Sentinel Asia
Water related Disaster Working Group

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Overview of IWMI

- Non-profit, scientific research organization focusing on the sustainable use of water and land resources in developing countries

- IWMI is a member of CGIAR, and involved in some of the programs

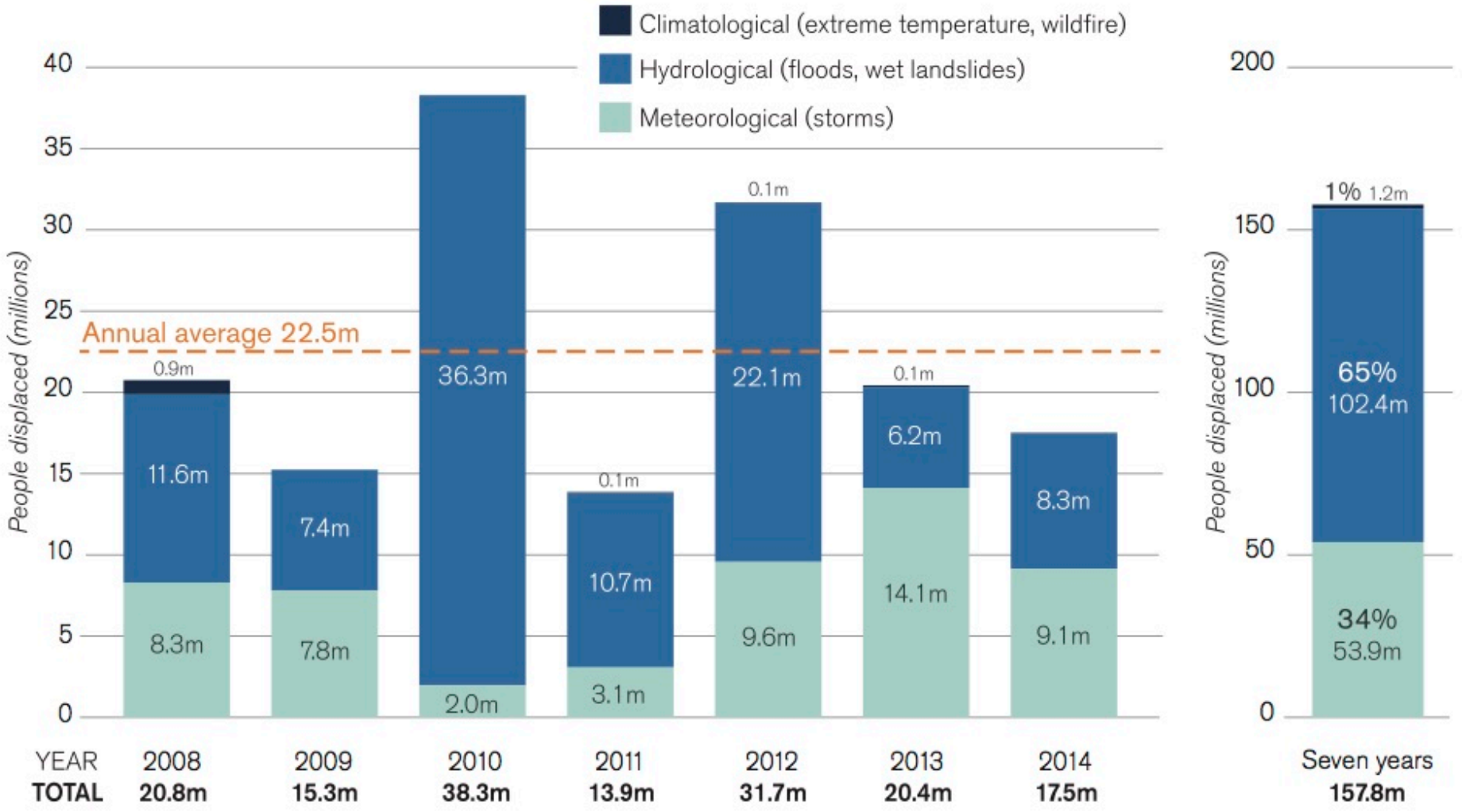
STAFF

- Around 300 employees in 10 countries
- 75% of researchers - in the field,
- 65% from developing countries

Content

- Global events on natural disasters
- Statistics on weather related insured losses
- IWMI's interventions and contribution to SA Water-related hazards WG
- Strengthening SA Water related hazard WG to promote Step3 Strategy

Global displacement by weather-related disasters, 2008 - 2014

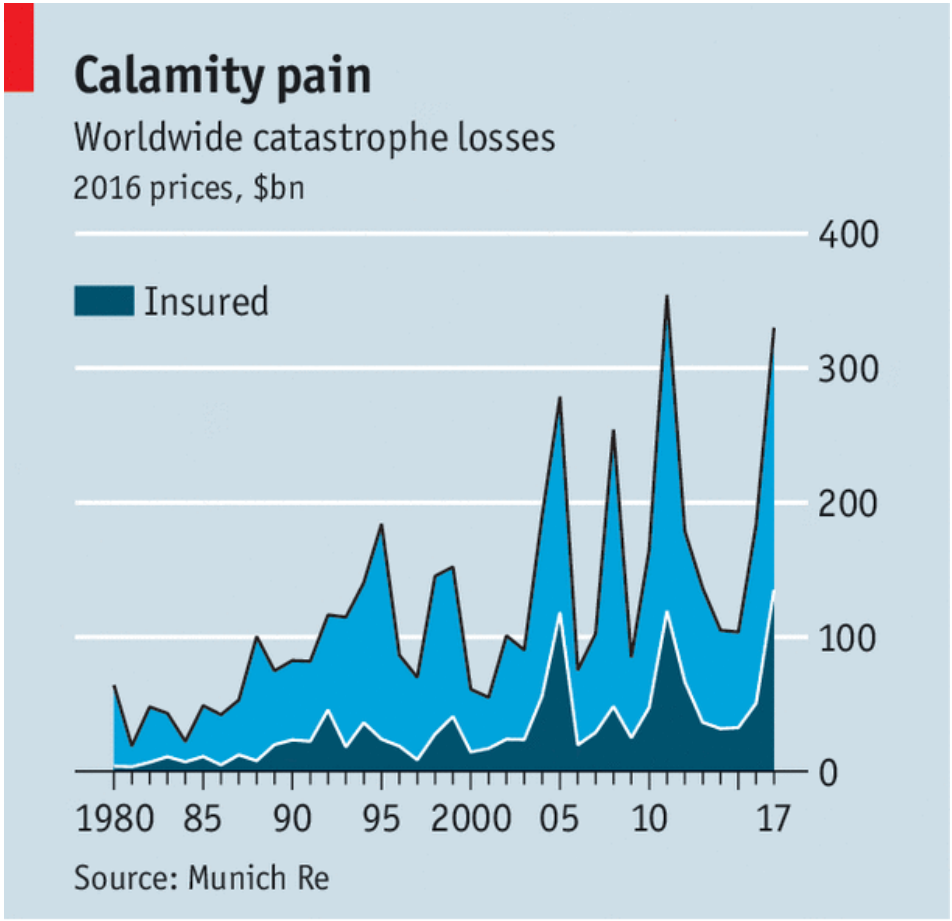


Source: IDMC estimates as of 1 June 2015

Natural Disasters and Risk Transfers

According to figures released on January 4th 2018 by Munich Re, insured catastrophe losses reached an all-time high of $135bn in 2017. Total losses (including uninsured ones) reached $330bn, second only to losses of $354bn in 2011.

"the proportion of all losses covered by insurance "is still too small".
Much risk is retained by governments, or uninsured.
Offloading more to private markets would benefit governments, property owners and the insurance industry alike"



IWMI's framework on Water Risks and Disasters

From managing disaster to managing risk

- **Outcome**: Substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries …

- **Goal**: Prevent creation of new risk, Reduce exisitng risk and Strengthen resilience through innovative risk management solutions

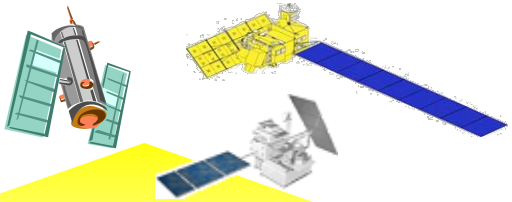
- **Scope**:
  - Promotion of space-based information in all phases of disaster risk management;
  - Develop innovative risk solutions to build resilience and sustainable development
  - Promote short and long-term capacity building including technology transfers and case studies to demonstrate DRR and DRM in the region

Reference: ISDR

Concept of Sentinel Asia Step 3

Positioning satellites

Earth observation satellites



Communication satellites

Information delivering to personal terminals

Monitoring

Information / data transmission

Pre-disaster

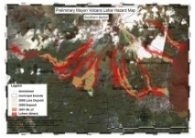
Mitigation:

Community education

Preparedness:

Hazard map

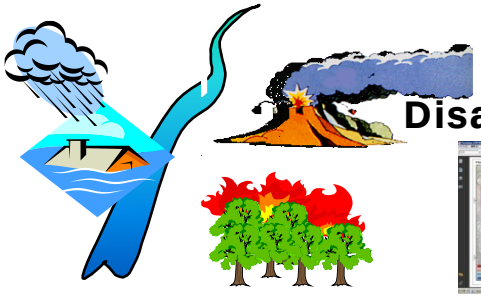
Early warning system



Just after disaster

Response:

Emergency observation



Disaster information

Post-disaster

Recovery:

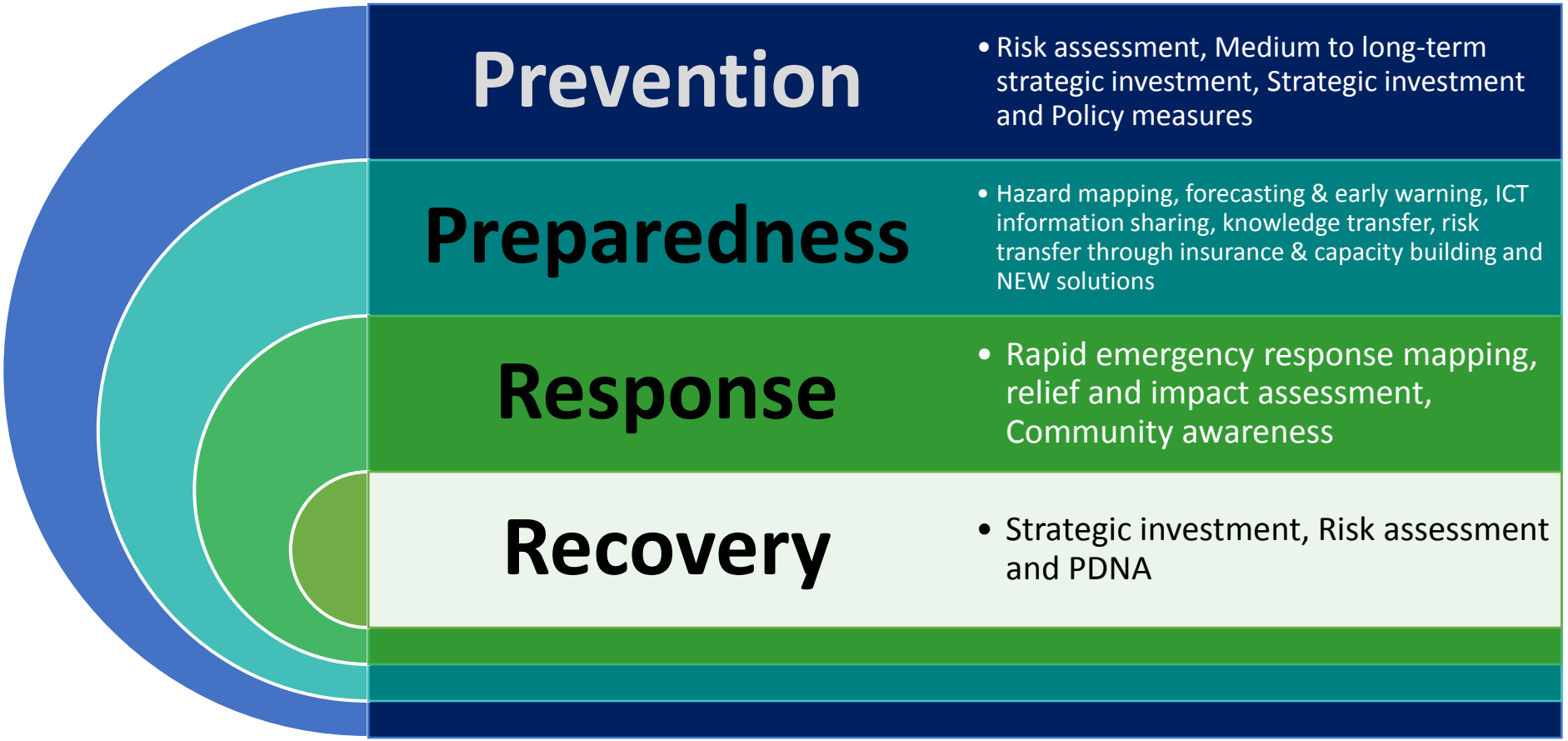
Monitoring

Information sharing
(Web-GIS)

Human network
Capacity Building, Outreach

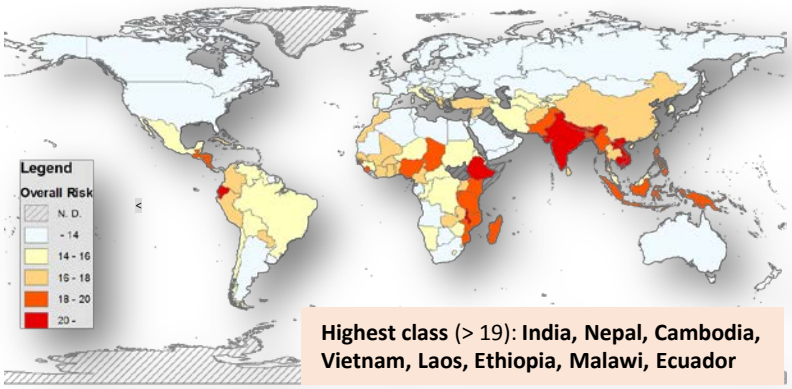
Source: Sentinel Asia Secretariat

IWMI'S REGIONAL APPROACH TO COMPREHENSIVE DISASTER RISK MANAGEMENT SOLUTIONS TO ENHANCE AGRICULTURE RESILIENCE AND REDUCING RISKS



MAPPING GLOBAL WATER-RELATED DISASTER RISK

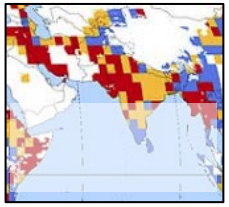
Overall Risk



Highest class (> 19): **India, Nepal, Cambodia, Vietnam, Laos, Ethiopia, Malawi, Ecuador**

Publicly available data sources

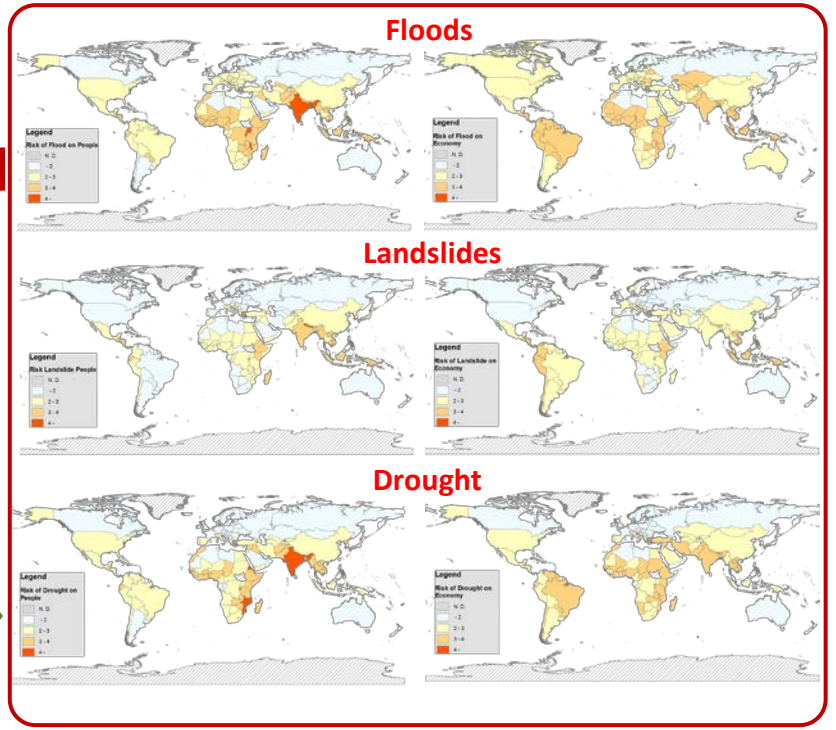
Global Risk Data Platform (UNEP)



Socioeconomic Data and Applications Center (SEDAC)

Human Development Report (UNDP)

Population Exposure **Economic Losses**

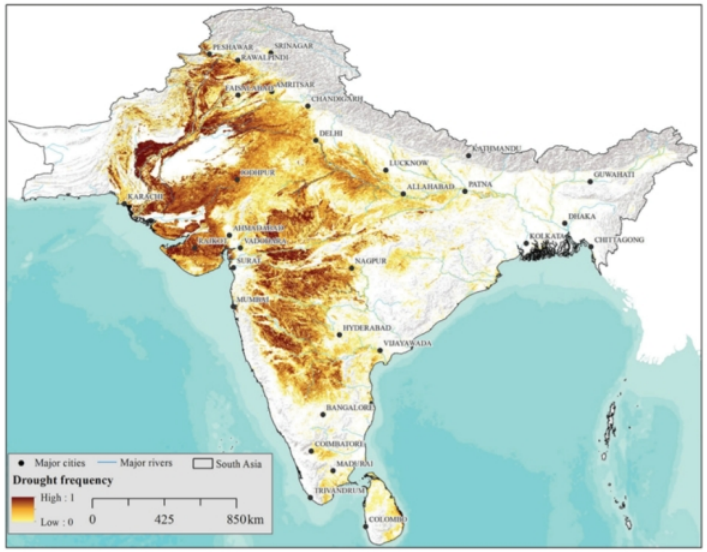


Amarnath G, Yoshimoto S, Goto K, Fujihara M, Smakhtin V, Aggarwal P, Ravan S, 2016, Global trends in water-related disasters using publicly available database for hazard and risk assessment, Congress of JRCSA 2016, held in Kyoto, Japan.

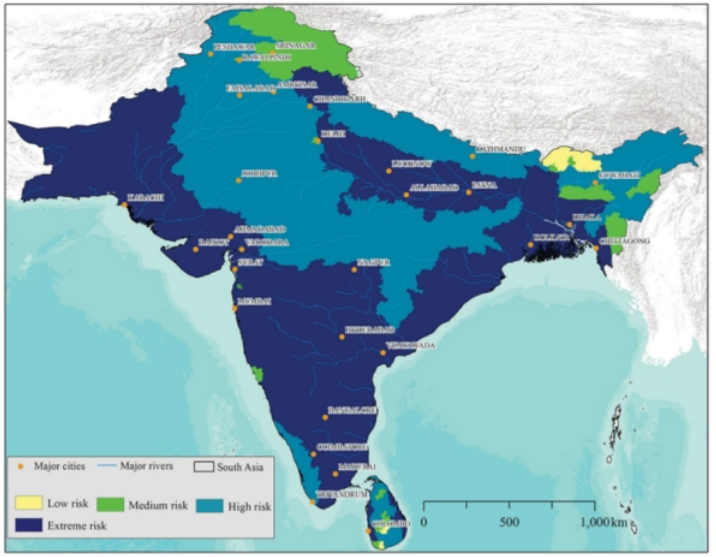
MULTIPLE HAZARD AND RISK ASSESSMENT IN SOUTH ASIA

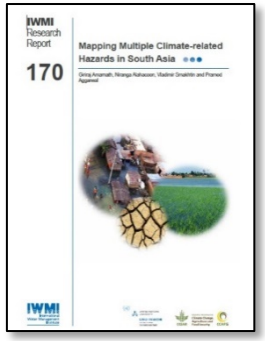
Combined risk index (hazards - floods, drought, extreme rainfall, heat waves, sea level rise, vulnerability and exposure) to identify RISK areas to district and sub-national level for climate adaptation strategy and risk investment in SA

Spatial distribution of drought frequency based on 13 years' time series of MODIS imagery



Climate change vulnerability map of SA based on exposure, sensitivity and adaptive capacity to multiple hazards

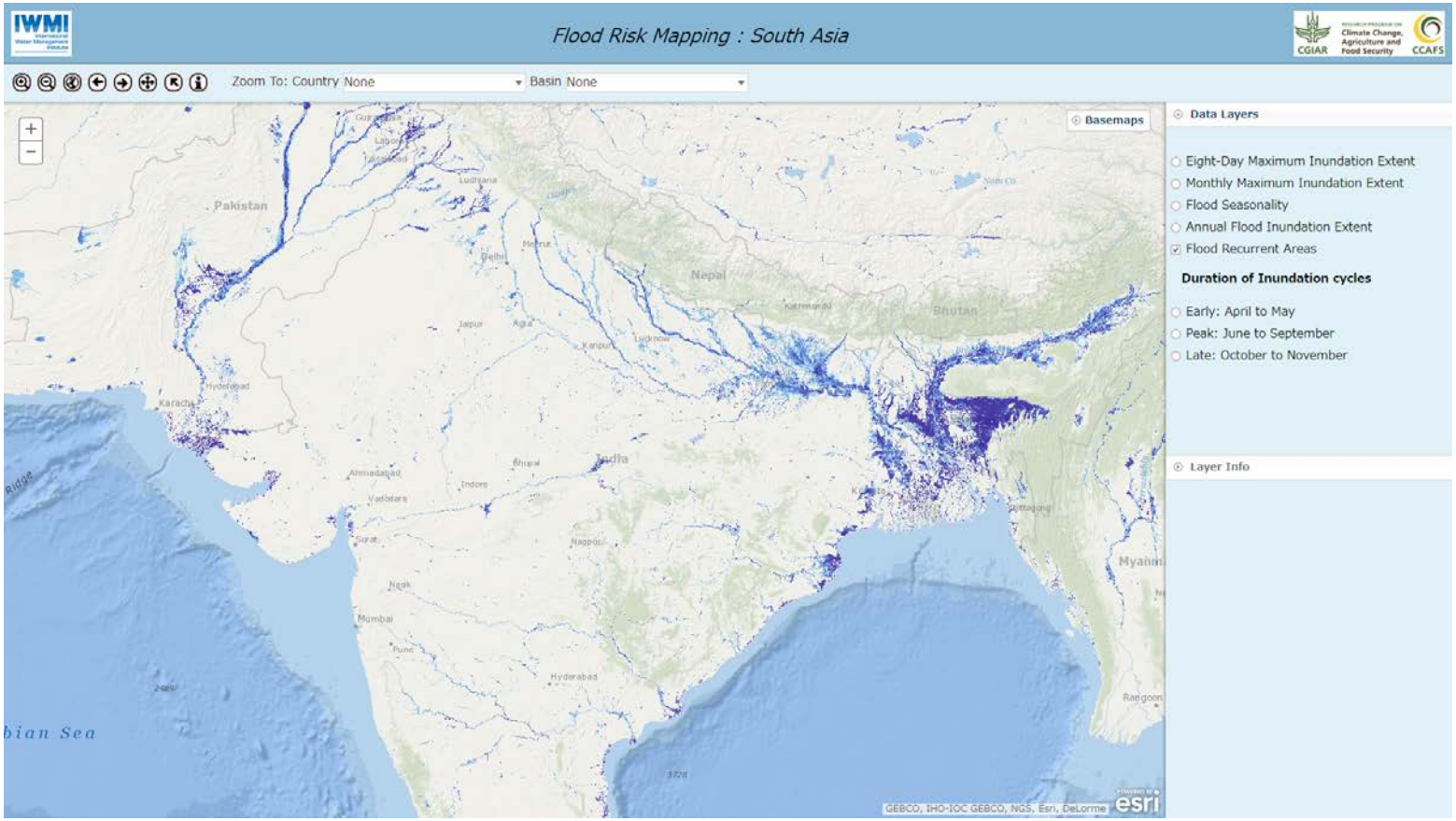




Amarnath, G.; Alahacoon, N.; Smakhtin, V.; Aggarwal, P. 2017. Mapping multiple climate-related hazards in South Asia. IWMI Research Report 170, 41p. doi: 10.5337/2017.207

FLOOD RISK ASSESSMENT IN SA USING RS DATA

- Flood inundation recurrent mapping using MODIS data
- Allows decision makers to propose new strategies based on information of return period, estimation of loss in economy and agricultural production.

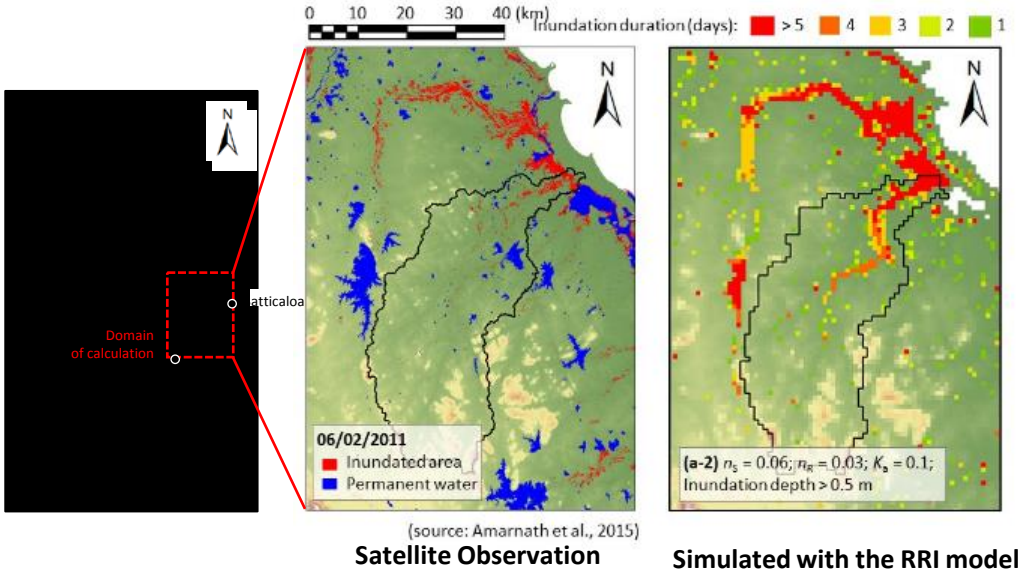


http://waterdata.iwmi.org/Applications/Catastrophic_Flood_Risk_Mapping/

FLOOD INUNDATION EXTENT MODELLING FOR SIMULATION

Simulated extents of flood inundation by the models:

- Able to complement discrete-time results of satellite images (and also in cloudy periods);
- Applicable to hazard prediction & vulnerability evaluation;
- Able to assist NRT simulation for early alert framework, even in poorly gauged basins.



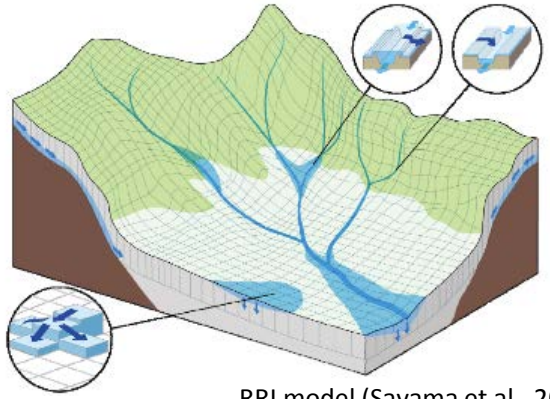
(source: Amarnath et al., 2015)

Satellite Observation | **Simulated with the RRI model**

The RRI model: Numerical model for simulation of two-dimensional flood inundation distribution which was developed by ICHARM

Merit of the RRI model

1) Combination of slope flow and channel discharge: this helps to apply to areas which have hills and flood plains.
2) Free of charge; this could help decision making in developing countries.

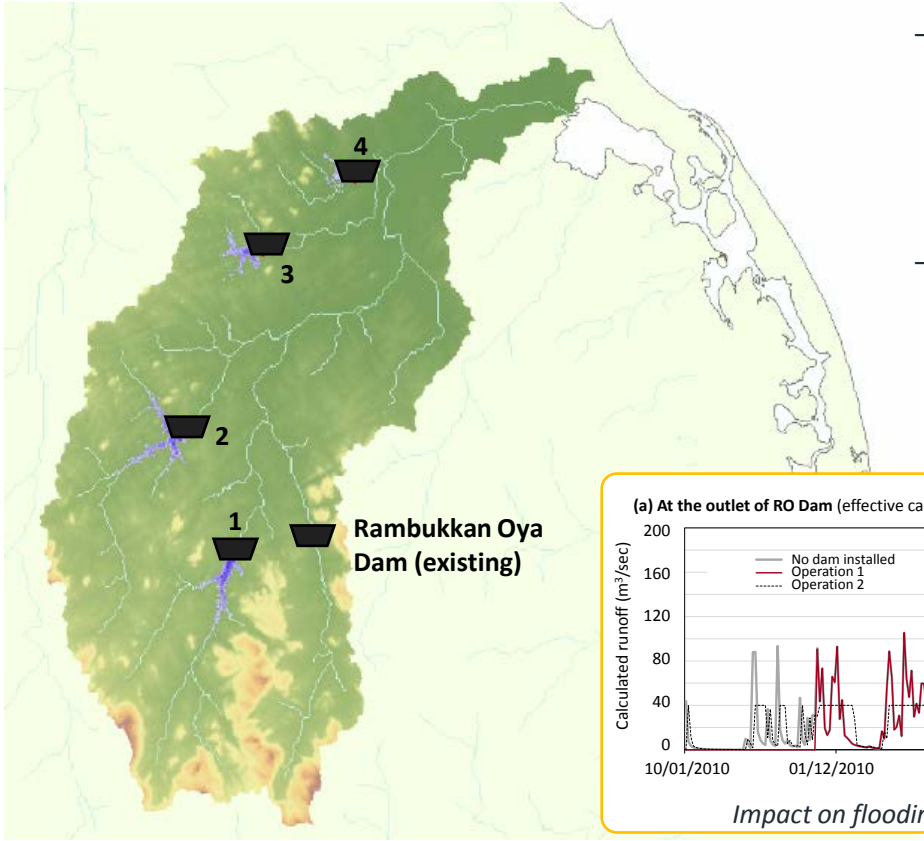


RRI model (Sayama et al., 2012)

COUNTERMEASURES TO REDUCE FLOOD AND STORE WATER

Integrated flood risk management that reduces flood risk while increasing its positive impact is needed

- Socio-economic aspects
  - Building multi-objective reservoir that reduces flood impact during wet season and used stored water for irrigation purpose during dry season
  - Proper Dam operation and application of basin scale forecasting system
- Ecosystem Management aspect
  - Re-establishing wetlands in the downstream of the basin area
  - Re-forestation in the upstream areas



Able to be evaluated with using the flood inundation model

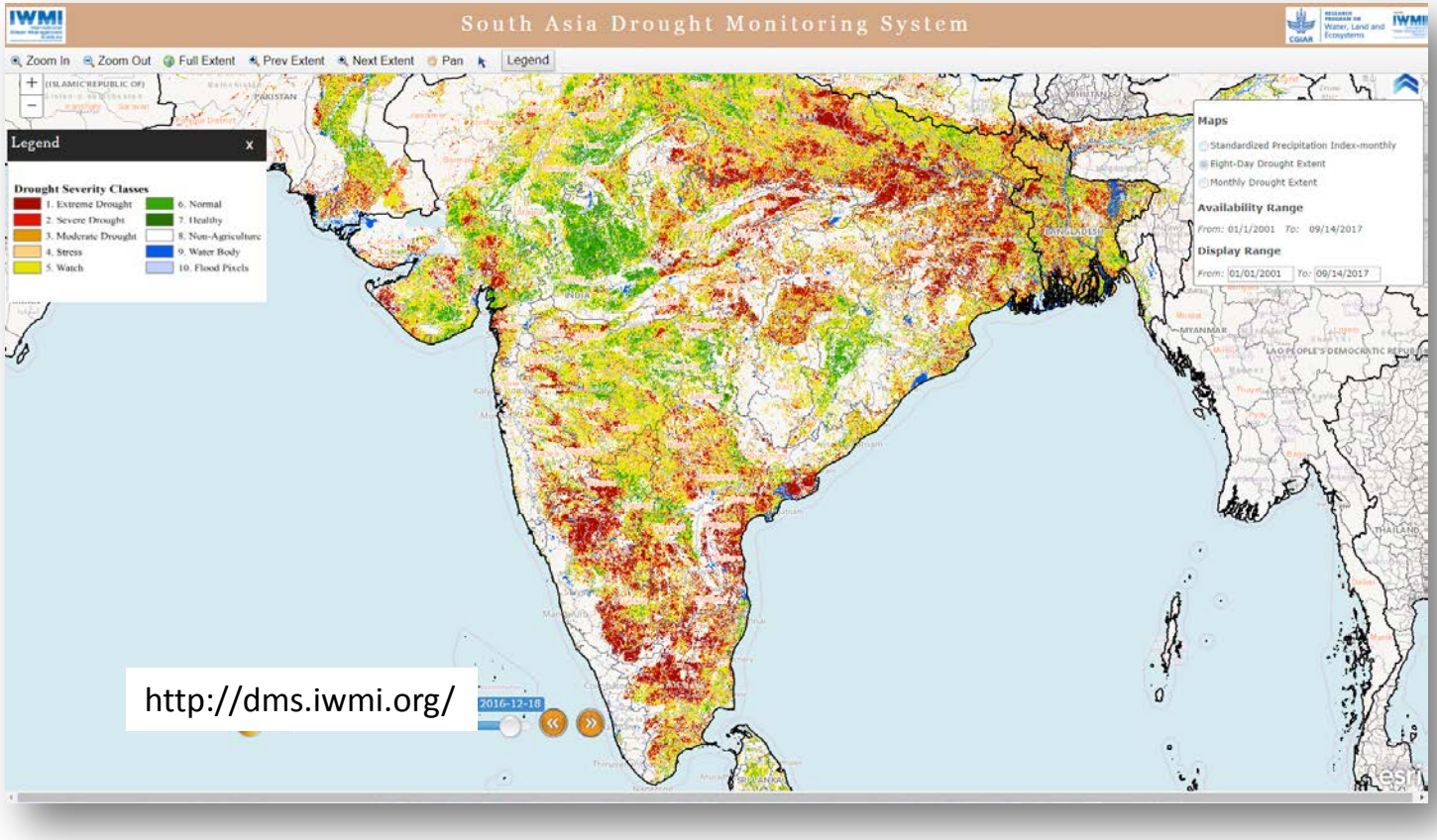
Impact on flooding discharge

No.	Capacity**	Minimum inflow to dam (rainy season in 1989)
RO*	59.2 * 10^6 m^3	87.1 * 10^6 m^3
1	27 * 10^6 m^3	142.3 * 10^6 m^3
2	25 * 10^6 m^3	131.6 * 10^6 m^3
3	14 * 10^6 m^3	29.0 * 10^6 m^3
4	3.8 * 10^6 m^3	32.5 * 10^6 m^3

Strengthening irrigation water

Yoshimoto, S.; Amarnath, G., 2017, Application of a flood-inundation model to analyze the potential impacts of a flood-control plan in Mundeni Aru river basin, Sri Lanka . *Natural Hazards. In Press. https://doi.org/10.1007/s11069-017-3143-5*

SOUTH ASIA DROUGHT MONITOR SYSTEM (SADMS)



2015 field observations in Jalna, Maharashtra

SADMS provides customized tools and models that use satellite technology to accurately and scientifically monitor and plan for droughts. SADMS supports planners in SA countries.

Visitors to DMS Portal

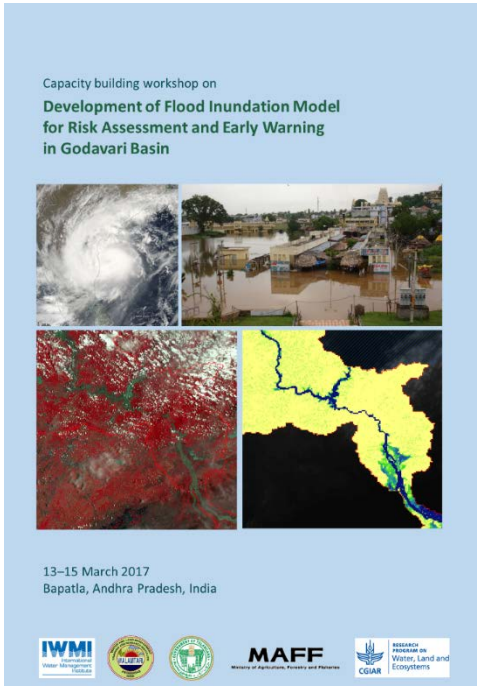
- More than 3,800 visit to DMS and spread over 85 countries since Jan 2017
- Approx. 300 visit per month and dominant being India, Sri Lanka, USA, Canada, UK

CAPACITY BUILDING TO GOVERNMENTAL OFFICERS

- Since 2011 more than 130 institutes has been trained on floods and drought monitoring and management and Space technology for disaster risk reduction
- More than 25 countries in Asia and Africa participated in training and workshop activities
- Outreach and communication activities through media and social networks for information and knowledge sharing on DRR activities

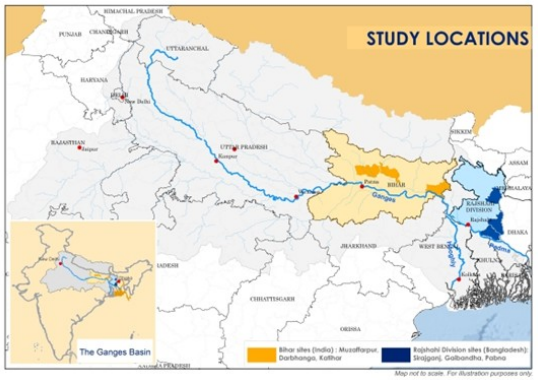
Local newspaper

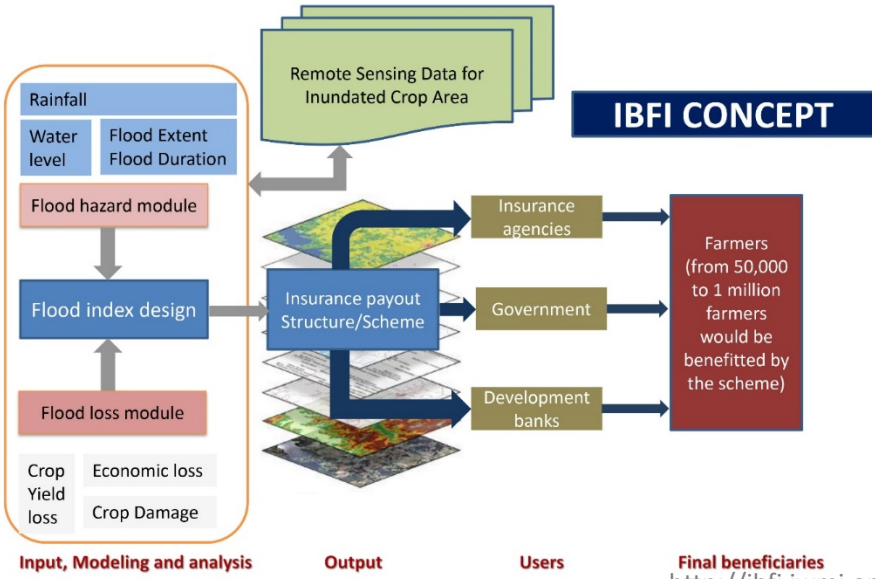
Training Manual



INDEX-BASED FLOOD INSURANCE (IBFI)

IBFI is an innovative approach to developing effective payout schemes for low-income, flood-prone communities. It enables speedy compensation payouts to farmers, based on flood modeling and satellite image analysis techniques.





http://ibfi.iwmi.org/

Partners: International Food Policy Research Institute (IFPRI), Indian Institute of Technology (IIT)-Gandhinagar, Indian Institute of Water Management (IIWM-ICAR)*; Agriculture Insurance Corporation of India, MoA; Bajaj Allianz, Insurer, Swiss Reinsurance

Water Related Risks & Community Based Resilience

http://utfi.iwmi.org

From one pond, **over 60,000 m3 of floodwater stored** underground in 2017. Thousands of such ponds are underutilized across the region

- **Underground Taming of Flood for Irrigation (UTFI)** has demonstrated that community-owned assets can be converted into recharge structures that are effective in achieving both **flood mitigation and enhanced groundwater availability during drought event**
- **Resilient community**
- **Community participation** for site maintenance

Proposal to strengthen SA Step3 implementation of Water-related Hazard Working Group

In particular, this support will focus on:

1. Sharing Space-based Information: **Procedural Guidelines for Disaster Emergency Response** in Asia Pacific countries; (during disaster)

2. Promote **standard approach and tools** in multi-hazard risk assessment using space-based information; (before disaster)

3. **Monitoring and assessment** of major natural disasters using space technology for disaster risk investment; (during/after disaster)

4. Up-scaling and accelerating **implementation of multi-hazard early warning systems** and services; (before disaster)

5. Facilitating the consolidation of **case studies and lessons learned** from SA Water Hazard WG the exchange of experiences among regions, countries, cities and local communities and the analysis of emerging related issues (capacity development);

Proposal to strengthen SA Step3 implementation of Water-related Hazard Working Group

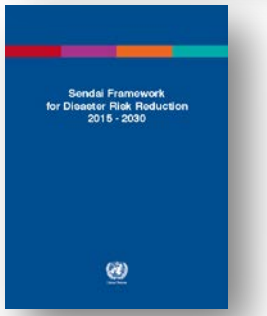
6. Building on the **paradigm shift** underway in national or local agencies such as National Meteorological and Hydrological Services:
   - to advance from their current status as providers of forecasts and early warnings to being providers of **impact-based forecasts** and **risk-informed warnings**;
   - to play a major role in **all aspects of disaster risk management** to better support disaster management agencies and local communities; and
   - to provide **better risk-based decision-support services**;

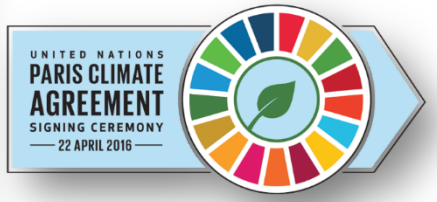
7. **Strengthening partnerships** of (national) technical agencies (providing data on hydro-meteorological, geophysical and other hazards) with relevant disaster management organizations.

8. **Measuring progress** in the number of people, including vulnerable people, with access to early warning, relief and emergency plans and risk information;

9. Finally **cooperation from end-users** in SA Water related Hazard Group is very important for the successful implementation of SA Step3 activities.

Water Risks and Disaster Research Group Strategy integrates SDGs and Disaster Risk Reduction





DRM Innovation: What's different?

- **Risk-informed development**
- Shift from disaster loss to **disaster risk**
- **Coherence** in policies and programmes across SDG and climate to ensure the DRR
- Shift from disaster management to **disaster risk management**
- Shift from "What to do?" to "**how to do**?"
- Primary responsibility of states for DRR, **shared responsibility** for DRR with stakeholders

Thank You

Nayabazaar, Morang