



International Association
for Hydro-Environment
Engineering and Research

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IAHR World Water Day Forum on “Hydro-environment Engineering and Adaptation to Climate Change”

International Panel Discussion

Climate Change and Adaptive Management Challenges and Issues

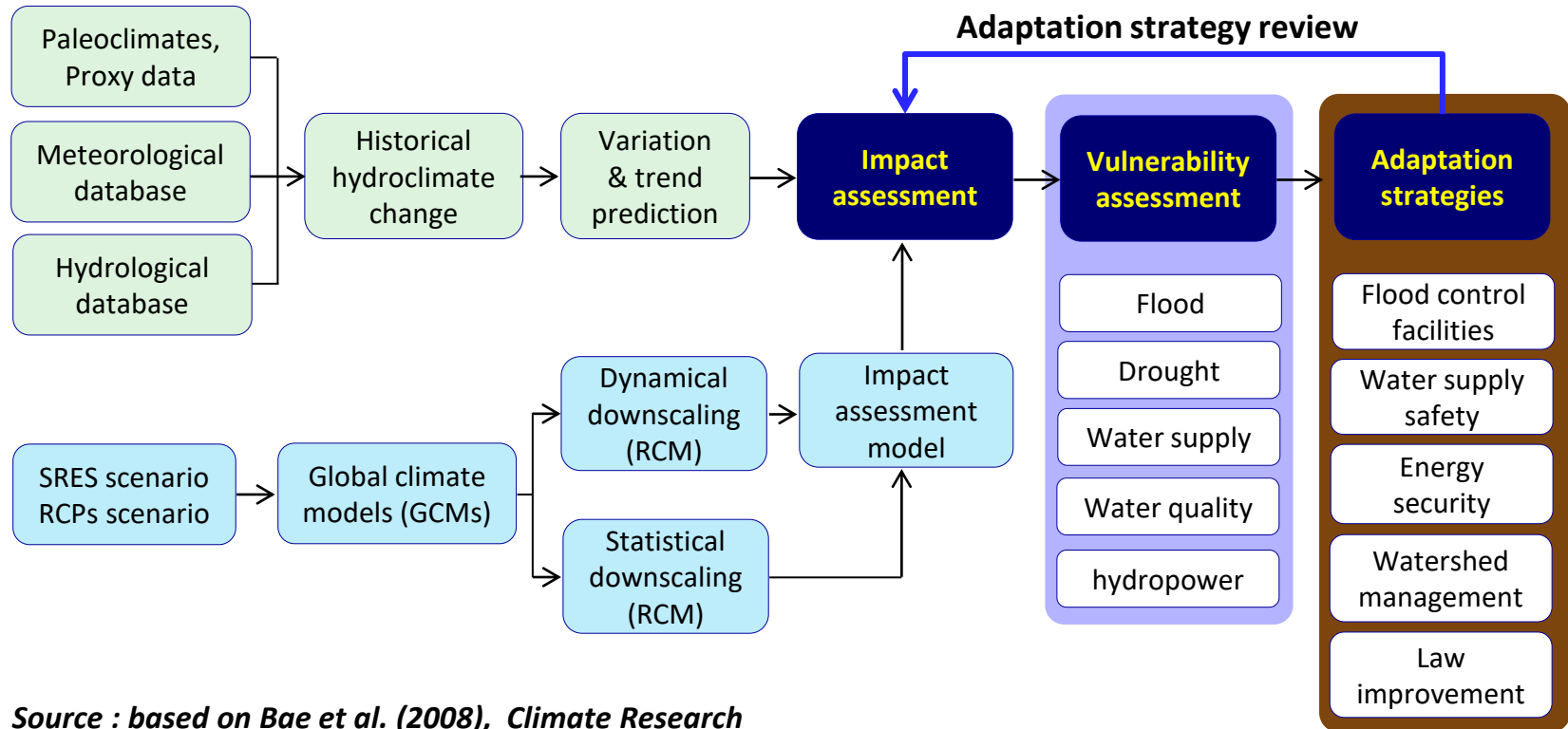
Scientific & Technical Issues on Climate Change
Adaptation of Korean Water Resources

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** Special contribution presented at the Croucher Advanced Study Institute on “Global Water Security: Integrated Modeling and Adaptive Management”, HKUST, January 8-11, 2019*

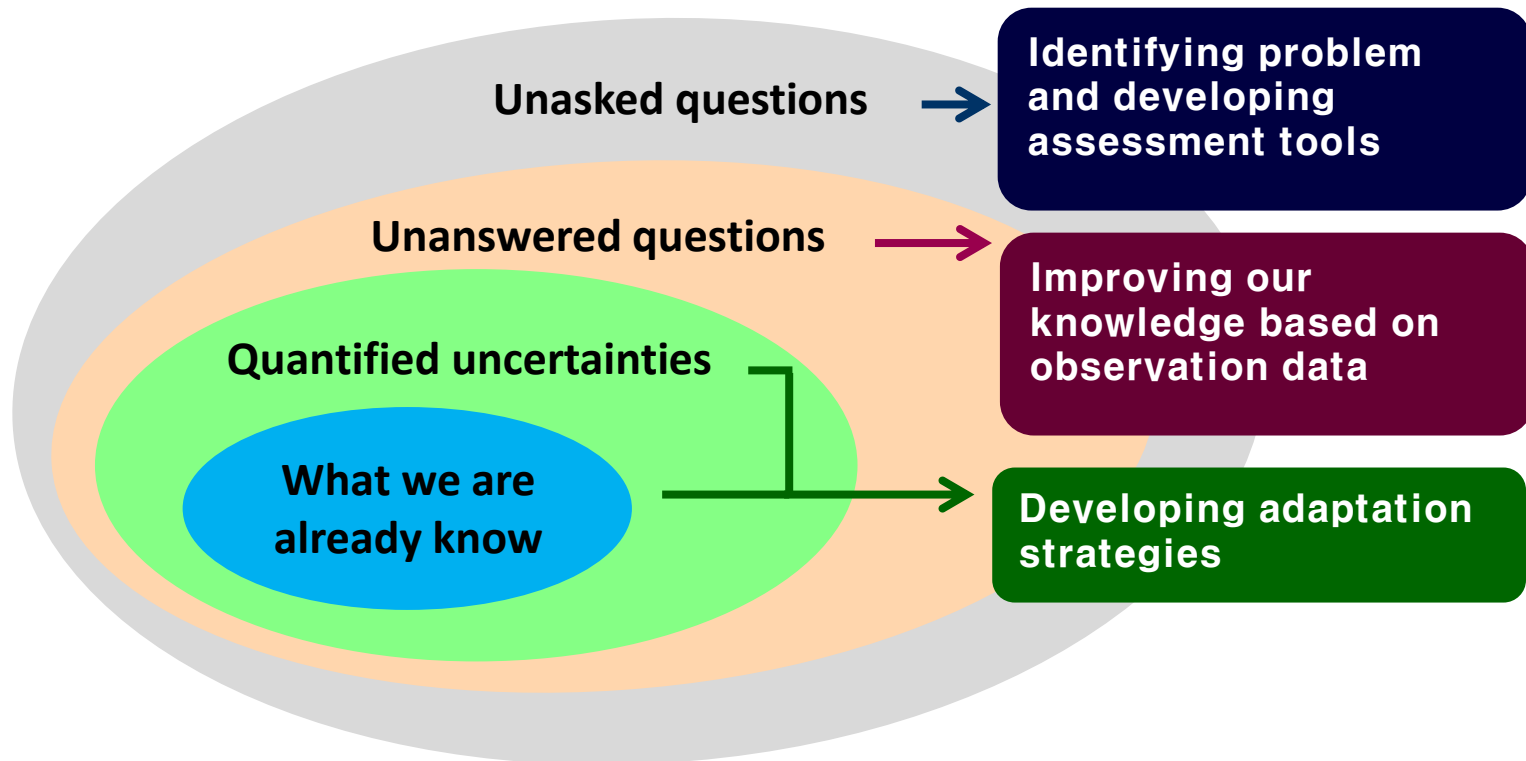
General process of climate change studies on water resources



Source : based on Bae et al. (2008), Climate Research

How to get usable knowledge on water resources ?

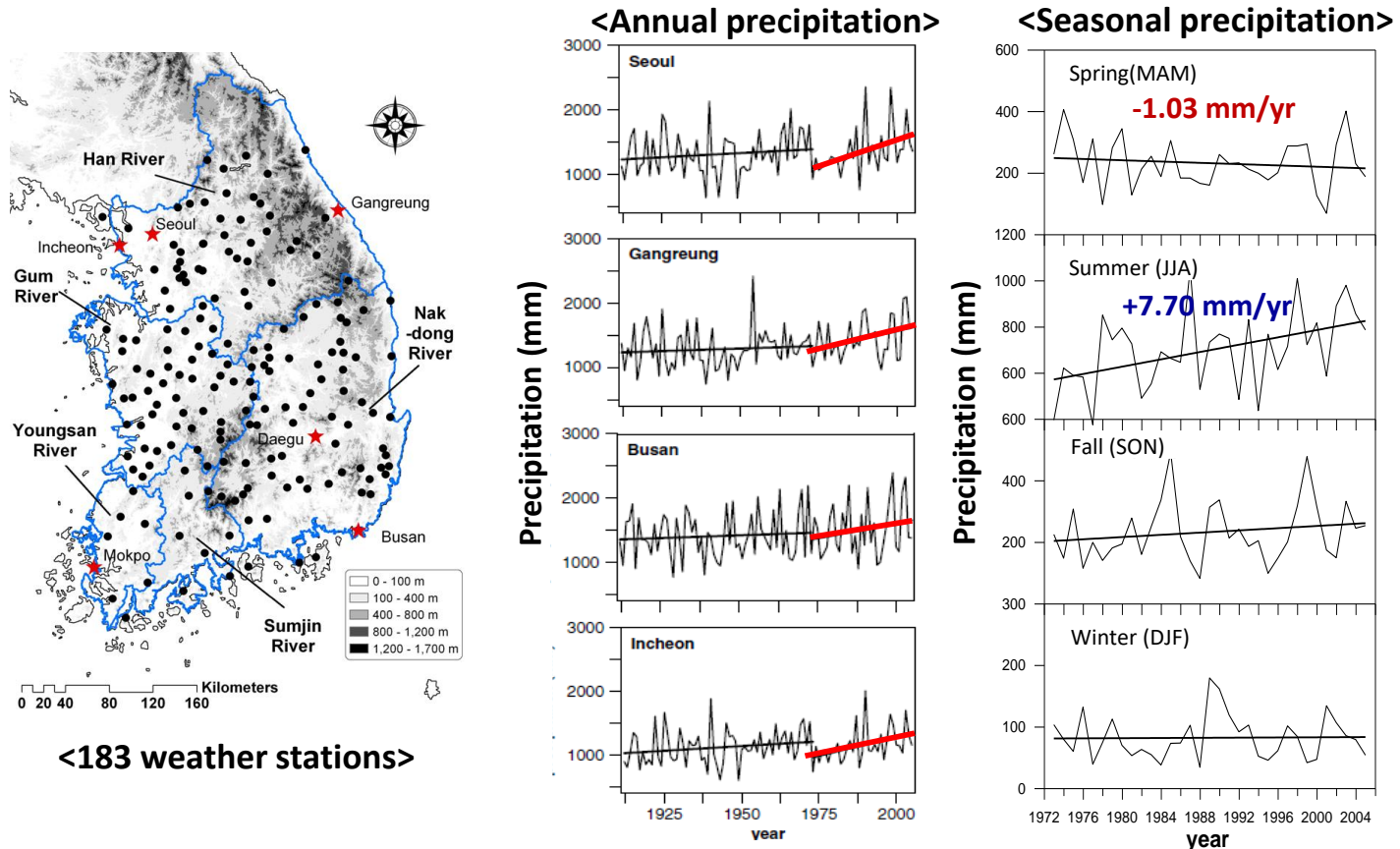
Levels of Information with different credibility



1. What we already know in Korea

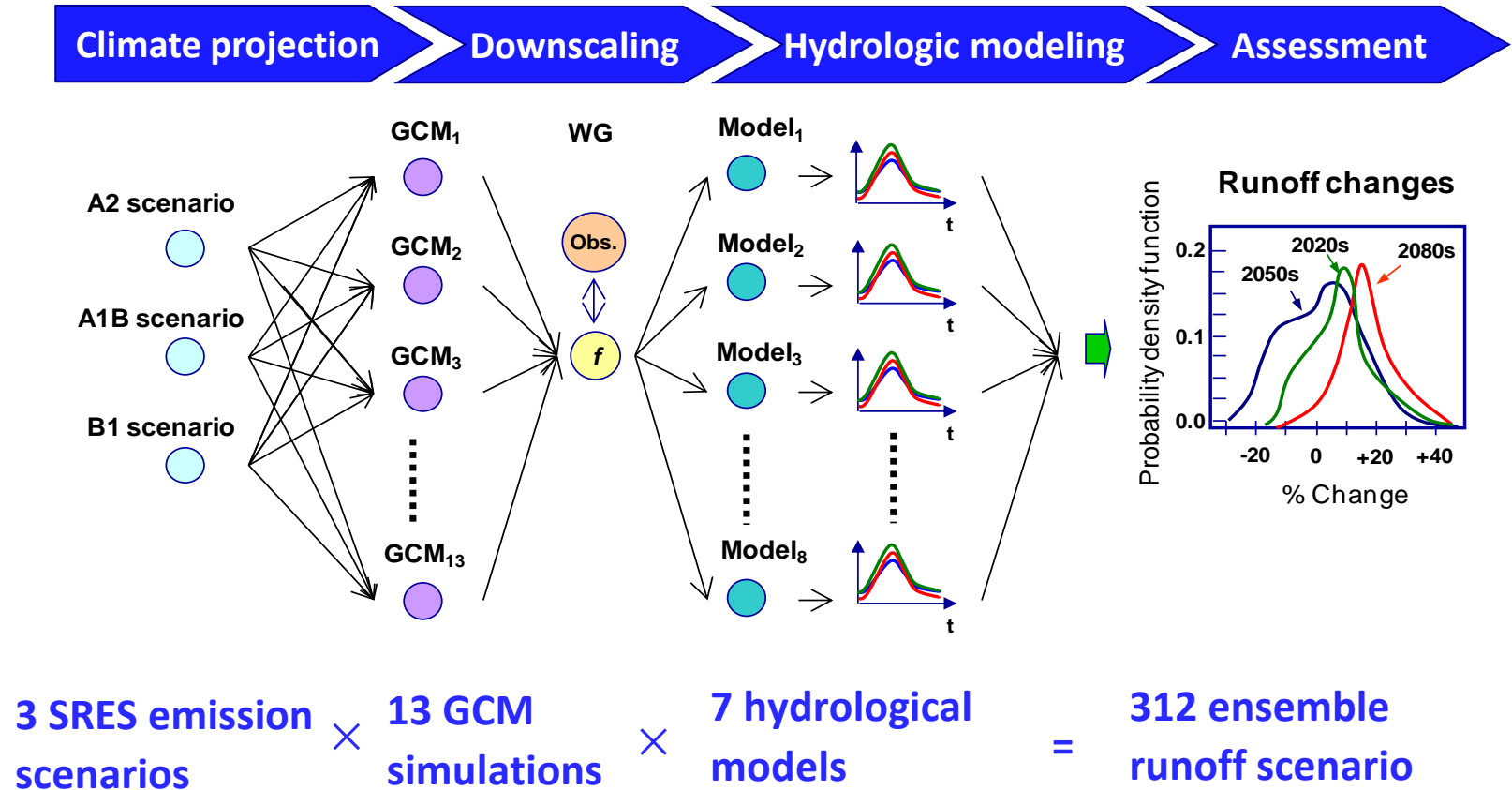
Historical data analysis for detecting trends

- Increasing precipitation (both annual and seasonal)



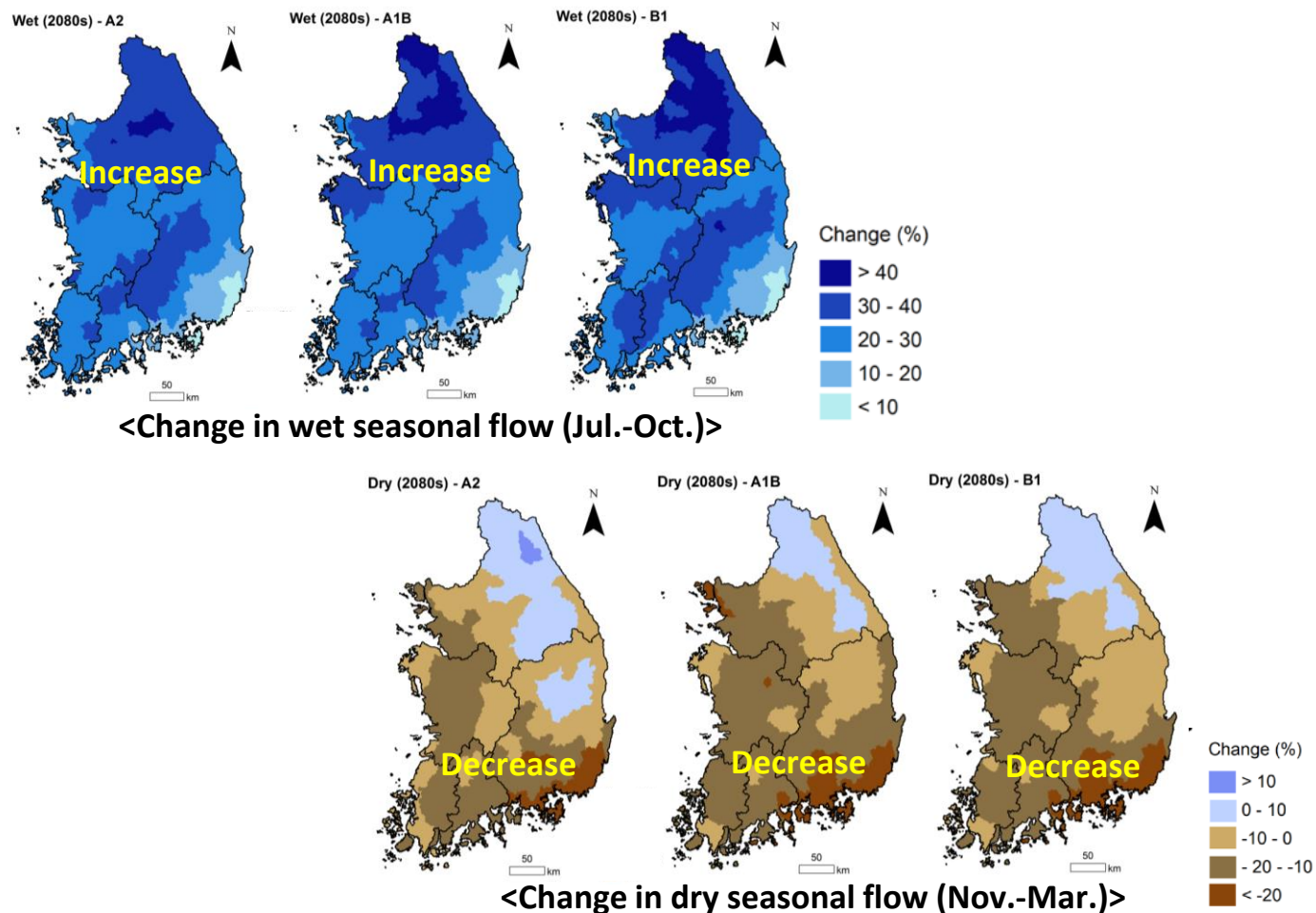
Source: Jung et al. (2011), International Journal of Climatology

MME-based impact assessment



Source : Bae et al. (2011), Journal of Hydrology

Change in seasonal streamflow



Source: Jung et al. (2013), Hydrological Processes

2. Unclear issues and unanswered questions

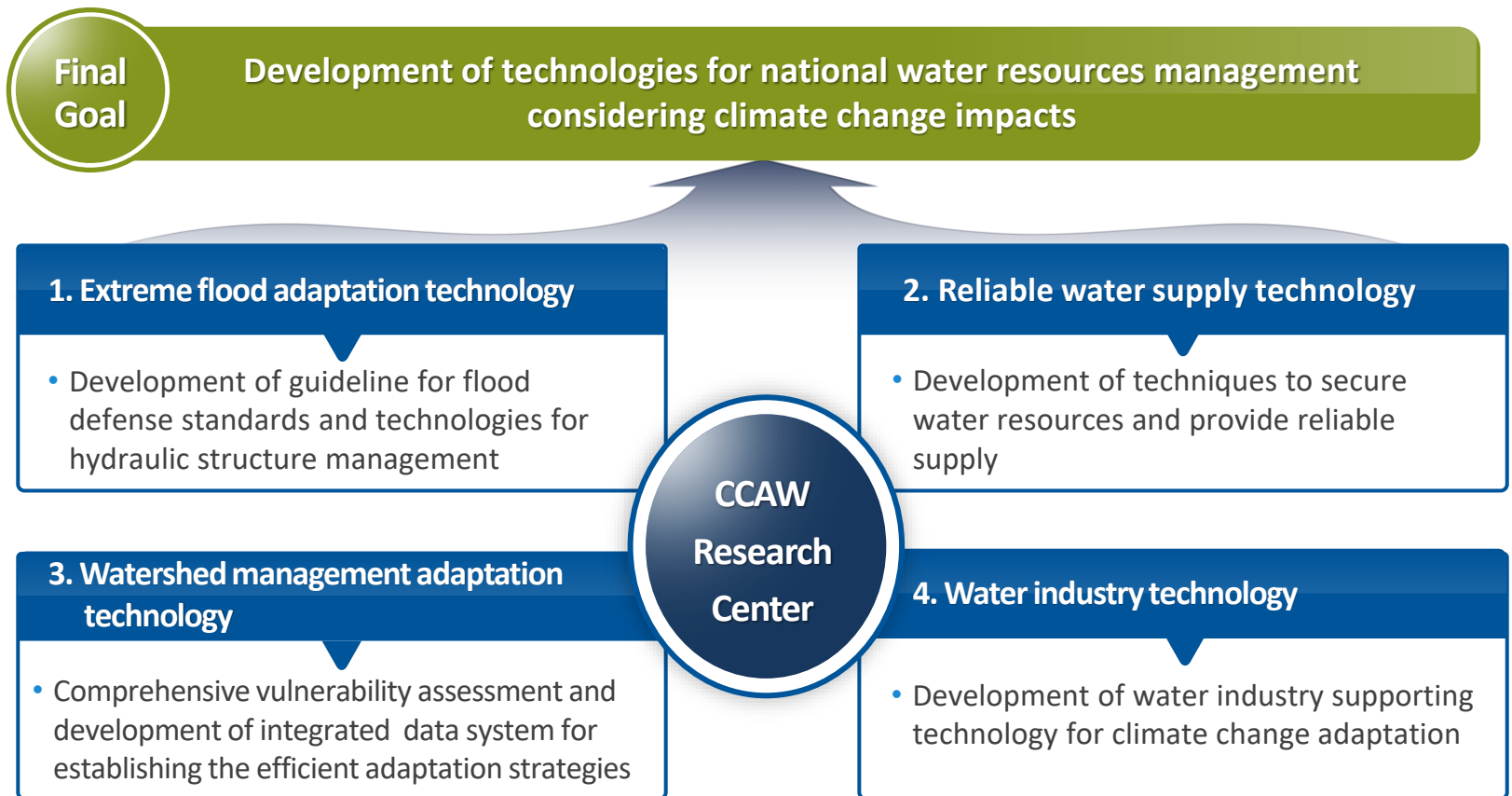
- SRES vs. RCPs emission scenario
- Improvement of spatial resolution of climate projection
- What is the optimal selection of GCM simulations for climate impact study?
- Uncertainty attributed from downscaling methods
- Temporal disaggregation of GCM simulations
- Hydrologic model selection uncertainty

Refer to Video link on Lecture 2 for more details

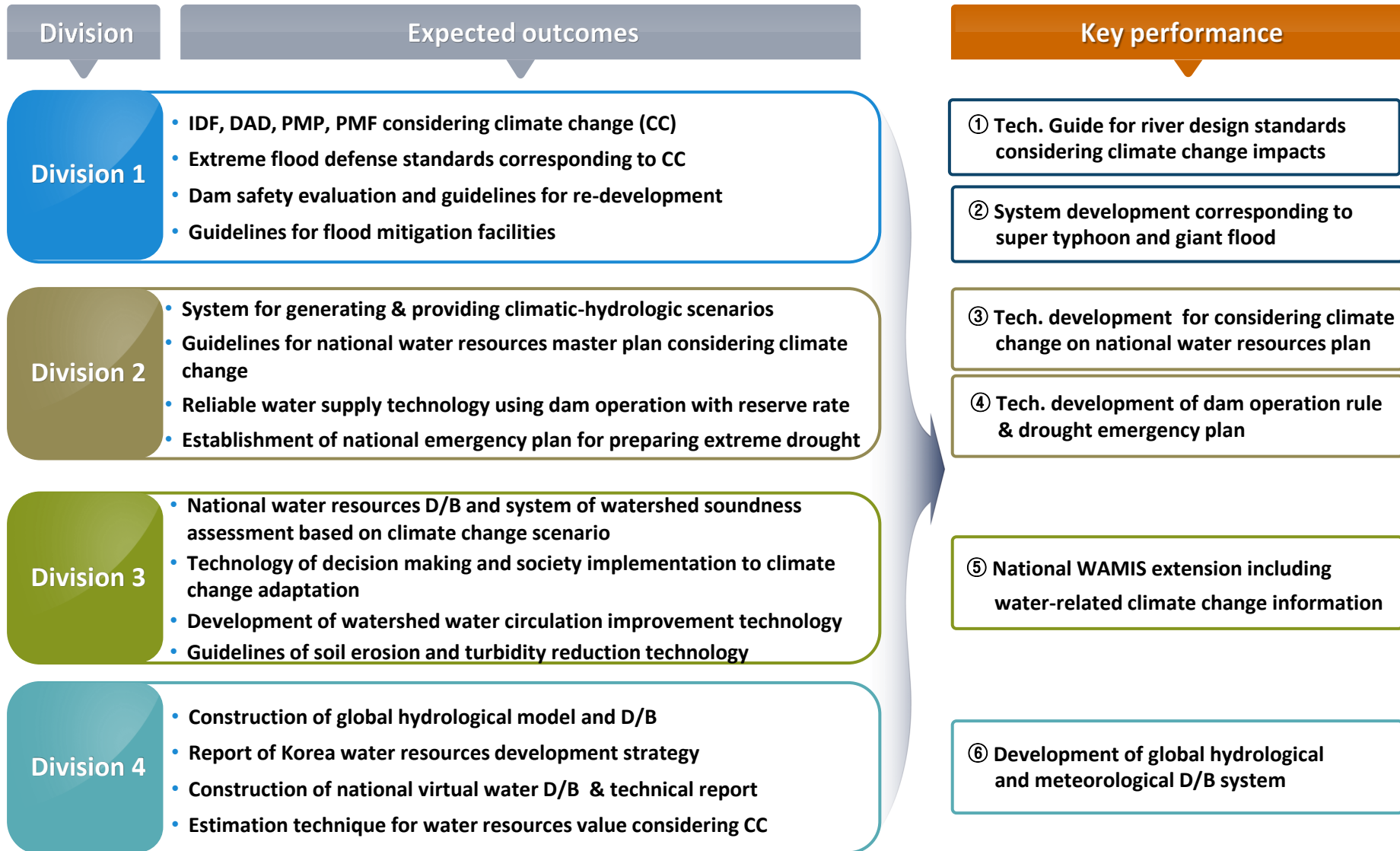
3. Are there any unasked issues ?

Climate Change Adaptation for Water Resources (CCAW) Research

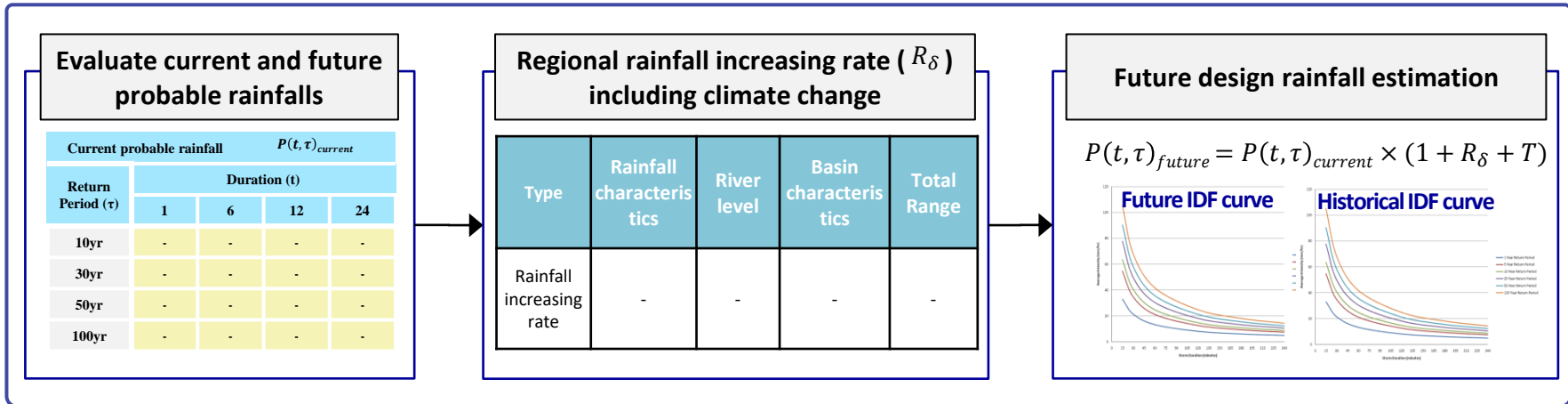
Project Overview



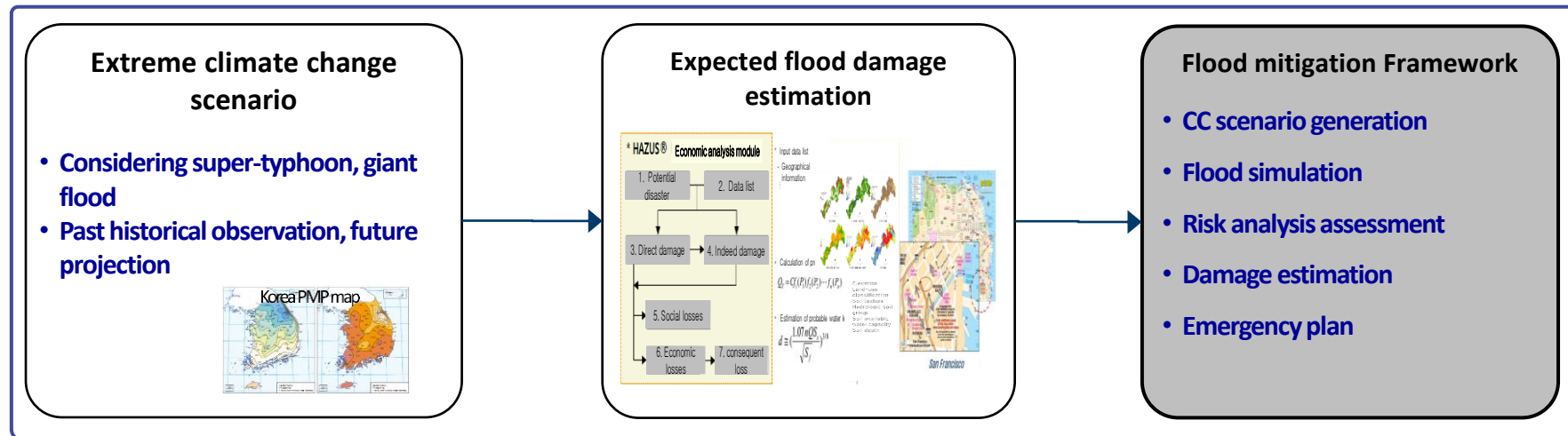
Research Outcomes



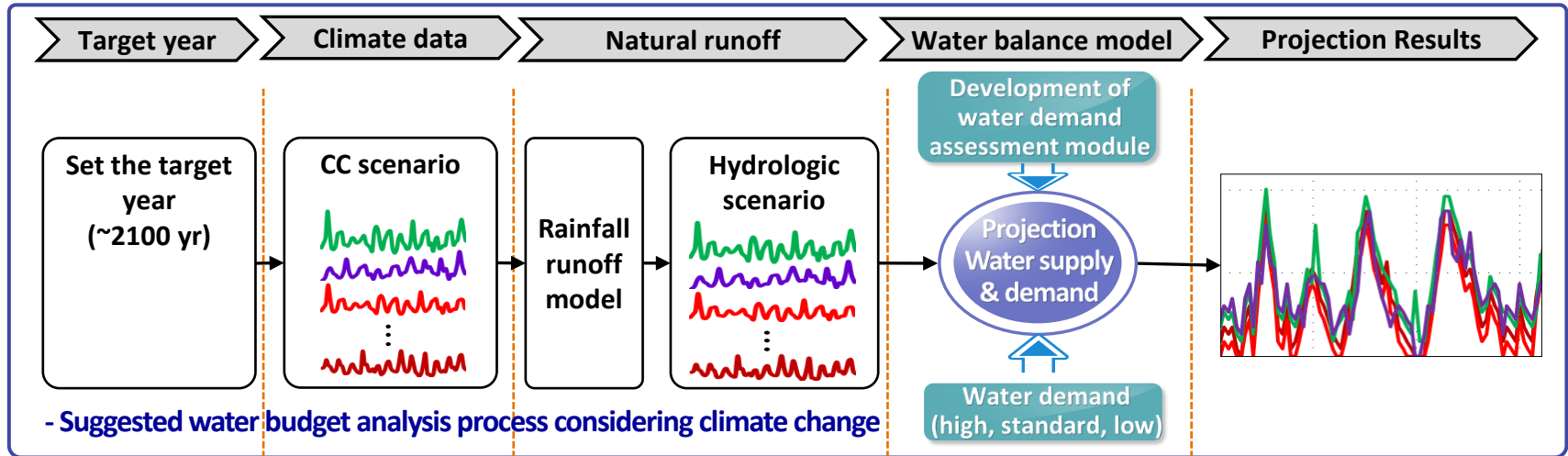
1 Tech. Guide for river design standards considering climate change impacts



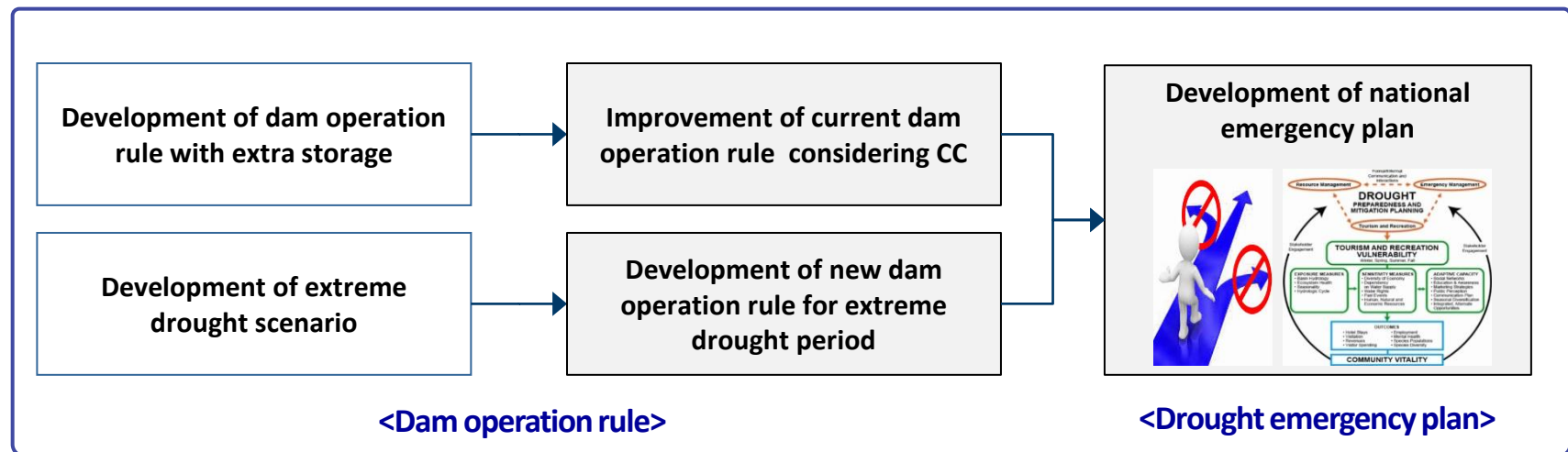
2 System development corresponding to super typhoon and giant flood (FCC, ME)



3 Tech. development for considering climate change on national water resources plan

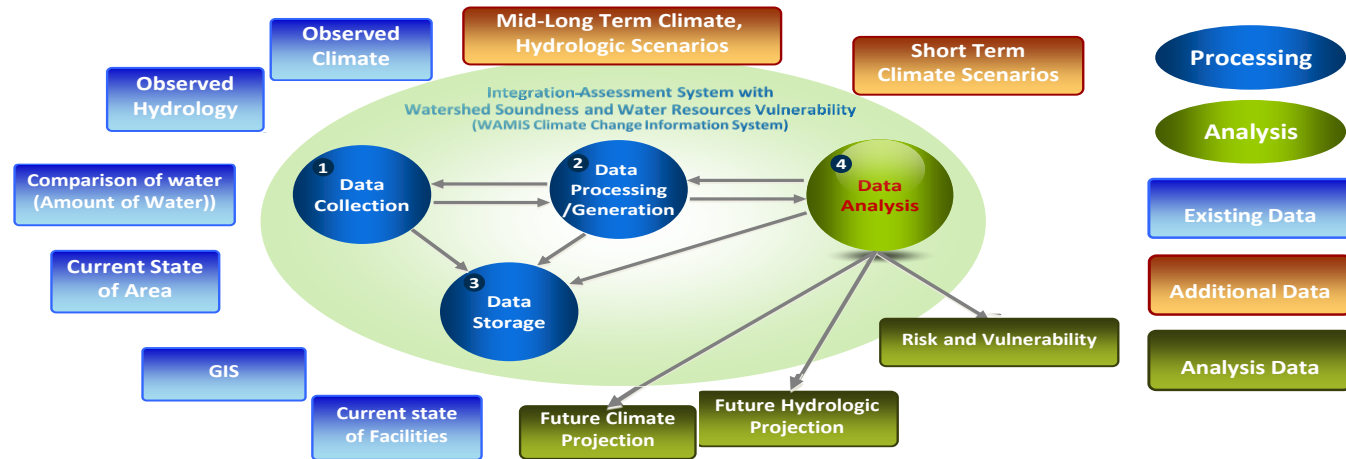


4 Tech. development of dam operation rule & drought emergency plan

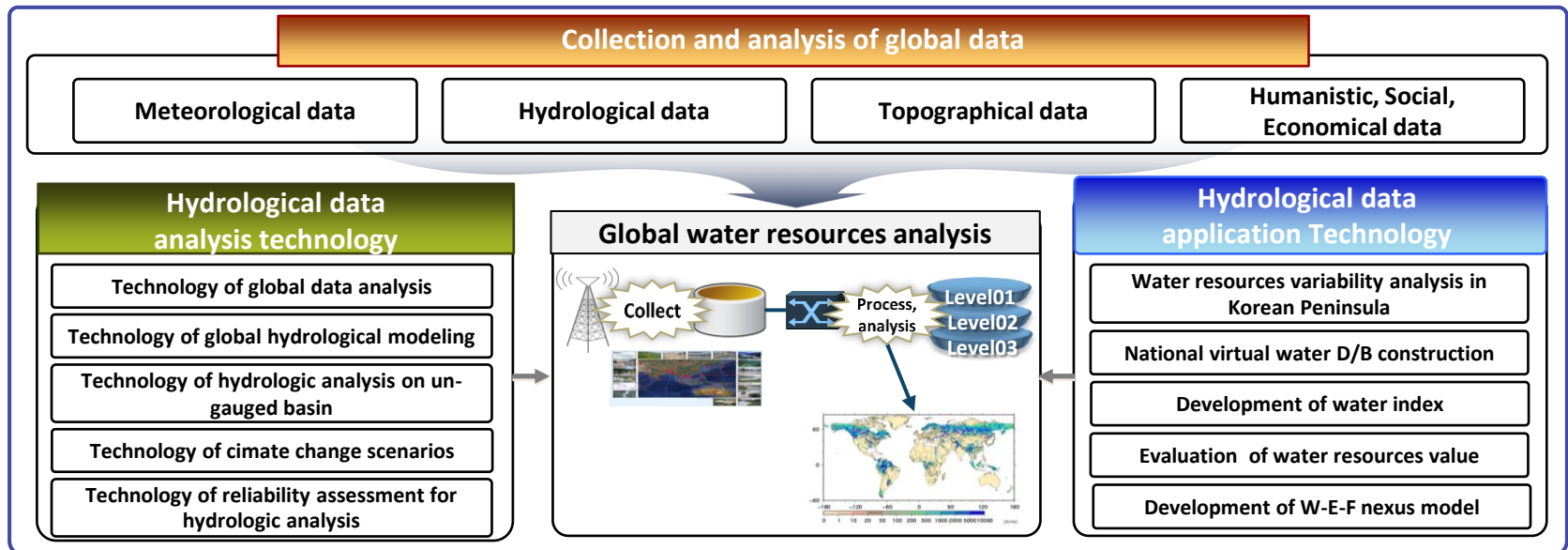


5 National WAMIS extension including water-related climate change information

WAMIS-CC (Water Management Information System – Climate Change)



6 Development of global hydrological and meteorological D/B system



Scientific and technical publications

1. Technical report, Article and Conference presentation

- 36 CCAW technical reports
- 460 research articles (152 peer reviewed international journal)
- 642 conference papers for both international and domestic

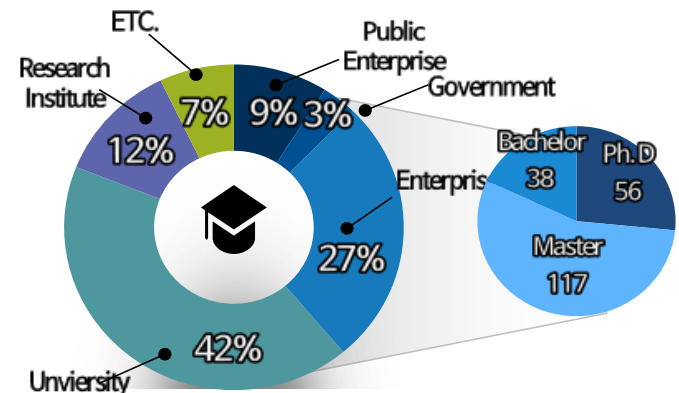


2. Legislation, policy suggestions and guidance

- 2 legislations, 5 policy suggestions and guidance for national climate change adaptation on water resources

3. Patent and software development, etc.

- 19 patents, 52 software developments
- 56 Ph.D, 117 Master scholars



Concluding Remarks

1. What we are already know

- Increasing summer precipitation and decreasing spring precipitation
- More frequent and intensified floods and droughts
- Increasing inter-annual variation and seasonality in streamflow

2. Quantified uncertainties in climate change impact studies

- Increase in wet seasonal flow
- Increase in flood risk
- Change in spatial water availability

3. Unanswered(now answered) questions in climate impact studies

- Different results according to emission scenarios (SRES vs. RCPs)
- GCMs' spatial resolution (**CMIP5, CORDEX**)
- **Selection of GCMs** for impact study (APCC Integrated Modeling Solution)
- Downscaling methods (**dynamical vs. statistical-SDQDM**)
- **Temporal disaggregation** of GCM simulation (Bayesian Copula Function)
- Hydrologic model selection (**MME**)

4. Unasked(now asked)questions for climate change adaptation on water resources

- Tech. guide for **river design standards** considering CC impacts (climate change factor)
- System development corresponding to **giant flood** (PMP, multi-typhoon)
- Tech. guide for considering CC on **national water resources plan** (K-WEAPccia, KICT)
- Tech. development of **dam operation rule & drought emergency plan** (K-Water)
- **National WAMIS** including water-related CC information (WAMIS-CC, River Information Center)
- Development of **global hydrological and meteorological D/B system** (GWB)