Potential Water Productivity Improvements in India: District level Analysis

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Outline

- Background
- Hypothesis, methodology and data
- Spatial variation at state and district level
- Potential improvements

Background

In 2000 India had:

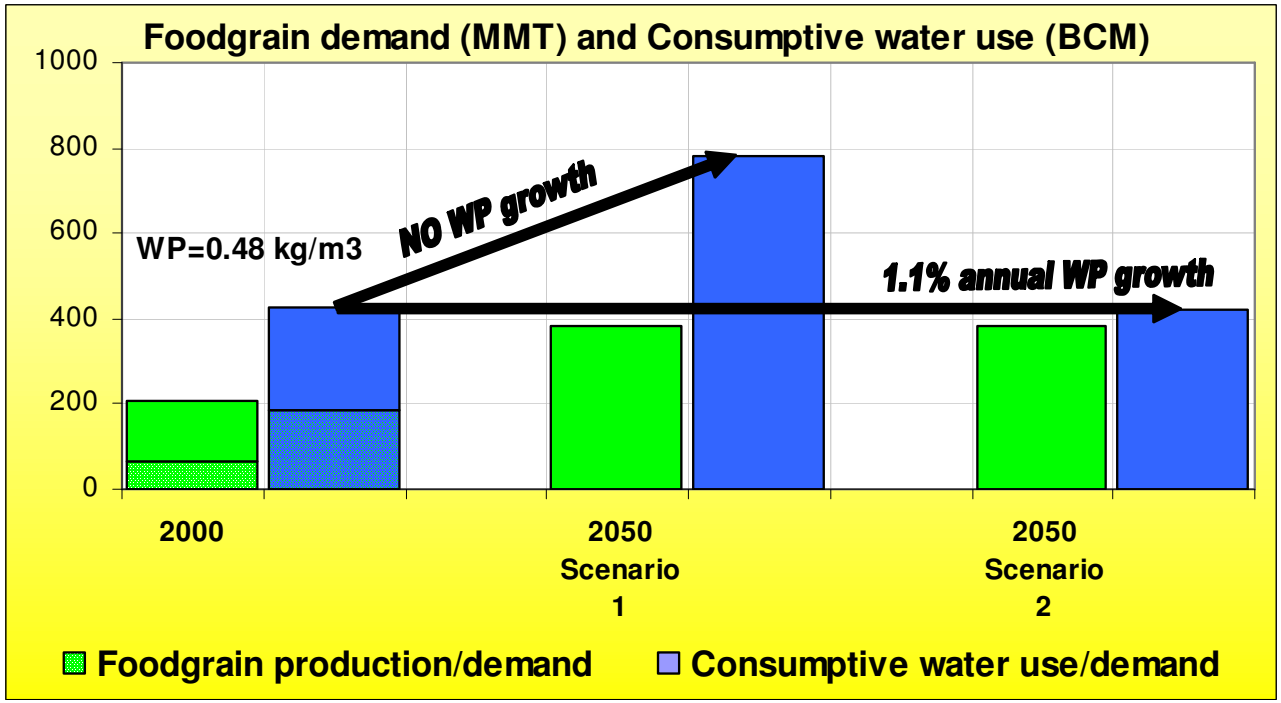
- 190 mha of gross cropped area, and 76 mha gross irrigated land
- 123 mha under foodgrains crops and 56 mha of irrigated FGs
  - 66% of GCA and 70% of the GIA under foodgrains
- 44% of the FG area irrigated
  - It contributes to 70% of the production
- Total and irrigated foodgrain areas are stagnating
- Demand for foodgrains is increasing!!
  - 201 mt in 2000
  - 45% more by 2025, and 90% more by 2050
- How can we get more foodgrains per drop?

Background

In 2000, the IGB has:

- 46% of GCA and 52% of FG area of India,
- 63% of the GIA, and 69% of the FG irrigated area
- 64% of total FG production, but only 52% of FG demand

IGB FG surplus = 30% of the other basins FG demand



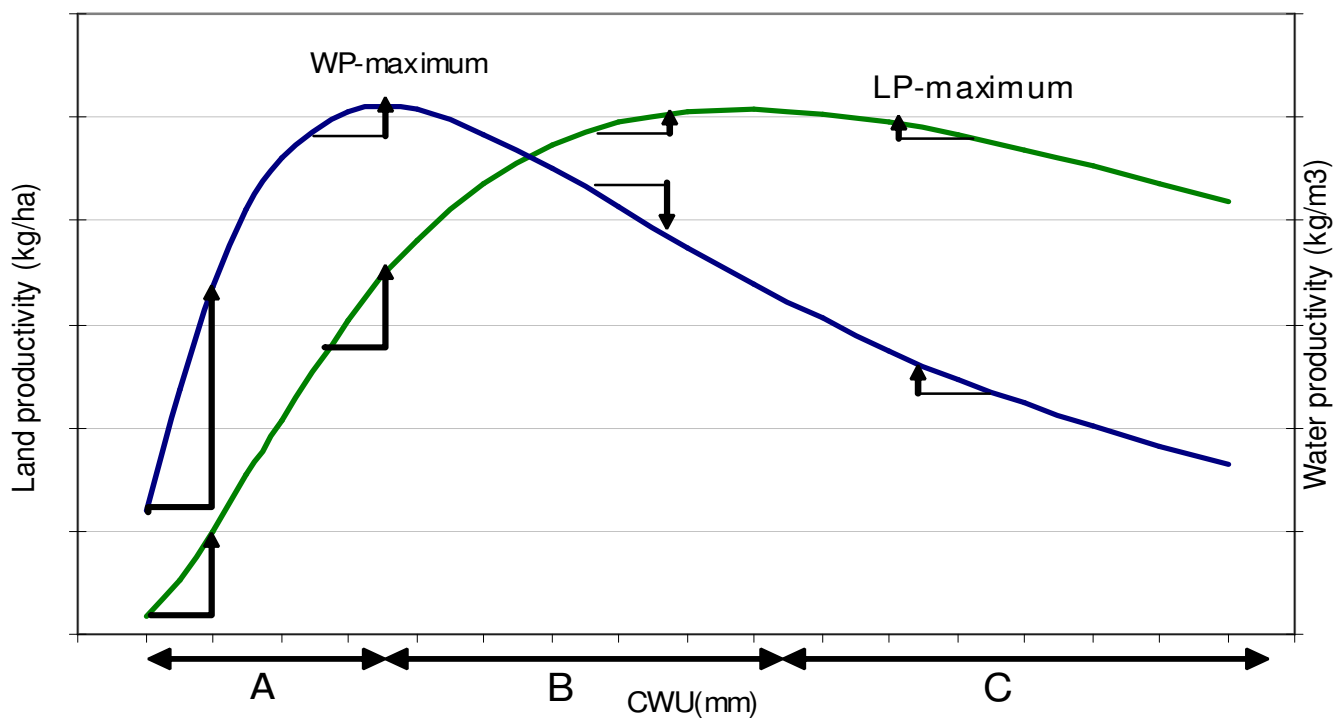
Methodology

$$Water\ Productivity = \frac{Foodgrain\ production}{Consumptive\ water\ use}$$

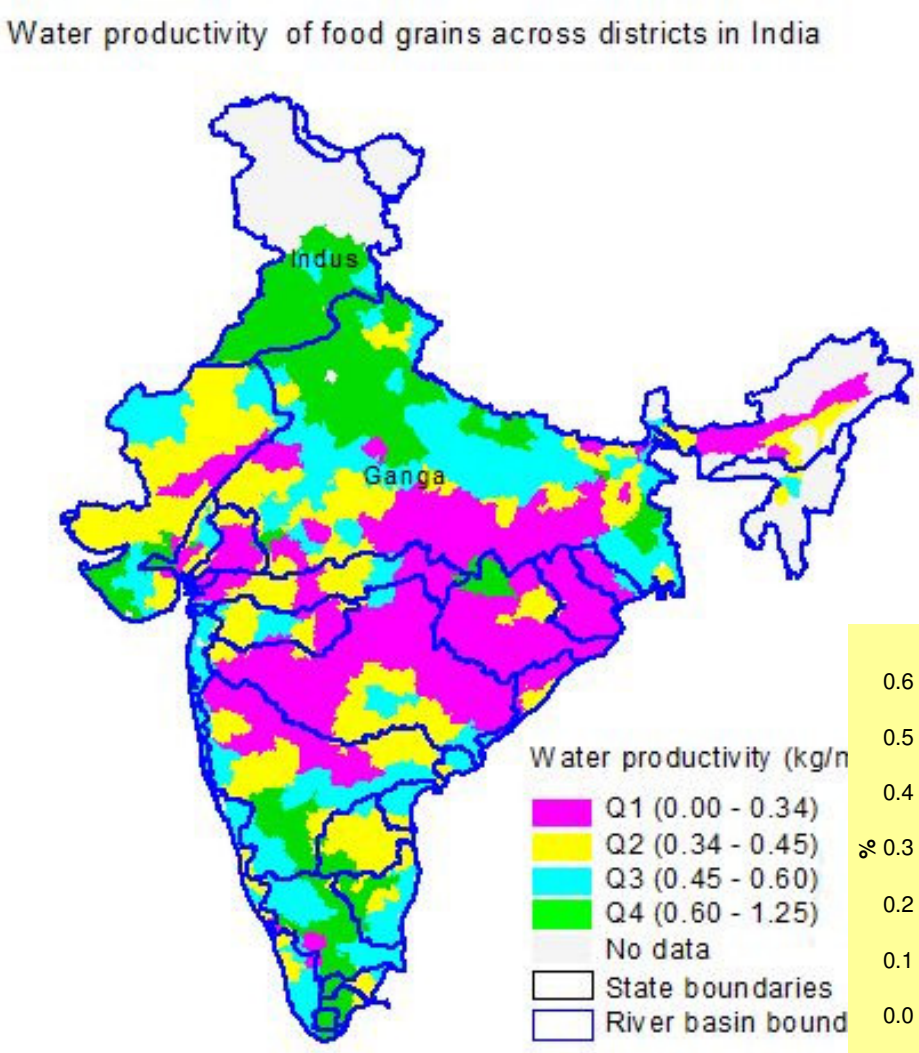
Hypotheses

Significant opportunities exist in increasing WP and production by:

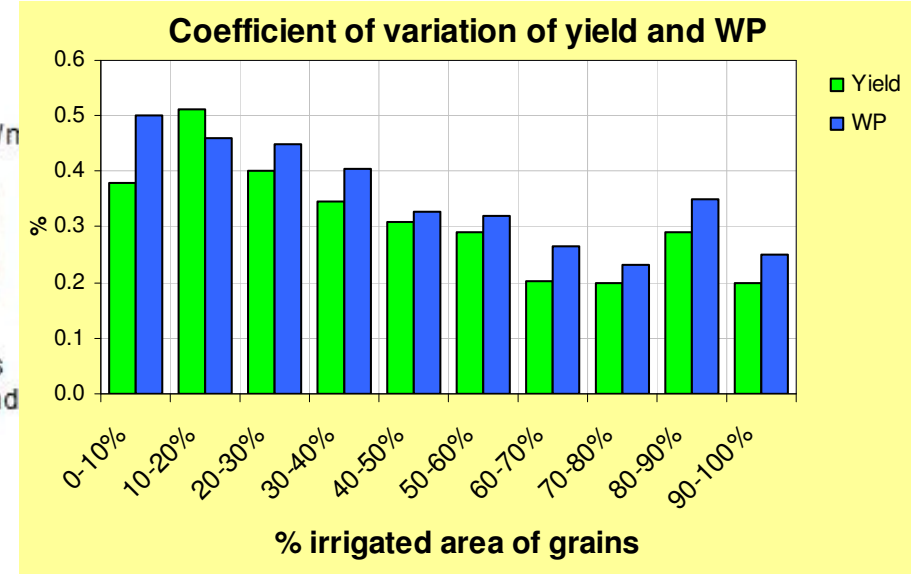
1. Bridging the gap between actual and maximum attainable yield
2. Supplementary irrigation in rainfed area
3. Deficit irrigation to operate at lower CWU regime



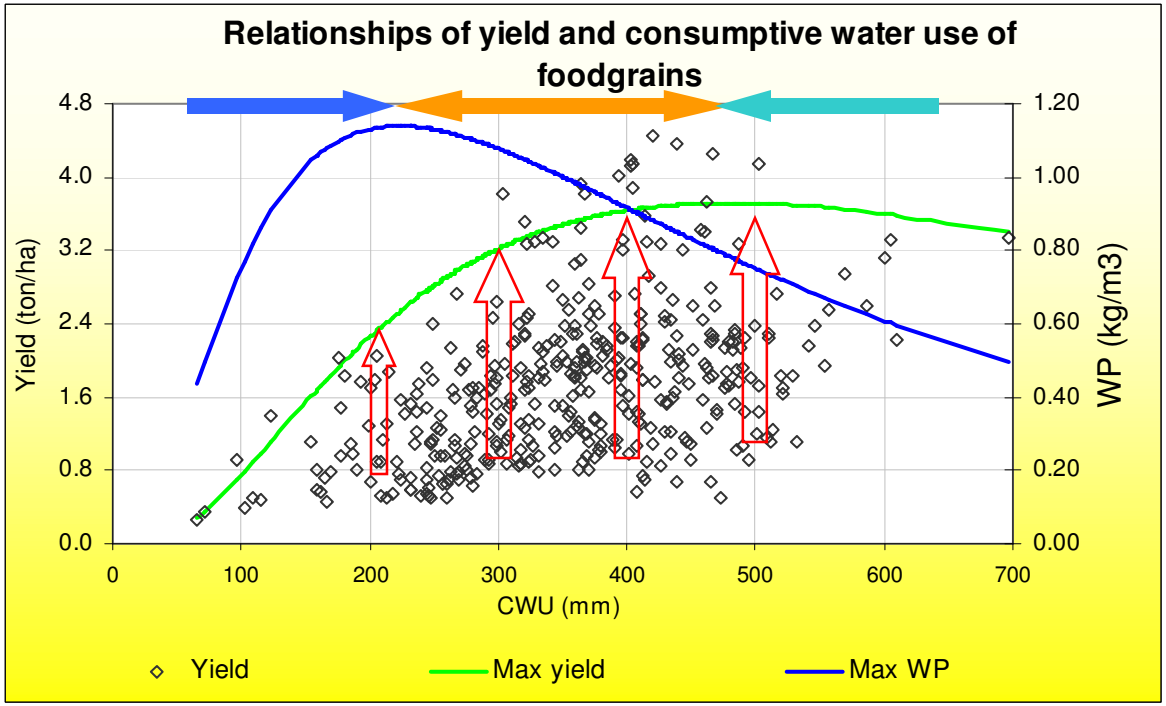
Spatial Variation



- Variation across states
  - 1.01 kg/m3 in Punjab
  - 0.21 kg/m3 in Orissa
- Variation across districts
  - varies from 0.11 kg/m3 to 1.25 kg/m3



Potential for WP improvements

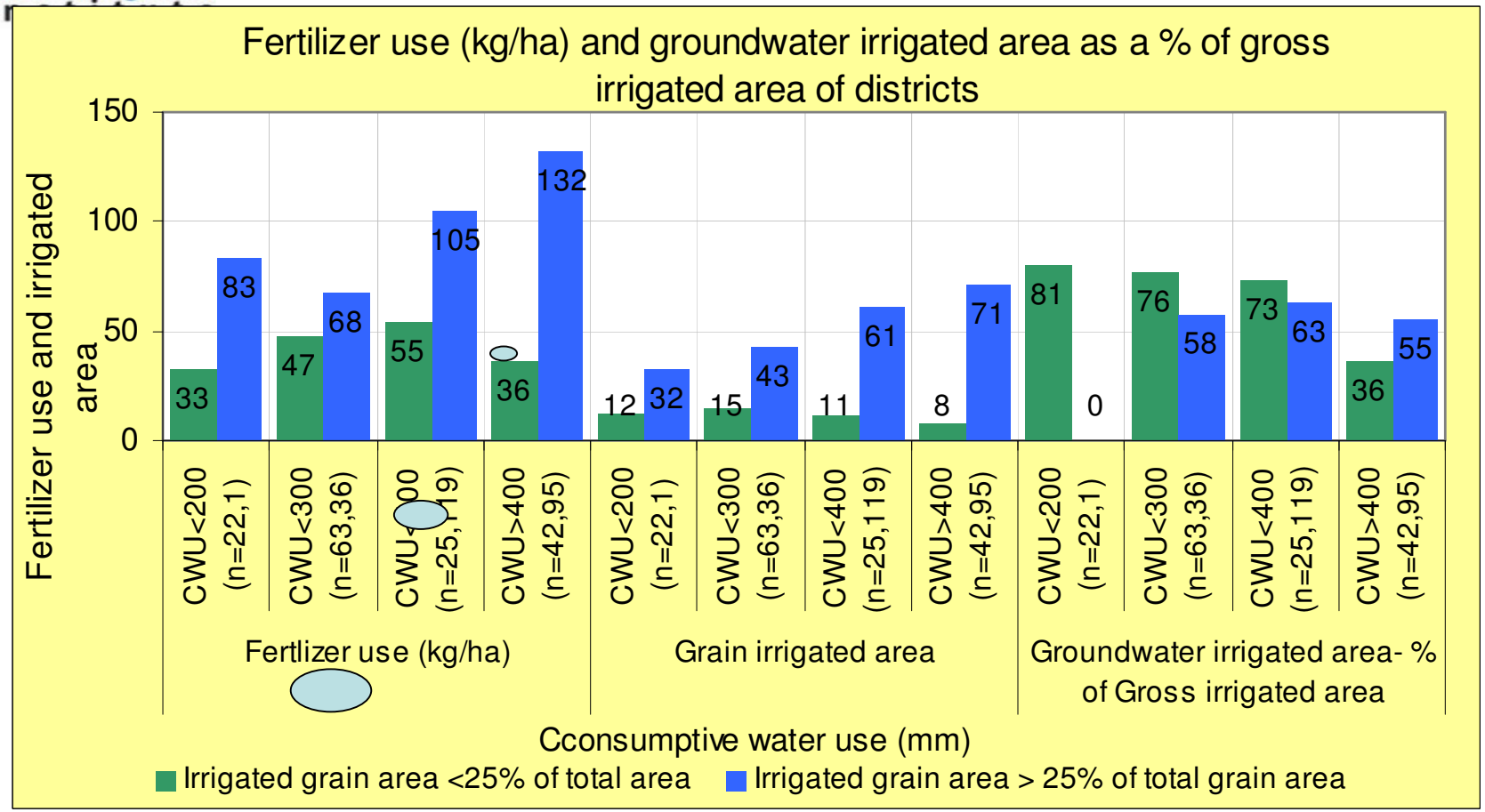


- Significant yield gap exists
- Supplemental irrigation can increase WP
- No significant increase in WP
- Deficit irrigation region

Potential for Reducing yield gap

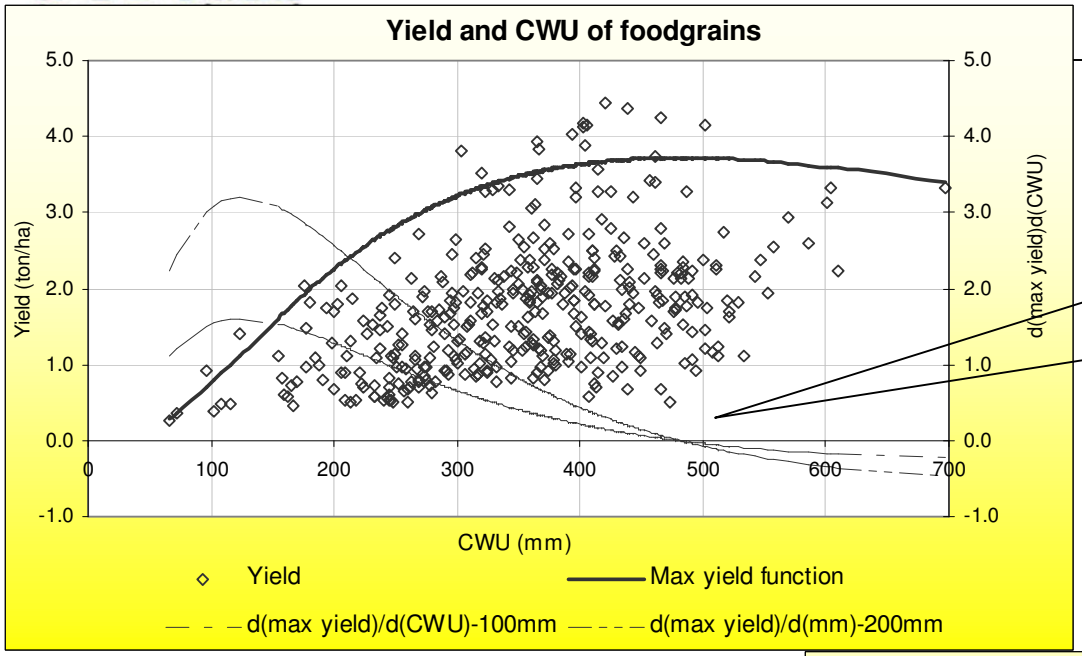
Actual yield - % of maximum	Number of districts with irrigated grain area:	
	< 25% total	> 25% total
0-25	10	38
25-50	31	120
50-75	86	76
75-100	25	7
Total	152	221

Potential for supplementary irrigation



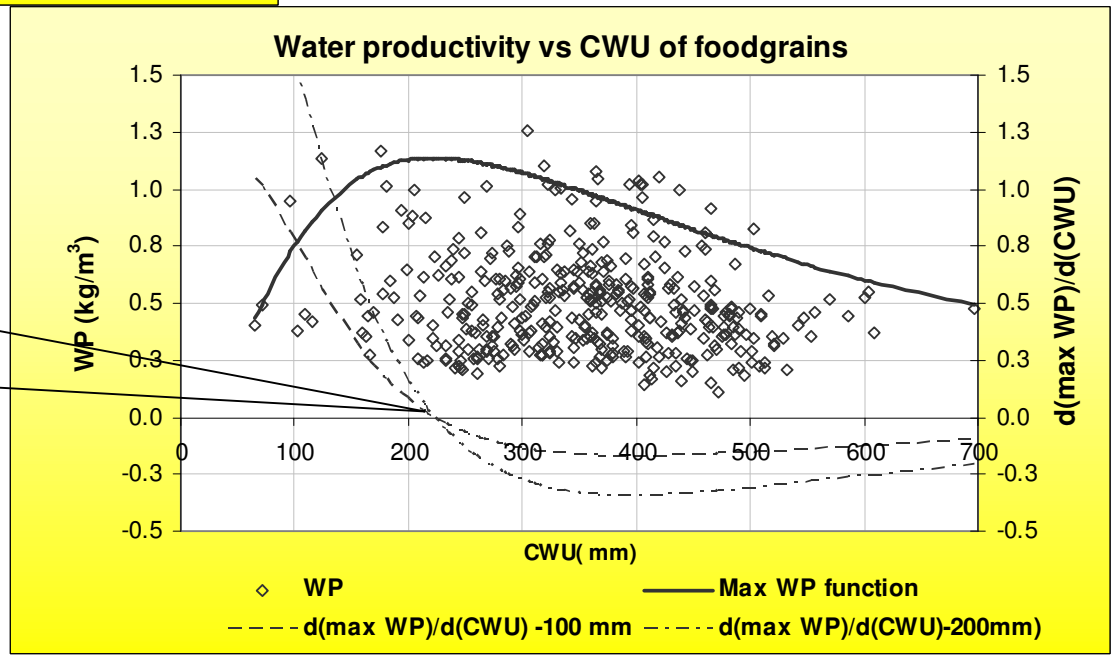
Irrigation can improve input application

Potential for supplementary irrigation



Marginal gains in yield is positive with additional irrigation in CWU < 475 mm

Marginal gains in WP is positive with additional irrigation in CWU < 225 mm



Potential in rainfed foodgrain areas

CWU	Number of Districts	Water management	Supplemental irrigation	Agriculture diversification
0 - 225	156		Increase LP and WP	
225 - 300	16		Increase LP decreases WP	
300 - 475	117	Increase LP and WP		X
> 475	18	Increase LP and WP		X

Potential in irrigated fodograin areas

CWU	Number of Districts	Water management	Supplemental irrigation	Deficit irrigation	Agriculture diversification
0 - 225					
225 - 300	111		Increase LP decreases WP		X
300-400	136	Increase LP and WP	Increase LP decreases WP		X
400– 475	66	Increase LP and WP		Increase WP and decreases LP	X
> 475	185	Increase LP and WP		Increases WP and LP	X