop varieties, for optimizing water use,

Considers:

Economical values of the crops

Farmers' preferences.

Common agronomical practices, and

Specific measures (drainage, ditches etc.).



Tillage and water requirement

Water requirement (mm/season)	Complete tillage	Minimum tillage	Without tillage
	Source: Setiobudi and Ruskandar (2010)		
Land preparation	305	0	0
Water flooding	0	47	46
Evapo-transpiration	185	340	346
Percolation and seepage	185	168	181
Total	846	555	573

Water use efficiency and productivity

- (1) maintaining rice yield at the same level while reduces water consumption;
- (2) increases rice yield without increases of water consumption; and
- (3) increases rice yield and reduces water consumptions.

Water management & requirement

Continuous flow of irrigation system which is commonly practiced in irrigated rice field with the supply efficiency as much as 80% required **12,000 m³/ha/season**.

Splash irrigation with four day intervals in alluvial soils of the North coastal areas of West Java spent as much as **8,000-9,000 m³/ha/season** (Baharsyah and Fagi 2008)



Effects of water irrigation system

Treatment	Grain yield 14% (kg/ha)	Water cons. (m ³ /ha)	Prod. Effic. (kg grain /m ³)	Water use eff. (m ³ /kg grain)
Source: Setiobudi and Ruskandar (2010)				
<u>2008 DS</u>				
Cont. flooding	8294	8740	0.95	1.05
Altern. wet-dry	8009	7460	1.07	0.93
<u>2008/2009 RS</u>				
Conti. Flooding	6679	5551	1.20	0.83
Altern. wet-dry	6612	3379	1.96	0.51

Effects of water irrigation system

Treatment	Total biomass (t/ha)	Grain yield (14% mc) (ton/ha)	Methane emission (kg CH ₄ /ha /season)
Source: Setyanto and Kartikawati (2007)			
FP-cont.flooding	8.70	6.72 ± 0.19	283 ± 36
FP-intermittent	7.18	6.49 ± 1.15	58 ± 7
ICM-cont.flood	8.81	7.10 ± 0.08	347 ± 0.82
ICM-intermittent	8.80	6.76 ± 0.14	78 ± 42
System of Rice Intensification	2.50	2.41 ± 0.34	61 ± 9



Strategy to overcome water shortage and drought

1. Consider crop varieties tolerant to drought and or short growth duration: Inpari 1, Inpari 10, Inpari 12, and Inpari 13 in drought areas and or season;
2. Improve water supply system, such as alternate wet-dry system;
3. Cultivation system and crop rotation; and
4. Optimized crop planting areas in a region based on water availability to avoid water stress to the whole areas.



Strategies to overcome submergence and flood

1. Global climate change may increase the flood affected areas under rice and other crops.
2. Splash floods to rice crop may decrease rice yield up to the zero yield (crop failure).
3. Rice varieties tolerant to submerged condition (for 14 days): Inpara-4, Inpara-5, Ciherang sub-1; IPB 1R Dadahup, and IPB 2R Batola

Conclusion

1. Current water management in lowland rice fields are still dominated by continuous flooding;
2. Water efficiency and productivity can be increased by alternate wetting-drying; However, it should be carefully adopted at certain locations in order not to decrease rice grain yield.
3. Promising rice varieties and lines tolerant to submerged condition or drought and short growth duration should be included in one year crop rotation to increase production and profit.