



RESEARCH PROGRAM ON  
**Climate Change,  
Agriculture and  
Food Security**



# Crop Yield Monitoring in Nepal

CGIAR Research Program on Climate Change, Agriculture and Food  
Security (CCAFS), Borlaug Institute of South Asia (BISA),  
International Maize and Wheat Improvement Centre (CIMMYT), New  
Delhi 110012, India

# CCAFS in South Asia Region



Policies and Institutions



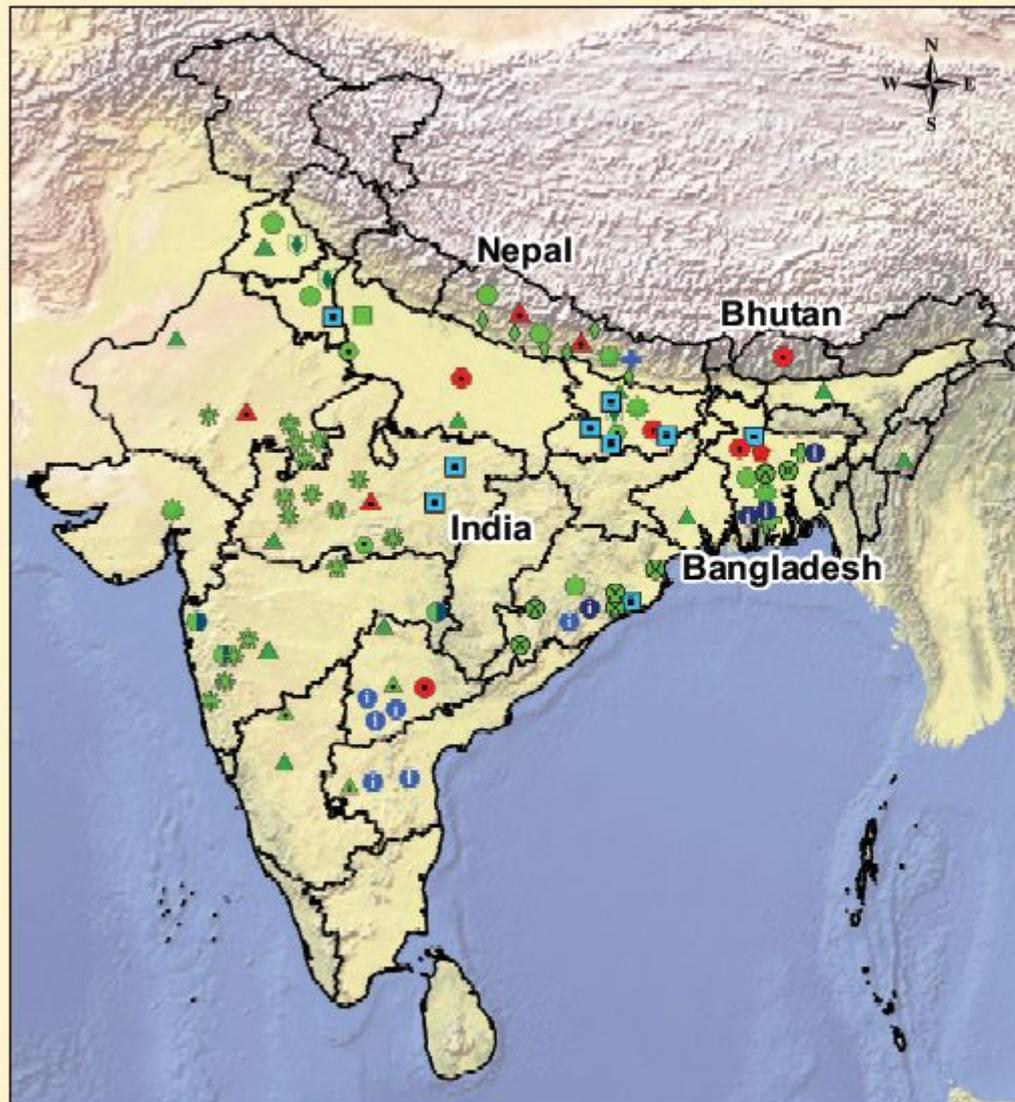
Climate-Smart Agricultural Practices



Low Emissions Agriculture



Climate Risk Management



## CCAFS Project Sites

### Priorities and Policies for CSA

- CSA Investment Planning (IFPRI)
- ▲ CSA Investment Planning (BISA)
- ◆ Policy Scenarios (CCAFS-U. of Oxford)

### Climate-Smart Technologies and Practices

- ☼ Solar Powered Irrigation (IWMI)
- Underground Taming of Flood (IWMI)
- Big Data Solutions for CSA (CIMMYT)

### Scaling up CSA/CSV approach

- ♻️ CIMMYT
- ◆ BISA-LiBIRD-Nepal Govt.
- BISA-CIMMYT-Govt. of Maharashtra, India
- BISA-USAID
- ▲ IWMI-ICAR
- ▲ ICRISAT
- ⊗ IRRI
- ☼ BISA-ITC
- ⊕ WorldFish

### Climate Services and Safety Nets

- Bundling Insurance Solutions (IWMI)
- Smart ICTs for Fishermen (WorldFish)
- ⊕ Food Security Monitoring (BISA-WFP)
- Yield and Weather Index Insurance (BISA)
- Smart ICTs for Farmers (ICRISAT)

Projects with substantial Gender and Social Inclusion component

Projects with substantial Low Emissions Development component

# Need for near real time yield forecasting

- Changing climatic conditions and increasing food demand in the world, improved climate risk management and agricultural decision support systems are needed to aid with appropriate selection of practices and strategies.
- Crop models can be used for yield forecasting, as well as risk analysis and assessment.
- Crop yield forecasts can be conducted prior to planting or during the actual growing season and the results can be used by growers for crop production management, or by governments for agricultural planning.



# CRAFT Development

**Objective: To develop a new spatial decision support system for short and long-term yield forecasting and agricultural risk analysis associated with the increasing climate variability and extreme events, as well as climate change.**

- Partners: NARS of India, Pakistan, Nepal, Bangladesh, Sri Lanka; Bhutan; CIMMYT; Alterra
- Inception workshop: April 2012
- Toolkit development: June-Dec 2012
- Prototype testing- Dec 2012 onwards
- Applications: 2013-14 onwards

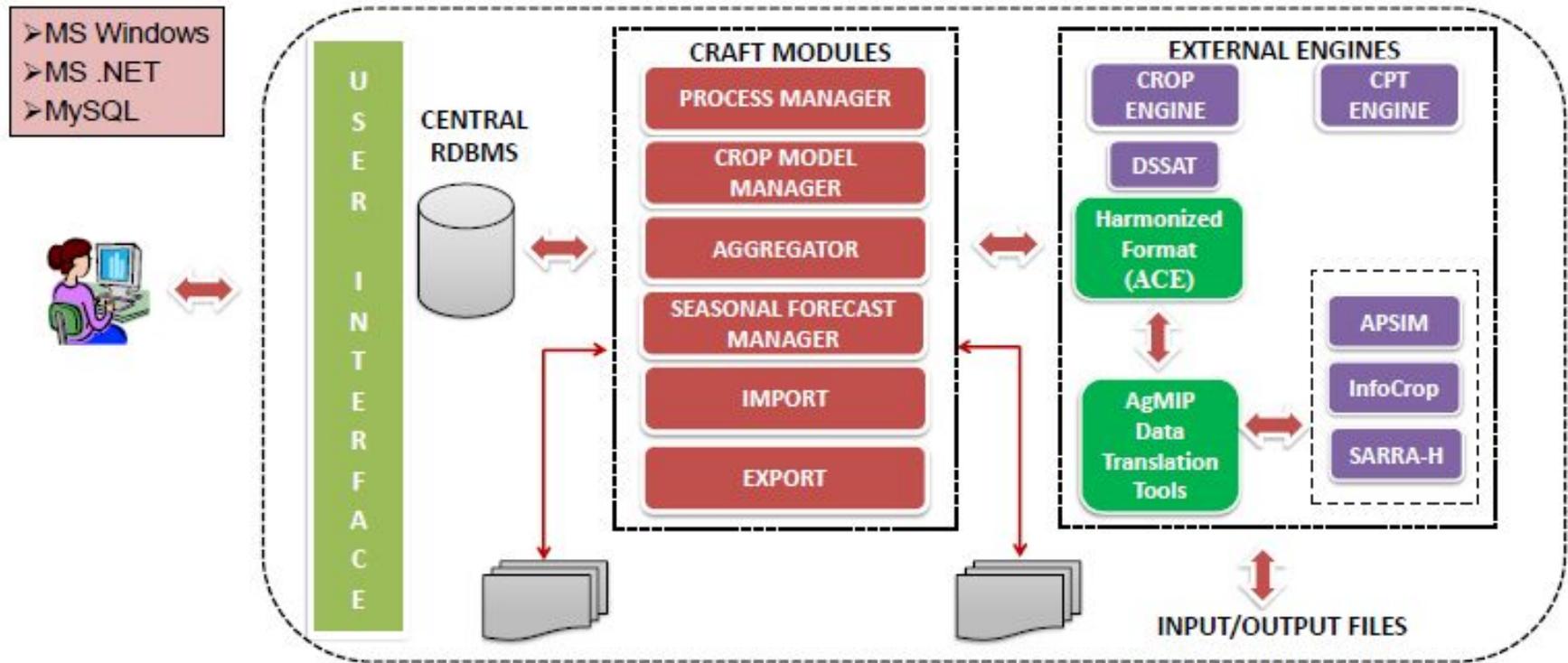


# CRAFT Development

- CRAFT is integrated with external engines:
  - Crop Modelling
  - CPT
- Developed to support multi-crop model capabilities using the harmonized data format and crop model data translation tools developed by the Agricultural Model Intercomparison and Improvement Project
- Started in CCAFS Phase-1
  - CRAFT V1 [DSSAT]
  - CRAFT V2 [DSSAT+APSIM\*]
  - CRAFT V3 [DSSAT+APSIM+InfoCrop+SARRA-H]



# ARCHITECTURE OVERVIEW



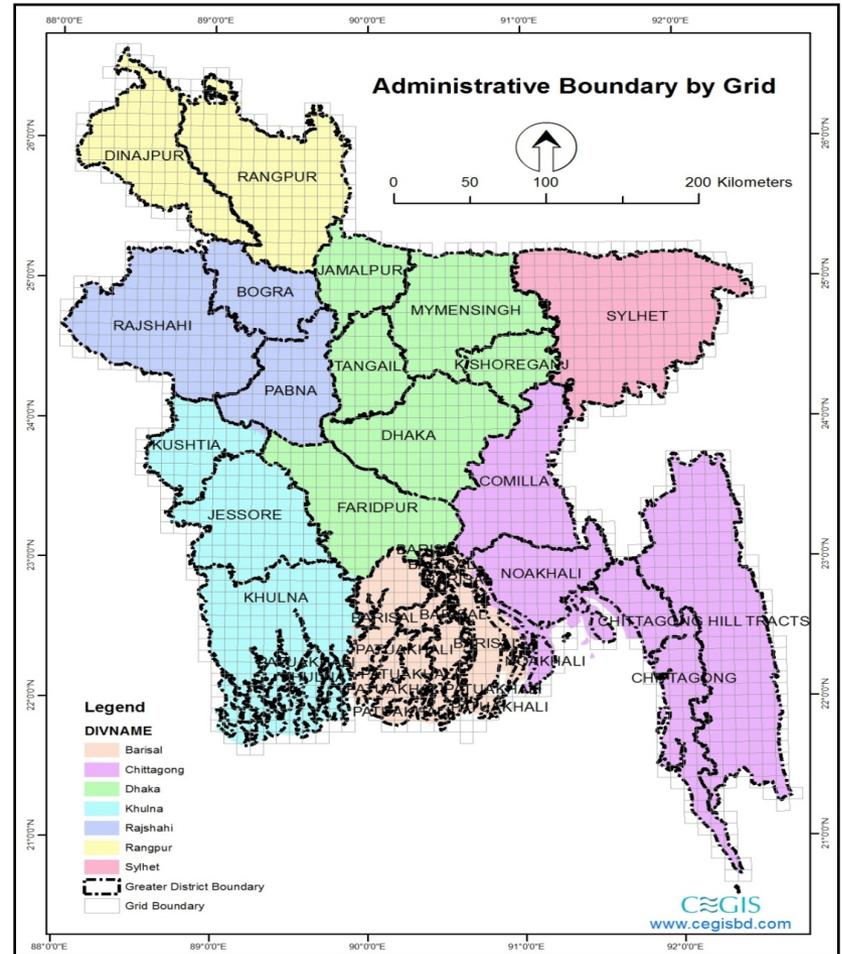
# CRAFT Regional Experience

- CRAFT applications in the South Asia:
  - Bangladesh [CEGIS]
  - India [IMD/IARI]
  - Nepal [WFP-NeKSAP]
  - Sri Lanka [NRMC]

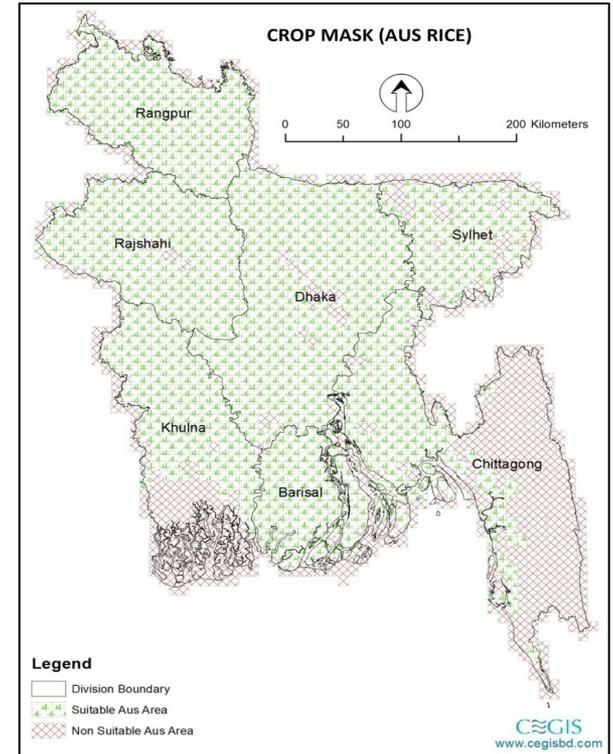
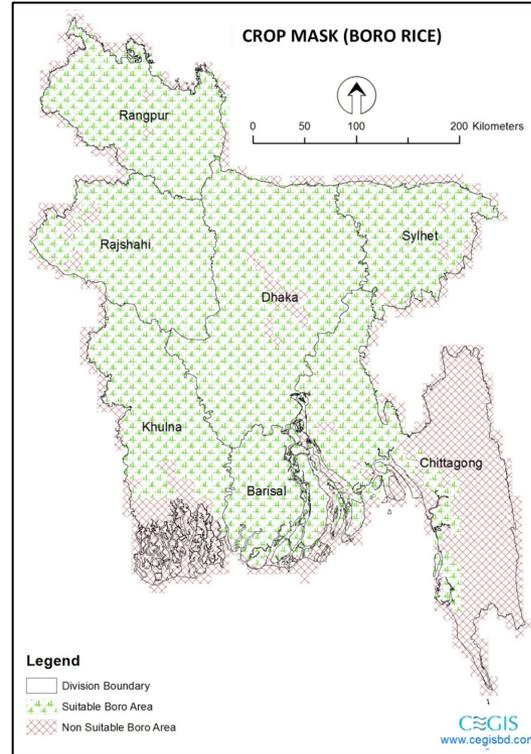
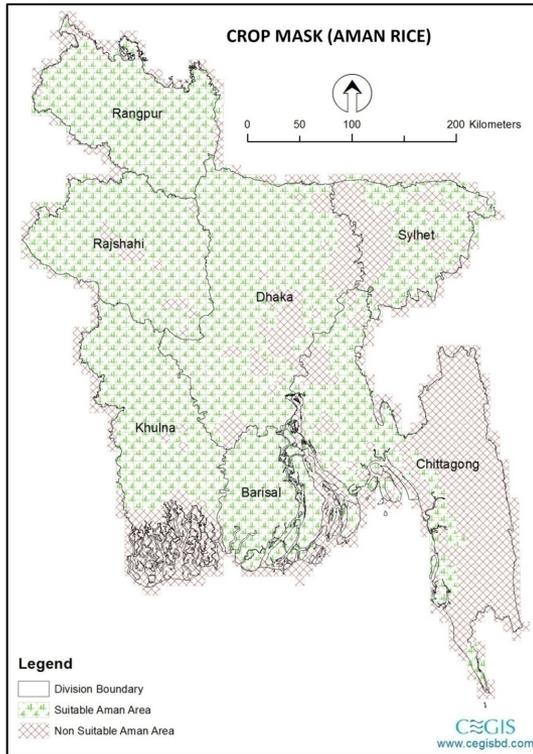


# CRAFT application in Bangladesh

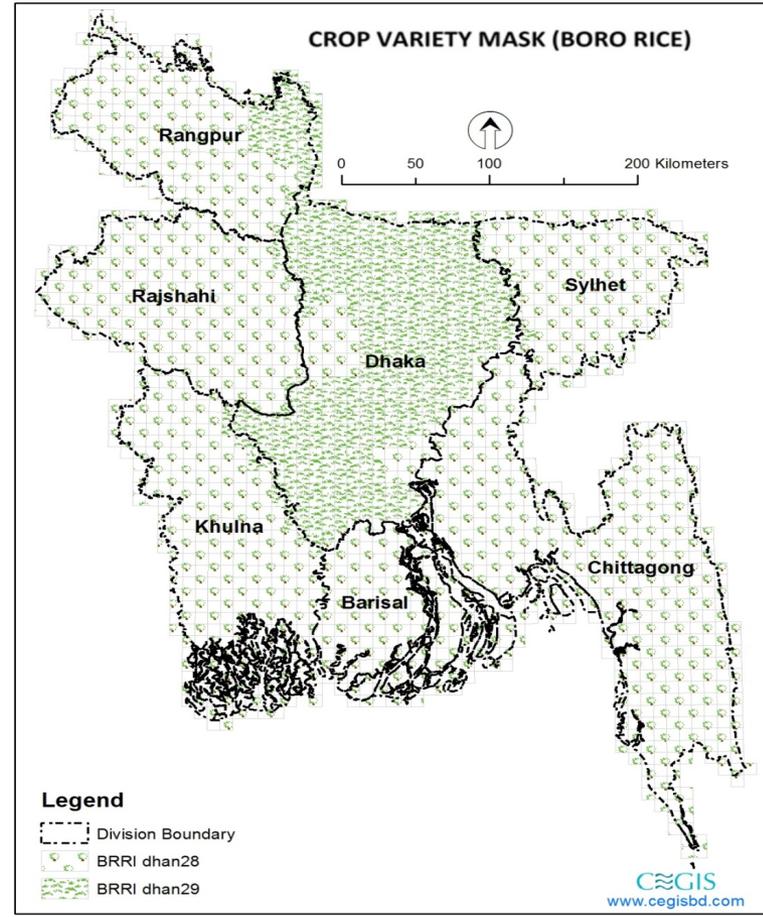
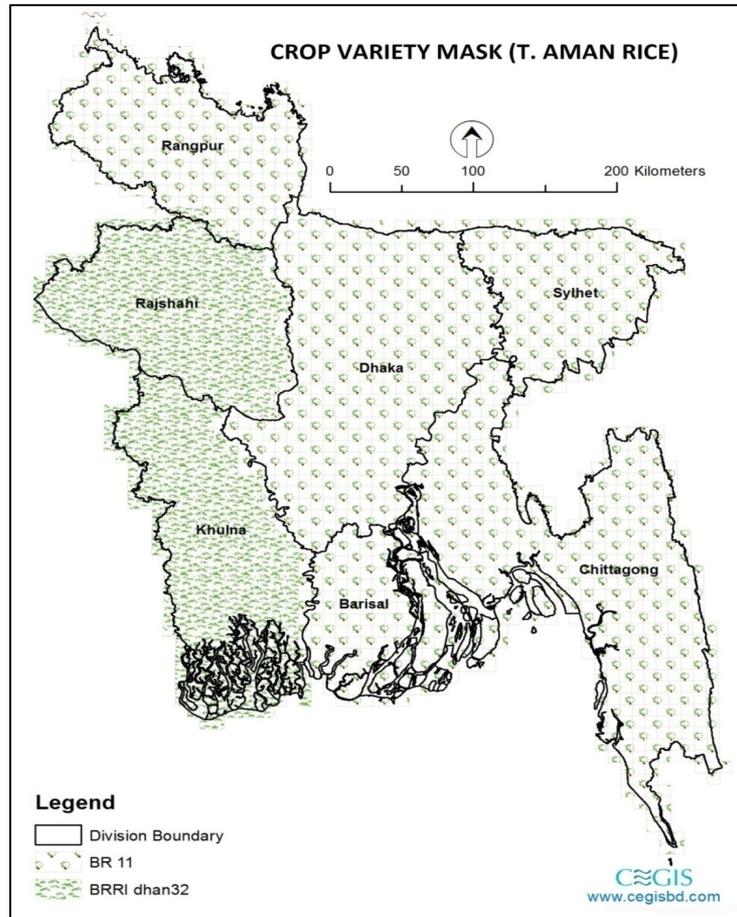
- Lead by the Center for Environmental Geographic Information Services (CEGIS)
- Crops
  - Rice in three seasons
  - Wheat



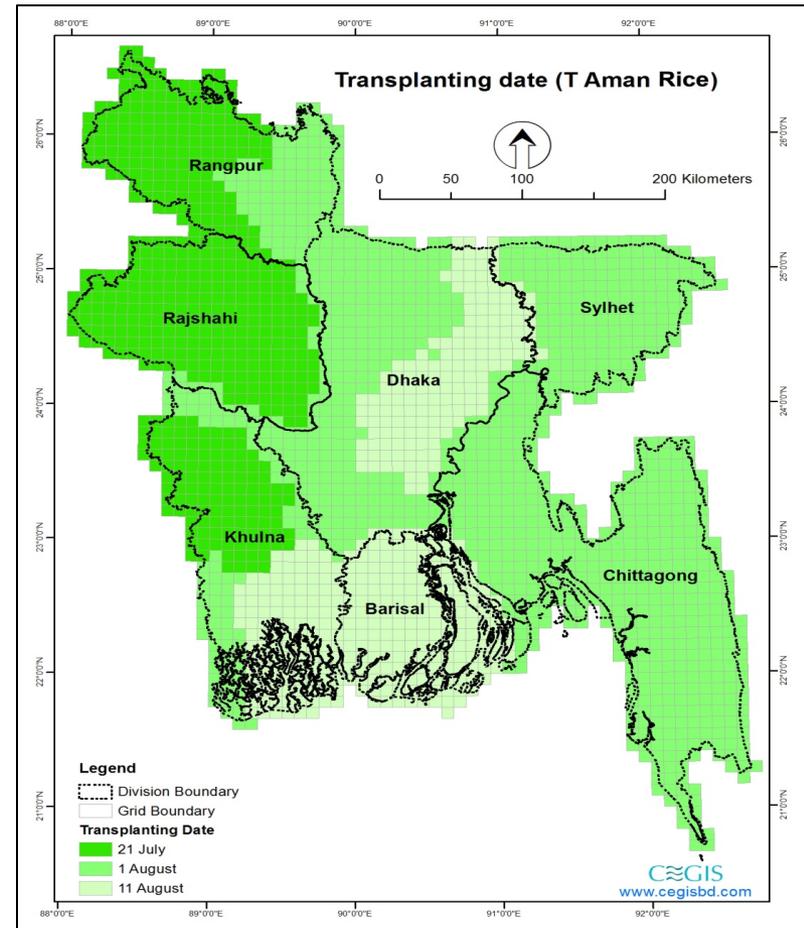
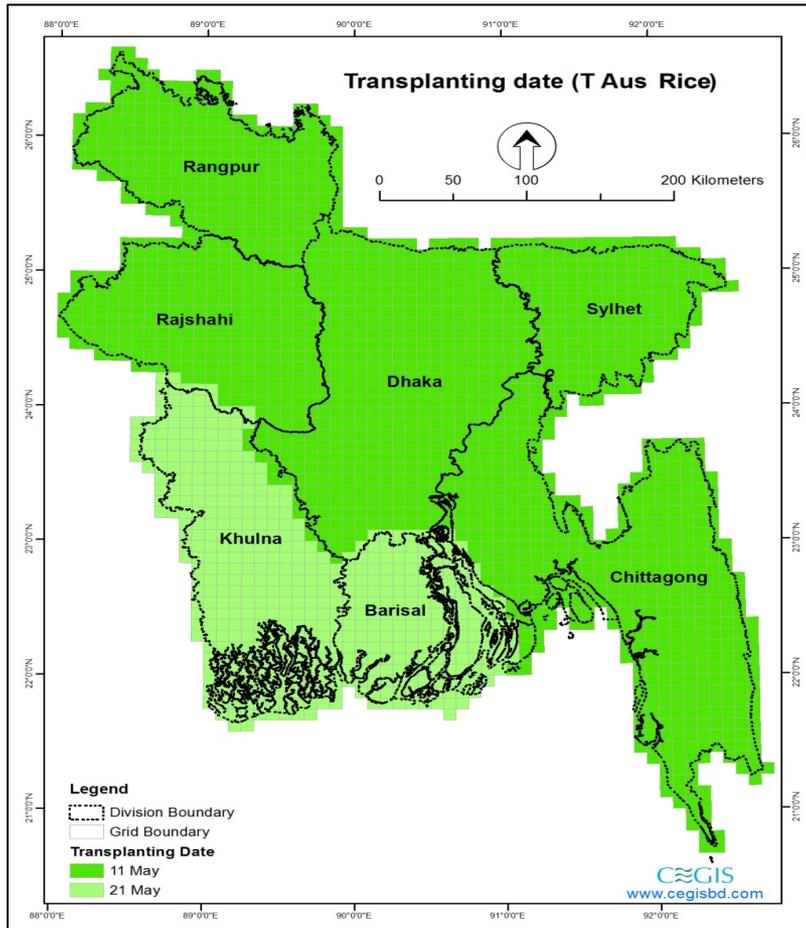
# Databases – Crop Mask



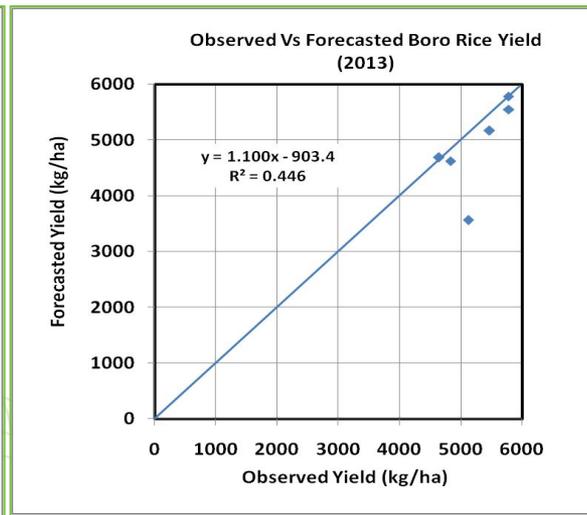
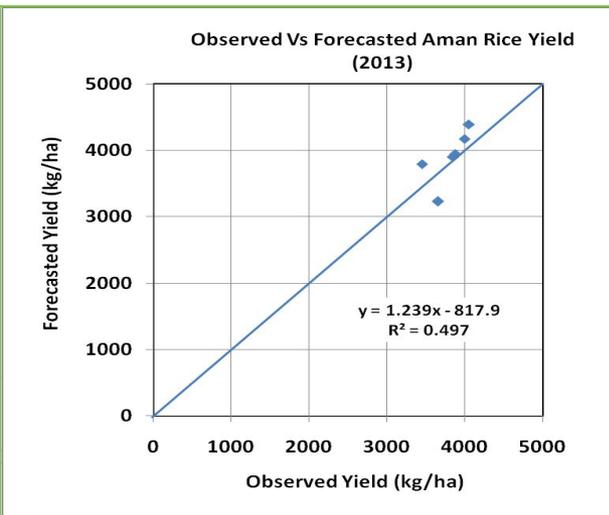
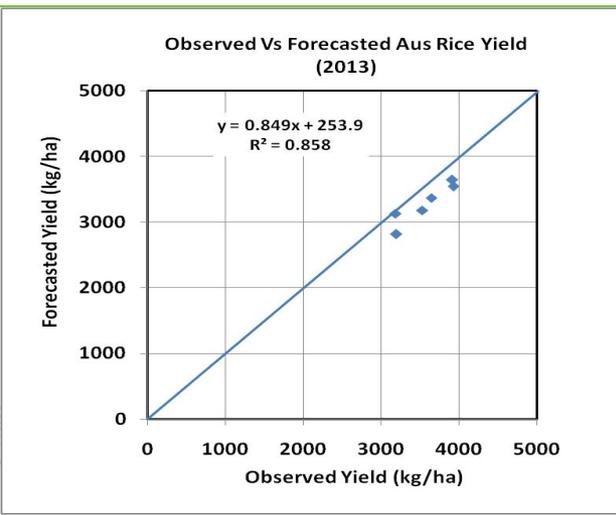
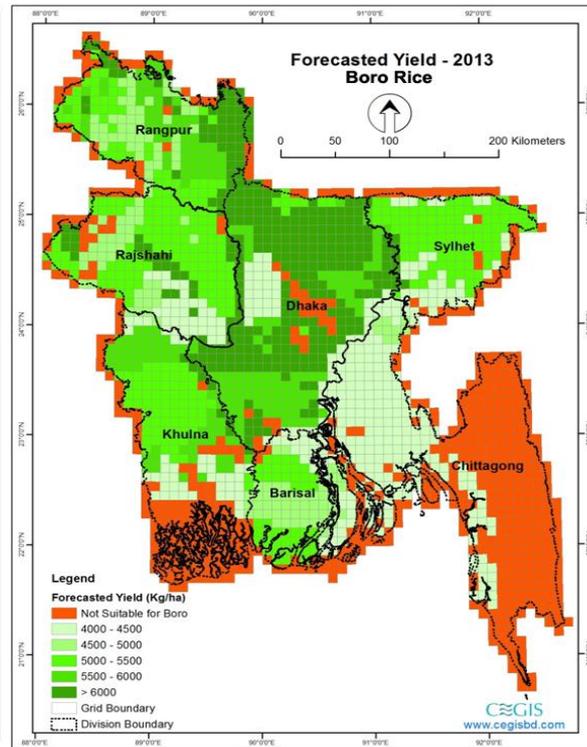
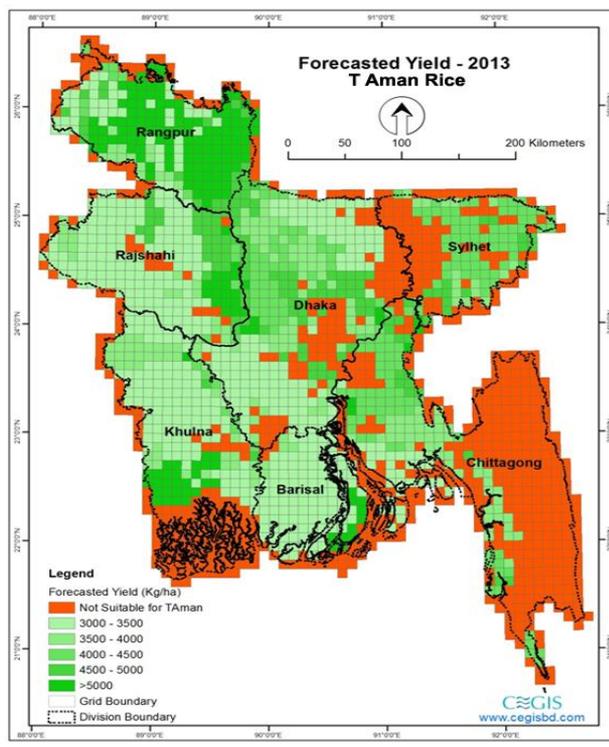
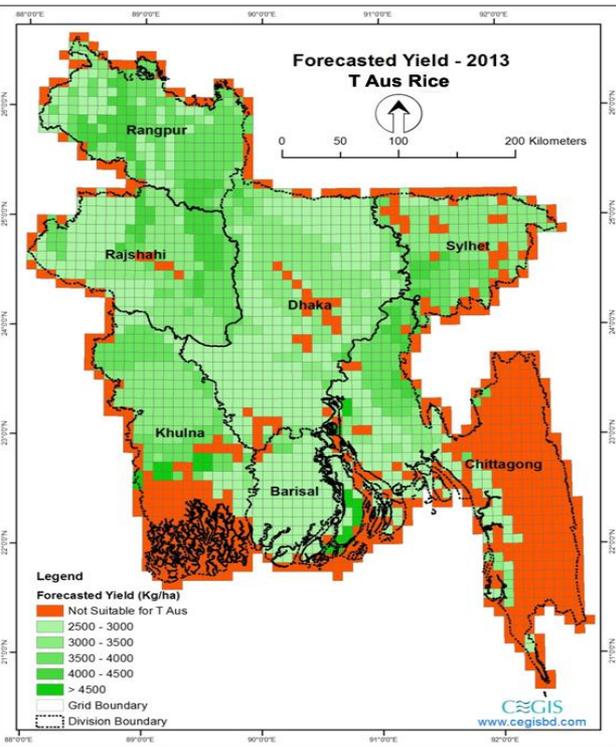
# Databases – Variety Mask



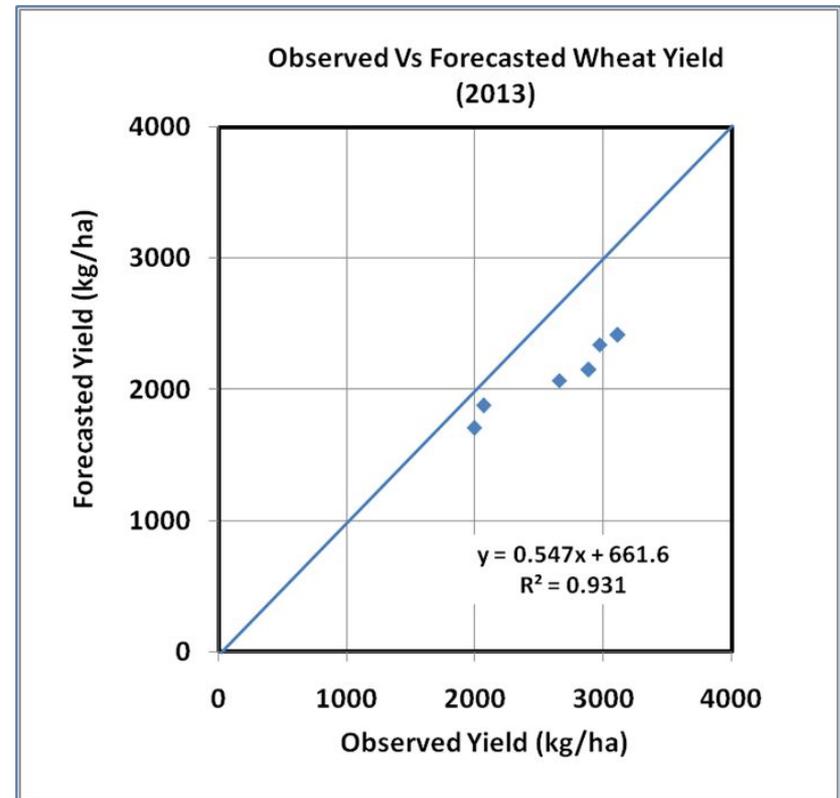
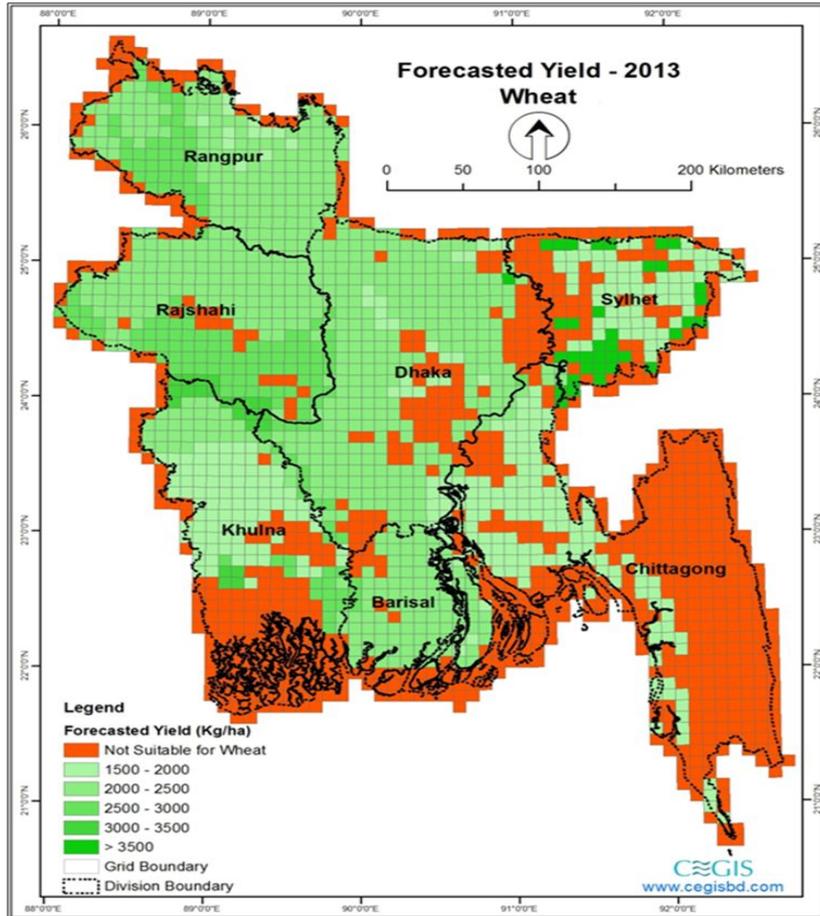
# Databases – Transplanting Dates



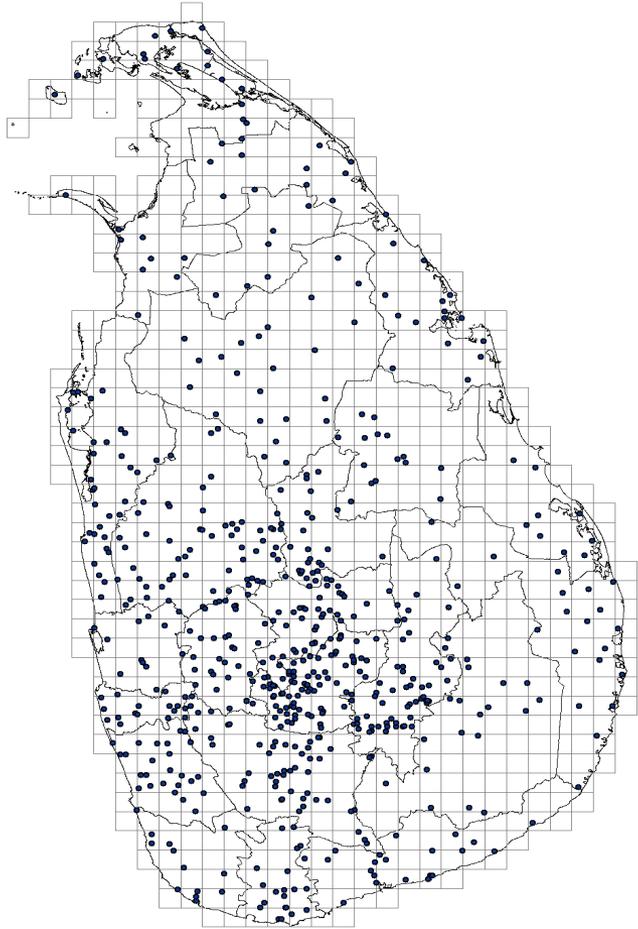
# Division Level Forecasts - Rice



# Division Level Forecasts - Wheat



# CRAFT applications in Sri Lanka



Weather Station distribution  
overlaid on 891 cells in CRAFT

## Objectives

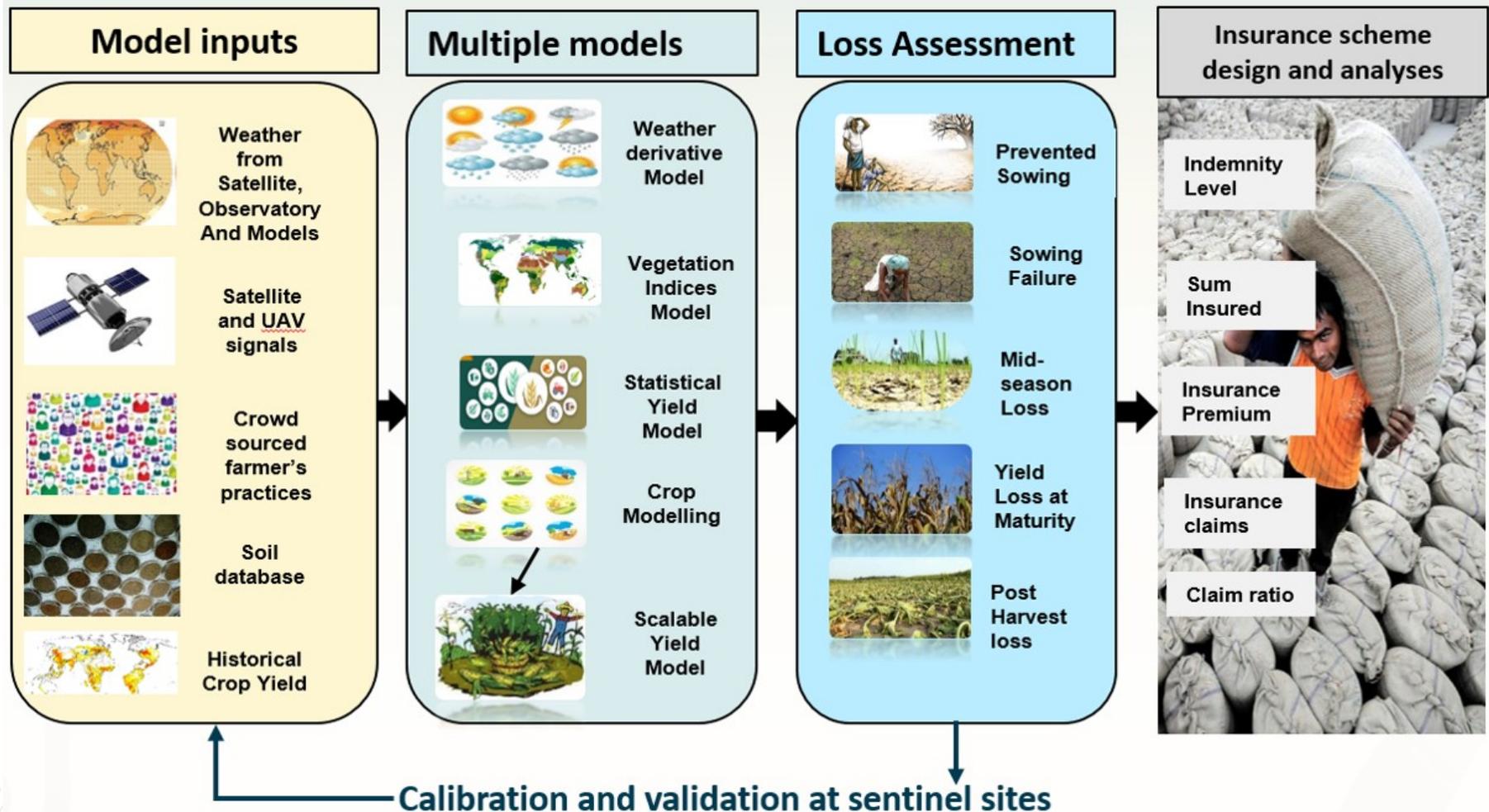
- To compile datasets to support databases of crop growth monitoring system and their in-season creation/population.
- To analyze within season crop environment and crop growth in near real time combining current season and forecasted weather, remote sensing and ground information.
- To assess the impact of climate change on selected crops in the region.

# Lessons learned

- There is huge scope to make operational crop yield forecasting at national scale;
- Different level of skills in forecast for rice (and by season as well) and wheat;
- Moving from national to sub-national level is possible in few crops and
- District level forecast will probably need very high resolution datasets and new modelling techniques in CRAFT like RS-Data Assimilation.

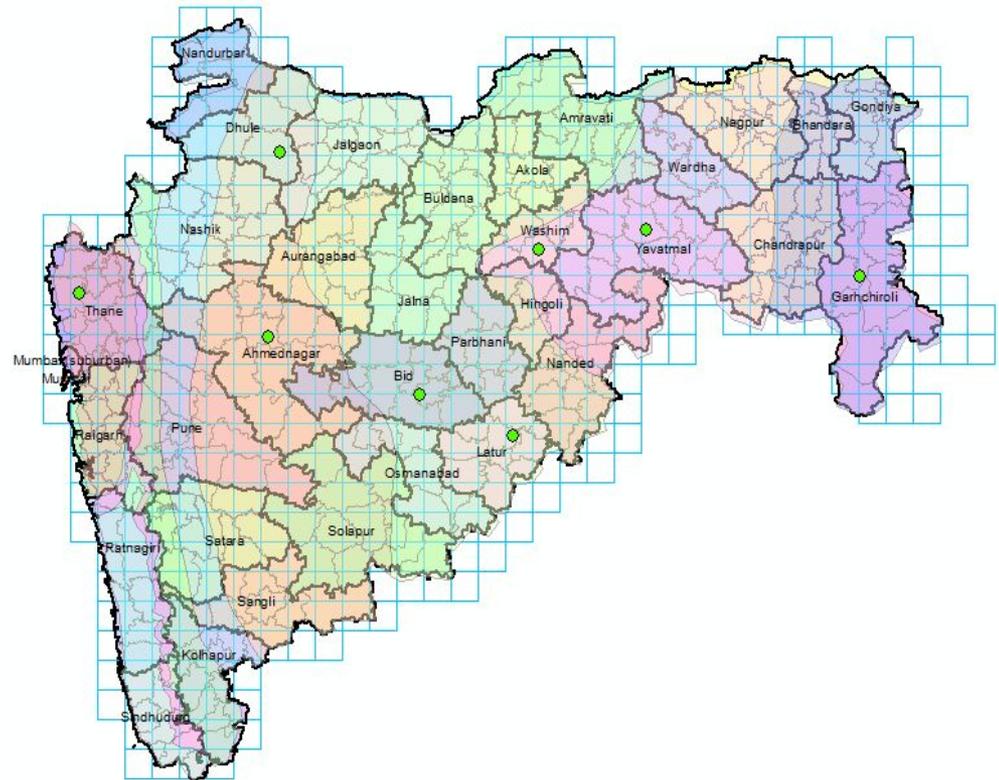


# CCAFS Crop-loss Assessment Monitor (CAM)



# Research Issues

- Use of CRAFT/CAM for developing soft adaptation measures;
- Assessing the value of seasonal forecasts through evaluation of economic benefits of crop yield forecasting.



# What are potential use cases of CRAFT in Nepal?

- Crop outlook assessment national and provincial level;
- Operational system during governance restructuring;
- Contingency planning during likely weather adversaries;
- Inputs from participants?





Thank you  
for your  
interest!

