**Regional Stakeholder Consultation on Climate Services for the Third Pole Region**

Jaipur, India

9-11 March 2016

**Dr. Kripan Ghosh**

**Scientist E**

**Regional Meteorological Centre**

**India Meteorological Department, Guwahati**

# Name of Country: INDIA

# National capabilities for production, management, delivery and application of climate services

# Climate services for the farming sector must include…….

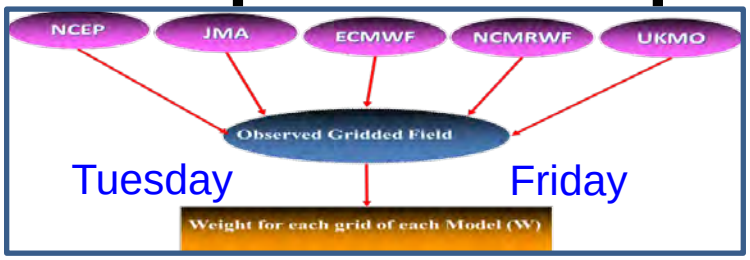
- Acquisition and wider dissemination of data and products.
- Assisting farmers in coping with current climatic risks.
- Advancing knowledge base for adaptation.
- Assisting in the intensification of food production systems.
- Enabling institutions and policy support and
- Partnerships and capacity enhancement.

# Needs of National Meteorological Services

- National Meteorological Services has great role to play to share climate information including the products with the small farmers.
- Climate Information should reach the last mile to create impact, enough information.
- There is great need to convert the climate information into actionable information for farmers.
- Linking the climatic information with the available technologies and best farming practices is required.
- Customized, location and crop specific actionable information is the requirement of the small farmers.

# Name of country: India

# Capacities for provision of climate services




**NWP products** (Rainfall, Wind speed and direction, Maximum temperature, Relative humidity, Minimum temperature, Cloud cover)

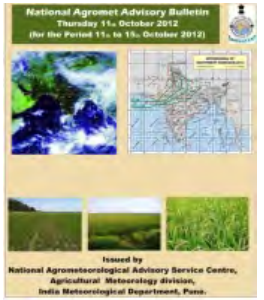
**State Met Centre (SAMC) (23)**

Issues District Level AAS Bulletin (633 Districts in 13 languages) & uploads in website of Agrimet Division (http://imdagrimet.gov.in)

## Operational AAS in India

From Composite State Level Bulletin, prepares National AAS

**Agrimet Division, IMD**




- Conducting State Level Meeting
- Composite State Level Bulletin


Value addition :medium range forecast at district level

**Agromet Field Units (AMFUs) (130)**

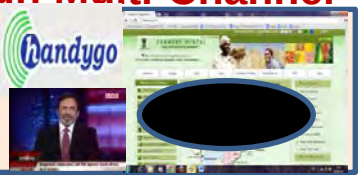
Conducts Farmer Awareness Programme

**Dissemination of Agromet Advisory, alerts in extreme weather through Multi-Channel**

Reuters Market Light | IFFCO | Mahindra AGRI BUSINESS

NOKIA

Central Silk Board

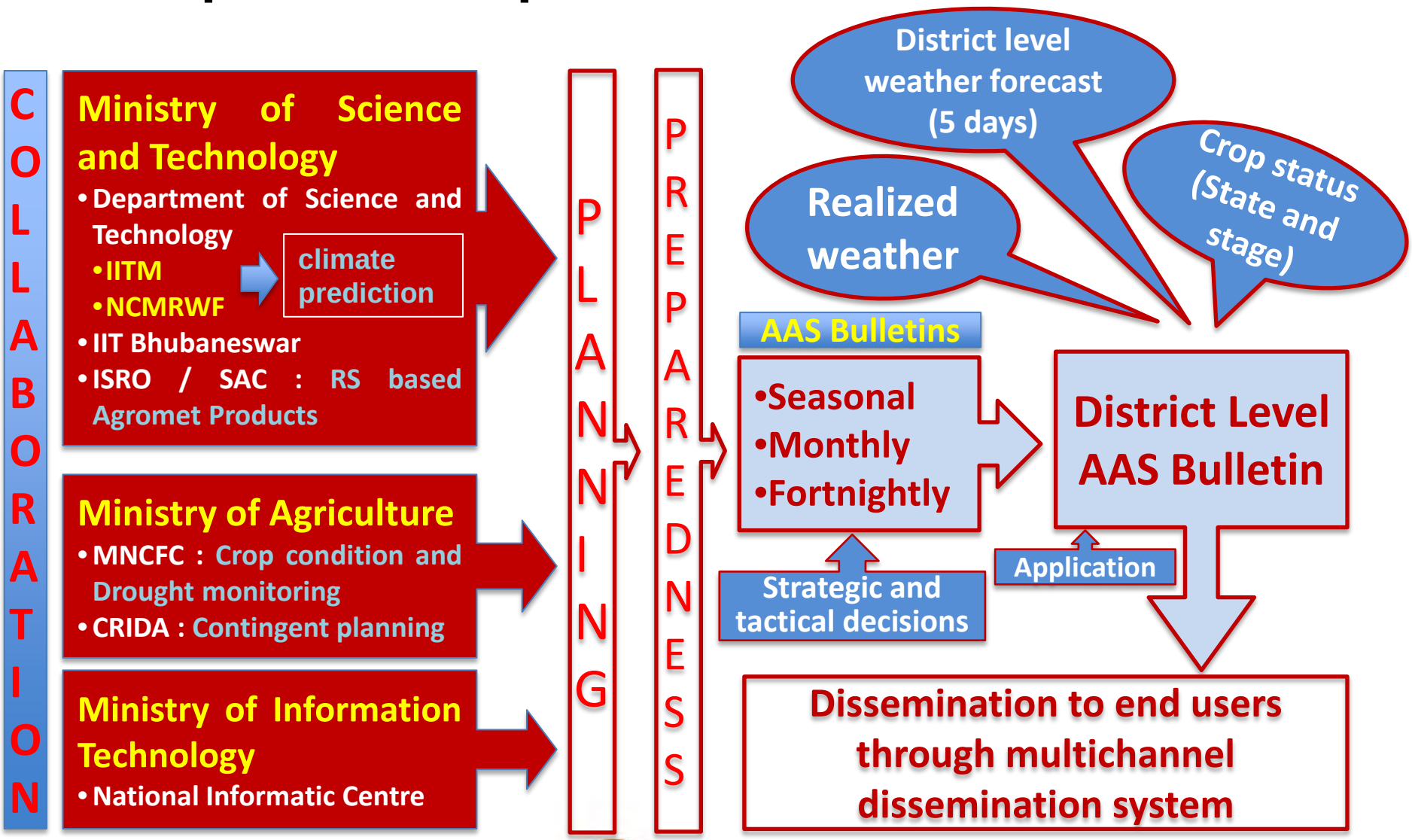



**Agromet Advisory**


**Feedback**

# Name of country: India

## Capacities for provision of climate services

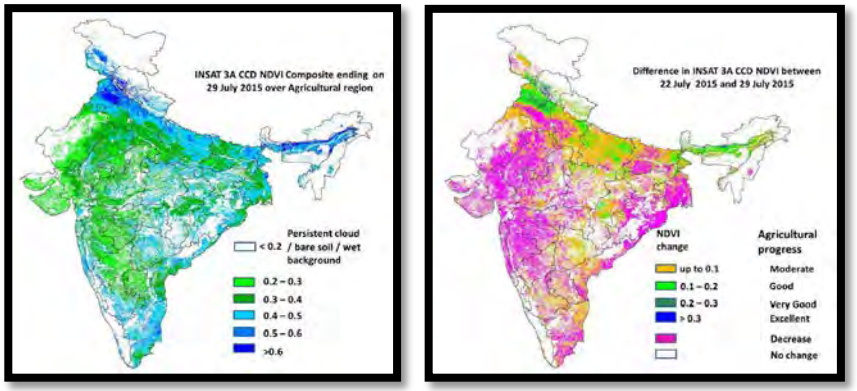





GFCS GLOBAL FRAMEWORK FOR CLIMATE SERVICES

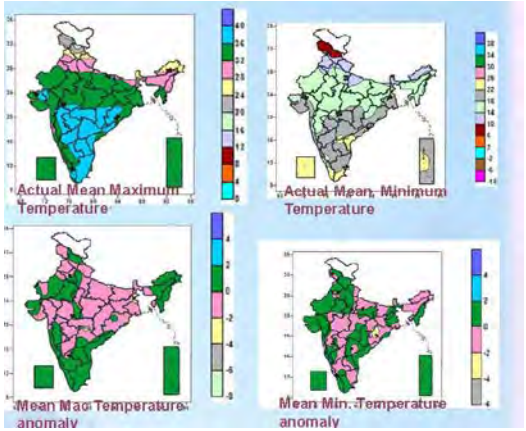
# Name of country: India

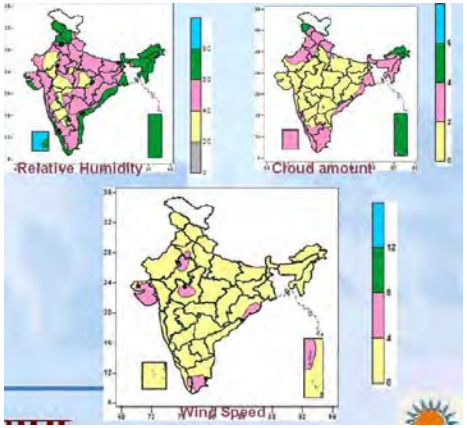
## Current status of provision of climate services to sectors and existing user interface mechanisms (e.g. NCOF/NCF)

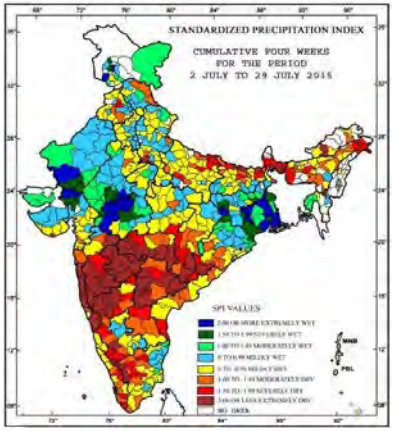



**NDVI Composite and progress of crop growth based on NDVI Composite image (as on 29 July 2015) for India**

**Contours**



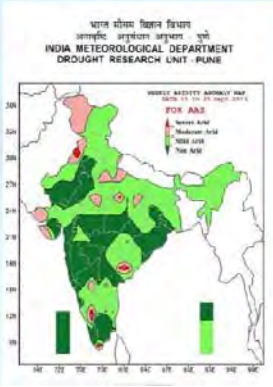



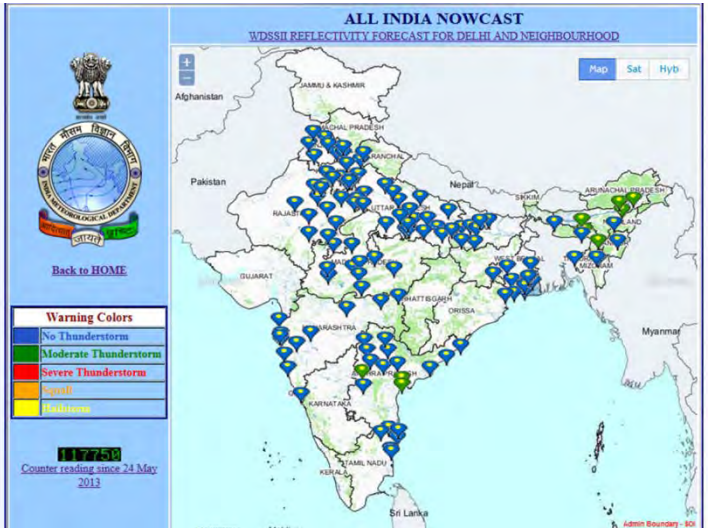




**Standardized Precipitation Index (SPI) (Cumulative four weeks from 2 to 29 July 2015)**

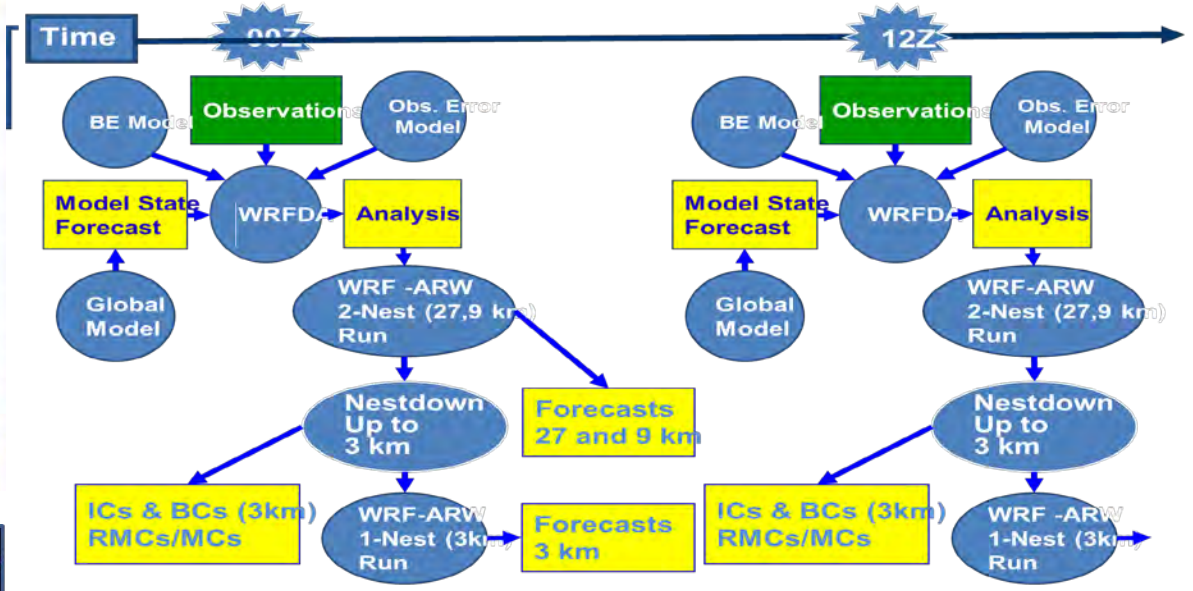
## Aridity Anomaly Maps

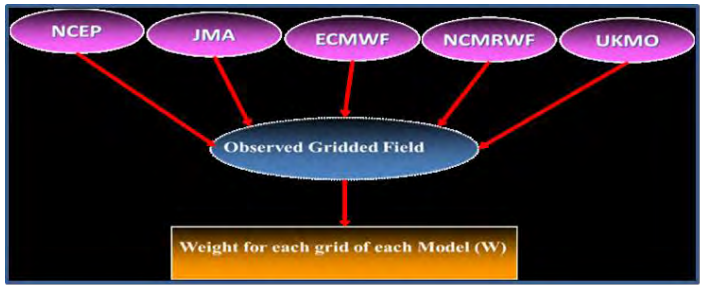
Aridity Anomaly Map gives information about the moisture stress experienced by growing plant. This analysis would indicate qualitatively retardation in the plants growth and so poor yields. Indirectly, this may also be helpful for irrigation scheduling, the amount and the time at which the water is badly needed by the plant.






## Generation of WRF-ARW Forecast with WRFDA Assimilation





**Parameters:**

- Rainfall
- Max and Min temperature
- Total cloud cover
- Surface Relative humidit
- Surface Wind

**The same was started since June 2008**

## DISTRICT LEVEL FORECAST

INDIA METEOROLOGICAL DEPARTMENT
MULTIMODEL ENSEMBLE BASED DISTRICT LEVEL WEATHER FORECAST
ISSUED ON: 13-11-2009
VALID TILL 08:30 IST OF THE NEXT 5 DAYS

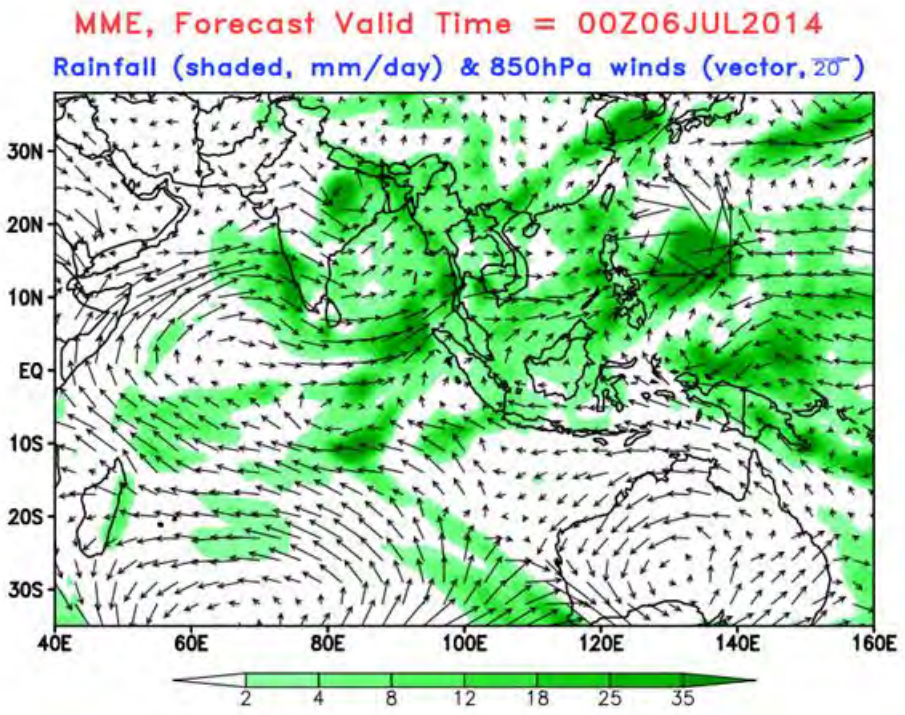
DISTRICT : PUNE STATE : MAHARASHTRA

| PARAMETERS | ENSEMBLE FCST | | | | |
|---|---|---|---|---|---|
| | DAY-1 14/11 | DAY-2 15/11 | DAY-3 16/11 | DAY-4 17/11 | DAY-5 18/11 |
| Rainfall (mm) | 0 | 8 | 15 | 15 | 6 |
| Max Temperature ( deg C) | 29 | 26 | 26 | 26 | 27 |
| Min Temperature ( deg C) | 19 | 20 | 20 | 21 | 21 |
| Total cloud cover (octa) | 7 | 8 | 8 | 7 | 8 |
| Max Relative Humidity (%) | 98 | 99 | 98 | 99 | 99 |
| Min Relative Humidity (%) | 93 | 92 | 92 | 87 | 82 |
| Wind speed (kmph) | 004 | 006 | 006 | 004 | 002 |
| Wind direction (deg) | 90 | 80 | 110 | 120 | 90 |

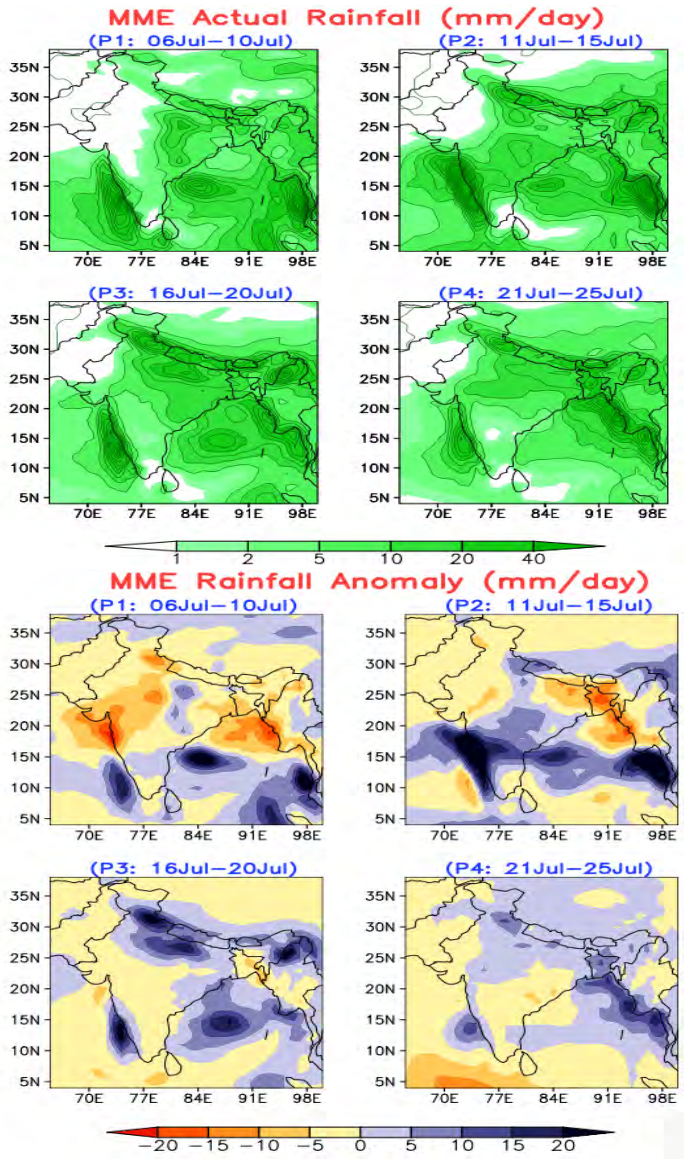
NOTE: -99.0 ..... NO DATA

# CFS BASED GRAND ENSEMBLE PREDICTION SYSTEM (CGEPS) FOR EXTENDED RANGE PREDICTION (FOR NEXT 20 DAYS) (IITM, PUNE)

Daily evolution of rainfall and wind at 850hPa




Pentad wise rainfall predicted by MME

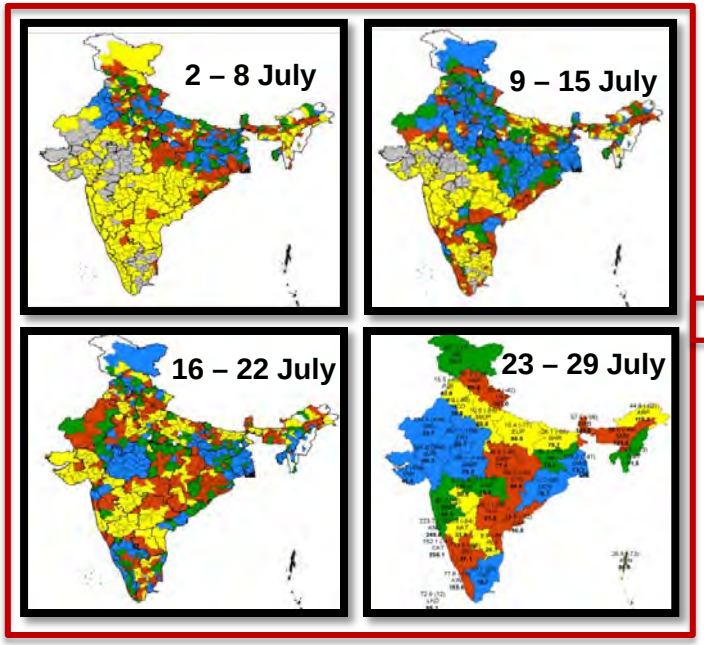



27-Apr-16

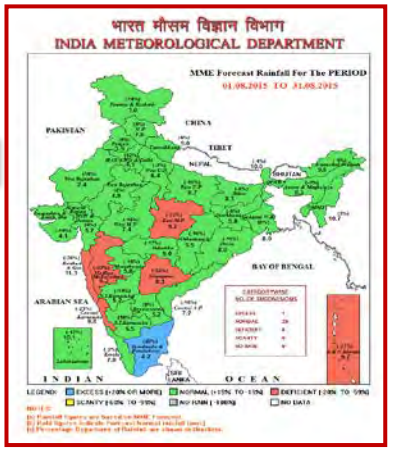
# Name of country: India

## Current status of provision of climate services to sectors and existing user interface mechanisms (e.g. NCOF/NCF)

**Realized Rainfall for July 2015**



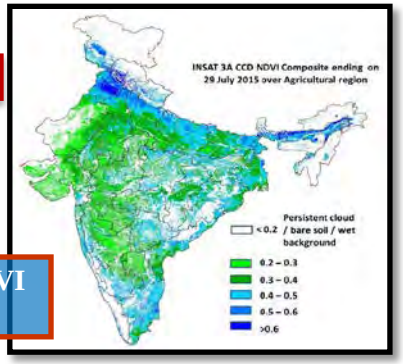

**Rainfall Forecast for August, 15**




## Agromet advisories for the month / first fortnight of August

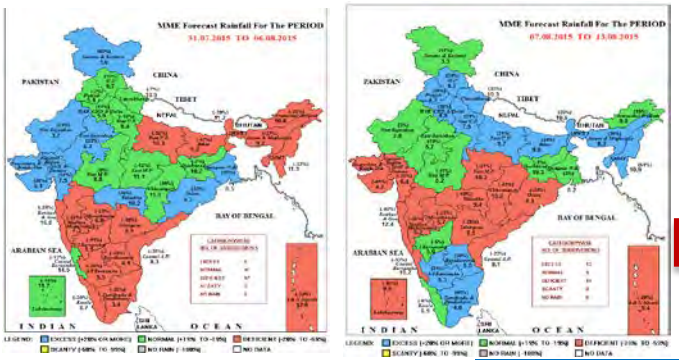
**Ex: Marathwada**

- Sowing of contingent crops like pearl millet (Shradha, Saburi, AIMP-92901), sunflower (Morden, SS-56, LSFH-35, BSH-1), castor (VI-9, Aruna, DCS-9 (Jyothi), GCH-4, 5, 6 and DCH-117 / 32) or adoption of intercropping of pearl millet + pigeon pea in 3:3 or 4:2 row proportion.



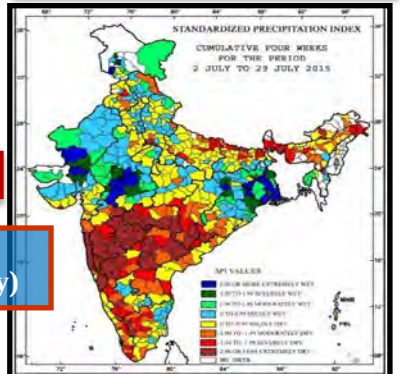

**Comp. NDVI (29 July)**

**Rainfall forecast for first fortnight of August**




Notes Rainfall figures are based on MME forecast
(Bold figures indicate forecast Normal rainfall (mm/day)
(Percentage Departures of Rainfall are shown in Brackets

**(31 July – 13 August, 2015)**




**SPI (2 – 29 July)**

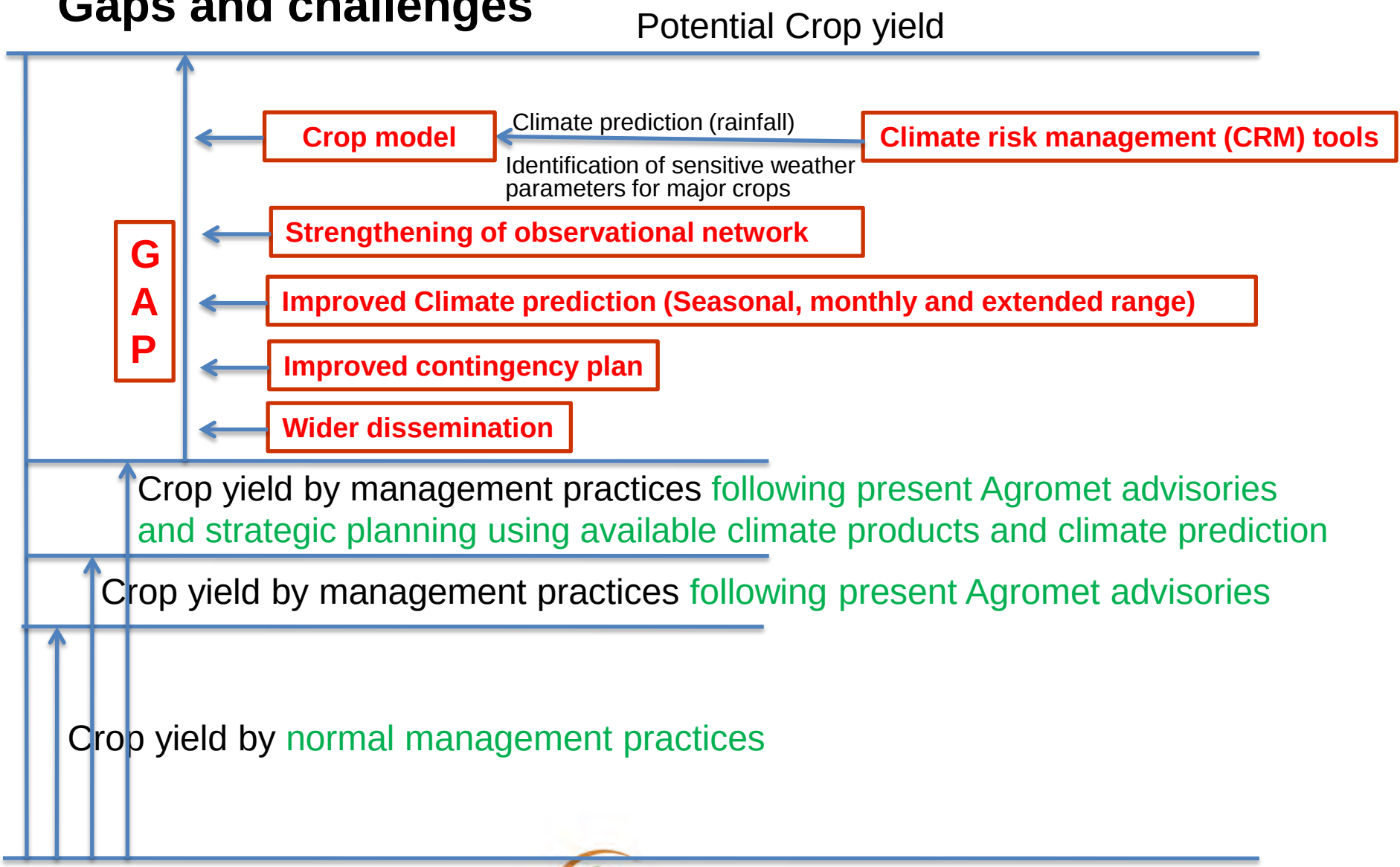
# Enhancing the Preparedness for Agricultural Contingencies in *Kharif* (monsoon) 2015 for Karnataka, Maharashtra, Telengana, Gujarat


Overall objective of this meeting was -

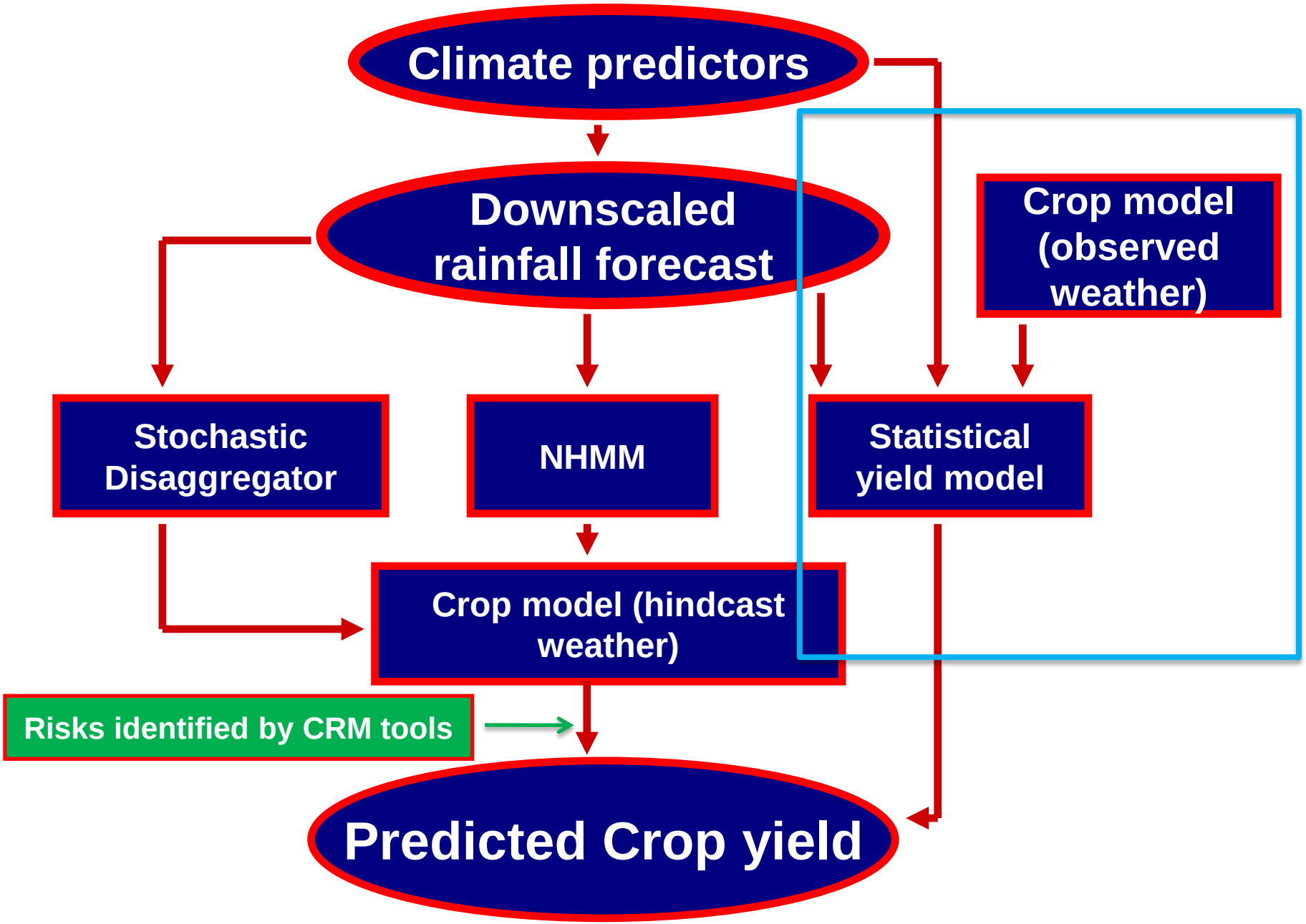
- to sensitize the various stakeholders on the ensuing *kharif* (monsoon) season with regard to the forecast of seasonal monsoon.
- to prepare the action plans based on available district contingency plans in the eventuality of deficient rainfall during *kharif* 2015 season based on IMD monsoon forecast.
- to plan for the issues related to alternate seed varieties, quantity available, identification of contingency crops and their seed availability, fertilizer requirement etc.

# Name of country: India

## Gaps and challenges

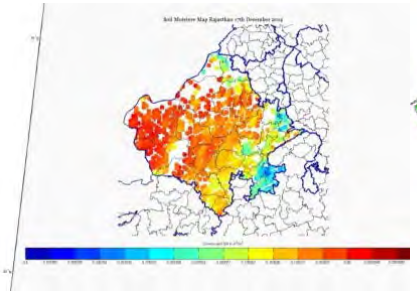


- **Training on linking of crop model with climate predictions and use of CRM tools for strategic planning has been provided to group of scientists at IIT Bhubaneswar in December 2015.**

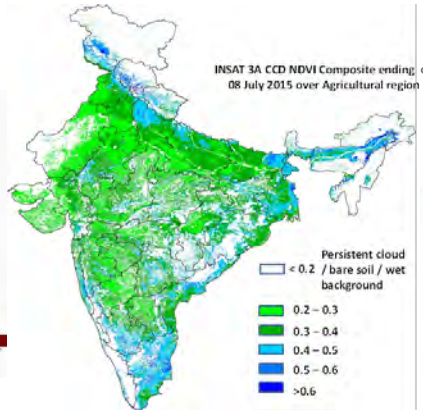


# IMD-ISRO initiatives on Satellite based Agromet Products for AAS

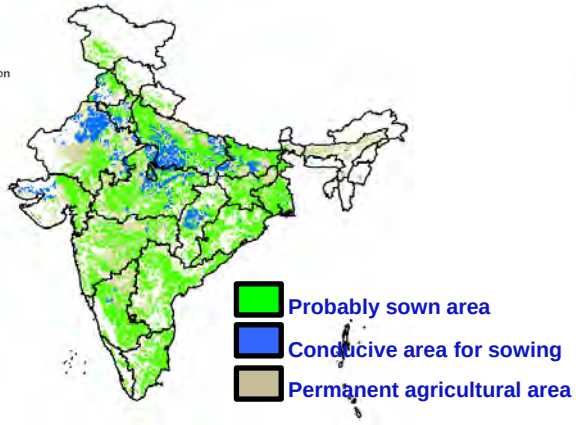
## On-going Collaboration



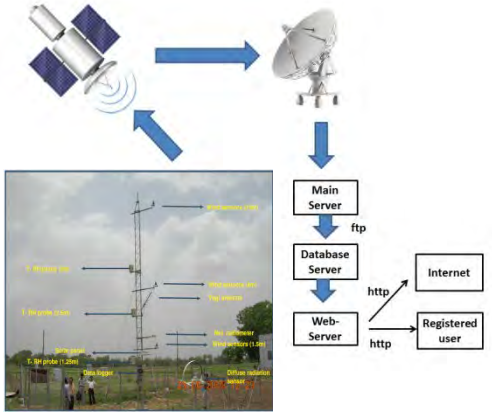
Real time estimation of soil moisture




**Real time crop stand**
(INSAT 3A CCD NDVI Composite)




Sowing Suitability of crops ( 8 July 2015)

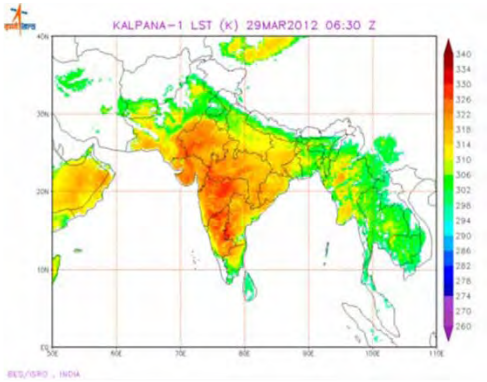



AMS stations for ET & in situ Soil Moisture Estimation

## Proposed satellite based Agromet Products

- In season monitoring of crop area
- LST PRODUCT FROM Kalpana 1 VHRR
- Daily Surface Insolation product from Kalpana 1 VHRR
- Surface Soil wetness index (SWI)
- Evapotranspiration using surface energy balance
- Monthly estimates of PET from VHRR insolation and WRF forecast
- Delineation of alarm zones to alert farmers
- Development of methodology for forecasting spatial crop age / phenology
- Development and validation of Crop Water Requirement Satisfaction Index (WRSI)
- Development of SPI from satellite rainfall
- Development of operational demand-based irrigation scheduling
- Development of Digital agro-climatic atlas for improved crop planning
- Development of methodology for tracking of major pests and diseases

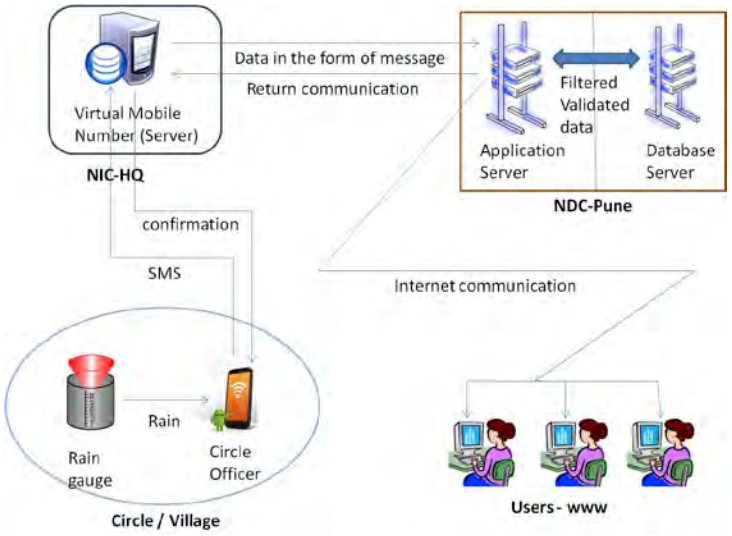
Land surface temperature (LST)



# Strengthening of Agromet observatories at Block Level

- IMD in collaboration with Ministry of Panchayati Raj (at Panchayat level) will work for effective delivery of Agromet Advisories for the farmers and installation of rain gauge in each Panchayat to record rainfall data under Gramin Rainfall Monitoring Mission (GRMM).
- IMD shared list of blocks with the ministry. On pilot mode, 100 blocks have been identified to install rainguages.
- Addresses submitted for 2 blocks of Karnataka to SI Division. Contacted to Kerala Nodal Persons. Decision has to be taken for installation of rainguages in the blocks. Collection of contact information for panchayat functionary is in progress).
- Proposed to install Mini Observatory at Panchayat level.

Rain gauge will be installed at Panchayat Level




Collection and transmission of rainfall data from Panchayat Level

# Capacity Building

## Training (Existing)

- Foreign Training Course
- Agromet Core Course
- Summer Placement Course
- Agromet Observer Course
- Met II Training Course
- Refresher Course
- Basic Agromet Course
- On the job training course

## Training (Proposed)

- Kisan Call Centre
- ATMA Centres
- NABARD District correspondents
- KVK Scientists
- Farmers Field Schools to promote farmer-to-farmer extension
- Mass Media personnel

# Communication Channels

Broadly divided into three groups;

- Mass and electronic media
- Group methods; have similar needs, hence benefit from similar information. Therefore, uniform advisories formulated to address critical decisions and provide the desired agromet information using the same format and language. The groups allow farmers to be exposed to other farmers' successes as well as realize that they may encounter similar problems or obstacles.
- Individual contacts; time consuming but build good rapport & develop credibility between role-players. It is a vital part of participatory technology and training & visit method of extension.

In general, the use of more than one channel gives a greater chance of reaching the client or user.

# Gramin Krishi Mausam Sewa: Preparation, Dissemination and Economic Assessment of Agromet Advisory


**Dissemination**

**Preparation of advisories at district level**

**A comprehensive study on impact assessment and economic benefits of this service carried out in year 2010 by the National Council of Applied Economic Research (NCAER) reported that the contribution to GDP of the country is Rs.50,000 crores. (used by 24% farmers)**

**Recent unpublished report on the same indicates substantial increase in the number of farmers covered under this service.**

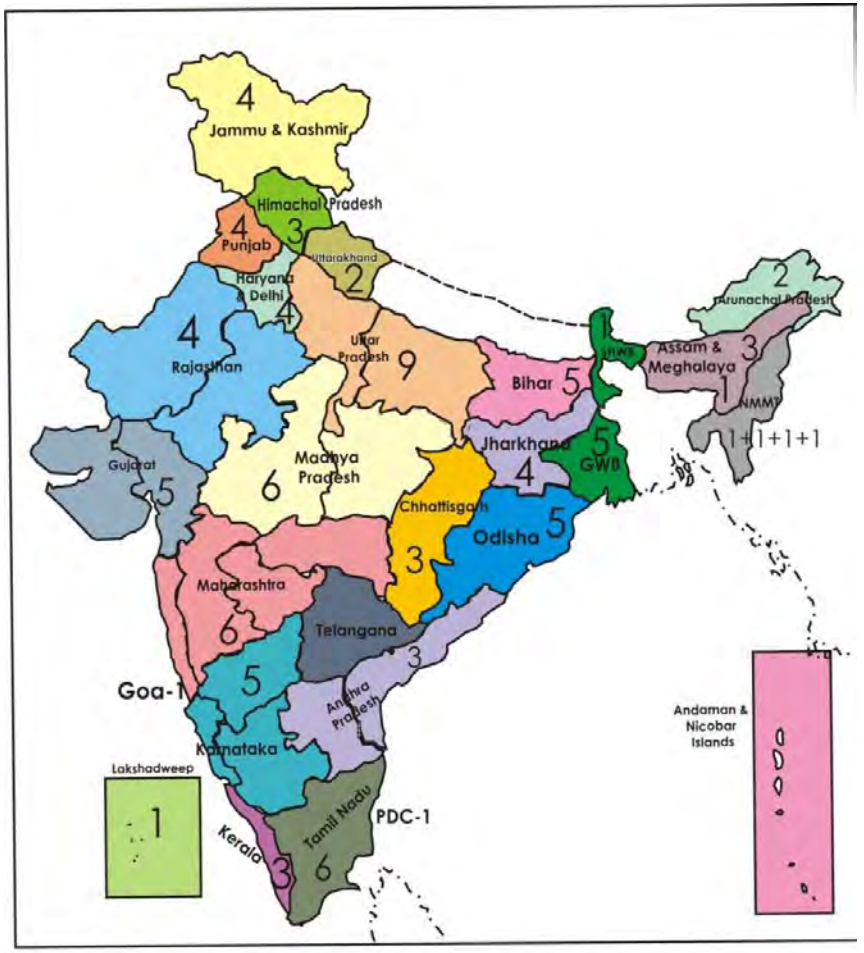
**One in nine family has been connected in the country.**

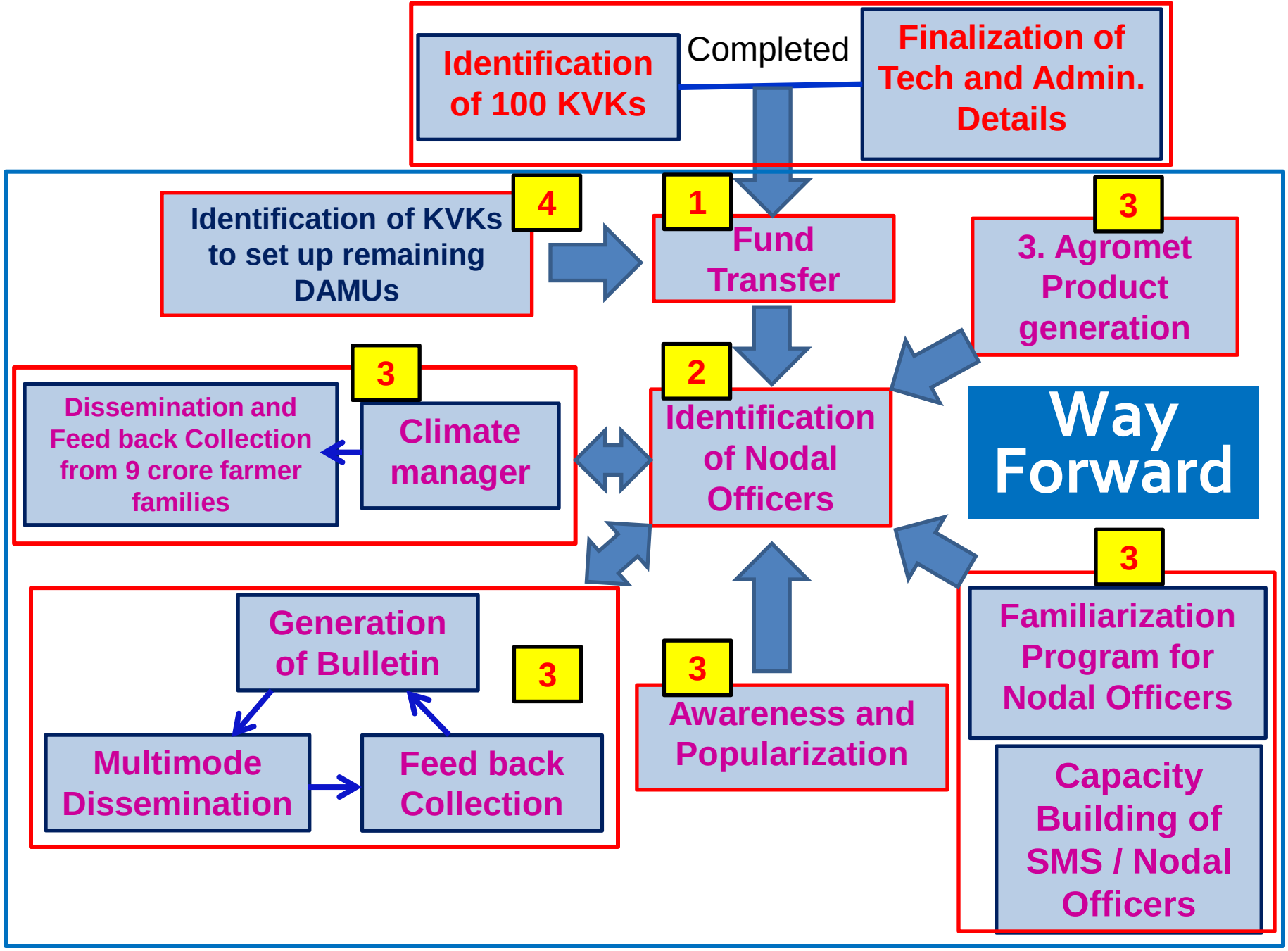
GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

# Extension of Agromet Advisory Services from District Level to Sub-district / Block level

- ✓ Presently Agromet Advisory Services are prepared at District level.
- ✓ Agromet Advisory Services will be extended upto Sub-district / Block level by establishing District Agromet Units (DAMU) at each Krishi Vigyan Kendra under ICAR network.
- ✓ It is proposed to establish 240 DAMUs during XIIth Five Year Plan.

**Proposed Dristict Agromet Units (DAMUs)**




Identification of 100 KVKs
Completed
Finalization of Tech and Admin. Details
Identification of KVKs to set up remaining DAMUs
4
1
Fund Transfer
3
3. Agromet Product generation
3
Dissemination and Feed back Collection from 9 crore farmer families
Climate manager
2
Identification of Nodal Officers
Way Forward
Generation of Bulletin
3
Multimode Dissemination
Feed back Collection
3
Awareness and Popularization
3
Familiarization Program for Nodal Officers
Capacity Building of SMS / Nodal Officers

# Future perspectives for improved climate services

- Improved district level agromet advisory services and experimental generation of sub-district / block level agromet advisories along with Seamless high resolution weather forecast.
- Agromet products for enhancing Agromet Advisories.
- Climate Risk Management (CRM) tools based on climate forecast along with Agromet Advisories.
- Blending of tools and technologies like high resolution data, Remote Sensing, Geographical Information System (GIS).
- Dissemination mechanism of Agromet Advisories to the farmers and other institutional users and also eficient alert system.
- To establish mini-observatory at the Panchayat level along with Climate Managers for disseminating real time weather information and Agromet Advisories to the farming community.
- To improve the accuracy and effectiveness of high resolution weather forecast and climate smart Agromet advisories to enhance the decision making ability of the farmers.

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GLOBAL FRAMEWORK FOR CLIMATE SERVICES


# Thank you