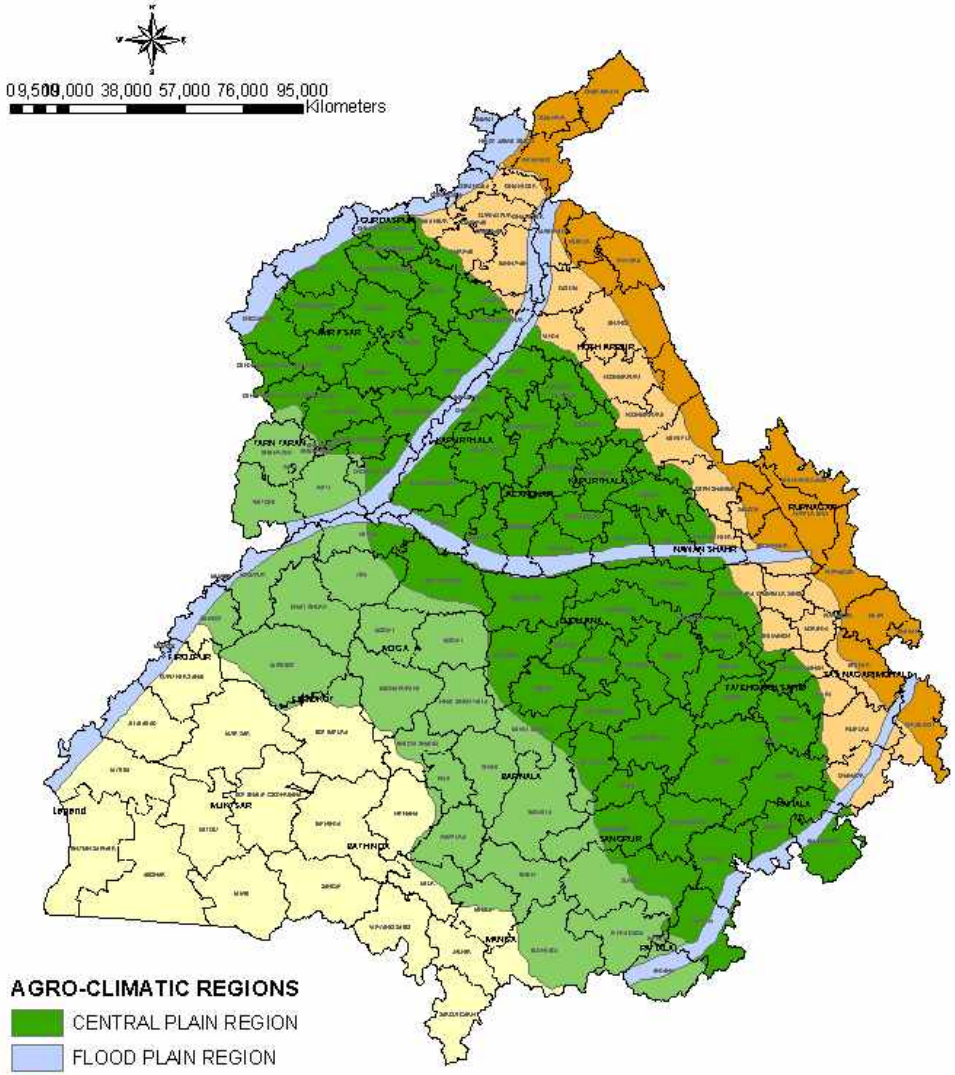
CROPPING SYSTEM ANALYSIS FOR THE PUNJAB STATE USING LOW RESOLUTION REMOTE SENSING DATA

S. K. BAL, B.U. CHOUDHURY, ANIL SOOD, G.S. BAINS AND J. MUKHERJEE

Dept. of Agricultural Meteorology

Punjab Agricultural University

AGRO-CLIMATIC REGIONS OF PUNJAB



Major Concern ?

- The state of Punjab and its farmers, once at the centre stage of green revolution, are facing serious problems of sustaining agricultural productivity.

- Due to intensification of agriculture, the cropping system of the state has changed drastically. The whole state is progressing towards a rice-wheat mono cropping system from the multi crop – husbandry practices.

Consequences

- As rice is a high water demanding crop, the toll has been visible on the water balance front of the state.

- Areas having water table depth >10 m has increased from **3 %** in 1973
  to **90 %** in 2005
  in central plain region.

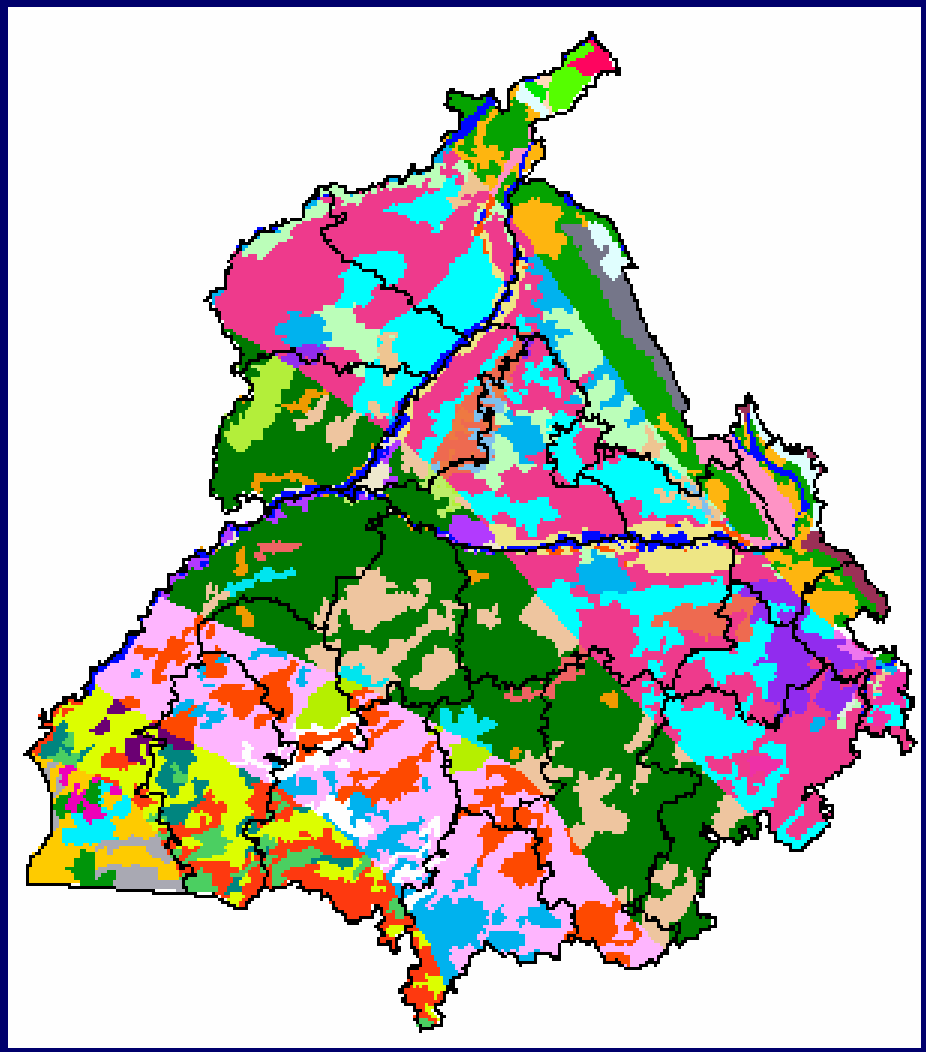
- Water logging and soil salinity are the other consequences of indiscriminate use of good quality and marginal quality waters for irrigation.

How to tackle the problem?

Thus to sustain the food security of the Indian Punjab, it is of great importance

- To delineate the state into different agro-ecological zones
- To assess the present status of cropping system.
- To suggest an alternate crop diversification plan for the entire state.

Delineation of Agro-ecological zones of Punjab



Basis

Temperature
Length of growing period
Soil
Biomass

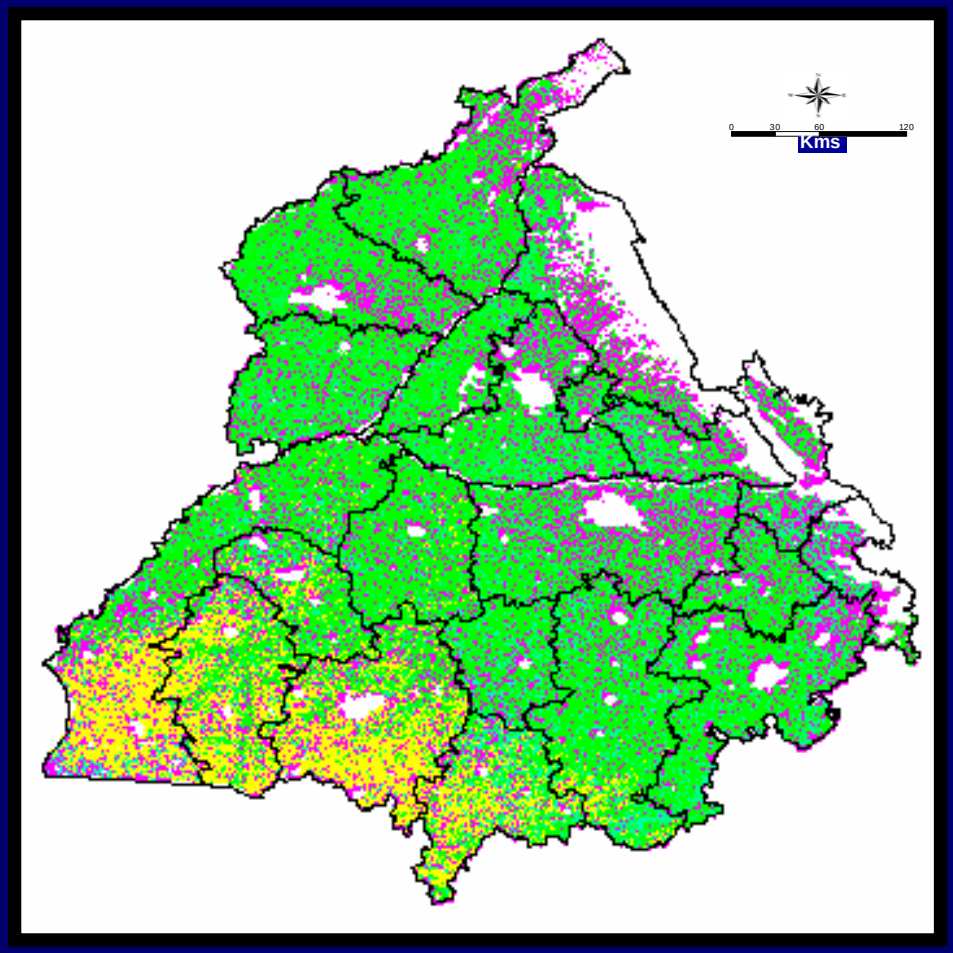
Z_2
$Z_1B_GS_2$
$Z_1B_GS_3$
$Z_1B_GS_7$
$Z_1B_ES_2$
Z_2
$Z_2B_GS_1$
$Z_2B_GS_2$
$Z_2B_GS_5$
$Z_2B_GS_7$
$Z_2B_ES_7$
$Z_2B_ES_9$
Z_3
$Z_3B_MS_3$
$Z_3B_MS_4$
$Z_3B_MS_5$
$Z_3B_GS_3$
$Z_3B_GS_4$
$Z_3B_GS_5$
$Z_3B_GS_7$
$Z_3B_GS_9$
$Z_3B_ES_3$
$Z_3B_ES_4$
$Z_3B_ES_7$
$Z_3B_ES_9$
Z_4
$Z_4B_MS_7$
$Z_4B_GS_3$
$Z_4B_GS_4$
$Z_4B_GS_4$
$Z_4B_GS_7$
$Z_4B_GS_8$
$Z_4B_GS_9$
$Z_4B_ES_5$
Z_5
$Z_5B_MS_3$
$Z_5B_MS_5$
$Z_5B_MS_7$
$Z_5B_GS_7$
$Z_5B_GS_8$
Z_6
$Z_6B_MS_3$
$Z_6B_MS_5$
$Z_6B_GS_3$
$Z_6B_GS_5$
$Z_6B_GS_7$
Z_7
$Z_7B_MS_3$
$Z_7B_MS_5$
$Z_7B_MS_7$
$Z_7B_GS_3$
$Z_7B_GS_7$
River

Cropping System Analysis

- Satellite Imagery: Multi-date (10-day composite) Low resolution SPOT satellite data having a spectral resolution of 1km x 1km

- Total Scene : 72 scenes (2004-06)
- Software : PCI Geometica
- Classification : Unsupervised
- Ground Truth : Extensive

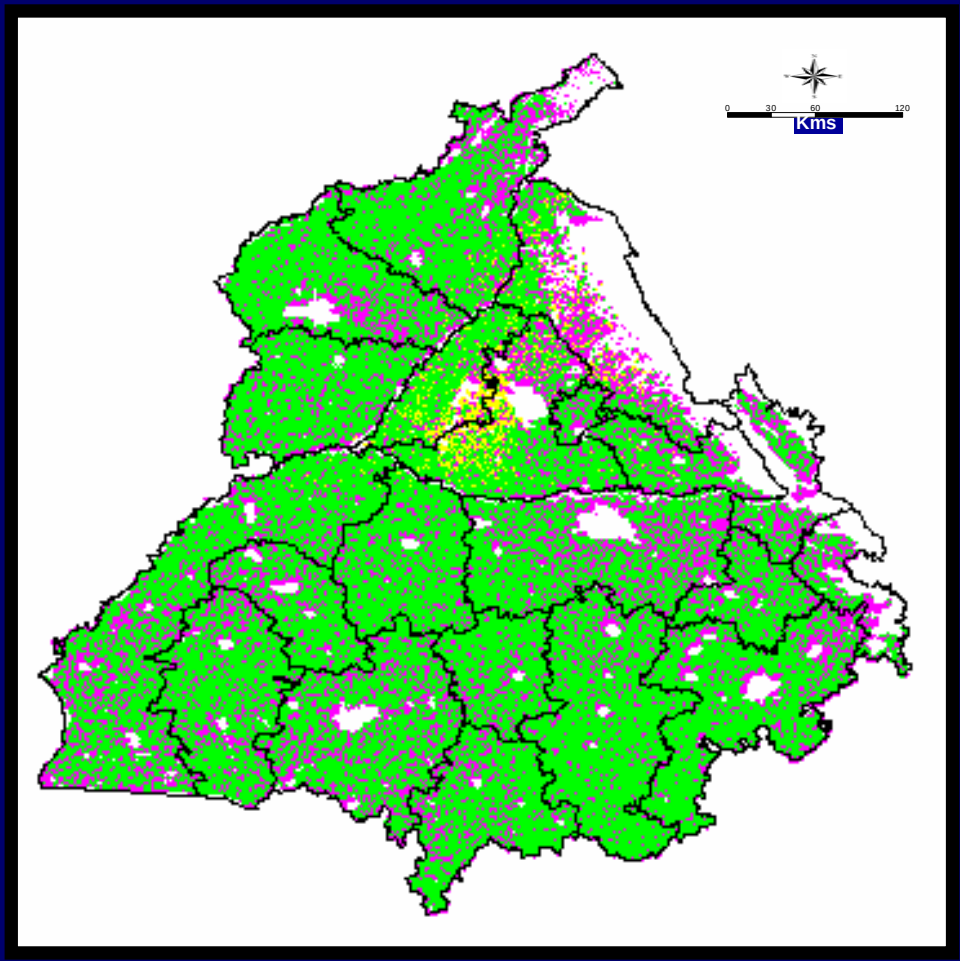
Kharif Cropping Pattern of Punjab



Type of crop	% Area
Rice	62.9
Cotton	14.0
Others	23.1

- Rice
- Cotton
- Other crops
- Non-Agriculture

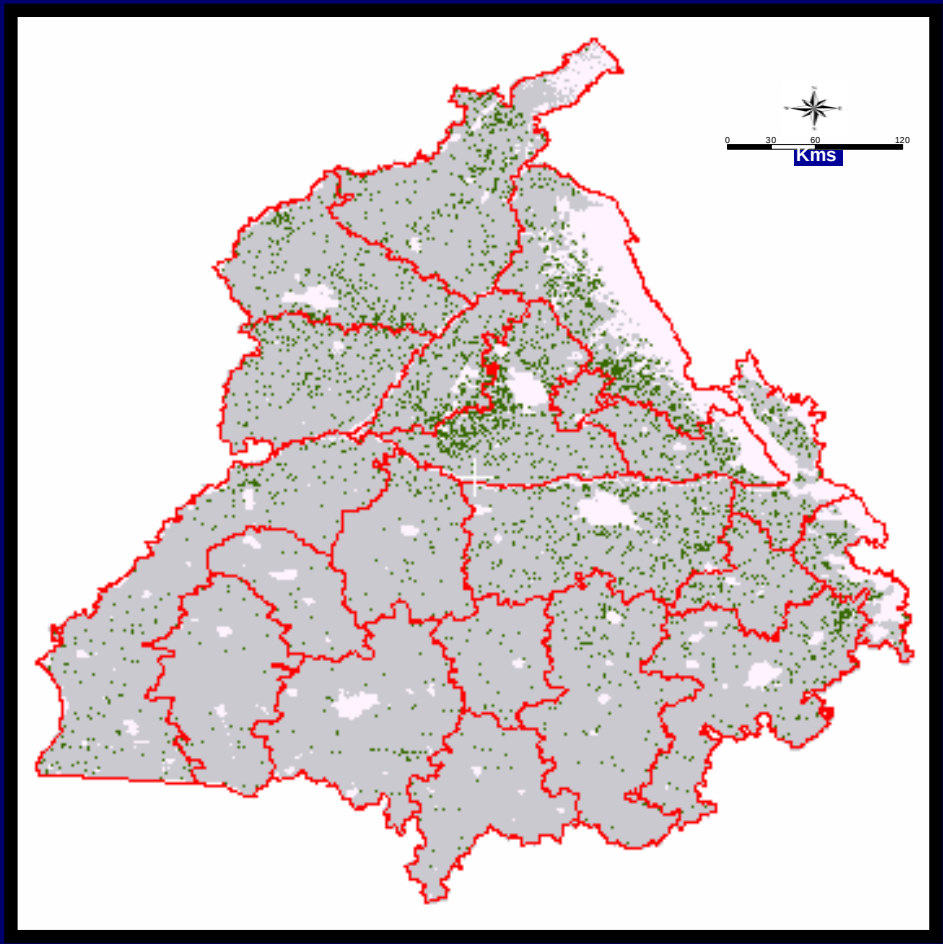
Rabi Cropping Pattern of Punjab



Type of crop	% Area
Wheat	85.6
Potato	2.1
Others	12.3

- Wheat
- Other crops
- Potato and vegetables
- Non Agriculture

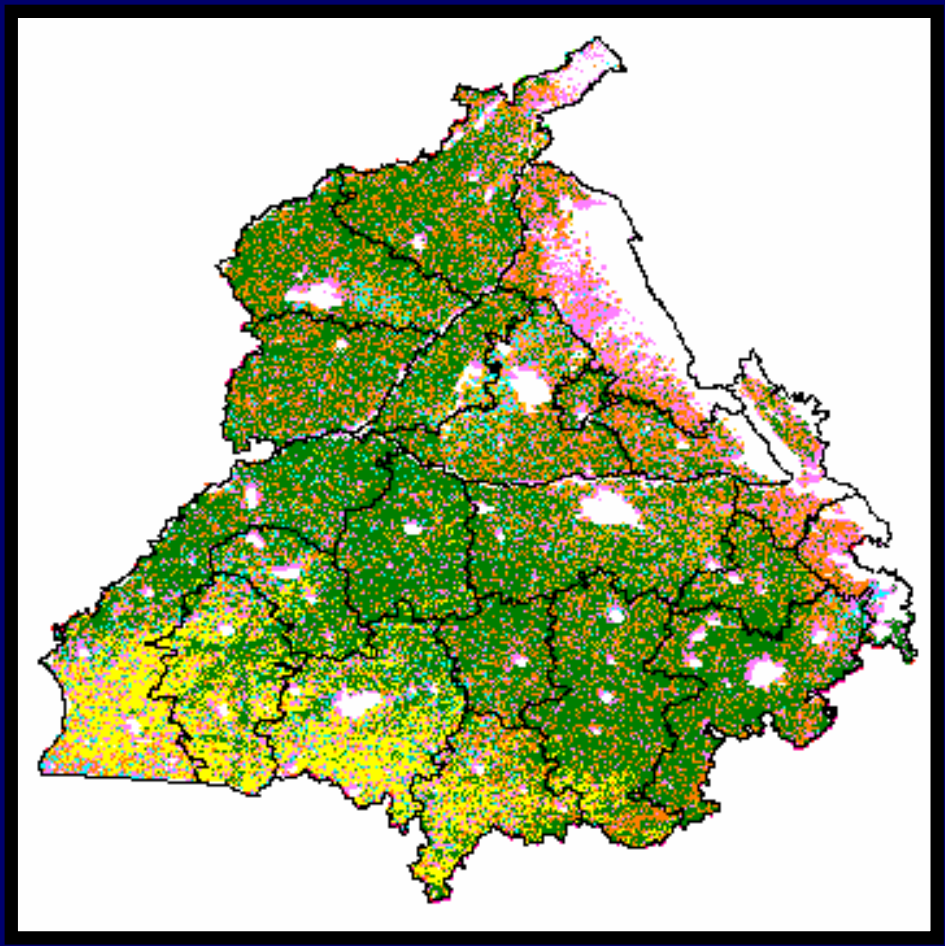
Summer Cropping Pattern of Punjab



Type of crop	% Area
Summer crops	4.8
Summer Fallow	95.2

Summer crops
Summer fallow
Non agriculture

Crop Rotation Map of Punjab



- Rice-wheat
- Cotton-wheat
- Potato-vegetables
- Rice-others
- Triple cropping
- Non agriculture

Type of crops	% Area
Rice-Wheat	54.0
Cotton-Wheat	12.0
Potato-Vegetables	2.1
Rice-Others	9.0
Others -Wheat	19.6
Others-Others	3.3

Crop Diversification Plan for Punjab State

Zones		Biomass	Soils	Present cropping system		Alternate cropping system		
				Kharif	Rabi	Kharif	Rabi	Summer
Z_2 Annual Average Temperature: 22-23 °C Length of Growing Period : 140-160 days								
	5	$Z_2B_GS_1$	Good	sandy skeletal (Typic Ustorthents)	Rice and other crops	Mixture of wheat and non-wheat areas. Non-wheat areas included maize, sugarcane etc	Agroforestry	Agroforestry	Agroforestry
	6	$Z_2B_GS_2$	Good	Loamy skeletal (Typic Ustorthents / Fluvents)	Rice and other crops		Maize(Fodder) Basmati Rice	maize	bajra
	7	$Z_2B_GS_5$	Good	Sandy (Entisols, Typic ustipsamments / Ustic Torripsamments)	Rice and other crops		Agro-forestry vegetables	Agro-forestry vegetables	Agro-forestry vegetables
	8	$Z_2B_GS_7$	Good	Coarse loamy (Typic Haplustepts-I)	Rice		Kharif maize	Wheat	Summer moong
	9	$Z_2B_ES_7$	Excellent	Coarse loamy (Typic Haplustepts-I)	Other crops than rice (Maize etc)		Sugarcane basmati	Sugarcane	Sugarcane Bajra
	10	$Z_2B_ES_9$	Excellent	Coarse loamy (Typic Ustfluvents)	Rice and other crops		Sugarcane basmati	Sugarcane	Sugarcane bajra

Concluding Remarks

- Save water to save Punjab
- How to change?

  Replace the present cropping system with the New Crop Diversification Plan

Else

Present

Future

THANKS