

## Drought Assessment & Combating through weather based advisory services in India

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## Presentation Outline

- Identifying, Monitoring and Predicting Drought
- Role of AAS in Combating Drought

## IDENTIFICATION AND MONITORING

- Several indices
- IMD

Step 1- Describe Rainfall Status

Rainfall category	Departure from long term avg.
Excess	+ 20% or More
Normal	+ 19% to - 19%
Deficient	- 20% to - 59%
Scanty	- 60% or Less

Step 2- Define Drought Severity

Seasonal Rainfall Deficiency (% departure from average)	Drought category
- 26% to - 50%	Moderate
Less than - 50%	Severe

- IMD: prepare rainfall maps on sub-divisional scale.

IMD: also monitor drought using water balance

$$\text{Aridity Index } (I_a) = \text{Water deficit} / \text{Water Need} = (\text{PET} - \text{AET}) / \text{PET}$$

Departure of  $I_a$  (in %) is plotted to demarcate drought as below

Drought Category	Anomaly Value
Mild drought	Up to 25%
Moderate Drought	26 to 50%
Severe Drought	More than 50%

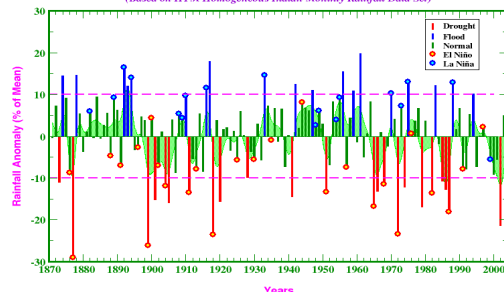
## PREDICTING DROUGHT

- Difficult for most locations
- Prediction needed for too many variables
- Long range prediction of precipitation and temperature
- Tools: Empirical, Statistical, Climate models
- Anomalies last for months to decades depending upon features of global circulation
- Big picture: Global weather patterns
- Little picture: High Pressure
- Tropical outlook: SST, ENSO

## El-Nino v/s Drought

All-India Summer Monsoon Rainfall, 1871-2003

(Based on IITM Homogeneous Indian Monthly Rainfall Data Set)



© Raju Kumar Kulkarni, IITM, Pune, India (April 27, 2004)

- In semiarid and arid regions, We should learn to recognize the inevitability of drought and prepare for it with appropriate combating strategies for ensuring sustainable agriculture
- Basic requirement is to generate ways and means of adjusting crop cultivation plans/practices depending on the time of occurrence of rain/drought

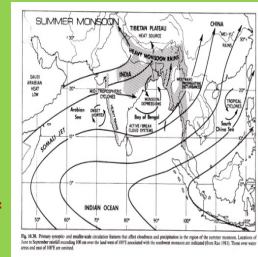
## Role of AAS in Combating Drought

## Components of AAS

- Observation
- Weather forecast
- Diagnose weather related stresses
- Weather based farm management advisory
- Advisory bulletin dissemination
- Responding to specific queries
- Feed back

## Components of Variability in Weather & Climate

- Heat/Cold Wave
- More variable R/F
- Increased Extremes Weather Events
- Erratic Onset, advance and retrieval of Monsoon
- Shift in Active/break cycles
- Intensity and frequency of Monsoon lows/depressions



## Role of Weather Information in Farm Management

- Cultivars Selection
- Choosing windows for Sowing/harvesting operations
- Irrigation scheduling – optimal water use
- Mitigation from adverse weather events such as frost, low temperature, heavy rainfall – at critical crop stages
- Nutrient Management : Fertilizer application
- Plant Protection : Pesticide/fungicide spraying schedules
- Feed, Health and Shelter Management for Livestock [Optimal temperature for dairy/ hatchery etc]

## AAS: India Meteorological Department

- Milestones 1932, 1945, 1976
- 23 State Agromet Service Centre in collaboration with SDA
- Agro-advisory preparation - Monday & Thursday
- Composite Agro-advisory preparation- Tuesday & Friday
- Dissemination- AIR, Doordarshan, Print media, Website



## AAS : National Centre for Medium Range Forecasting

- 107 AAS units with SAUs & ICAR institutes
- 4-days forecast + weekly outlook preparation- Tuesday & Friday
- Agromet Advisory Board & Agro-advisory - Tuesday & Friday
- Composite bulletin preparation
- Crop Weather Models
- Dissemination- AIR, Doordarshan, Print media, Web
- Feedback – Farmers, Forecast Verification, Economic Impact Assessment & Annual Review Meetings
- AAS awareness & user interaction programs



## Agro Met R&D back up: ICAR

- 25 Centers of AICRP on Agro Meteorology
- Located at SAUs with AAS of NCMRWF
- R&D in Agromet
- Agromet data bank & Website



## CHALLENGES

- Weather Forecast : Skill, Quantitative, Locale Specificity, Seamless
- Agriculture : Assessment of conditions of Crop  
Livestock  
Soil  
Pest & Diseases
- Weather Sensitivity of Crops & Management Practices
- Decision Support Tools for Translating Weather Forecast into Advisories
- Advisory Dissemination, Outreach & Feedback
- Synergistic Collaboration among Participating agencies

## Launching of Integrated Agromet Advisory Services

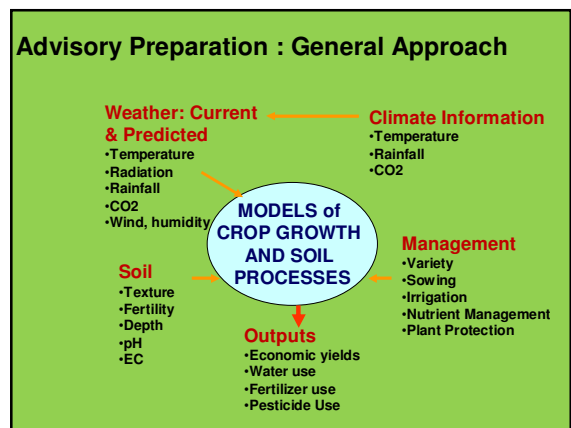
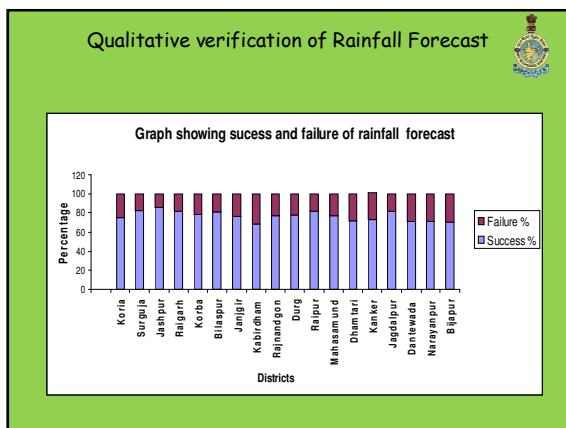
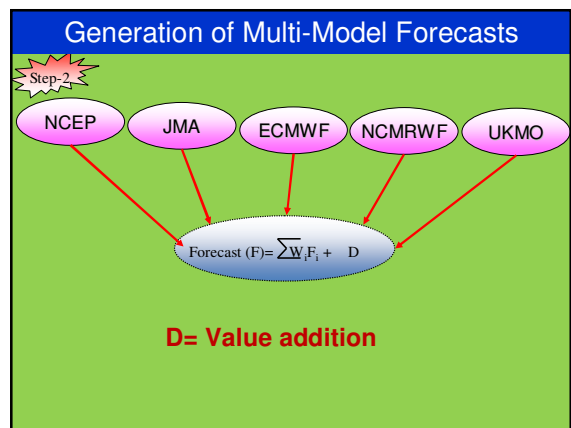
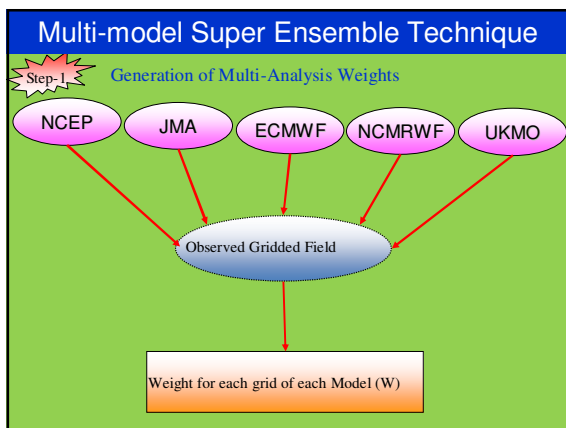
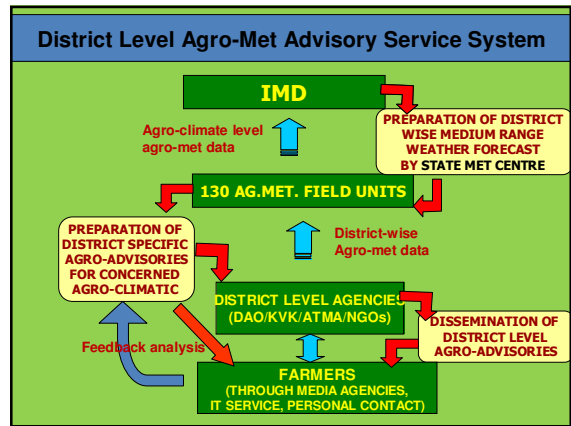
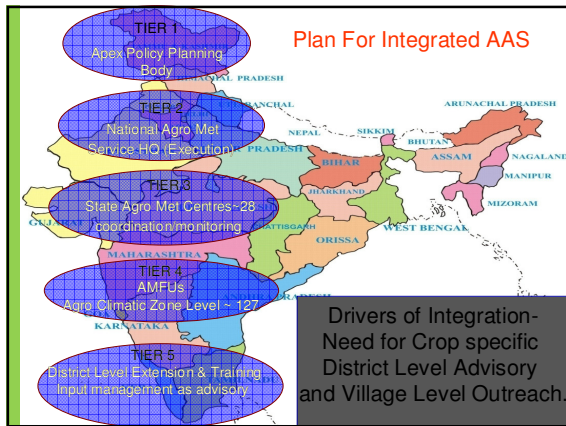
- AAS of IMD and NCMRWF has been converged and the services are being provided under single window system.
- All the AMFUs of NCMRWF has been transferred to IMD since 01-04-2007.

## PHILOSOPHY OF INTEGRATED AAS

- AAS has to be essentially a multi-institutional program.
- As the basic core is weather and climate, IMD has to play pivotal role. Integrate AAS at IMD in a collaborative manner.
- Around meteorological nucleus, one needs to synthesize the orbits of agro-meteorological data base along with decision support system to translate weather forecast into advisory---SAUs, ICAR Institutions & others
- The final orbit comprises of information dissemination agencies. These include; KVK, DAO, ATMA, NGOs etc
- Mass media dissemination agencies such as Radio, television, print media etc. And Village level knowledge dissemination agencies (DIT) needs to play an active role.

## Collaborating Agencies

- Ministry Of Earth Sciences
  - India Meteorological Department
  - National Centre For Medium Range Weather Forecasting
  - Indian Institute of Tropical Meteorology
- Indian Council For Agricultural Research
- Department Of Agriculture & Cooperation
- State Departments Of Agriculture
- State Agricultural Universities And Other Universities
- Ministry of Information Technology
- Ministry of Science & Technology
- Ministry of Information & Broadcasting (AIR & TV)
- Print Media
- Department Of Space
- Min. of Rural Development
- MSSR Foundation & Other NGOs & PP



### Three tier Agro-met Advisory System

- AMFUs issue district level advisories.
- State Level Composite AAS Bulletins are prepared by State Meteorological Centre.
- National Agromet Advisory Bulletins are prepared by National Agromet Advisory Service Centre, IMD, Pune .

### District Agromet Advisory Bulletin

- More than 450 districts are covered
- Bulletin is targeted for the farmers.
- This contains advisories for all the weather sensitive agricultural operations from sowing to harvest.
- It includes advisories for horticultural crops and livestock also.

### State level Composite Bulletin

- This bulletin is prepared for the State level CWWG meeting.
- This is also meant for other users like Fertiliser industry, Pesticide industry, Irrigation Department, Seed Corporation, Transport and other organisations which provide inputs in agriculture.

### National Agromet Advisory Bulletin

- The bulletin is primarily prepared for the Ministry of Agriculture for taking important decision in Crop Weather Watch Group (CWWG) meeting.
- Besides the same is also communicated to all the related Ministries (State & Central), Organisations, NGOs for their use.

### Dissemination of Agromet Advisory

#### 1. Mass Mode of Dissemination

- All India radio
- Television
- Print Media

#### 2. Outreach at Village level

- Ministry of IT Internet based Village Connectivity
- Web Pages: IMD, SAUs, ICAR Web Pages
- Mobile Phones (SMS & IVRS)

#### 3. Human face for advisory dissemination

- KVK (ICAR): Training + interaction
- DAO (SDA): Coordinate Farm inputs with Line Function Dept. in rhythm of weather forecast
- NGOs & other intermediary groups
- Awareness Programme

### **Feedback Issues & Mechanism**

- Quality of Forecast
- Quality & relevance of Advisories
- Farmer should contact Whom & How?
- Problem solving through interactive mode
- Answering questions of common interest through bulletins
- Accessibility to information via ICT
- Accessibility to Experts & video Conferencing

### ***Way Forward***

- Improved prediction needed for Extreme weather events & shifting climatic regimes
- To generate advisories on cultivar selection in view of variable thermal/precipitation regimes
- Advice on selection of sowing window
- Develop appropriate management practices to cope with extreme weather events.
- Develop forewarning system for P&D spread and duration.
- Develop advisories on forest fire danger

