

Integrated Decision-Supporting System for Water Scarcity on Climate Change: A Case Study of Pranburi Basin, Thailand



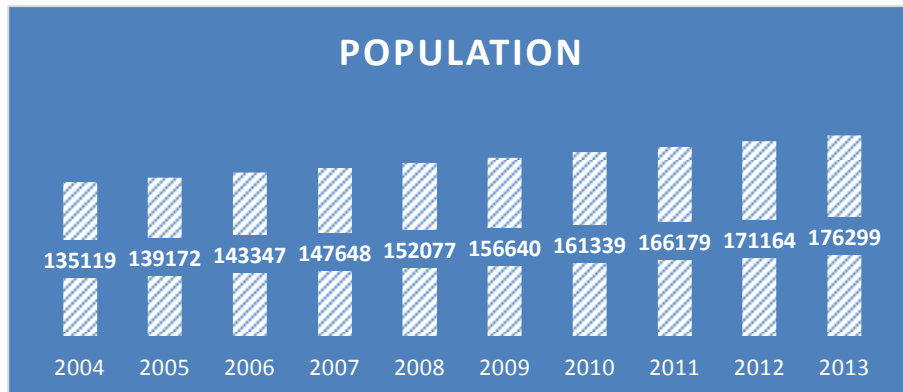
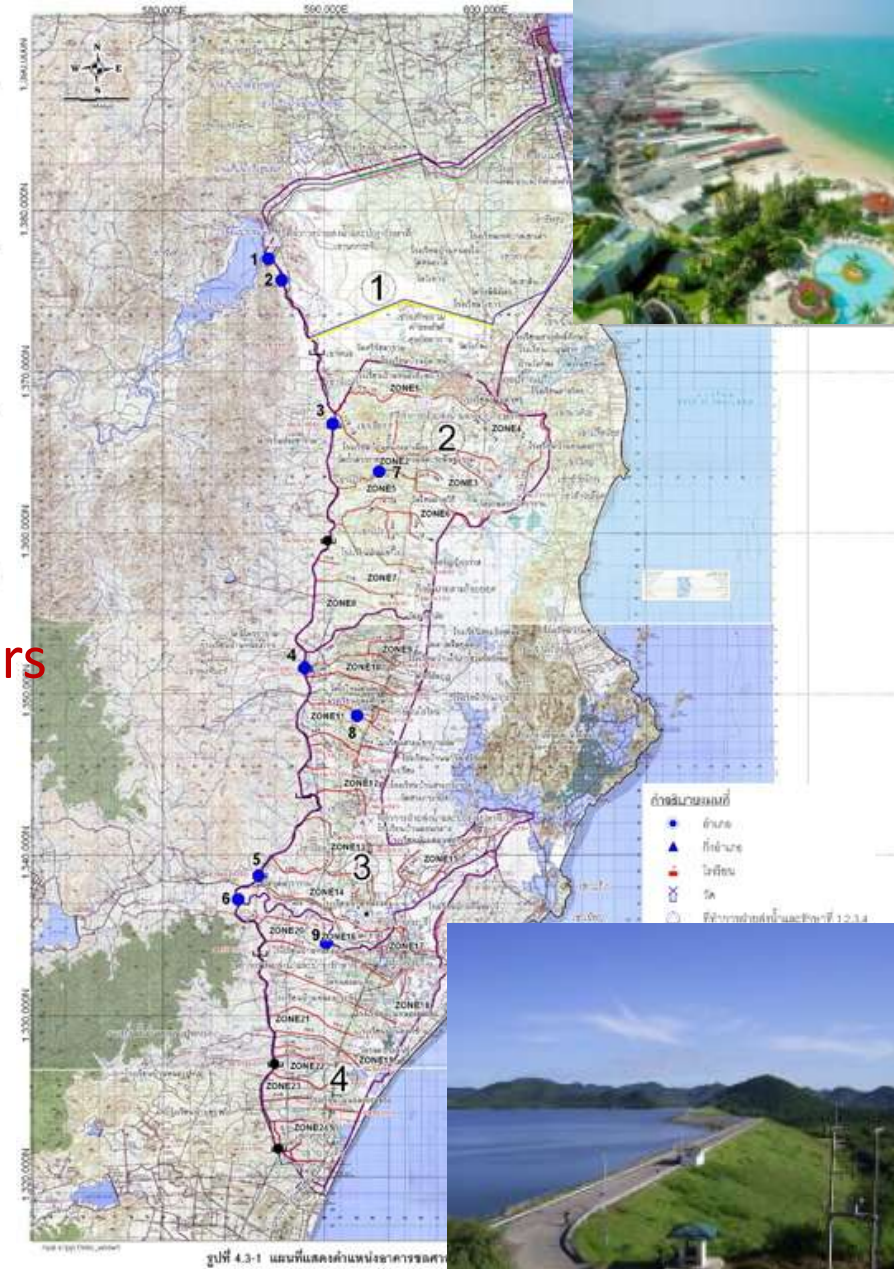
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**4th Asia-Pacific Climate Change Adaptation Forum,
1-3 October 2014, Kuala Lumpur, Malaysia.**
**Cities: Panel 2.5 Water supply and sanitation under
increased flood or drought risks**

Pranburi basin

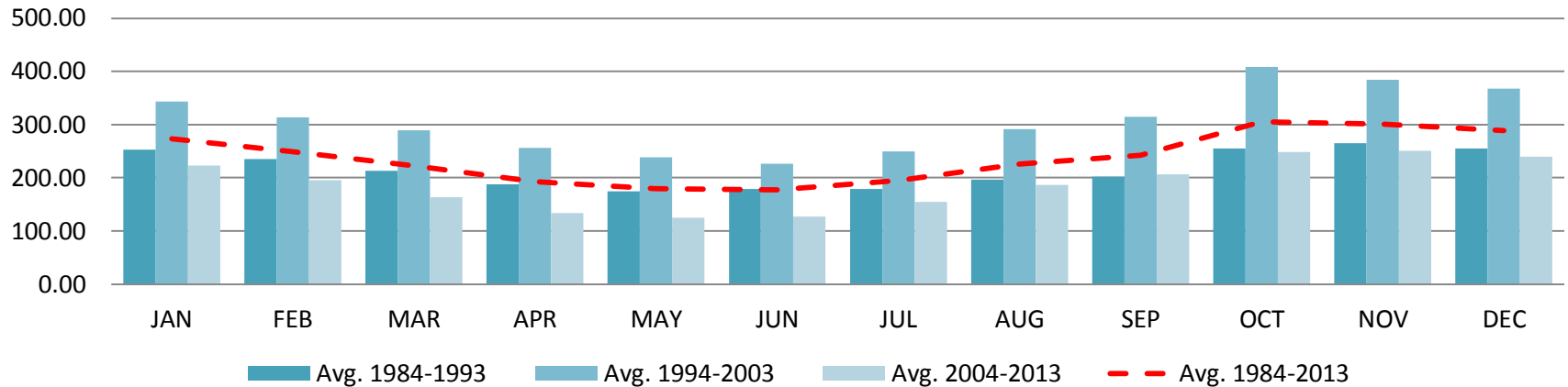
- Western of Thailand
- Area: ~3,000 sq.km
- Rain-shadow zone
- Population increasing 3% per years
- Economic high growth
- Popular tourism area
- Agricultural change



Water resources in Pranburi basin (Pranburi dam)

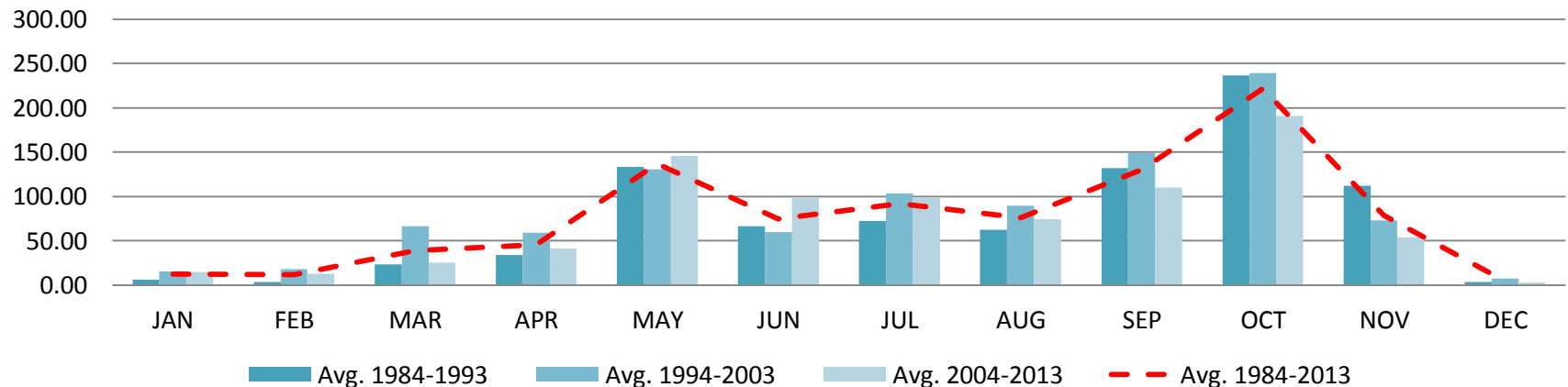
Water Level in Pranburi Dam (10^6 m^3)

Max: 347 M m³



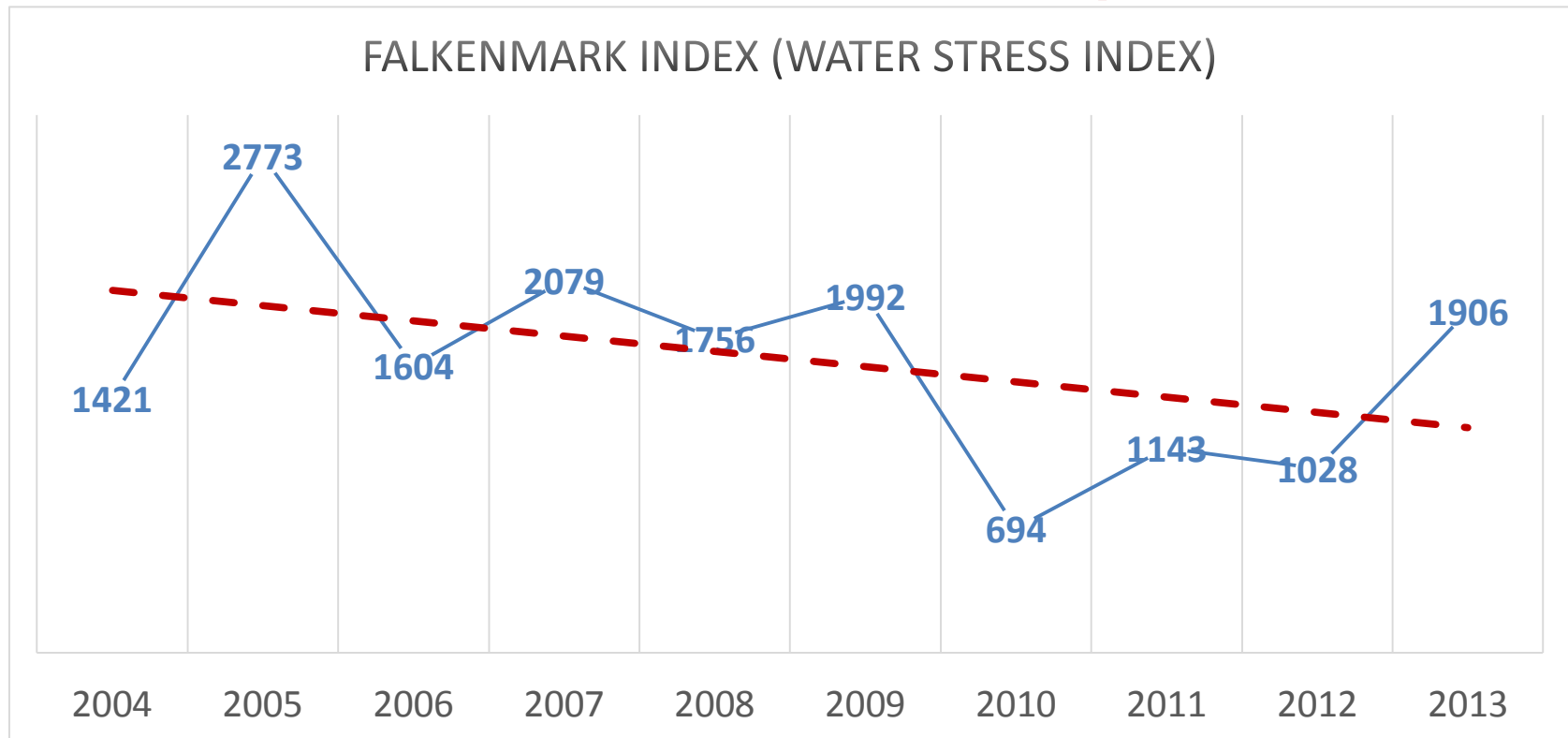
Pranburi Dam Precipitation (mm)

Annual: 922 mm



Falkenmark index (Water Stress Index)

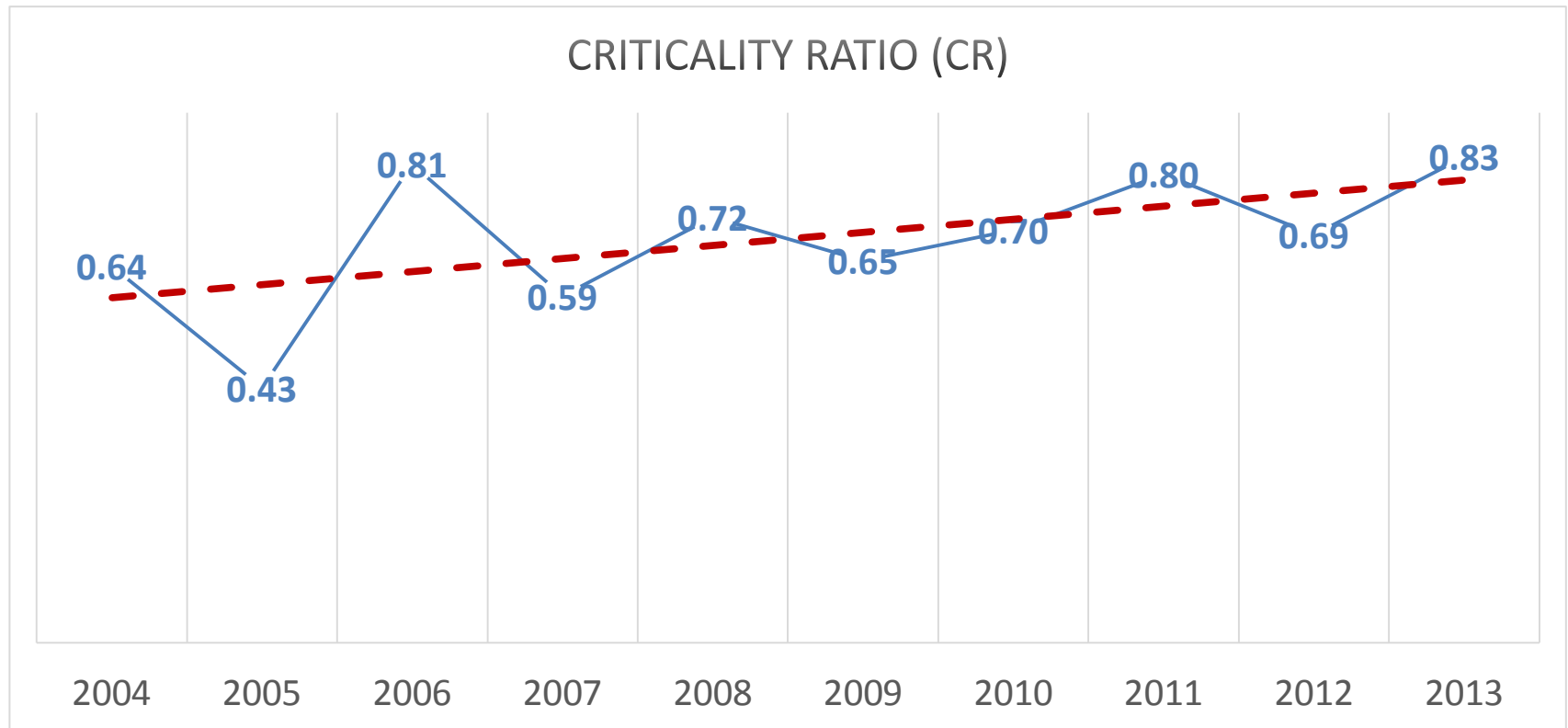
$$WSI = \frac{\text{Water storage (end of wet season)}}{\text{Population}}$$



Water stress: 1000–1700, **Water scarcity: 500–1000**, Absolute scarcity: < 500
[Falkenmark et al., 1989](#)

Criticality ratio (CR)

$$CR = \frac{\text{Water discharge (dry season)}}{\text{Water storage (end of wet season)}}$$



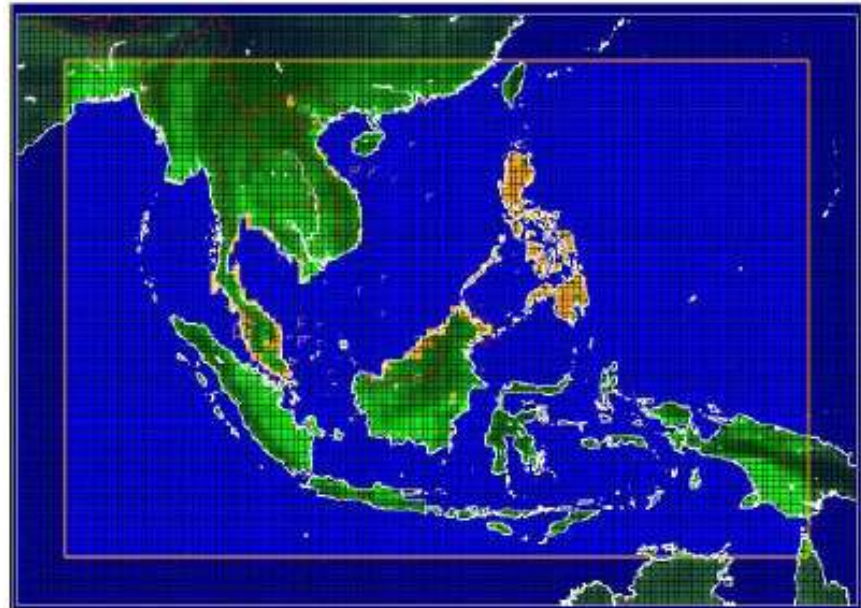
No water stress: 0–0.1, Low water stress: 0.1–0.2, Mid water stress: 0.2–0.4, High water stress: 0.4–0.8, **Very high water stress: > 0.8**

[Alcamo et al., 2000](#)

Climate Projection Data

ECHAM5 scenario A1B

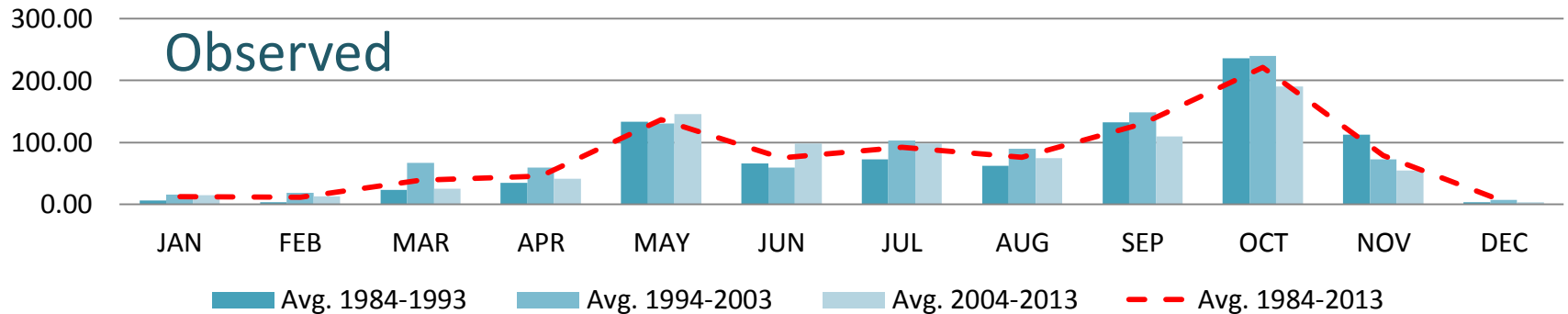
- GCM data from Hadley Center (MET office UK.)
- Dynamic downscaling (20km) using PRECIS RCM
- Adjustments by using baseline (observer data) 1980-2009



ECHAM5 A1B Precipitation in Pranburi basin

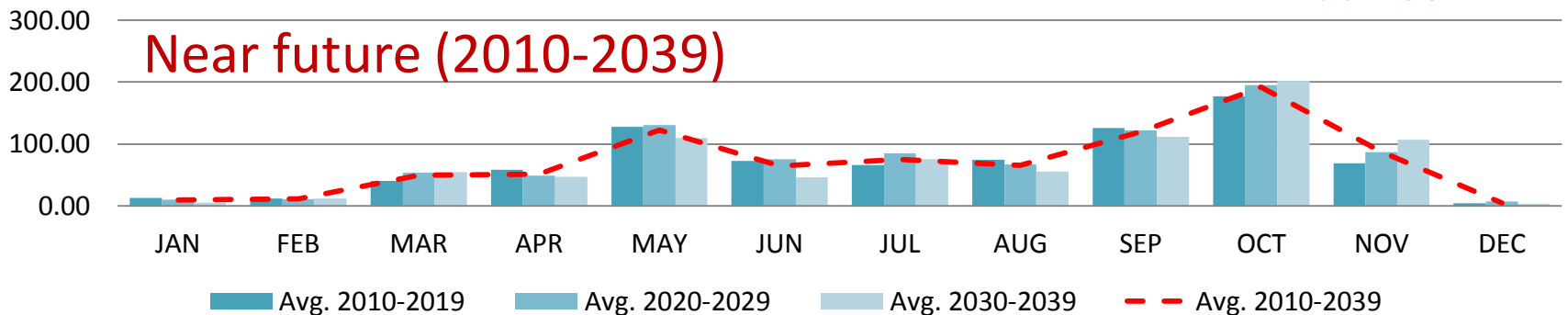
Observer Precipitation (mm)

Annual: 922 mm



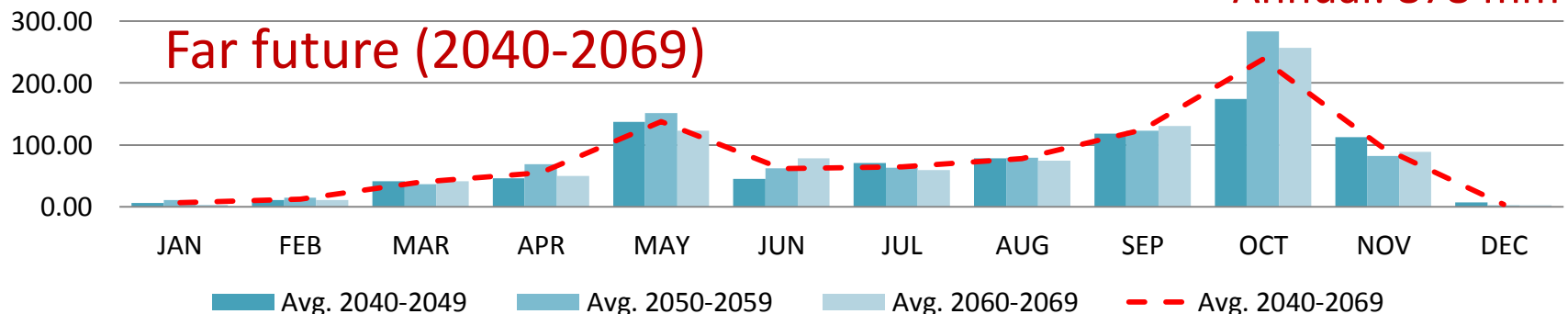
ECHAM5 A1B (mm)

Annual: 837 mm



ECHAM5 A1B (mm)

Annual: 878 mm



Integrated Decision-Supporting System for Water Scarcity

Water Scarcity

- Drought
- Human well being

Participatory

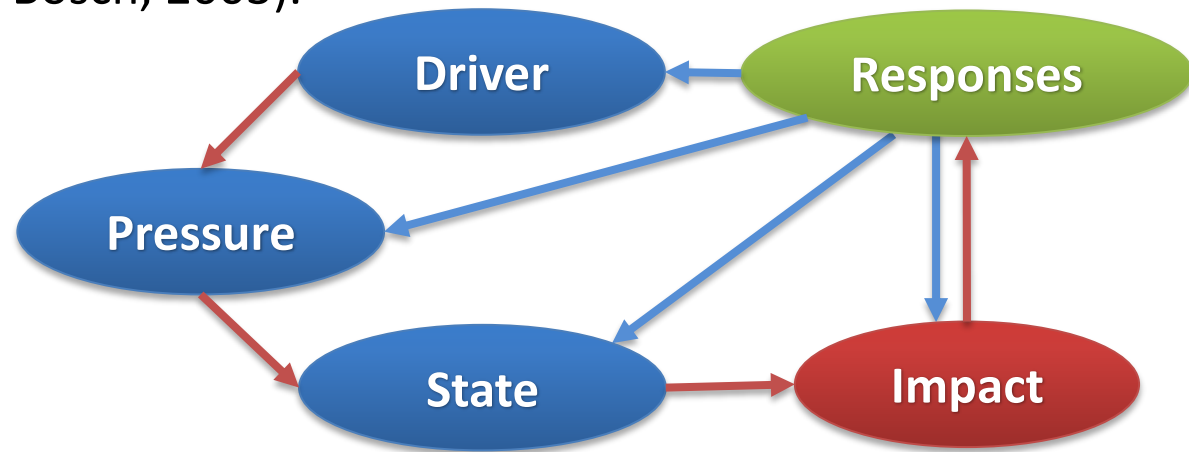
- Governmental Organizations
- Stakeholder

Integrated Water Resources Management (IWRM)

- Optimization management
- Appropriate adaptations
- Appropriate strategies

Driver-Pressure-State-Impact-Response Framework (DPSIR)

The European Environmental Agency (EEA) was adopted as a DPSIR conceptual framework in 1995 (Gabrielson and Bosch, 2003).



- To show the cause–effect relationships between environmental and human systems
- To help policy makers to understand the meaning of the information in indicator reports.

(Smeets and Weterings, 1999)

Identifying factors and response

Expert consulting and brainstorming

1. Criteria for selecting experts

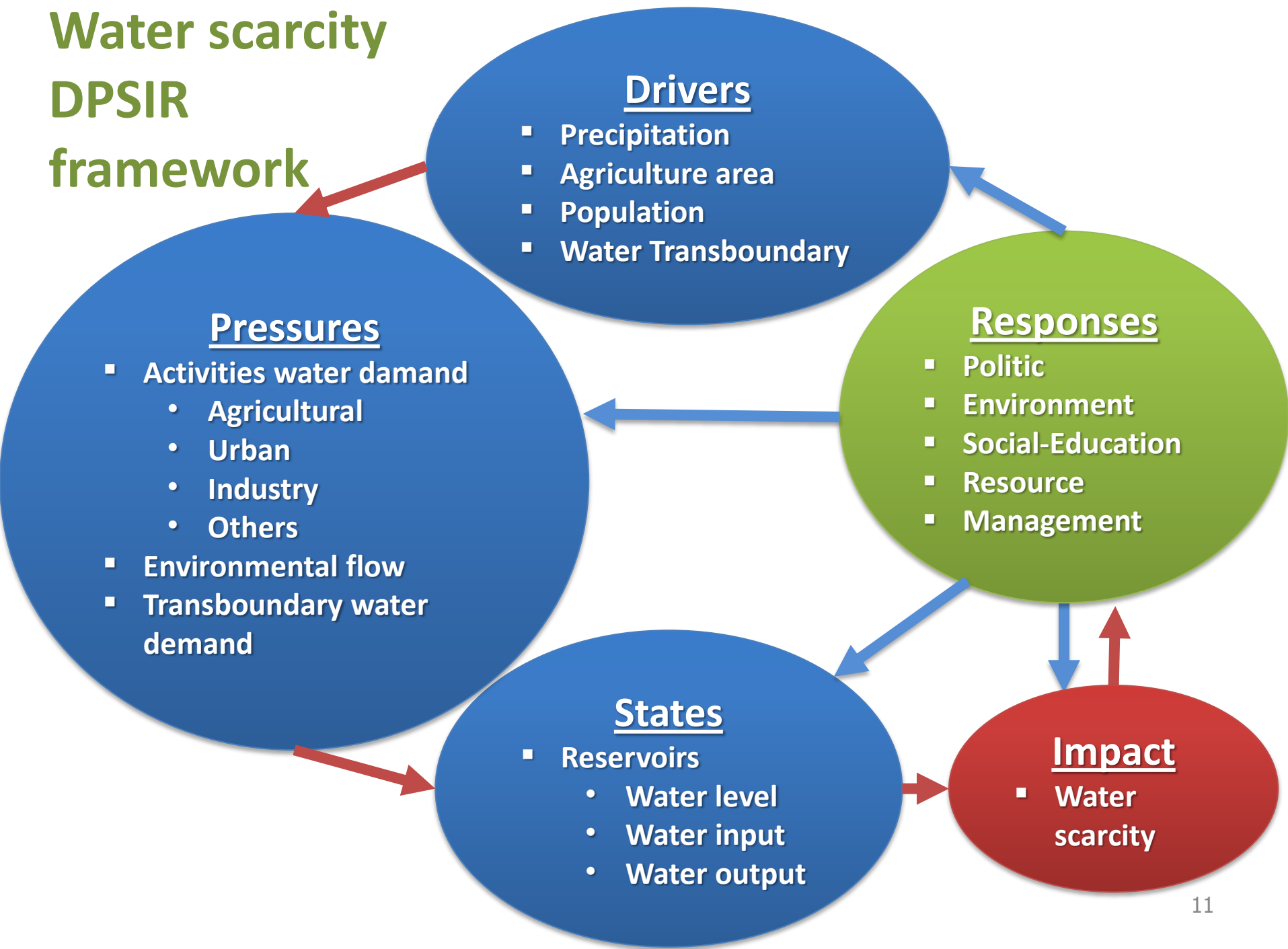
- Water resource management expert
- Climate change expert

2. Participants

- Local actors
- Policies makers
- Royal Irrigation Department (RID) agents

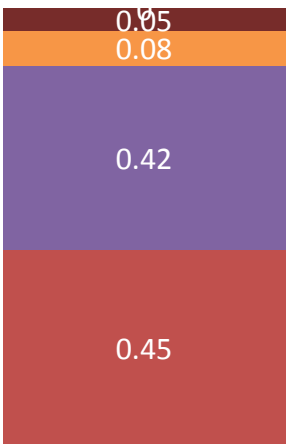


Water scarcity DPSIR framework



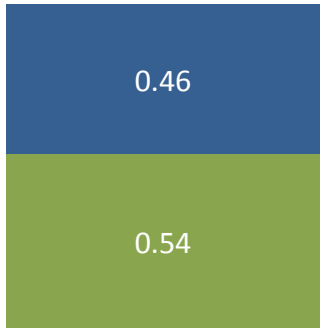
SOCIAL-ECONOMIC

- Water Transboundary
- Other water demand
- Industry water demand
- Urban water demand
- Population

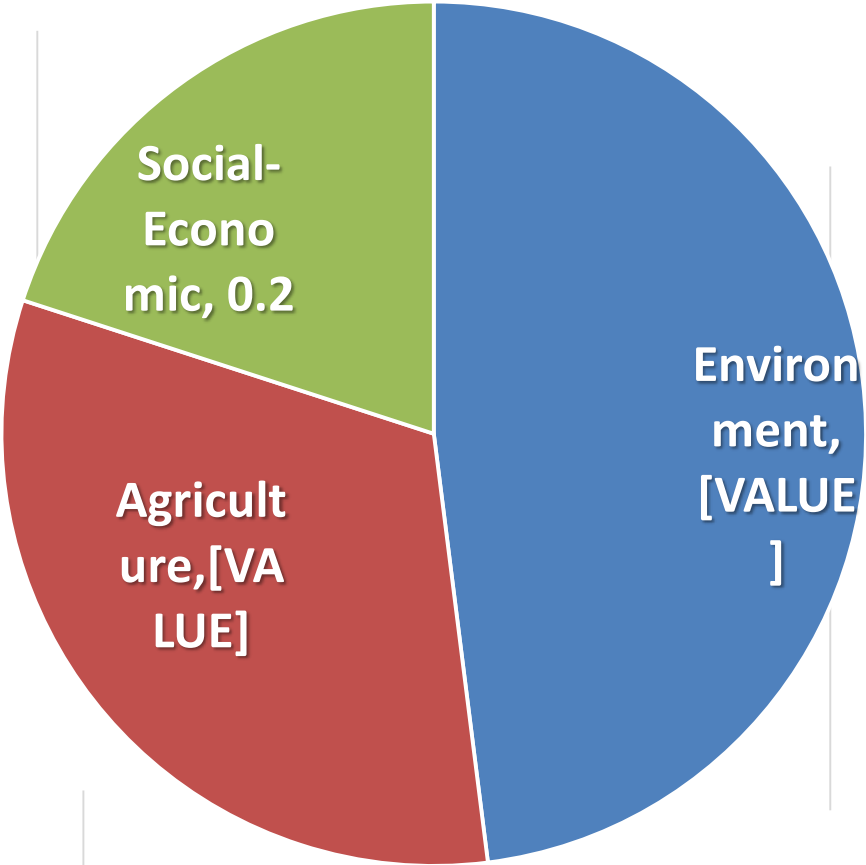


AGRICULTURE

- Agriculture area
- Agricultural water demand

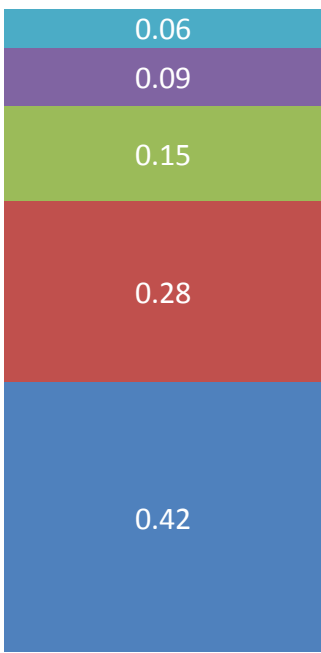


PRIORITIZING WATER SCARCITY FACTORS

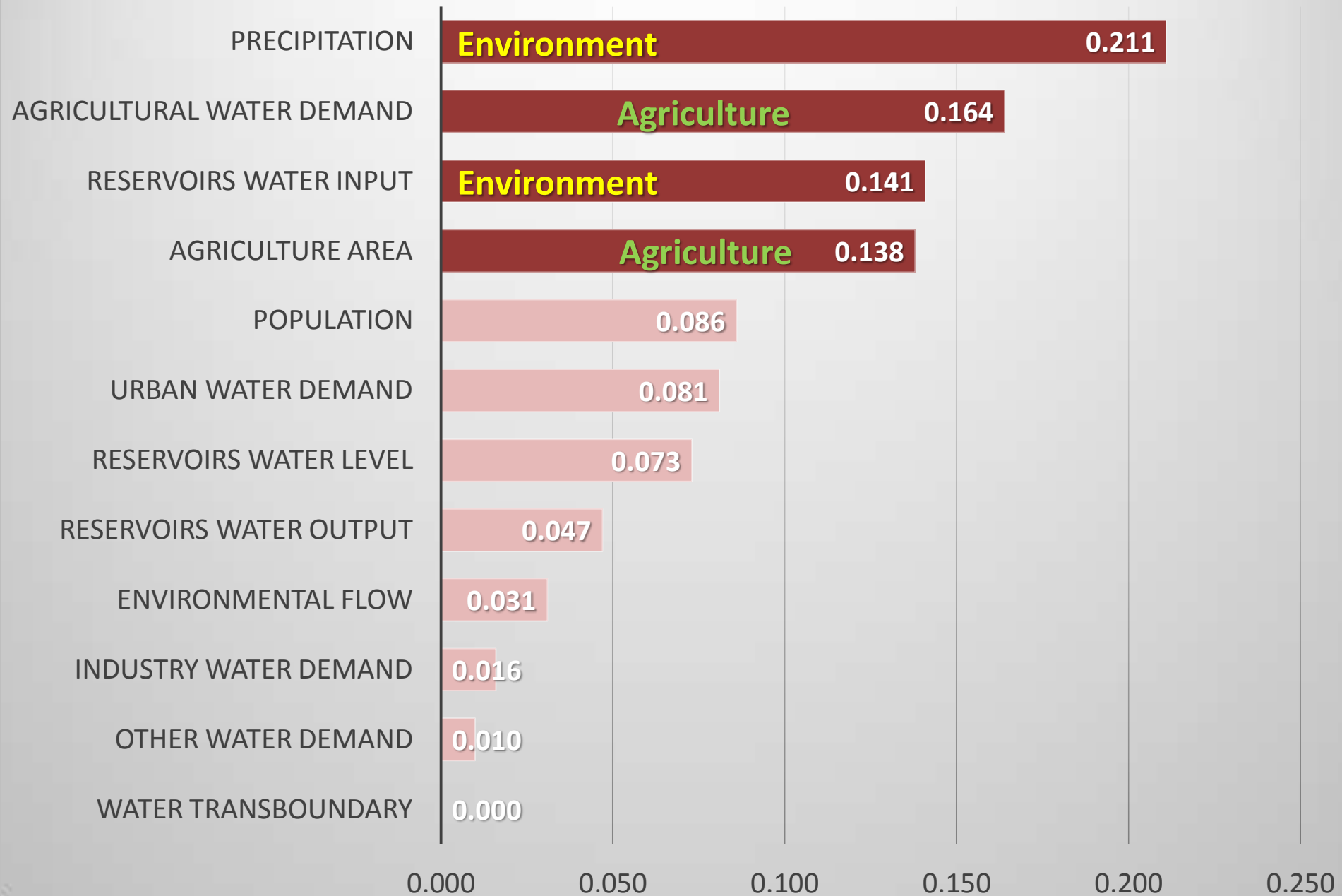


ENVIRONMENT

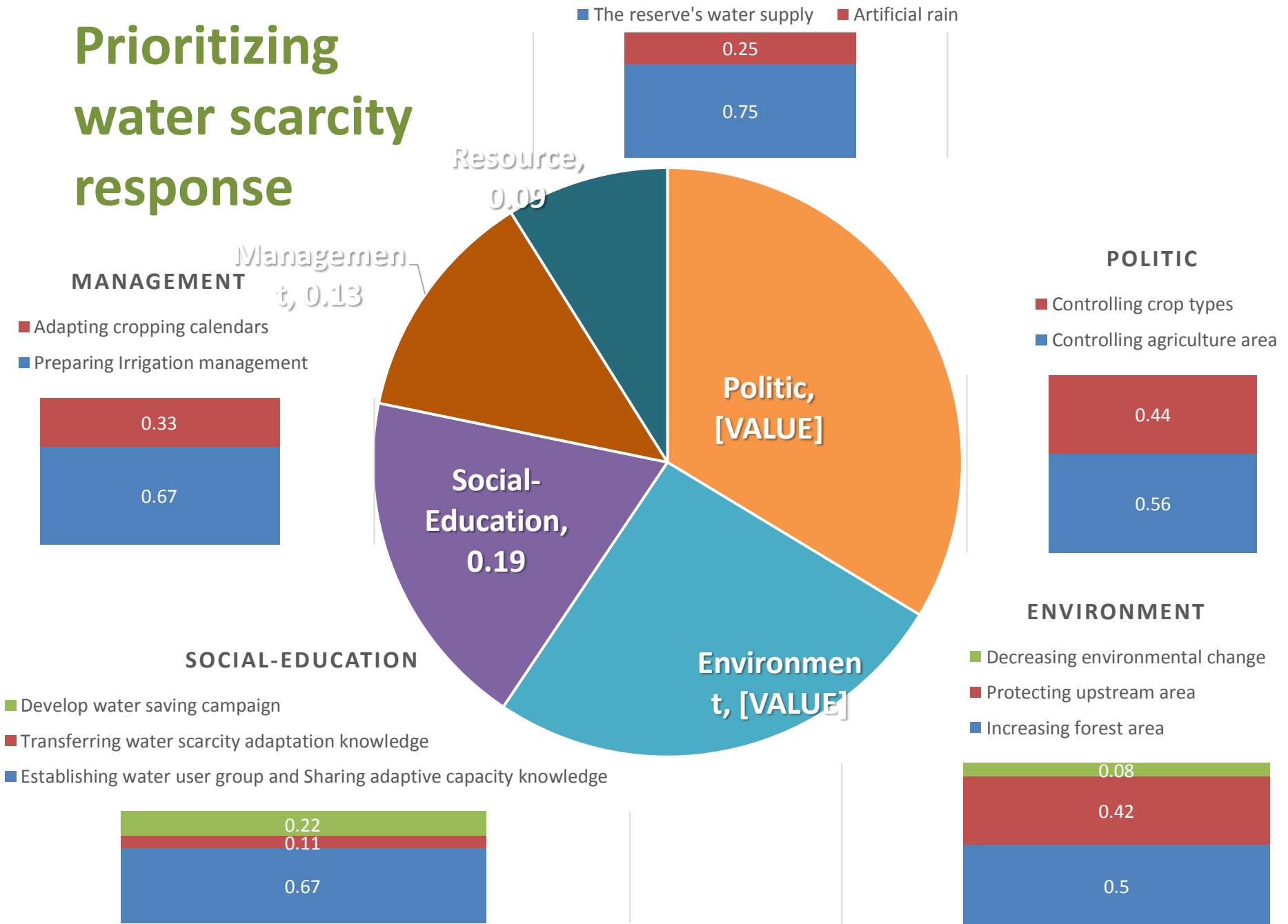
- Environmental flow
- Reservoirs water output
- Reservoirs water level
- Reservoirs water input
- Precipitation



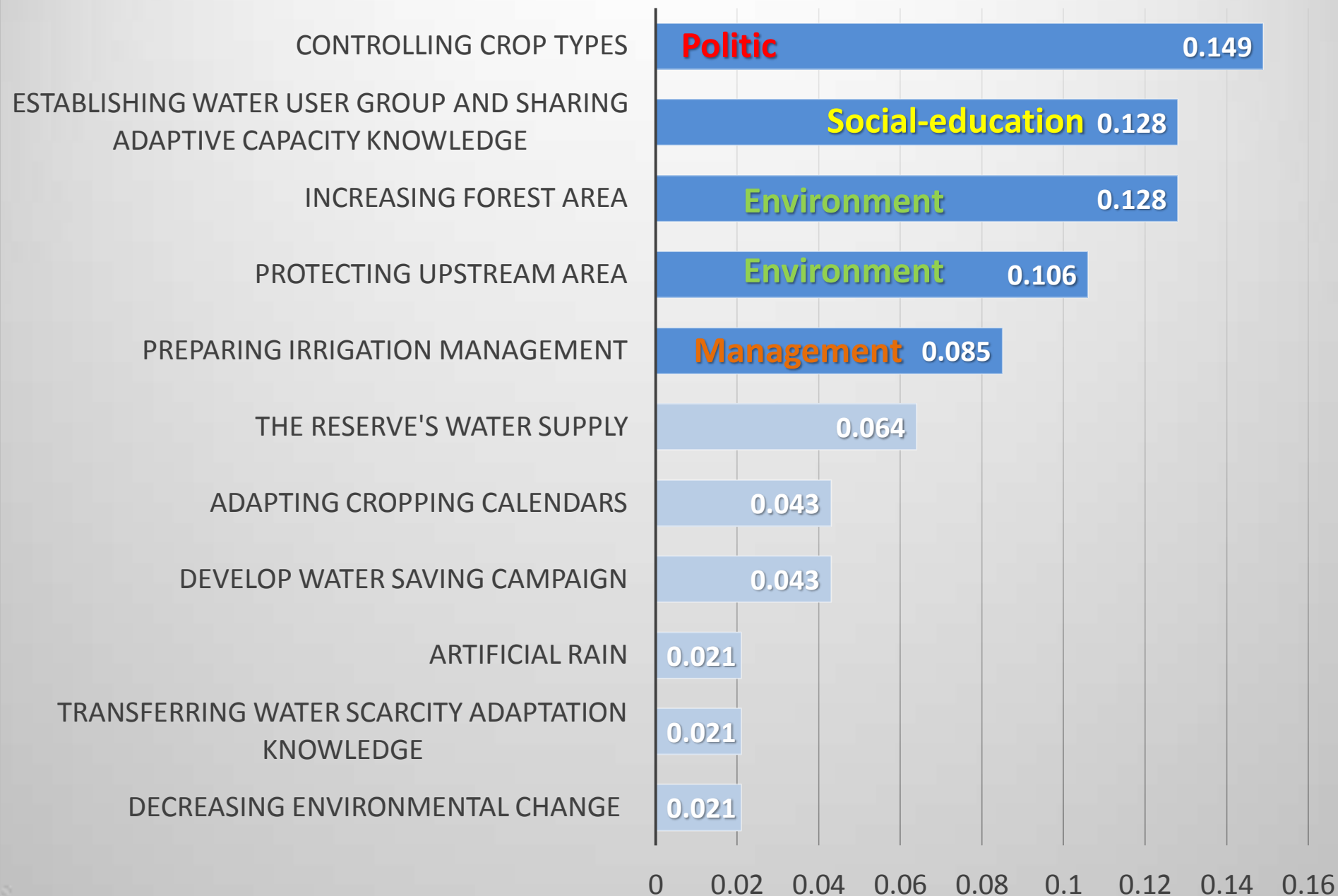
Prioritizing water scarcity factors



Prioritizing water scarcity response



Prioritizing water scarcity response



Conclusion

■ Water scarcity factors

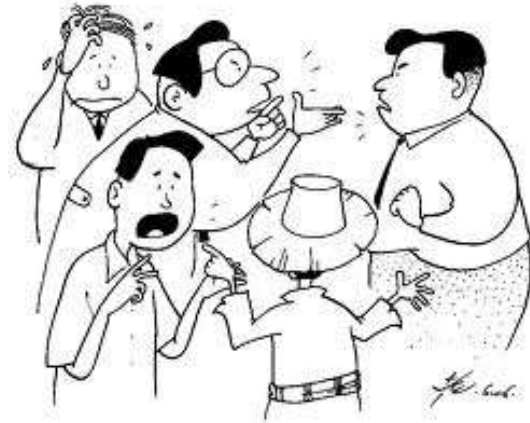
- Agriculture factors
- Environmental factors

■ Responses

- Agricultural practices management
- Increase in participation

■ Agreement between Facts & Public concern will lead to successful management

- Optimization management
- Appropriate strategies & adaptations



Acknowledgement

- **Pranburi irrigation projects, Regional Irrigation Office 14, Royal Irrigation Department** was communicated with stakeholder and collected water resource data in the area.
- **Thai Meteorological Department** were supported observer meteorological data.
- **Southeast Asia START Regional Center** were supported ECHAM5 climate projection data (scenario A1B)

Thank You



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