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Asia Water Forum 2022

8–11 August 2022 • Online

Focus Area 1: Water as a sustainable resource

Session Title: Governance and planning for water security

Schedule: [10 August 2022 | 11:00 a.m. – 12:30 p.m.]

Assessment of Water Security in River Basins of Thailand

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Water Security definition: Multiple perspectives

Discipline

Agriculture

- Input to agricultural production and food security

Water Resources

- Water scarcity
- Supply security (demand management)

Environmental science

- Access to water functions and services for humans and the environment
- Water availability in terms of quality and quantity
- Minimizing impacts of hydrological variability

Policy

- Sustainable development
- Protection against water related hazards

Geology/Geoscience, Hydrology

- Hydrologic (groundwater) variability
- Security of the entire hydrological cycle

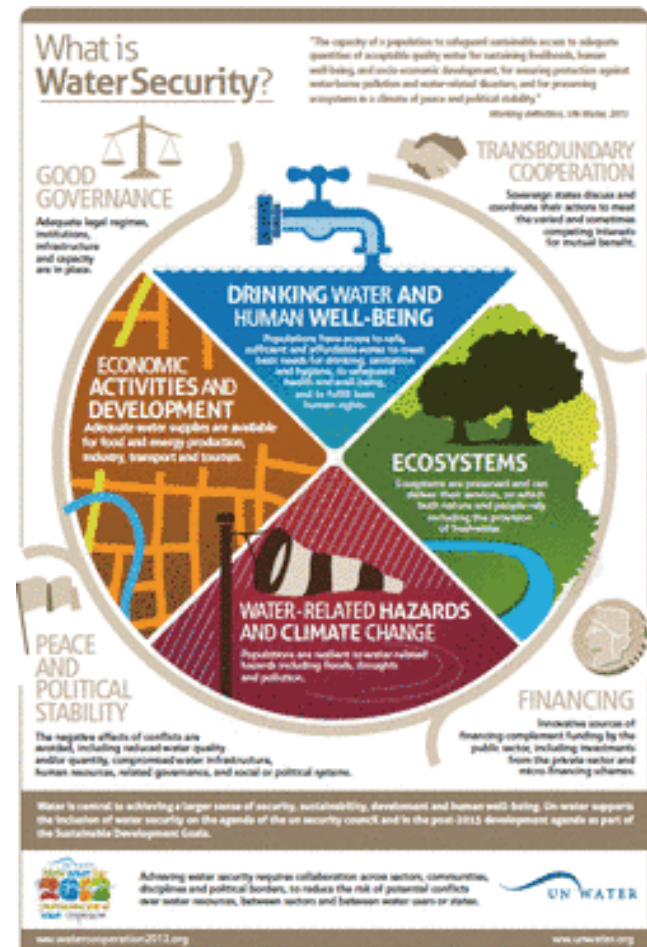




Water Security definition: Widely accepted notion

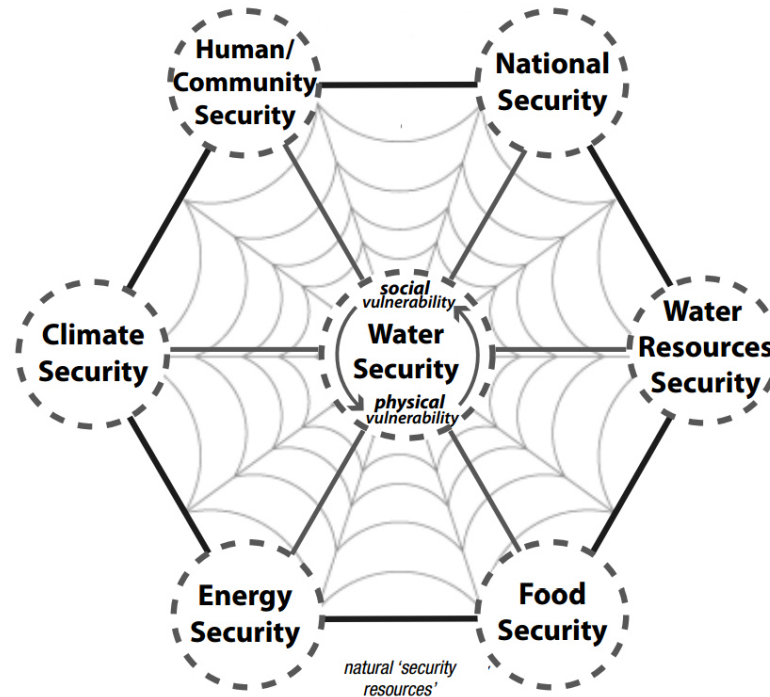
“The capacity of a population to safeguard sustainable access to **adequate quantities** of and **acceptable quality water** for sustaining livelihoods, human well-being, and **socio-economic development**, for ensuring protection against **water-borne pollution** and **water-related disasters**, and for **preserving ecosystems** in a climate of peace and political stability.”

UN-Water (2013)





Water Security: central to all forms of security

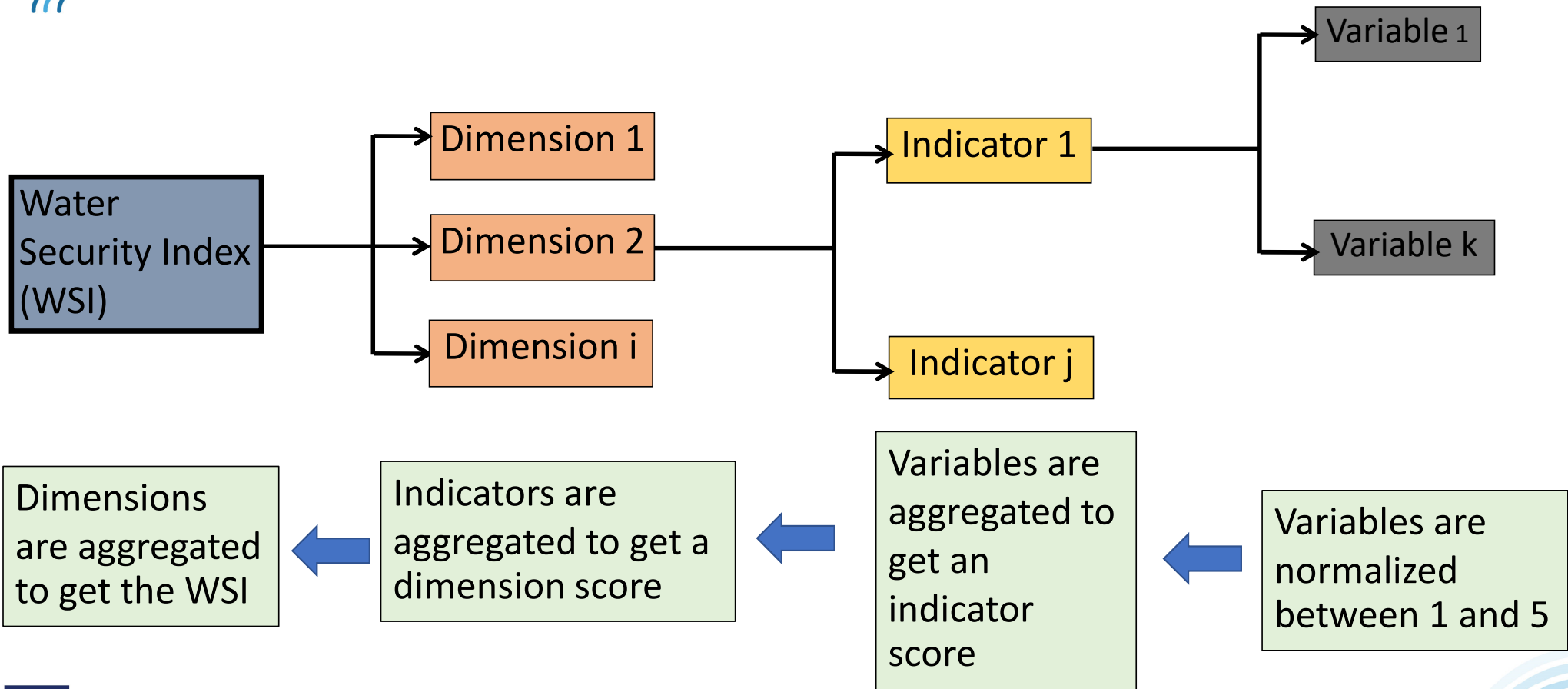


- A first step to improving or enhancing water security is to measure it. As the adage goes, **'you cannot manage what you cannot measure'**.





Basin Scale Water Security Assessment Framework





Basin Scale Water Security Assessment Framework

S. No.	Dimension	Indicator	Variable	Estimation of the variables	Unit
1.	Water Availability	Sustainable basin exploitation	Per capita water availability	Surface runoff/Population	m ³ /capita / year
		Proportion of population using safely managed drinking water service	Population access to improved drinking water source	Population using an improved drinking water source (piped water; public taps or standpipes; boreholes or tube wells; Rainwater or protected streams)/ Total population	%
2.	Water Productivity	Economic value of Water	Commercial/ Industrial revenue per unit of water	Non-Agricultural GPP/ Non-Agricultural water use in the basin	US\$/m ³
			Agricultural, aquaculture and livestock revenue per unit of water	Agricultural, aquaculture and livestock GPP/Agricultural, aquaculture and livestock water use in the basin	US\$/m ³





Basin Scale Water Security Assessment Framework

S. No.	Dimension	Indicator	Variable	Estimation of variables	Unit
3.	Water-related disasters	Drought factor	Drought damage	Total loss due to drought	Million US\$
		Flood factor	Flood damage	Total loss due to flood	Million US\$
4.	Watershed Health	Health of Water bodies	Surface water quality factor	DO concentration level of rivers in the basin	mg/l
		Vegetation cover	Natural vegetation factor	Natural vegetation area/ Total basin area	%
		Proportion of population using safely managed sanitation services	Population access to improved sanitation facility	Population using improved sanitation facility/Total population	%
		Proportion of wastewater safely treated	Percentage of treated to total wastewater generated	Total wastewater generated/ Total wastewater treated	%
5.	Water Governance	Overall management of the water sector	Institutional factor	Questionnaire survey	-
		Potential to adapt to future change	Adaptability factor	Questionnaire survey	-





Normalization of Variables

Dimension	Indicator	Variable	Reference values					Reference
			1	2	3	4	5	
Water Availability	Sustainable basin exploitation	Per capita water availability (m ³ /capita/year)	500 - <800	800 - <1180	1180 - <1440	1440 - <1700	>= 1700	(Falkenmark, 1989)
	Proportion of population using safely managed drinking water service	Population access to improved drinking water source (%)	<60	60 - <70	70 - <80	80 - <90	>= 90	UNICEF (2017)
Water Productivity	Economic value of water	Commercial/Industrial revenue per unit of water (US\$/m ³)	0 - <24	24 - <27.3	27.3 - <30	30 - <33.3	>= 33.3	WB (2010)
		Agricultural, aquaculture and livestock revenue per unit of water (US\$/m ³)	0 - <0.51	0.51 - <0.95	0.95 - <1.4	1.4 - <1.84	>= 1.84	WB (2010)
Water-related Disasters	Drought factor	Drought damage (10 ⁶ US\$)	>= 0.1	0.08 - <0.1	0.05 - <0.08	0.03 - <0.05	0 - < 0.03	*This study
	Flood factor	Flood damage (10 ⁶ US\$)	>= 1	0.75 - <1	0.5 - <0.75	0.25 - <0.5	0 - < 0.25	*This study
Watershed Health	Health of water bodies	Surface water quality factor (mg/L)	0 - <3	3 - <4.1	4.1 - <5.1	5.1 - <6	>= 6	WHO (2011)
	Vegetation cover	Natural vegetation factor (%)	0 - <14	14 - <19	19 - <24.5	24.5 - <30	>= 30	FAO (2015)
	Proportion of population using safely managed sanitation services	Population access to improved sanitation facility (%)	<60	60 - <70	70 - <80	80 - <90	>= 90	UNICEF (2017)
	Proportion of wastewater safely treated	Percentage of treated to total wastewater generated (%)	0 - <26	26 - <40	40 - <52	52 - <64	>= 64	UNICEF (2017)
Water Governance	Overall management of water sector	Institution factor	Corresponding to Likert scale interpretation					(Babel et al., 2020)
	Potential to adapt to future changes	Adaptability factor	Corresponding to Likert scale interpretation					(Babel et al., 2020)

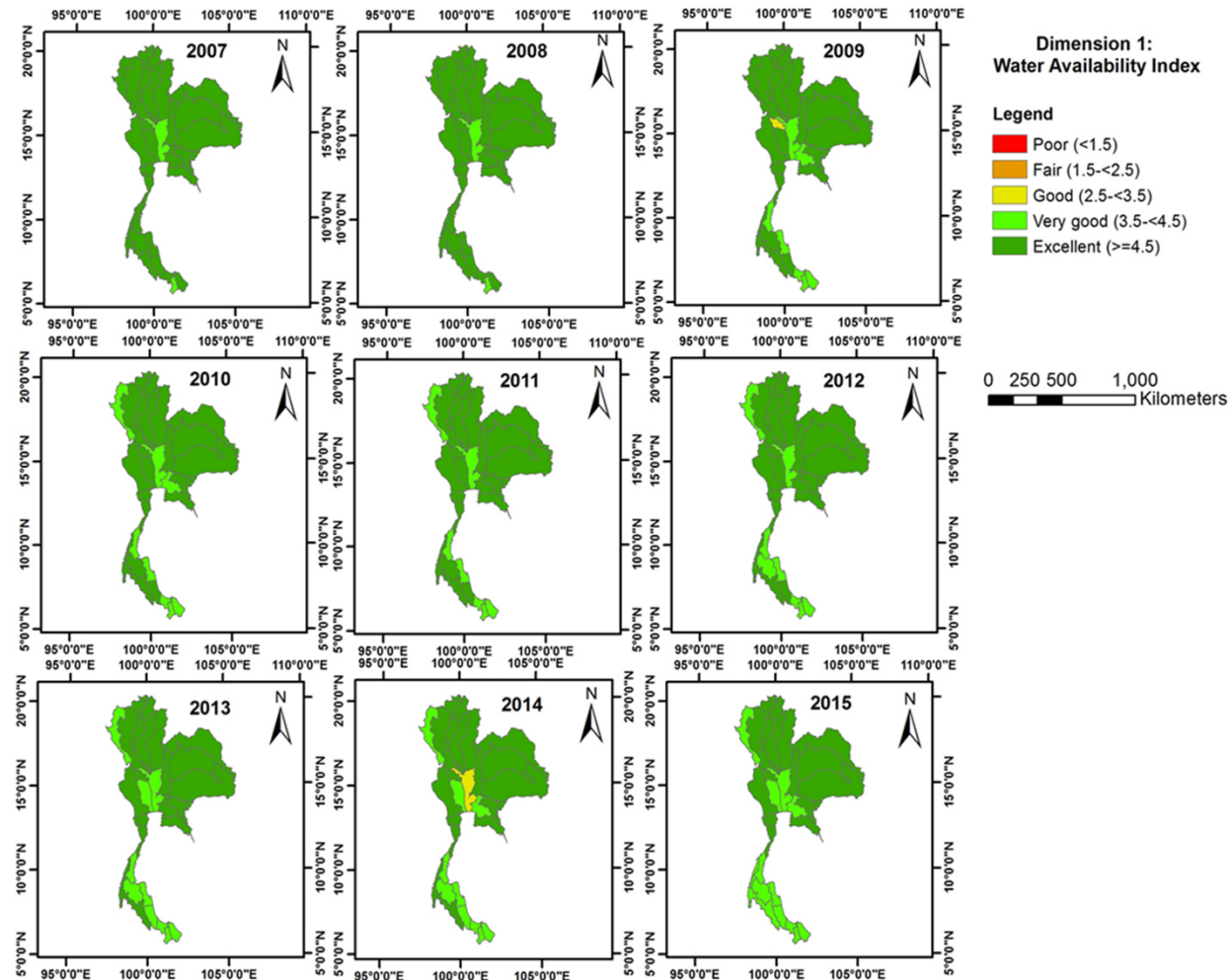


Application in 25 River Basins of Thailand

Water availability dimension

Indicators:

- Sustainable basin exploitation
- Proportion of population using safely managed drinking water services
- All basins perform very well against this dimension.
- Some basins have moved from 'excellent' to 'very good' category from 2007 to 2015. However, the situation is still favorable



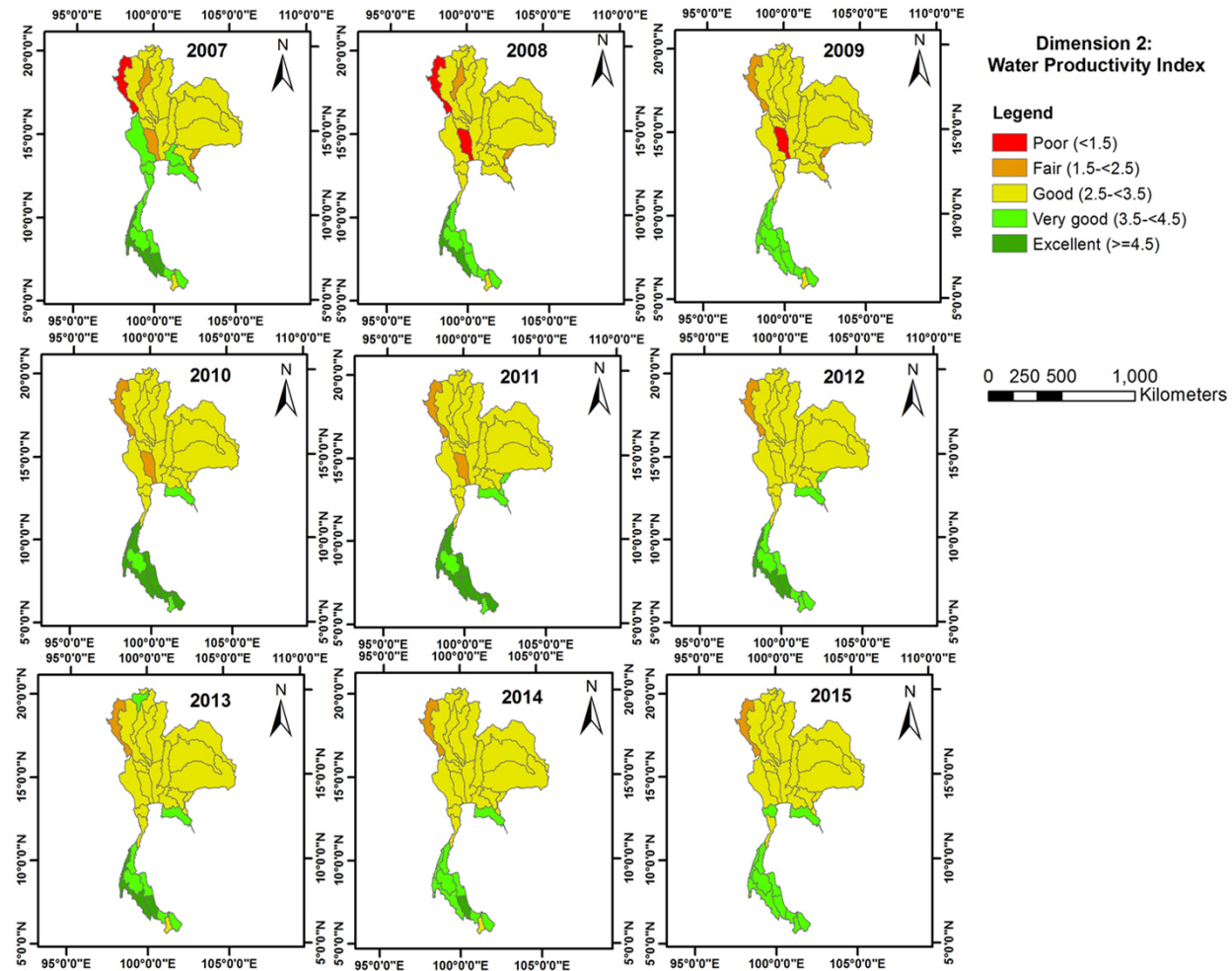


Application in 25 River Basins of Thailand

Water productivity dimension

Indicators:

- Economic value of water
- Water productivity has generally improved in the basins from 2007-2015
- Agricultural productivity is still a cause of concern but is counterbalanced by the massive improvement in industrial/commercial productivity





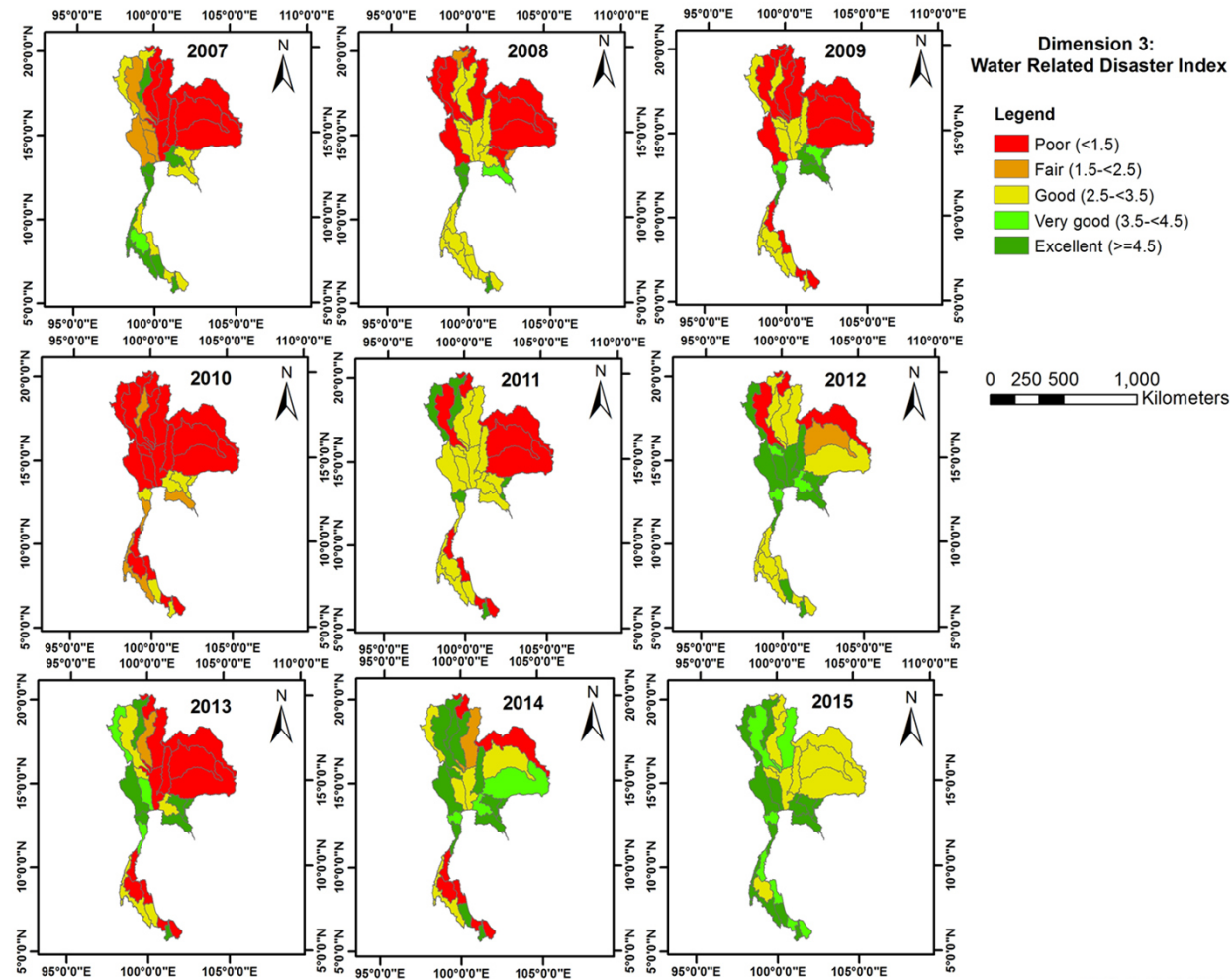
Application in 25 River Basins of Thailand

Water-related disasters dimension

Indicators:

- Drought factor
- Flood factor

- The dimension was a major cause of concern from 2007 to 2011.
- However, there has been significant improvement from 2012 onwards.



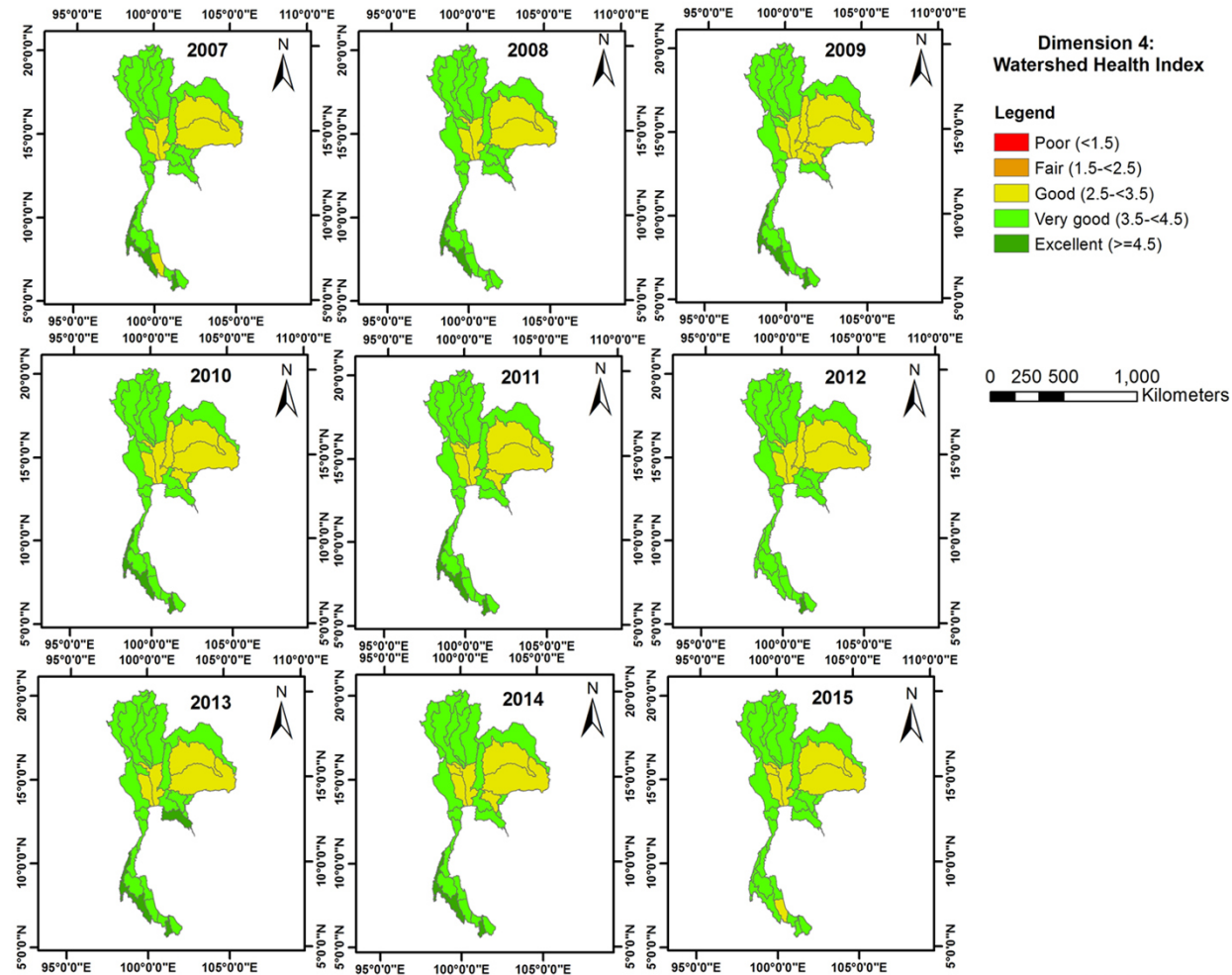


Application in 25 River Basins of Thailand

Watershed health dimension

Indicators:

- Health of water bodies
 - Vegetation cover
 - Proportion of population using safely managed sanitation services
 - Proportion of wastewater safely treated
- The overall watershed health dimension ranges from “good” to “very good”
- However, the indicators related to health of water bodies and proportion of wastewater safely treated are a concern in most basins





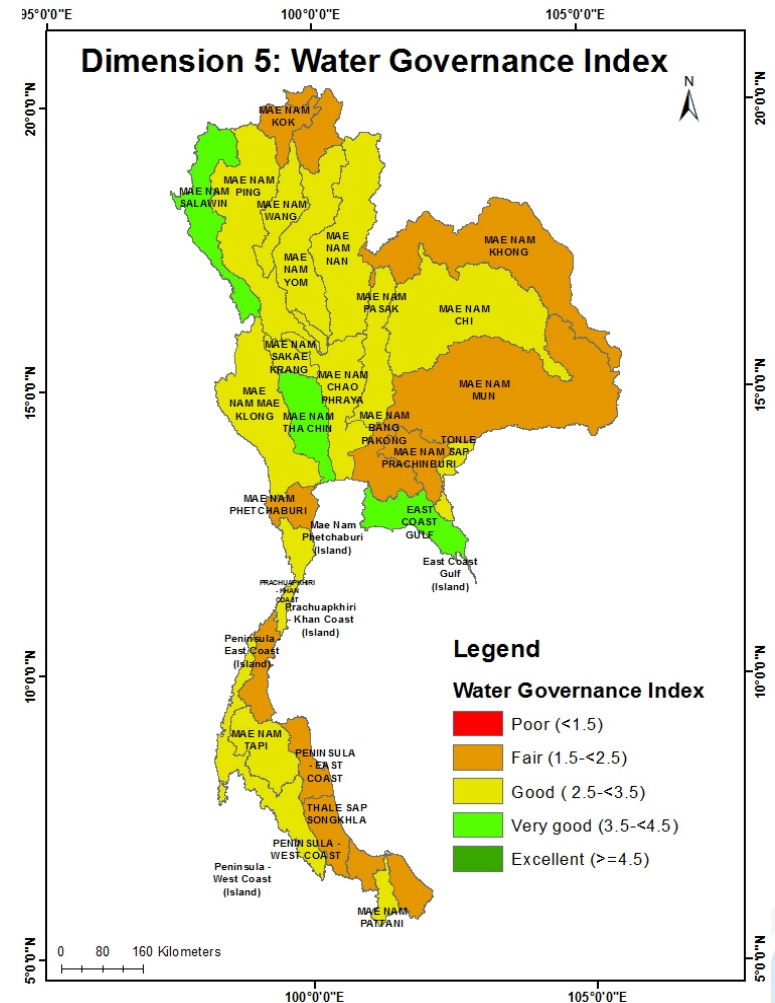
Application in 25 River Basins of Thailand

Water governance dimension

Indicators:

- Overall management of water sector
- Potential to adapt to future changes

While basins have reasonable water governance, there are hardly any basins that have excellent or very good water governance.

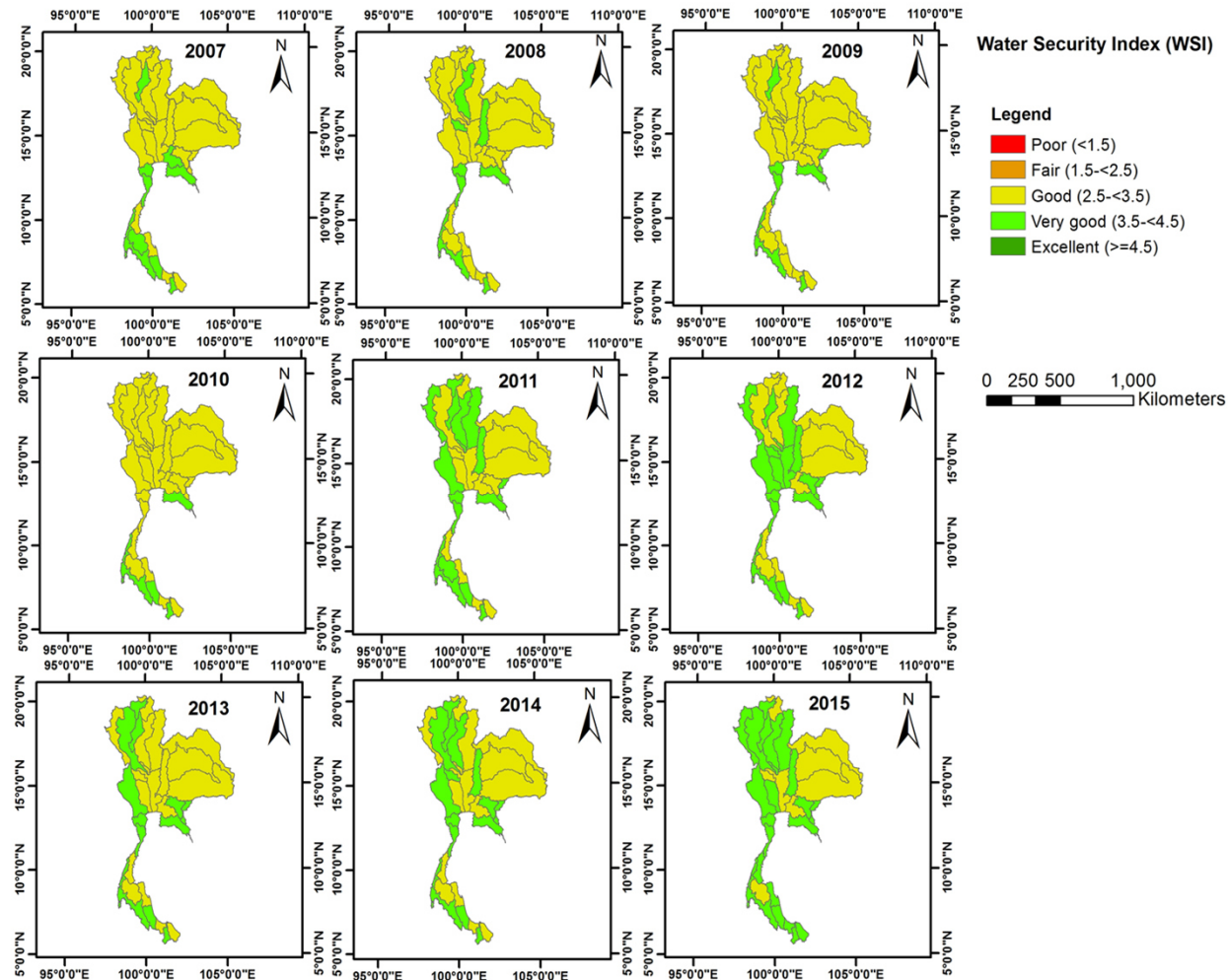




Application in 25 River Basins of Thailand

Water Security Index (WSI)

- Water security has improved from 2007 to 2015 in most of the river basin.
- The main improvement has been due to improvement in the water related disasters dimension.
- Watershed health dimension has, however, degraded in several basins.
- Overall, the water security in most of the basins is “very good”





Conclusions

- The overall water security in Thai basins is quite **satisfactory**. However, there are concerns with **individual dimensions**.
- The **watershed health** is an area of concern. The concerned authorities need to step up efforts to enhance the wastewater treatment capacity in order to improve the health of river basin.
- Basins needs to improve on the **Water Productivity** and **Water Governance** dimensions. The concerned authorities could emphasize on **capacity building for farmers** and enhancing proper **water resource management plans and adaptation for future water challenges**.
- Some research is needed to arrive at **interventions to improve water security** on the basis of the framework developed.
- The framework will be useful to determine **Thailand's progress made on the SDGs**.





Thank you!

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