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Thailand's Water Security Situation in the context of world and ASEAN

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Abstract
During RIO+20 meeting, the sustainable green economy for protecting environmental health via income increasing and poor eradication had been discussed. The successful countries for sustainable green economy depend on efficiency of integrated water management and provision of water supply and sanitary services. Water security index was another issue that had been proposed to monitor the national socio-economical development which comprised of household, urban water, economic water (including irrigation water), river health and resilience. The study proposed the water security definition and assessed the water security status of Thailand by using water use status and correlated with gross domestic product per capita in various countries of the world, Asia and ASEAN which helped to understand the competitiveness and the strength, weakness and potential of water development of Thailand compared with the rest of the world and ASEAN countries.

Introduction and methodologies
This study determined the water security status from five dimensions, i.e., WS1: basic water (renewable, supply, hygiene),WS2; sufficient water (water supply, consumption, agricultural water), WS3:development water (irrigation area, industrial water use, water for energy, water for aquaculture), WS4:water disaster (loss from floods and drought), WS5:water for future (population growth, urban population growth, water footprint). The index status analysed were correlated with water use unit (cubic meter per capita) and water productivity (US $ per cubic meter of water use) and grouped into four groups of country classified by income per capita of the country. Based on the available data from various sources of the world (World Bank, 2014; Mackie Black et. al, 2009), the index of each country was determined comparatively by weighting equally from each dimensions and ranked by marking equally (1-5 points) of each elements from the average and standard deviation values.

Water security status in the world scale
From the analysis, the average water use unit, water productivity grows up with the GDP per capita growth though the agricultural water use in the high income group decreased due to the change of water use structure. In general, more water productivity induced better water security status. Water security index increased from the less income group to lower middle income group and became stable in the upper middle and high income group due to the loss of water disaster (which may reflect from the data availability). The water productivity, measured by the income per capita and per water use unit, was assessed and compared with the water security index obtained and it showed that more water productivity induced better water security status.

Thailand and ASEAN
The water security status of Thailand, compared with the world, Asia and ASEAN regions were investigated with the ranking in each dimension as shown in Table 1. Within ASEAN countries, the water use, water productivity and water security status of each country VS country GDP per capita were assessed comparatively and it showed that Thailand has the highest water use unit, moderate lower water productivity and moderate in water security ranking.

Conclusions

This study showed the status of water security of Thailand compared with the rest of the world. Thailand has strengths on clean water and sanitation water accessibility from the development investment in the past. However, water use status in fresh water renewable, agricultural sector, i.e., low efficiency, high water footprint, low productivity, seemed to be a weakness compared with other countries. There are potential demands on industrial water and water for energy, thus, the restructure of water use structure is needed to cope with future water demand increase.

Table 1 The average world, Asia and ASEAN water use status and the ranking of Thailand's

Items	Elements	World		Asia		ASEAN		Thailand
		average	ranking	average	ranking	average	ranking	
Basic water	1. fresh water renewable (m^3/capita)	22,167	79	10,854	15	19,205	8	6,382
	2. water supply (m^3/capita)	84	46	84	9	85	3	98
	3. sanitation water (m^3/capita)	67	15	70	6	71	2	96
Sufficient water	1. water use per capita (m^3/capita)	511	12	842	9	531	7	1,391
	2. house holds (m^3/capita)	84	46	84	9	85	3	98
	3. agricultural water (m^3/capita)	354	159	712	7	424	1	1,322
Water for development	1.irrigation area (%)	19	49	41	30	18	3	25
	2.industrial water (m^3/capita)	97	68	60	18	49	4	34
	3.water for energy (%)	31	89	20	23	14	6	4
	4. water for fresh water aquaculture (m^3/capita)	346,734	4	1,241,323	4	582,458	2	1,385,801
Water disaster	1.flood damage (US$)	3,543,108	3	8,670,092	2	6,002,888	1	41,051,592
	2.drought damage (US$)	1,261,531	22	1,896,770	5	239,512	2	424,300
Water for future	1.population growth (%)	1.3	137	1.43	38	1.31	10	0.43
	2.urban population growth (%)	63	147	59	30	59	7	42
	3.water footprint (m^3/capita)	1,338	7	1,304	2	1,697	2	2,223
Water productivity	1.GDP (10^6 US$)	343,530	29	445,799	7	151,224	2	318,907
	2.productivity(US$ / m^3 water)	81	132	41.3	132	117.3	6	3.6
	3.agricultural productivity (US$ / m^3 water)	392	124	33.8	18	162.5	7	0.32
	4.industrial productivity(US$ / m^3 water)	169.1	63	69.5	8	121.6	4	51.2

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