

# South Asia Drought Monitoring System (SADMS)



**Giriraj Amarnath**

*International Water Management Institute (IWMI),  
Sri Lanka*

**25 August 2018**

*AC Meeting of the Integrated Drought Management Programme (IDMP),  
GWP Stockholm*

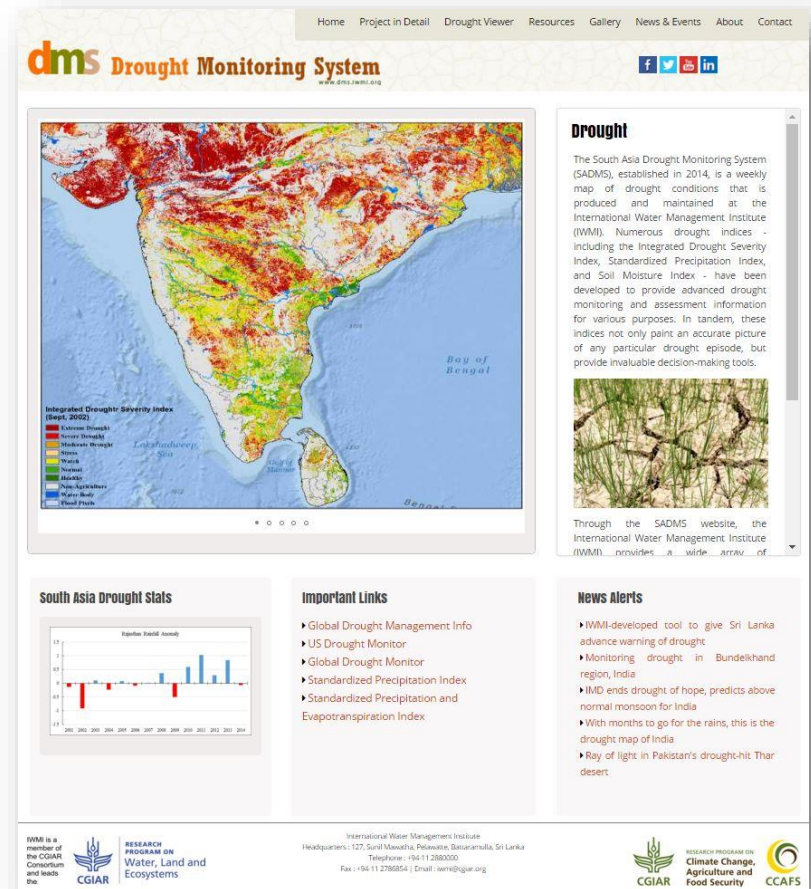


# Background SADMS

*Started through Integrated Drought Management Programme (IDMP) supported by the WMO/GWP and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and implemented by IWMI (2014 – mid 2016)*

Expansion of SADMS are the following:

- IWMI established **beta** Southern African Drought Monitor – funding from FAO to assist SADC (2016-17)
- ICAR, India - Drought monitoring to management Drought bulletin dissemination and validation (2017-2020)
- CGIAR Water, Land and Ecosystems support to maintain SADMS with new products and capacity development (2017 – 2020)
- MAFF Japan - Drought Monitoring and Forecasting to Enhance Agriculture Resilience and Improving Food Security in South Asia (Aug 2018 – Jul 2021)



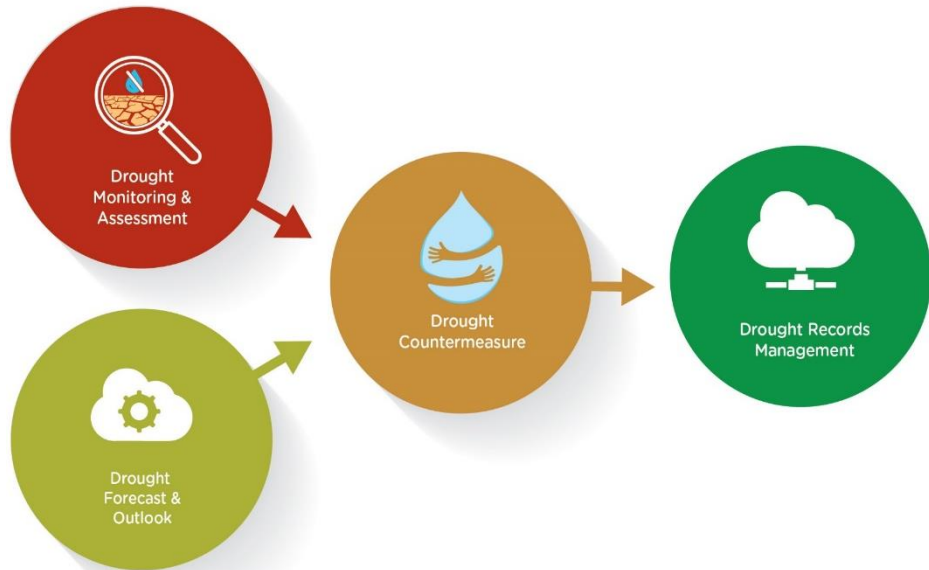
## Pipeline Discussion

- Sri Lanka – IWMI & GWP South Asia to support ongoing climate resilience project. Regular meetings with stakeholders to identify key topics for fund raising.
- Thailand - CEH UK to support drought programme

# IWMI's research program on Drought Resilience Partnership

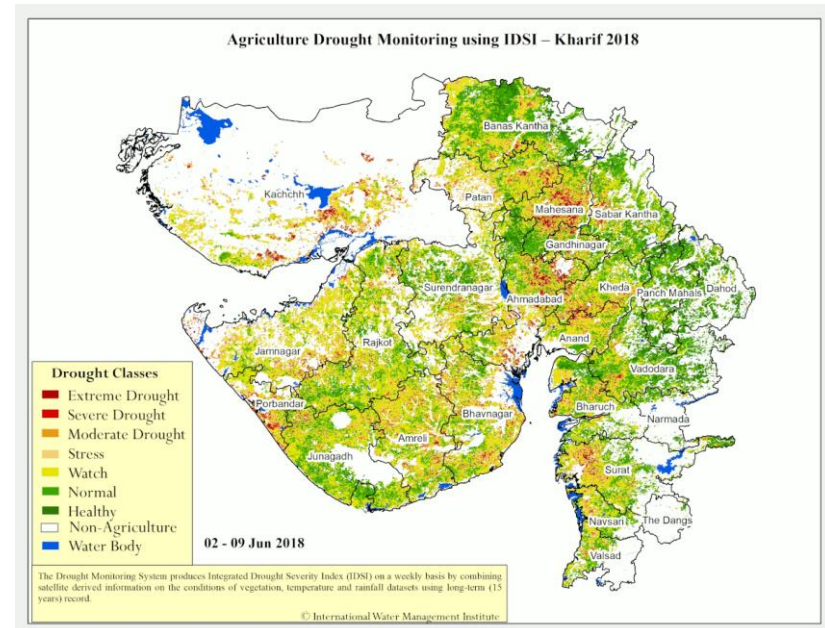
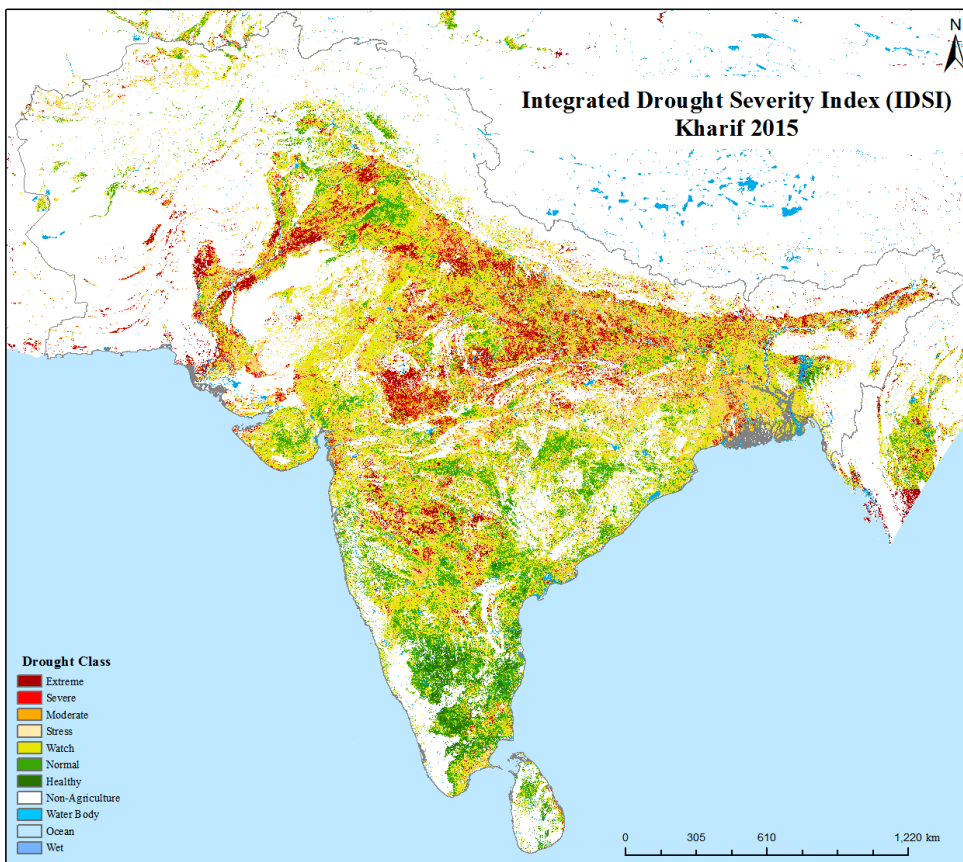
*With a focus on building long-term drought resilience, this partnership is dedicated to helping communities better prepare for future droughts and reducing the impact of drought events on livelihoods and the economy.*

## DECISION SUPPORT SYSTEM PROCESS FOR AGRICULTURAL DROUGHT MANAGEMENT



- Linking information such as monitoring, forecasts, outlooks, and early warnings with long-term drought resilience strategies in critical sectors such as agriculture and water.
- Closer coordination with national agencies and serving as a contact on drought resilience;
- Strengthening coordination of national drought policies and programs in support of community efforts in building resilience;
- Outreach and education

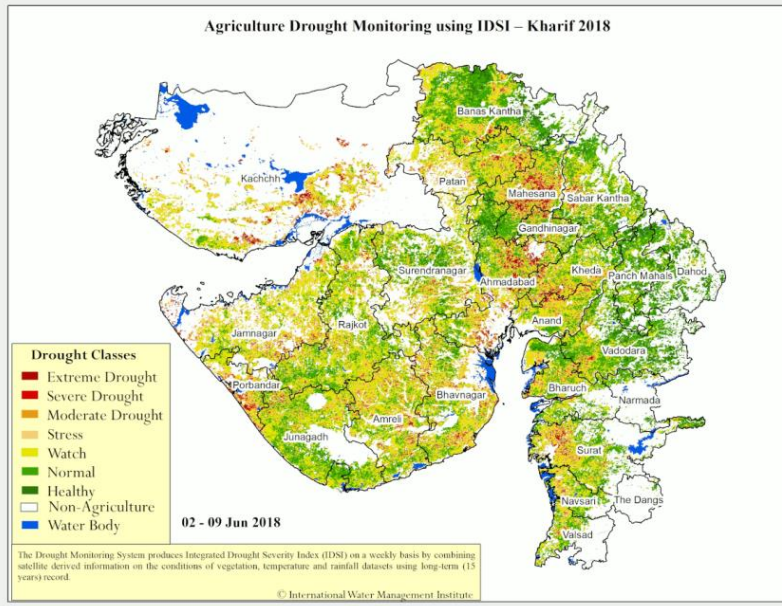
# SOUTH ASIA DROUGHT MONITOR SYSTEM (SA-DMS)



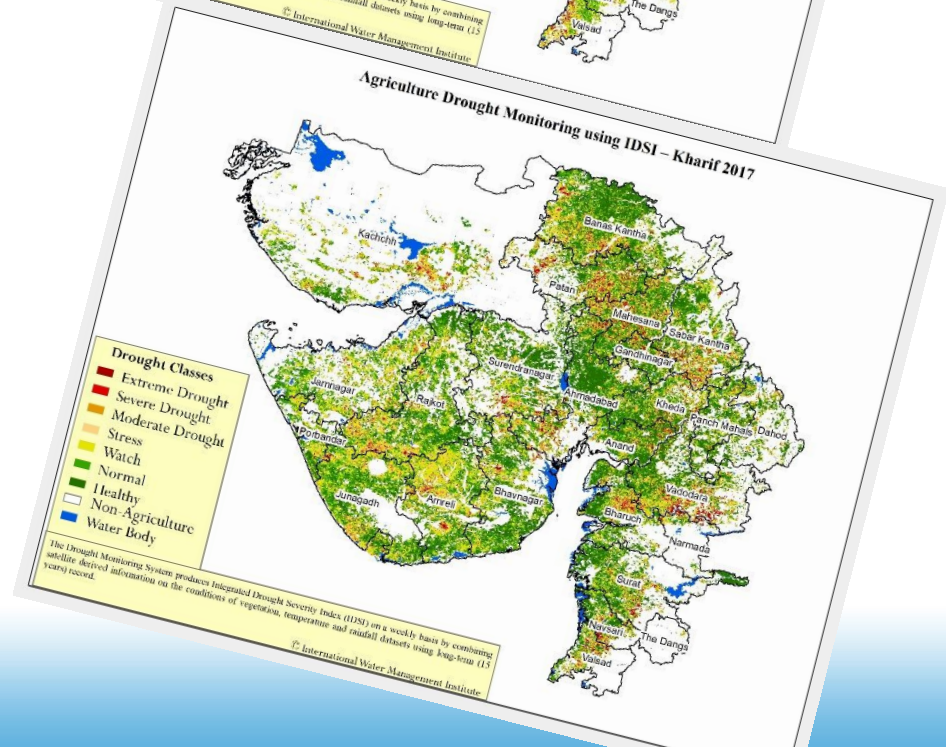
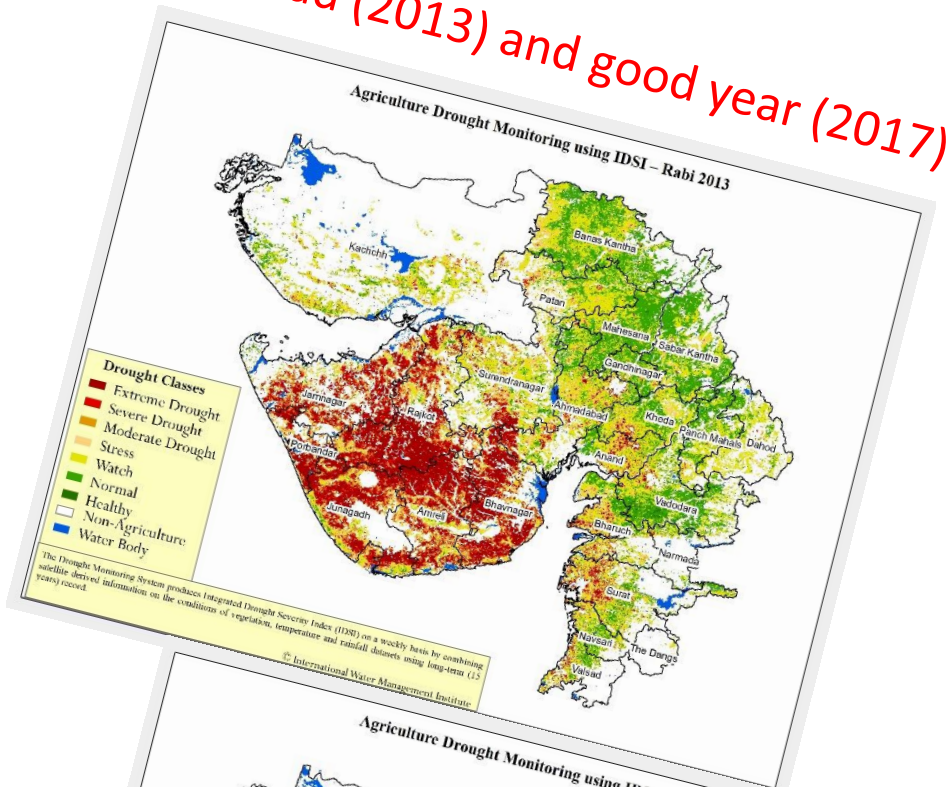
- First of its kind to establish for entire South Asia using multisource remote sensing observations;
- Historical drought risk mapping and assessment covering SA countries (2000 – Current);
- IDSI allows better understanding on drought frequency, duration over the 18years;
- Products are useful tools in drought mitigation studies and in decision-making process;



# Monitoring weekly agriculture stress



Bad (2013) and good year (2017)

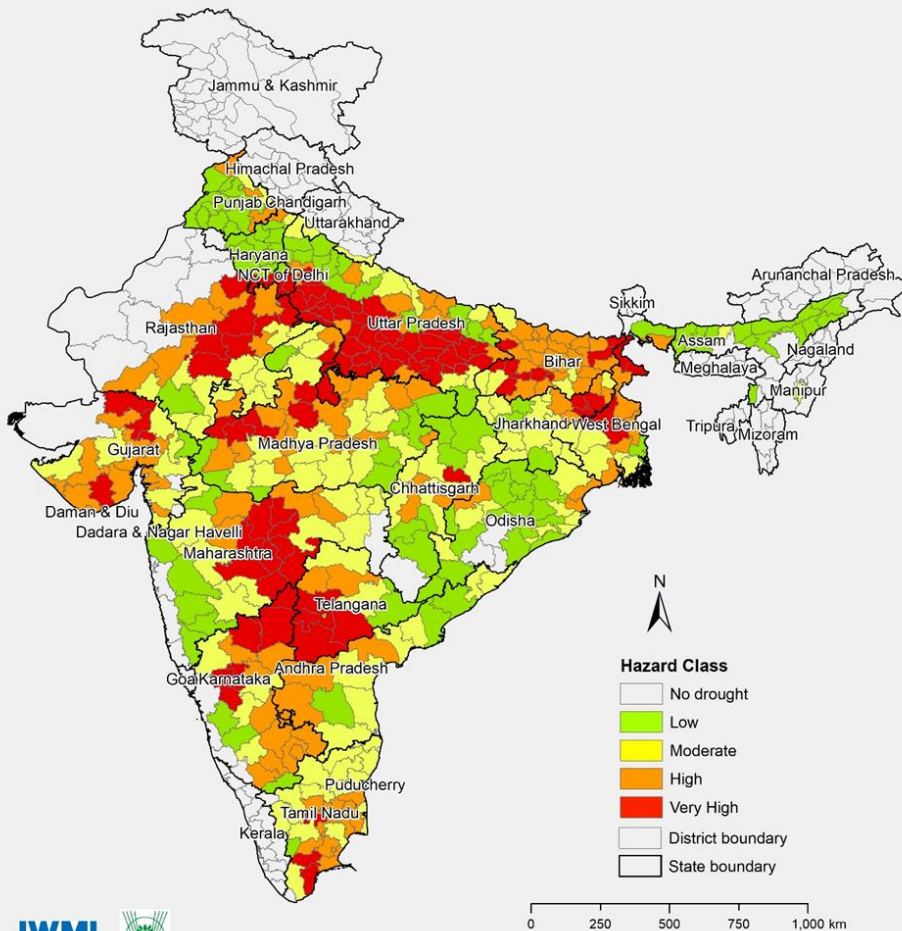




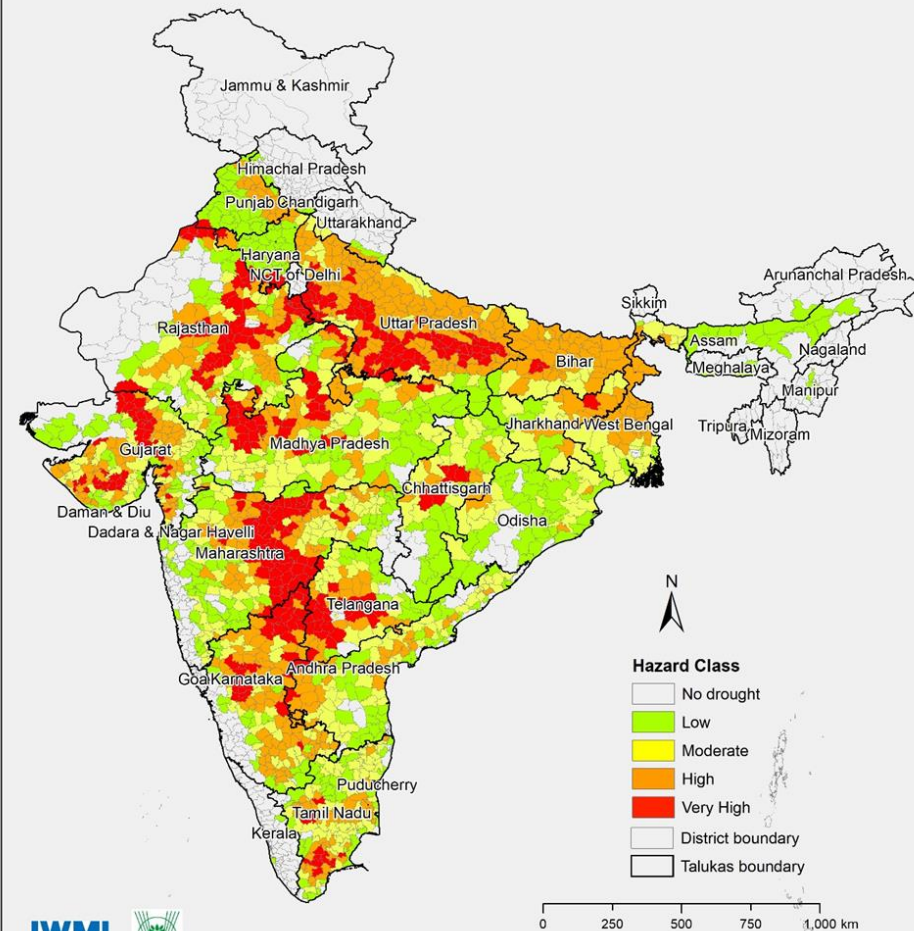
# Agricultural drought hotspots using IDSI product over India

Draft in evaluation with ICAR/CRIDA

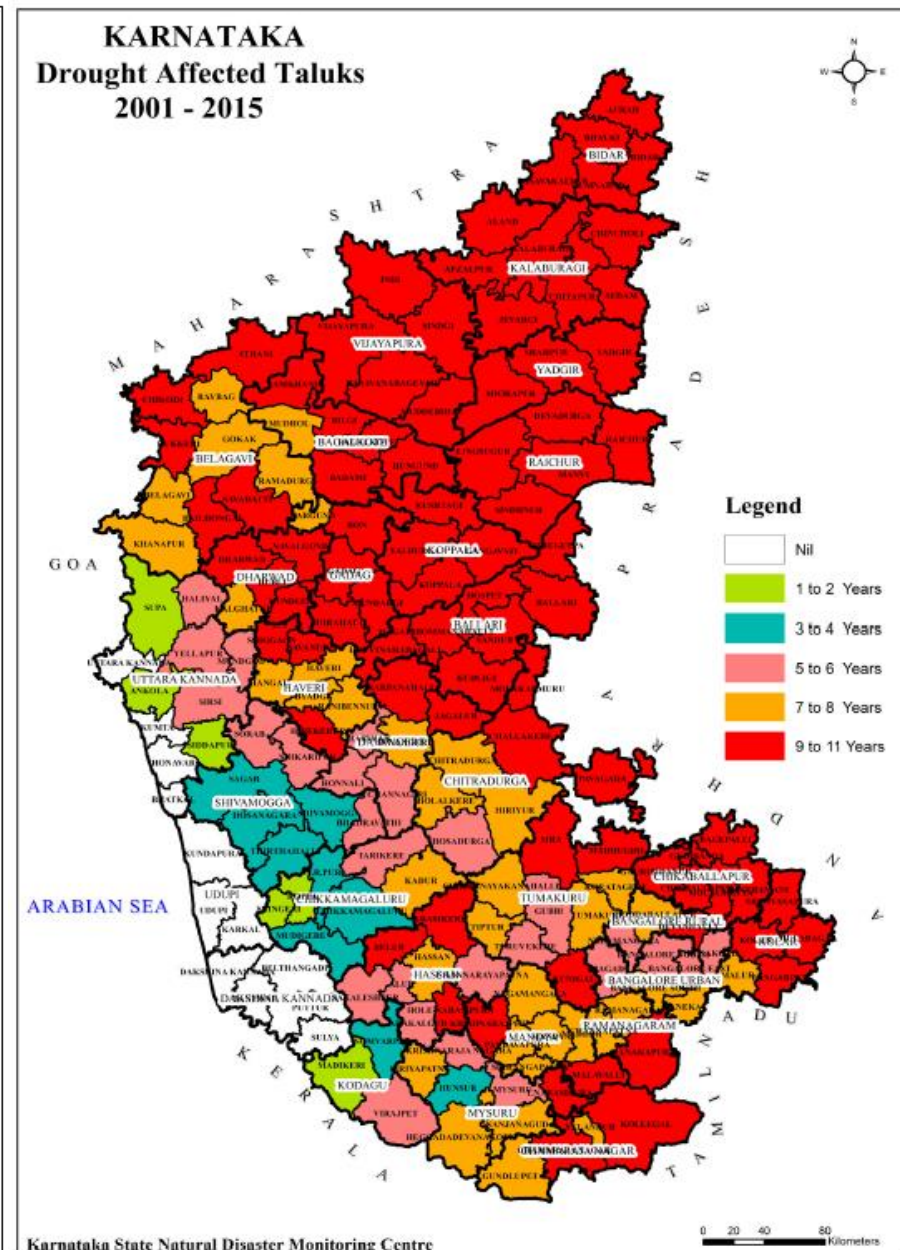
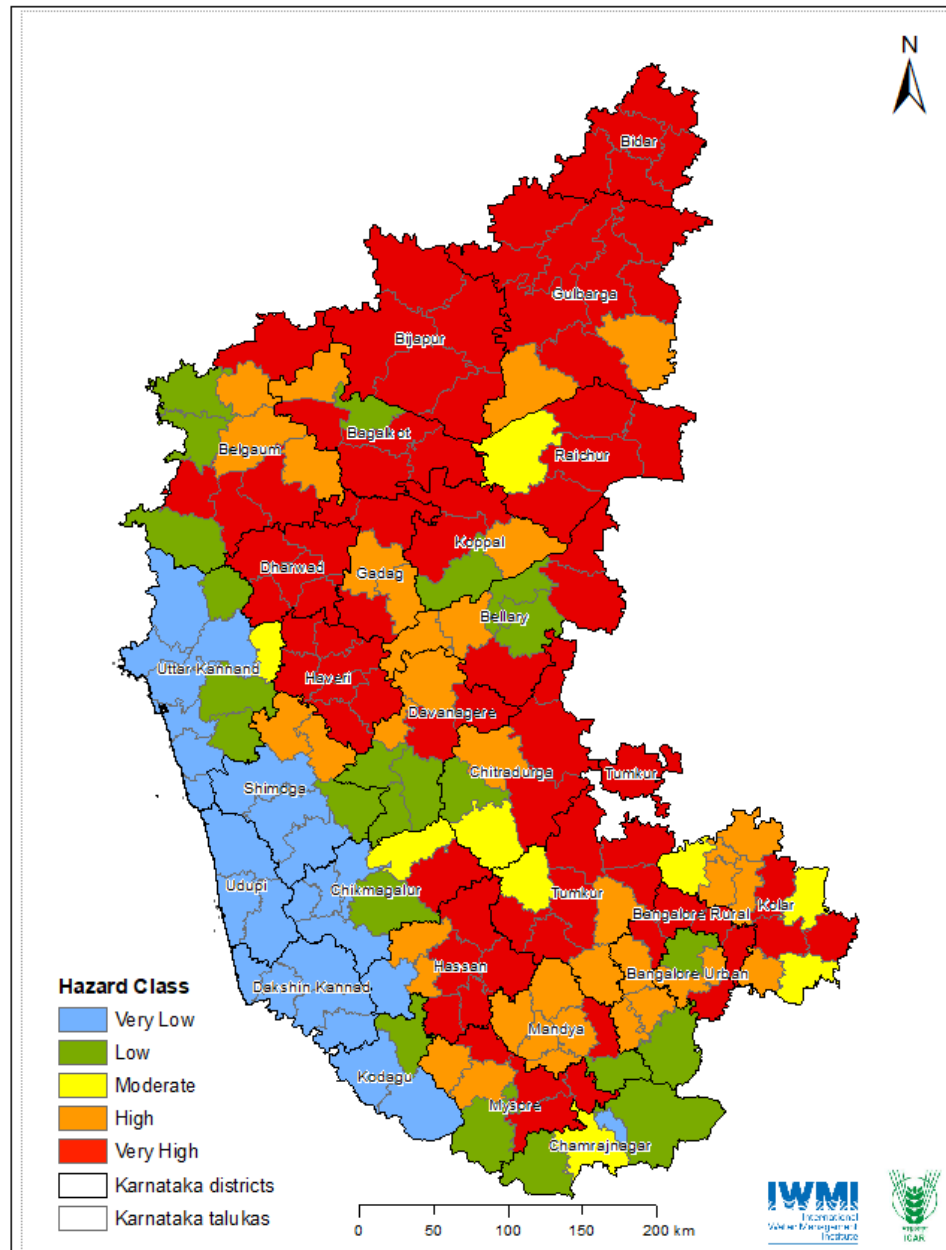
## District wise averaged IDSI



## Taluk wise averaged IDSI



# Agricultural Drought Hazard in Karnataka





# South Asia Drought Early Warning System (SADEWS)

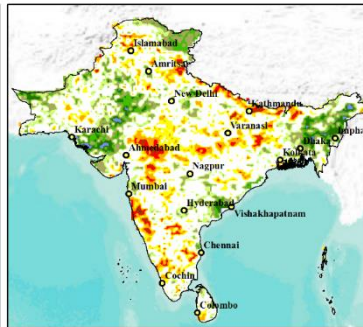
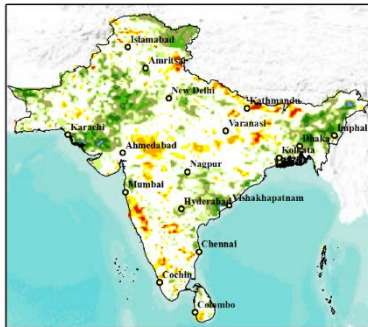
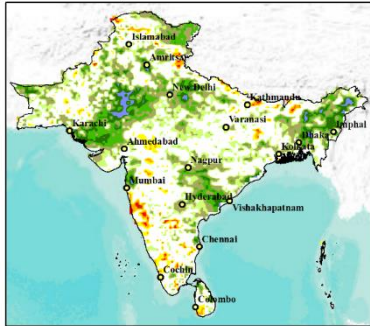
## SOUTH ASIA DROUGHT EARLY WARNING SYSTEM (SADEWS)

### SOIL MOISTURE PERCENTILE (SMP)

7-day Percentile 10 Jul 2017

7-day Forecast Percentile 17 Jul 2017

7-day Forecast Percentile 25 Jul 2017

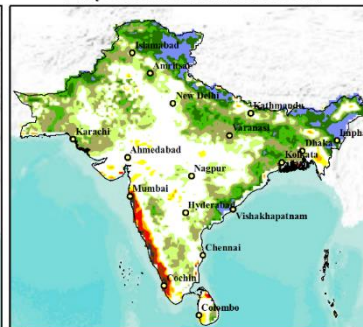
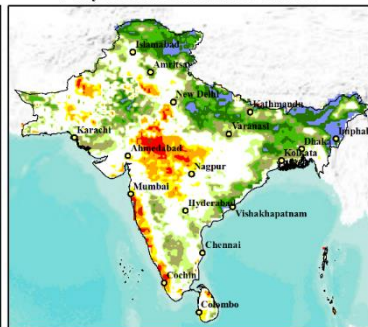
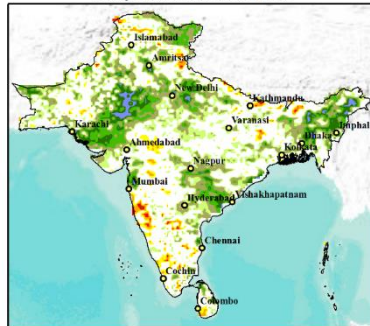


### SOIL RUNOFF PERCENTILE (SRP)

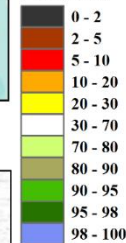
7-day Percentile 10 Jul 2017

7-day Forecast Percentile 17 Jul 2017

7-day Forecast Percentile 25 Jul 2017



#### Percentile



**Current Condition: 10 July 2017**

**Forecast Period : 17 July and 25 July 2017**

**Standardized Soil Moisture and Runoff Index for regional drought and early warning**

### Summary:

The experimental drought forecast products for research/scientific use based on 10<sup>th</sup> July 2017 initial condition. These forecast products are based on the real time weekly operational forecast generated by Global ENsemble (GENS), a weather forecast model made up of 21 separate forecasts, or ensemble members developed at The National Centers for Environmental Prediction (NCEP), NOAA.

### Drought Forecast Outlook:

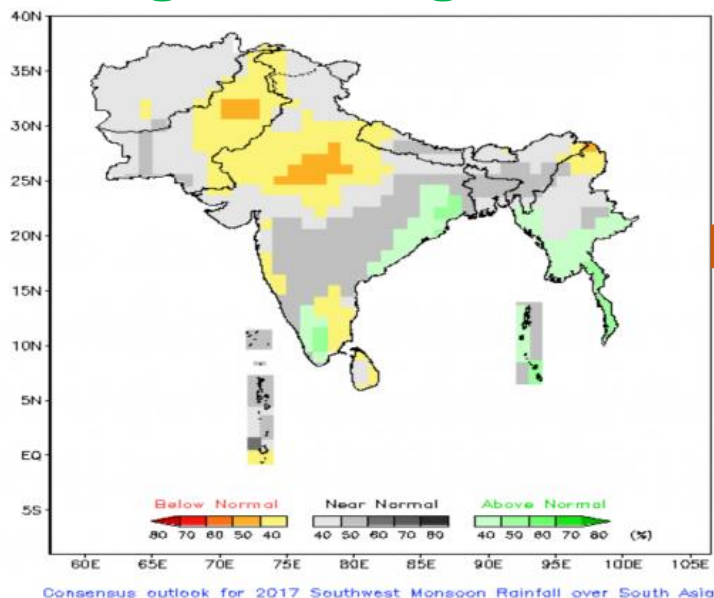
- The initial condition has improved over Telangana, Andhra Pradesh, Rajasthan, Western UP and North-eastern states..
- Initial condition on the Soil Runoff Index (SRI) explains similar trend to SSI.
- Some level of dryness is expected in the following weeks over central parts of the region such as MP, eastern Gujarat and Jharkhand.
- The leeward side of the western ghats along the southern Maharashtra seems to be progressing towards dryness.
- In reference to IMD actual rainfall for India, several east-central states are in deficit rainfall condition which is affecting the crop productivity and advance need for State and Local authorities for better planning and coordination on water resources management.

The SADEWS is regional scale early warning system developed as a collaborative project between International Water Management Institute (IWMI) and Indian Institute of Technology – Gandhi Nagar (IIT-GN).

*Disclaimer: The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the International Water Management Institute (IWMI) and its partners concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of IWMI.*



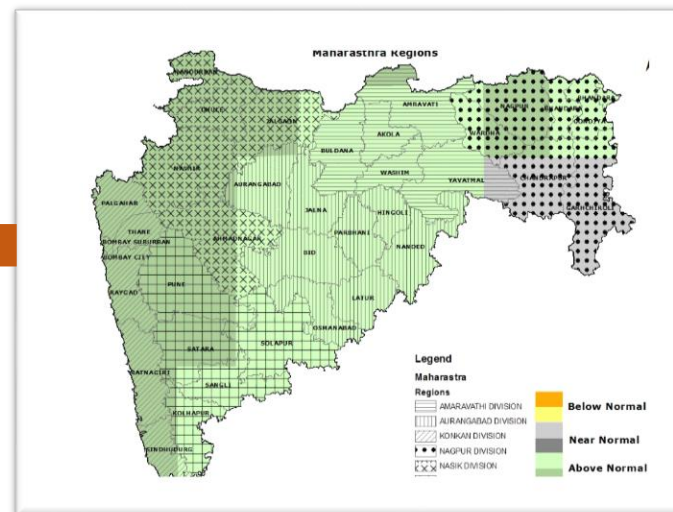
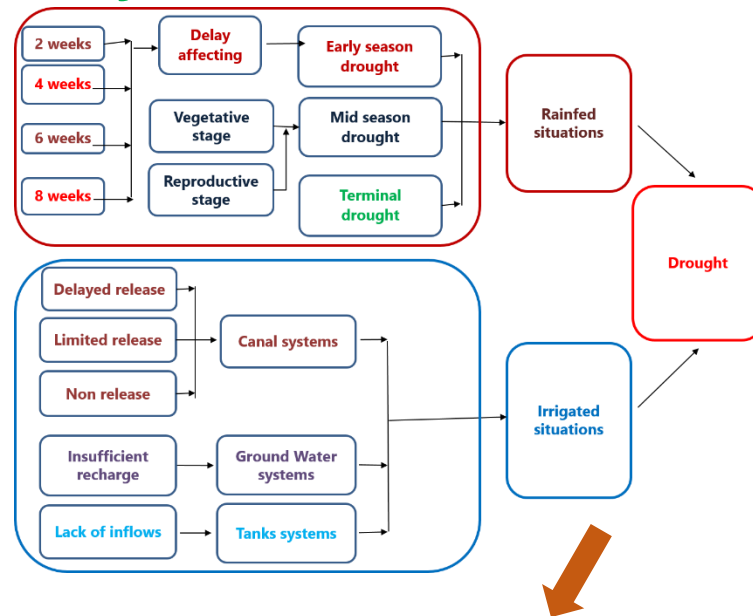
# Drought Management & Contingency Plans



Based on the previous years i.e., 2015 and 2016 experience, during Kharif – 2017 contingency plan was proposed as below

| If the rains are not received till 15 <sup>th</sup> July, 2017 |                |                            |                                  |                |  |      |                  |                         |         |
|--|----------------|----------------------------|----------------------------------|----------------|--|------|------------------|-------------------------|---------|
| S. No.   | District       | Crop wise Normal area (ha) | Crop wise area likely to be sown | Left over area | Crop wise areas proposed for Contingency |      | Seed requirement |                         | Remarks |
|  |                |                            |                                  |                | Crop                                     | Area | Crop/variety     | Qty. of seed req (Qtls) |         |
| 1  | Anantha puramu | 801675                     |                                  |                | Groundnut+Redgram crops                  |      |                  |                         |         |

| If the Rains are not received till 31 <sup>st</sup> July, 2017 |                |                            |                                  |                |  |      |                  |                         |         |
|--|----------------|----------------------------|----------------------------------|----------------|--|------|------------------|-------------------------|---------|
| S. No.   | Mandal         | Crop wise Normal area (ha) | Crop wise area likely to be sown | Left over area | Crop wise areas proposed for Contingency |      | Seed requirement |                         | Remarks |
|  |                |                            |                                  |                | Crop                                     | Area | Crop/variety     | Qty. of seed req (Qtls) |         |
| 1  | Anantha puramu | 801675                     |                                  |                | Groundnut+Redgram crops                  |      |                  |                         |         |

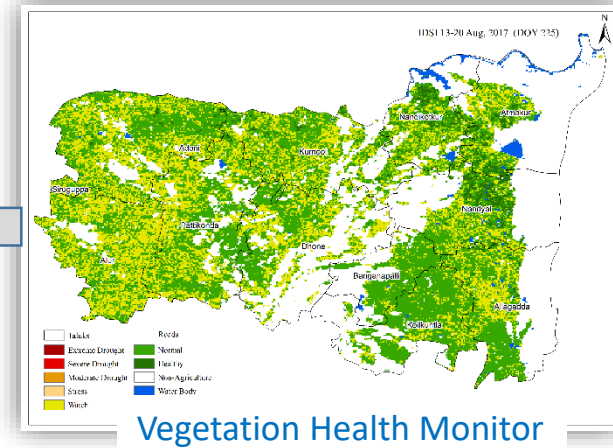


Source: CRIDA

Joint project of ICAR-CRIDA and IWMI on promoting drought resilience in pilot states in India

# Drought Management & Contingency Plans

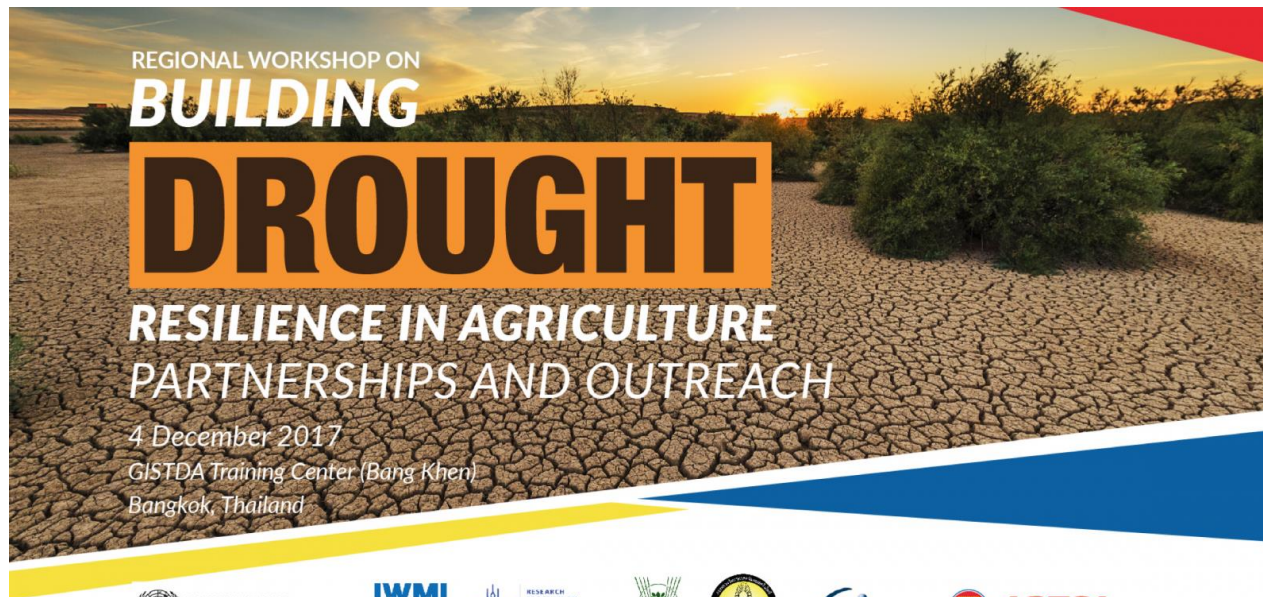
- Joint field validation (CRIDA-IWMI-KVK) of IDSI drought product in Kurnool district, in September 2017;
- Field measurement using Crop Sensor to validate vegetation stress (NDVI) and brief to farmers
- Drought contingency plans discussed for land use and crops options



Stress condition of Foxtail Millet







UNITED NATIONS  
 Office for Outer Space Affairs



RESEARCH PROGRAM ON  
 Water, Land and  
 Ecosystems



GISTDA



ARTSA



# “Drought Monitoring and Forecasting to Enhance Agriculture Resilience and Improving Food Security in South Asia”

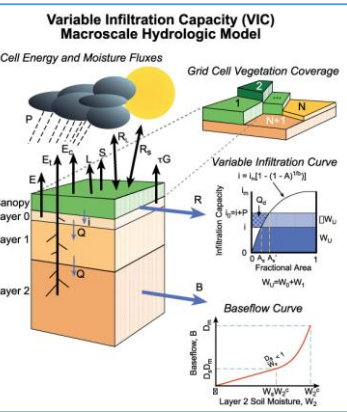
## DEWS and linking agriculture-water management

funded by MAFF, Japan  
2018-2021

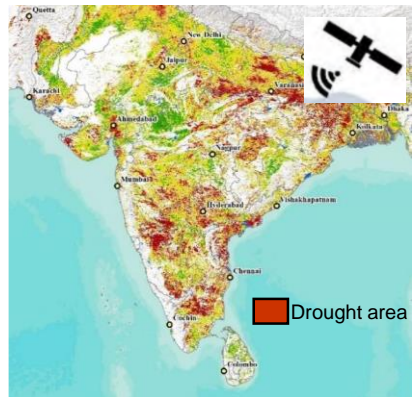
Near-real-time rainfall forecasting  
data (GCF, IMD-IITM ERPAS)



Hydrological model  
analysis



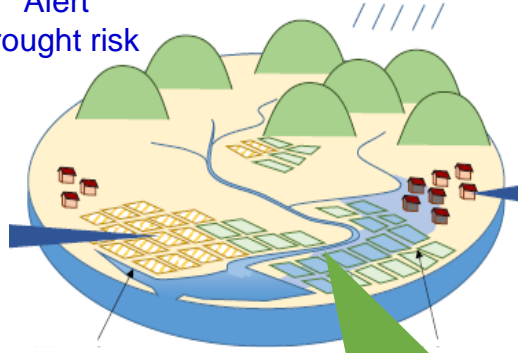
Drought forecasting  
using satellite  
observation



Adaptation management feedback  
on the model analysis

Ensemble forecasting

Alert  
drought risk



Adaptation in Agricultural  
water management

- Water-saving cultivation practices
- Adjusting cropping timing
- Rotation irrigation
- Underground storage

Link with  
crop growth model

Adaptation in Water  
resources management

- Water Sharing among the reservoirs
- Delay release from the reservoirs
- Stock flood water in underground reservoirs
- Optimal use of discharge pump for flood disaster prevention
- Modernization of Irrigation facilities

Hydrological and  
hydraulic model  
analysis



Micro-irrigation

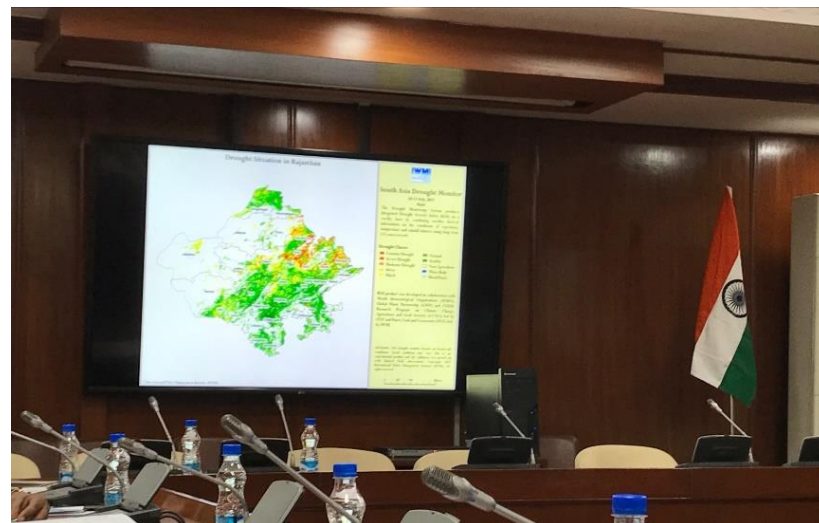


Recharging groundwater



# Key Highlights (2017 – 18)

- Govt. of India requested IWMI to present Drought condition maps for Rabi 2016-2017 and also shared with Secretary, Water Resources Ministry covering 9 Indian States;
- Secretary, Water Resources presented these maps and Statistics and was appreciated by Cabinet Secretary and Principal Secretaries of the drought affected States;
- Drought bulletin is official hosted in IMD website
- Gaining visibility but the links to management and policy are critical which will be addressing in the next two years





# Thank You



Nayabazaar, Morang