Exploring New Paradigms of Natural Disaster Research

Report from Group C: Atmospheric and Water Related Disaster

Subgroup#c1: Weather, Hydrology, Rivers and Water Related disasters

Subgroup#c2: Coastal Disaster

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To propose research road map on DRR, it is important to ***Identify The Research Gaps and Needs***!

Risk = Hazard × Vulnerability × Exposure

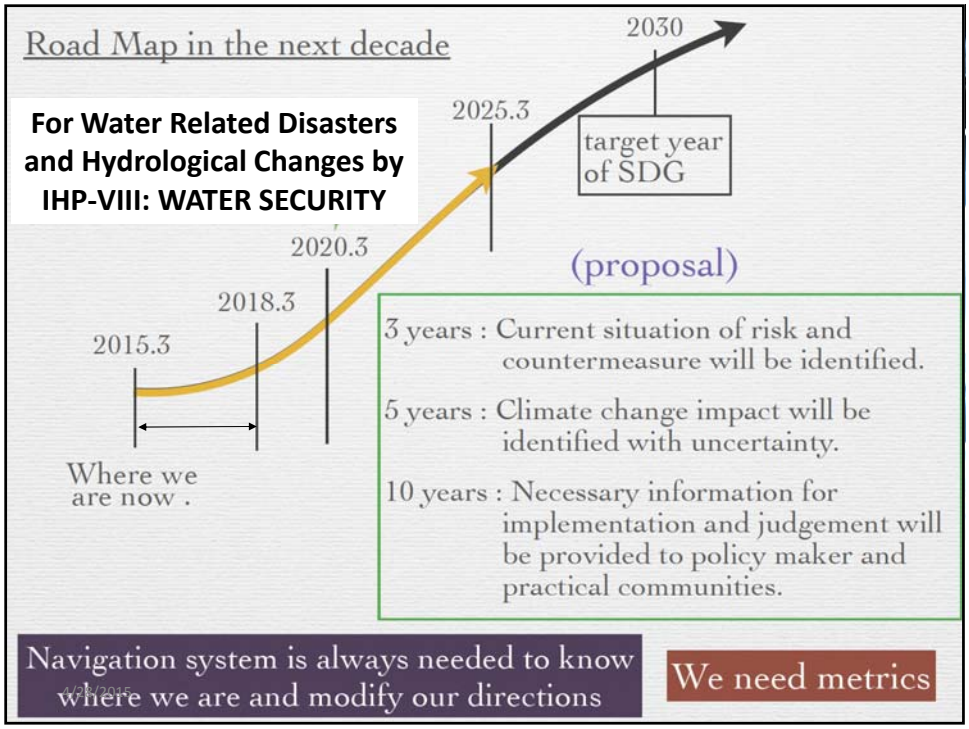
For each element we have to identify and evaluate our knowledge?

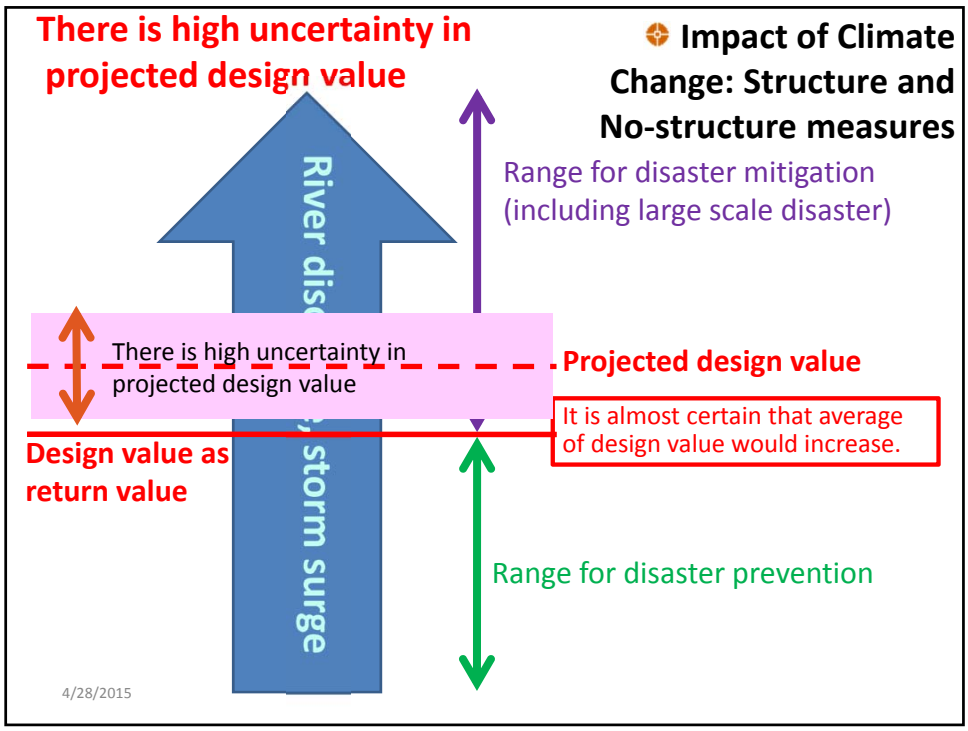
- Hazard: Runoff mechanism (effective rainfall duration, evapotranspiration, inundation etc.), magnitude and frequency relation, forecasting capabilities for tsunami and storm surge , lead time of forecast/early warning, etc.
- Vulnerability: depth-duration-damage relation, etc.
- Exposure: depth-extent-population/ asset relation, etc.,

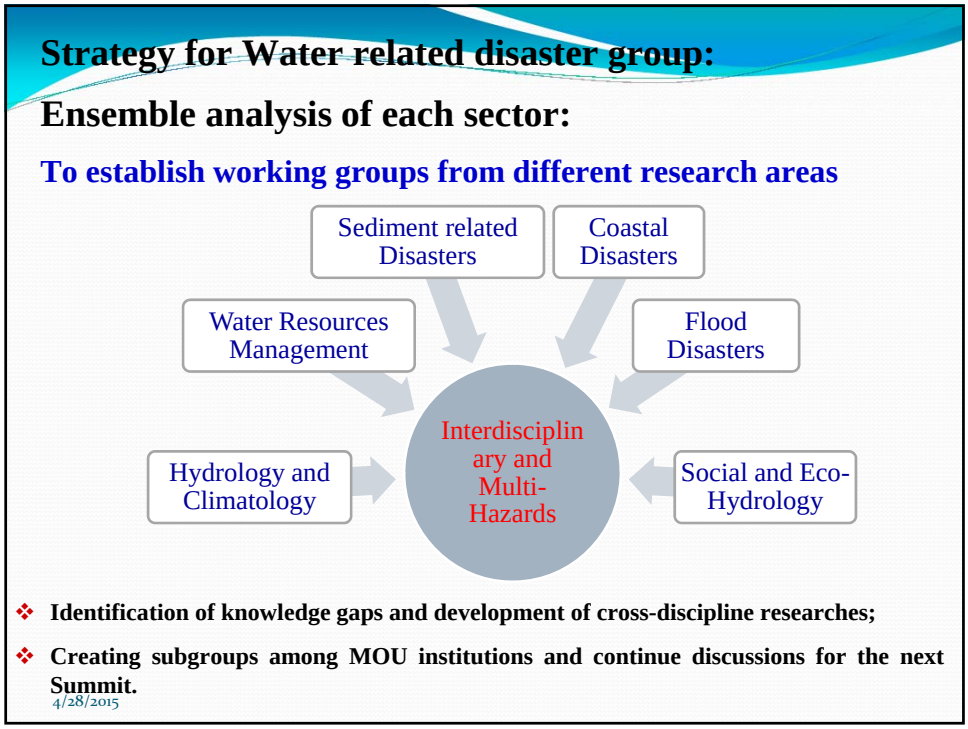
Is it enough for DRR? What kind of challenges still remain?
How long does it take to solve the problems?

Key questions: Road Map for Water Related Disasters

- **Why are disaster impacts increasing for atmospheric, coastal and water resources disasters?**
- **What are the research and knowledge gaps for coastal disasters, atmospheric, hydrology, rivers and water related disaster?**
- **What will be needed in terms of technology, data, monitoring and assessment, modelling and analysis…etc.? (Interdisciplinary approaches)**
- **What are the specific study needs? (critical locations, frequencies, accuracies)**
- **What is the current availability, evaluation and identification of knowledge gaps and data gaps?**
- **Redesign and research mode: What are the actions needed for implementations to fill these gaps ?**
- **What are the needed research for upgrading current structures?**
- **What are the recommendation to develop short, mid, and long-terms Research Road Maps in the Next 3, 5, and 10 Years?**




There is high uncertainty in projected design value
Impact of Climate Change: Structure and No-structure measures
Range for disaster mitigation (including large scale disaster)
River disc
storm surge
There is high uncertainty in projected design value
Projected design value
It is almost certain that average of design value would increase.
Design value as return value
Range for disaster prevention
4/28/2015


Strategy for Water related disaster group:
Ensemble analysis of each sector:
To establish working groups from different research areas
Sediment related Disasters
Coastal Disasters
Water Resources Management
Flood Disasters
Interdisciplinary and Multi-Hazards
Hydrology and Climatology
Social and Eco-Hydrology
Identification of knowledge gaps and development of cross-discipline researches;
Creating subgroups among MOU institutions and continue discussions for the next Summit.
4/28/2015

Current Situation of Risk and Countermeasures

- Development of disaster damage function and database for inventory;
- Evaluation of current situation and data needed, assessment and accuracy;
- Building Interdisciplinary platform
- Upgrading of Hydrometric Data, example runoff coefficient;
- Generalized conceptual frame work for disaster risk reduction in global level;
- Assessment of technologies that are needed to address disasters issues including understanding, modeling, advancing etc.;
- Structural countermeasures L1(return period 1/50-1/100) + Non-structural countermeasures L2 (return period 1/500-1/1000)
- Development of suitable modeling # single hazard model, multi hazard model based on 3 year data acquisition
- Sediment related disaster &integrated basin management and extreme events;
- to advance modelling and real time forecasting capabilities for tsunami and storm surge (GPS tsunami gauges)
- to improve international coastal research corporations, sharing data, models and technologies
- to establish inter-disciplinary research groups
- to determine and standardize database

Five Years Research Road Map for Water Related Disasters

- Enhancing collaboration with private sectors. Their role can be like collaborator on technological advancement such as sensor development, information providers, sponsors.
- Generalized conceptual frame work for disaster risk reduction in global level.
- This frame work should be adjusted to regional level on each specific issues.
- Multi-hazard model
- Integration of models such as Debris flow model and distributed run-off model
- Paradigm shift from Disaster prevention to Disaster mitigation or reduction.
- to carry out long term measuring programs
- to calibrate and validate models against measurements (finished by 5 years)
- to set up a holistic approach
- to develop open platforms for research outputs
- to finish the design method of resilience structures

10 Years Research Road Map for Water Related Disasters

- **Filling the gap between scientists and policy makers.**
- **This frame work should be adjusted to regional level on each specific issues.**
- **Paradigm shift from Disaster prevention to Disaster mitigation or reduction.**
- **Reliable early warning system for flood,**
- **Establish common data base for networking, data sharing**
- **Ensemble prediction model *example**
- **Prediction and forecasting ***
- **Sediment**
- **Mainstreaming Risk Management in development**
- **Target Return period for design**
- **Information to government;**
- **to present efficient countermeasures**
- **to provide smart resilience and recovery strategies**
- **to employ effective communicating and educating methods to society**
- **to develop resilient society with sustainability**