District Level Agro-Met Advisory Services in India

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Topics of Presentation

• Evolution of Service
• Identification of Gaps
• Integration & Reorganization
• **District Level AAS - The New Approach**
• Way Forward
SALIENT FEATURES OF INTEGRATED AAS

- INVOLVE ALL CONCERNED ORGANIZATIONS
- IMPROVED OBSERVING SYSTEM
- DISTRICT SPECIFIC WEATHER FORECAST
- DISTRICT SPECIFIC ADVISORIES USING ADVANCED TOOLS
- OPERATIONAL MECHANISM WITH EXTENSION AND INFORMATION DISSEMINATING AGENCIES
- IMPROVED OUTREACH SYSTEM
- MONITORING AND FEEDBACK MECHANISM
India Meteorological Department

- Milestones 1945, 1972, 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
National Centre for Medium Range Weather 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
Indian Council of Agricultural Research

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

• Though IMD/NCMRWF services were useful but demand of the farming community could not be fully met due to following gaps:

  – Non-availability of automated met. observations
  – Non-availability of District specific weather forecast
  – Non-availability of real-time crop information
  – Lack of objectivity in Advisories
  – Inadequate outreach/extension mechanism
  – Poor communication and dissemination
Gap Filling Through Following Efforts

• Assessment of information needed by diverse groups of end-users
• Generation of seamless weather forecast
• Development of tools to integrate agro-meteorological data into useful information
• Generate farm level advisories
• Effective communication of agro-meteorological information
• Training needs of end-users
Reorganization Plan for IAAS

Is Aimed to Improve in:

– Weather Forecast & Advisory Content
– Use of Modern Technology in AAS
– Advisory Dissemination Mechanism
– Feedback Mechanism
– linkages with Administrative Authorities
– Monitoring System
– Mechanism for Continuous Up-gradation
– Mutual Collaboration by Related Agencies
Launching an 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, synthesized 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, 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.
Plan For Integrated AAS

Drivers of Integration-
Need for Crop specific
District Level Advisory
and Village Level Outreach.
FUNCTIONS OF AAS COORDINATION CELL

Basic Philosophy: Standing mechanism involving MoES, Ministry of Agriculture and other collaborating agencies to continuously monitor and upgrade the services.

- Policy
- Planning
- Coordination
FUNCTIONS OF NATIONAL AGROMETEOROLOGICAL ADVISORY SERVICE HQ

Basic philosophy: Apex executive body to run AAS.

- Coordination, liaison, administration
- Assess weather forecast needs & interface to forecasting
- Infrastructure, observation and communication support
- Assess and meet Data needs, R & D support and economic assessment
- Develop AgroMet products and application tools
- Evolve methodologies for advisory preparation, dissemination and feedback
- Creation of data base
- Preparation of national level composite advisory bulletin
- Training
- Monitoring and review meeting
Basic philosophy: Technical Inputs generator & coordinate/manage state level advisory.

- Monitor and coordinate activities of AMFUs under its area of operation & organize state level review meetings.
- Networking to expand the out reach of AAS up to village level. Induce information technology and private public partnership to expand outreach.
- Manage Agro met observatory network in the area of operation.
- Obtain inputs from AMFUs to prepare state level advisory bulletin and disseminate the same to state officials and state level media.
- Participate in state level CWWG and liaise with SDA, irrigation department etc. to mobilize farm inputs in tune with advisories.
- Assessment of impact of inclement weather on crop at state level.
- Reception of district level observation and channelize to data centre.
- Preparation of district level agro-climatological information.
Functions of Agro Met Field Units

Basic philosophy: Serve as service provider i.e. to prepare & disseminate agro met advisory bulletins and generate locale specific information for use at state and national levels, participate in R&D work related to AAS (ICAR/SAU).

• Receive weather forecast, Prepare & Disseminate Agromet Advisories
• Assess users requirements and impact of AAS
• Participate/operate Agri-clinics, Kisan Call Centers, farmers fair, awareness activities etc.
• Experimental data for calibration and validation of crop models
• Maintain agro met observatory, record observation, dispatch and store data.
• Prepare local climatological information & data base. Receive current weather observations and agricultural data from districts
• Identify weather sensitivity of crops, animals, P&D and management practices.
Basic philosophy: To carry out extension of agro met advisories and collect feedback to understand dynamically varying needs of the farmers.

- Receive advisory bulletins and Disseminate to farmers through local mass media, AIR & Private Radio, cable network, District/Tehsil/Block/Village Level.
- Manage farm inputs as advised in coordination with other line function departments of State Govt.
- Observe high impact weather events and report to AMFU.
- Collate district level Rainfall & Agricultural data - crop acreage & condition, rainfed/irrigated, P&D incidence and send to AMFU.
- Obtain farmers feedback and disseminate to AMFU/KVK.
- Farmers Training and awareness programmes.
Monitoring Mechanism

Set up monitoring mechanism to evaluate the progress of Agro met Services in the country at regular interval and suggest suitable up-gradation of the service;

- National Level
- State Level
- University Level
- Agro-Climatic Zone Level
- District Level
# Forecast System

<table>
<thead>
<tr>
<th>Existing</th>
<th>New</th>
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<tbody>
<tr>
<td>Agro-climatic Zone specific weather Forecast (~127)</td>
<td>District Level Weather Forecast (~612)</td>
</tr>
<tr>
<td>Single GC Model Output (Resolution 150 &amp; 75 Kms)</td>
<td>Multi-Model Super Ensemble (NCMRWF, UKMO, GFS, ECMWF, JMA)</td>
</tr>
<tr>
<td>Meso-scale Models (Resolution ~30 Km)</td>
<td>Meso-scale models (Resolution ~10 km)</td>
</tr>
</tbody>
</table>
Multi-Model Ensemble Technique

Forecast = \sum w_i F_i + d

d = Value-addition

FORECAST FOR 5 DAYS FOR ALL PARAMETERS
FOR RAINFALL –WEEKLY CUMMULATIVE
FORECAST ALSO
## Advisory Service System

<table>
<thead>
<tr>
<th>Existing</th>
<th>New System</th>
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<tbody>
<tr>
<td>Zone Level Advisories</td>
<td>District Level Advisories</td>
</tr>
<tr>
<td>Subjective Methodology to prepare advisory bulletins</td>
<td>Decision Support System tools</td>
</tr>
<tr>
<td>Crop Status information – fragmented and based on visual estimate</td>
<td>Use of high resolution remote sensing products</td>
</tr>
<tr>
<td>Crop Calendars</td>
<td>Use of GIS and other IT tools for value addition</td>
</tr>
<tr>
<td>Generic Advisories for zones</td>
<td>Customized products for targeted user groups</td>
</tr>
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</table>
District Level Agro-Met Advisory Service System

1. IMD/ NCMRWF

- Preparation of District Wise Medium Range Weather Forecast by State Met Centre

2. 130 Ag. Met. Field Units

- Preparation of District Specific Agro-Advisories for Concerned Agro-climatic Dissemination of District Level Agro-Advisories to Farmers (through media agencies, IT service, personal contact)

3. District Level Agencies (DAO/KVK/ATMA/NGOs)

4. Feedback Analysis

Feedback analysis

5. Farmers (through media agencies, IT service, personal contact)
ASPECT OF AUTOMATION FOR ADVISORIES

• Agro Met Observations & Data
• Weather & Climatic information
• Mechanism for Preparation Of Advisory
• Development Of DSSAT For AAS
• Role Of IT in Preparation Of Advisory
• Use Of Remote Sensing in AAS Etc.
GIS for Agro Met Advisory Services

• Useful for Quick Generation of Agro Met Products

• Agro Met Data May be Collated into an RDBMS and Dynamically Displayed on Map Using GIS

• The GIS Based Database May be Linked Live on Internet. The End Users Will be Able to See Advisories Online and also Browse Maps in a GIS Environment.
CROP WEATHER MODELS FOR AAS

• Calibrate & Validate Crop Simulation Models for Principal Crop of Different Districts.

• Inter-disciplinary Task Requiring Experts in Modeling, Weather Prediction, Agronomy, Plant Pathology, Entomology And Other Agricultural Disciplines.

• Has to be Implemented in Mission Mode

• Finally Develop Expert Systems For Farm Level Decision Making
REMOTE SENSING (RS) TECHNIQUES FOR AAS

- RS Based Techniques Developed for Crop Acreage and Crop Condition Assessment. FASAL & AAS Need Closer Interaction.

- Collaborative Efforts Between DoAC, DOS & MoES Required to Generate Crop and Soil Information at Local Scales for Use in AAS.

- Set up direct linkages with district level agencies for identifying crop stresses

- Develop GIS based tools
Dissemination of Advisories

Mass Mode of Dissemination

All India radio/Television/Print Media

Outreach at Village level

Web Pages/Internet
DIT/NIC
Kisan Call Centers & NGOs

Interactive Dissemination

KVK (ICAR): Training + interaction
DAO (SDA): Coordinate Farm inputs
NGOs & other intermediary groups
Awareness Program (Kisan Mela, Exhibition etc)
Establishment of Common Service Centres (CSC) by DIT

• DIT is developing ICT facilities for the benefit of the citizens, especially those in rural & remote areas.
• 1,00,000 CSC will be set up in rural areas by the year 2007 to provide all possible services.
• Among others, Agro Met services would be provided through the CSCs.
• State governments are putting up appropriate institution mechanism for such support.
Outreach of advisories at Village level

• Village Knowledge Centers (~3342) are proposed to be opened by MSSRF & Alliance Partner. AAS may partner in this to strengthen the outreach mechanism.
  • Receive advisory bulletins from AMFU.
  • Disseminate the bulletins to farmers through all possible links - Tehsil/Block/Village kiosk.
  • Observe high impact weather event and its real time reporting to AMFU and District level office.
  • Receive feedback from farmers and disseminate to AMFU.
Involving ATMA and other functionaries

• Agriculture Development Officer at block level may disseminate agro-advisory through BDO/Gram Sevak.

• Ministry of Agriculture is already operating "ATMA" project in several districts. AAS may be linked with AAS.

• The State Government employee (Teacher/ Post Master/ Shiksha Mitra etc.) working in the village should be involved.

• Engage local educated youth/ progressive farmers as climate manager.
Feedback 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
Popularization of service

- Widen the outreach of AAS through Exhibitions
- Documentary films
- Suitable advertisements
- Prepare pamphlets
- Participate in Ag. Extension activities like Krishi Mela etc.—Almost all units
- Organize meets with farmers
- Provide suitable grant-in-aid for these activities
Human Resource Development for AAS

1. Preparation of district forecast
2. Weather forecast based AAS to Technical Officers
3. Orientation Training to District Functionaries
4. Crop/ P&D models and Decision Support System
5. Use of Remote Sensing and GIS in AAS
6. Observers Training
TRAINING NEEDS OF END-USERS

• FARM LEVEL DEMONSTRATION

• TRAINING WORK-SHOP

• KISAN GOSHTHI (EXPERIENCE SHARING)

• TEACHING WEATHER SENSITIVITY OF CROP/ANIMAL PRODUCTION

• TIME AND METHOD OF PESTICIDES FOR PLANT PROTECTION

• TEACHING METHODS OF CROP PROTECTION FROM ADVERSE WEATHER

• FARMERS TRAINING AND AWARENESS PROGRAMMES.
Farmer Training Program under Integrated AAS

- Training to young farmers.

- Introduction of weather component in 'agri-clinic and agribusiness' schemes.

- Need based training to be organized.

- Linking agromet training program with existing farmers’ training programs conducted by various agencies.
Weather Risk Insurance for Agriculture

Deviation in rainfall and risk management through Weather Insurance - Example

<table>
<thead>
<tr>
<th>Stages</th>
<th>Presowing</th>
<th>Seedling</th>
<th>Vegetative</th>
<th>Reproductive</th>
<th>Maturity</th>
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<tbody>
<tr>
<td></td>
<td>2 wks</td>
<td>3 wks</td>
<td>6 wks</td>
<td>6 wks</td>
<td>5.5 wks</td>
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<tr>
<td>Water</td>
<td>40-50mm</td>
<td>50-60mm</td>
<td>150-170mm</td>
<td>160-170mm</td>
<td>40mm</td>
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<tr>
<td>requirement</td>
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Weather Insurance policy Payout Rs.XXX per mm deviation

Loss in yield

Output

Rainfall required

Actual Rainfall recorded