Current Situation of Domestic Wastewater Management in Asian Region -Insights from WEPA-

Preparation Workshop on the Asia Wastewater Management Partnership(AWaP)

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Water Pollution in Asian Countries

Purpose of Wastewater Treatment

Sanitation ⇒ Water Environmental Conservation

Sustainable Development Goals (SDGs) Goal 6

Ensure availability (continuously adopted goals since MDGs) and sustainable management (new goals from SDGs) of water and sanitation for all

Target

- By 2030, achieve universal and equitable access to safe and affordable drinking water for all
- By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
- By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
- By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
- By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
- Support and strengthen the participation of local communities in improving water and sanitation management

Water Environmental Partnership in Asia (WEPA)

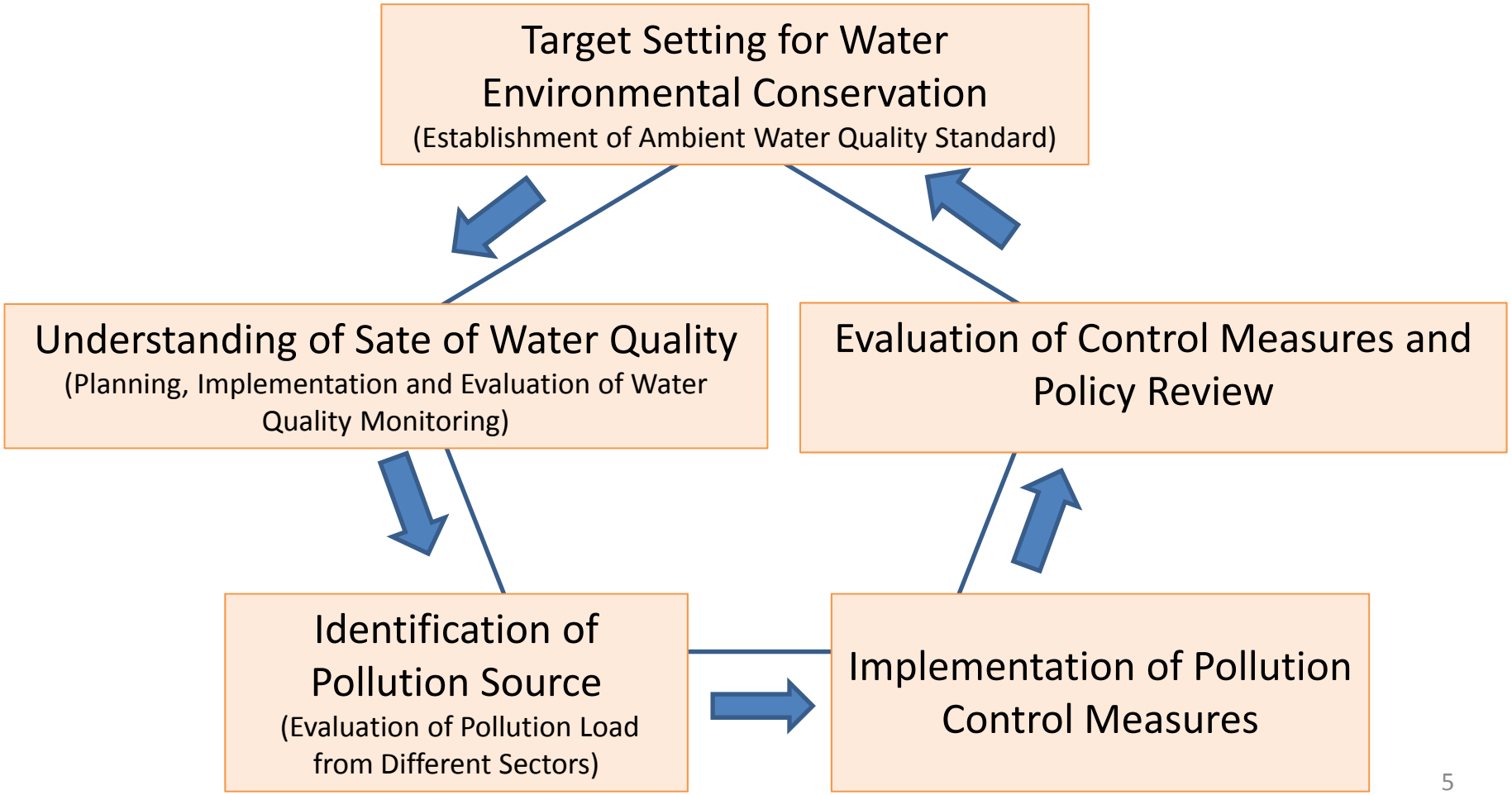
Recognizing the improvement of water environmental governance is essential to solve water pollution problems in the Asian region, the Water Environmental Partnership in Asia (WEPA) was launched in 2004 by the Ministry of the Environment, Japan. WEPA conducts its activity on a 5-year cycle and the third phase started in April 2014

WEPA consists of partners in 13 Asian countries

1. Democratic Socialist Republic of Sri Lanka (Sri Lanka)
2. Federal Democratic Republic of Nepal (Nepal)
3. Japan (Japan)
4. Kingdom of Cambodia (Cambodia)
5. Kingdom of Thailand (Thailand)
6. Lao People's Democratic Republic (Lao PDR)
7. Malaysia (Malaysia)
8. People's Republic of China (China)
9. Republic of Indonesia (Indonesia)
10. Republic of Korea (Republic of Korea)
11. Republic of the Philippines (Philippines)
12. Socialist Republic of Viet Nam (Viet Nam)
13. Union of Myanmar (Myanmar)

Water Environmental Management

PDCA(Plan-Do-Check-Action) Cycle in Water Environmental Management



Establishment of Ambient Water Quality Standard in WEPA Countries

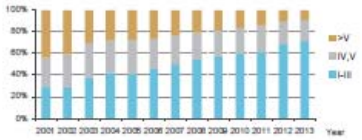
Country	Surface Water	Groundwater	Marine Water
Cambodia	Water Quality Standards in Public Water Areas	Water Quality Standards in Public Water Areas	Water Quality Standards in Public Water Areas
China	Environmental Quality Standards for Surface Water	Quality Standard for Ground Water	Sea Water Quality Standard
Indonesia	Water Quality Criteria	Water Quality Criteria	Standard Quality of Seawater
Japan	Environmental Quality Standards for Water Pollution	Environmental Water Quality Standards of Groundwater	Environmental Quality Standards for Water Pollution
Republic of Korea	Environmental Standards for Water Quality and Aquatic Ecosystem	Environmental Standards for Water Quality and Aquatic Ecosystem	Environmental Standards for Water Quality and Aquatic Ecosystem
Lao PDR	Surface Water Quality Standard	Groundwater Quality Standard	
Malaysia	National Water Quality Standards		Marine Water Quality Criteria and Standard
Myanmar			
Nepal			
Philippines	Water Quality Criteria for Fresh Surface Waters		Water Quality Criteria for Coastal and Marine Waters
Sri Lanka			
Thailand	Surface Water Quality Standards	Groundwater Quality Standards	Marine Water Quality Standard
Vietnam	National Technical Regulation on Surface Water Quality	National Technical Regulation on Ground Water Quality	National Technical Regulation on Coastal Water Quality

Water Quality Monitoring in WEPA Countries

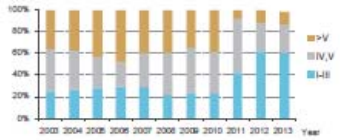
Country	No. of Monitoring Stations	Frequency	Year
Cambodia	10 (rivers)	Monthly	2011
China	469 (rivers), 26 (main lakes and reservoirs), 4 (Three Gorges Dam), 4100 (Groundwater), 279,225 km^2 (marine water)	Unknown	2011
Indonesia	Unknown (40 rivers)	At least twice a month	2011
Japan	4,550 (rivers), 475 (lakes and reservoirs), 2,044 (sea), 3,680 (Groundwater)	Monthly	2013
Republic of Korea	697 (rivers), 185 (lakes), 2,499 (groundwater)	Monthly for rivers and lakes (48 times/year for key locations) 2 times/year for Groundwater	2008
Malaysia	901 (rivers), 105 (groundwater), 321 (marine water)	Unknown	2013
Philippines	192 (rivers), 4 (lakes), 88 (groundwater), unknown (marine water)	Monthly or 4 times/year (rivers) unknown (groundwater, marine water)	2001-2015
Thailand	366 (rivers and lakes), 170 (marine waters), 620 stations (groundwater)	4 times/year (rivers and lakes) 2 times/year (marine water)	2012
Viet Nam	248 (surface water)	4 times/year	2007

Result of Water Quality Monitoring

China

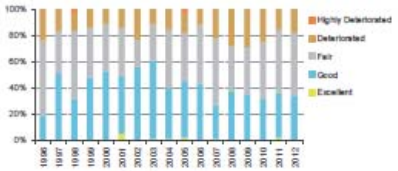


Surface water

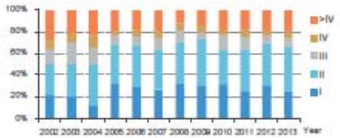


Lake Water

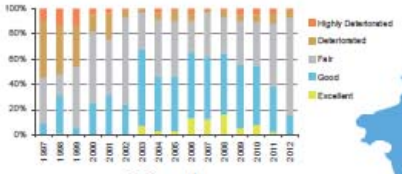
Thailand



Surface water

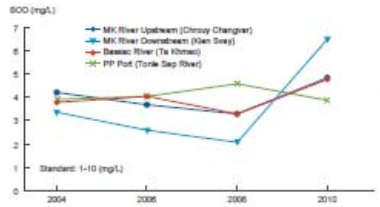


Marine Water

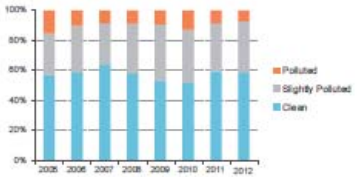


Marine water

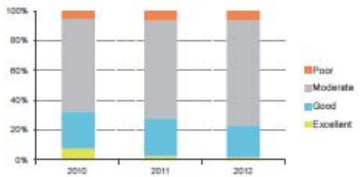
Cambodia



Malaysia

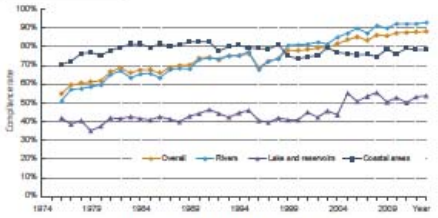


Surface water



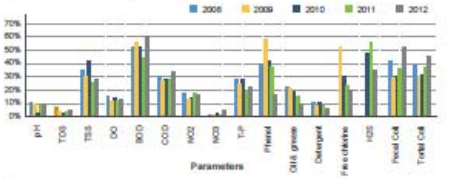
Marine water

Japan

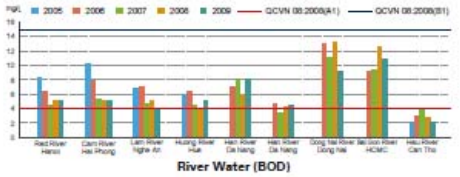


River, Lakes and Marine Water

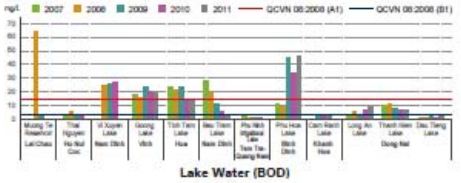
Indonesia



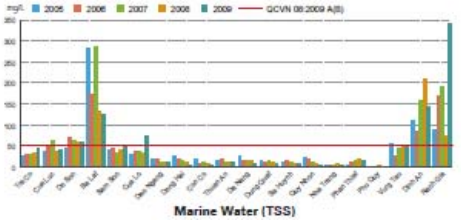
Viet Nam



River Water (BOD)

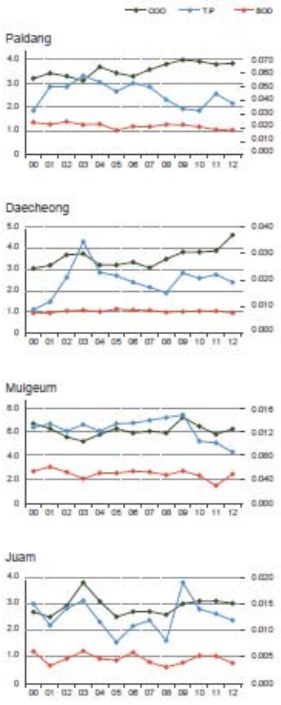


Lake Water (BOD)



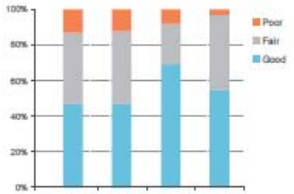
Marine Water (TSS)

Republic of Korea



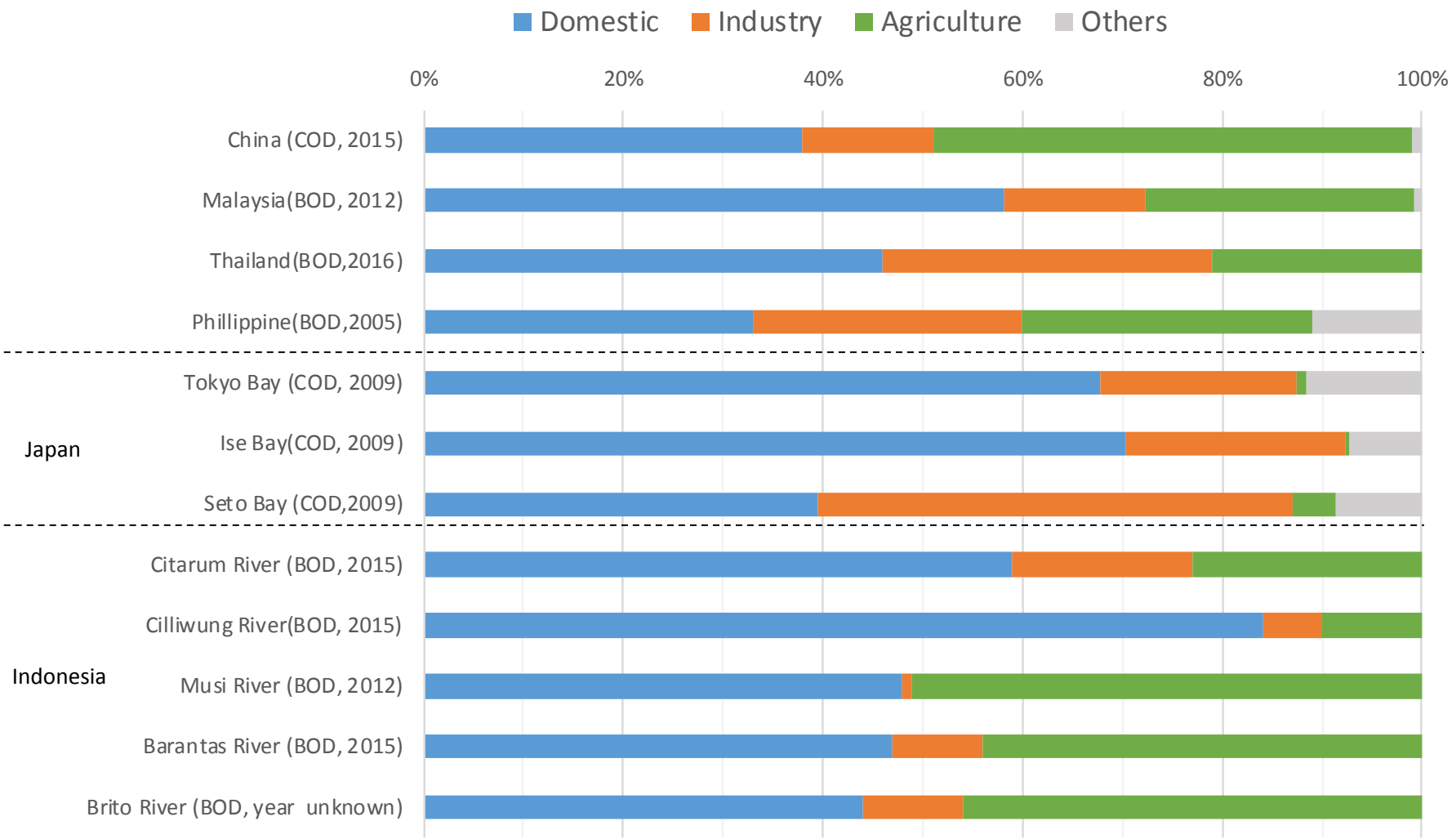
Four Major River Waters

Philippines



Surface water and Marine water (2001-2005)

Pollution Source by Sector in Selected WEPA countries



Pollution Source by Sector in Selected WEPA countries (Summary)

- Inventory survey of wastewater for identification of pollution source is conducted in 8 countries among 13 WEPA countries. Indonesia and Vietnam are trying to modify the framework of inventory survey.
- Based on the analysis of pollution (BOD/COD) source by sector, domestic sector is major pollution source in the 8 WEPA countries.

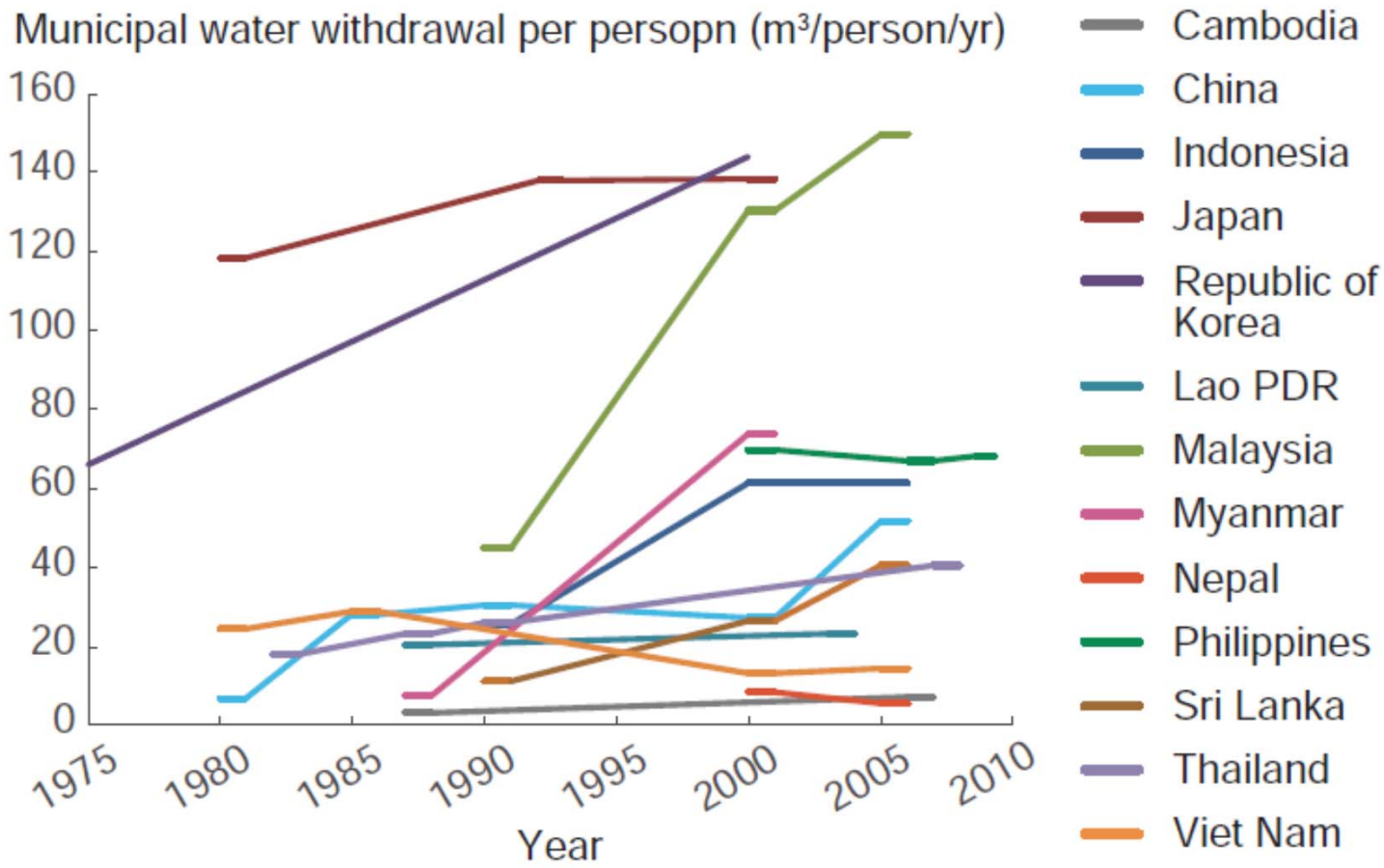
Consideration Points When We Think about Domestic Wastewater Management in Asian Region

1. Increase of Volume of Domestic Wastewater Discharge from Urban Area due to Population Increase and Urbanization
2. Low Coverage Ratio of Sewerage Treatment System
3. Septic Tank
4. Economical Condition

Change in Population and Urbanization of Asian Countries

Country	1975		2010		Population Growth Rate (1975-2010)
	Population (thousand persons)	Proportion of Urban Population (%)	Population (thousand persons)	Proportion of Urban Population (%)	Average annual rate of population change (%)
Cambodia	7,098	4	14,138	20	2.8
China	915,041	17	1,341,335	47	1.3
Indonesia	134,106	19	239,871	44	2.3
Japan	110,808	57	126,536	67	0.4
Laos	3,042	11	6,201	33	3.0
Malaysia	12,313	38	28,401	72	3.7
Myanmar	29,534	24	47,963	34	1.8
Nepal	13,373	5	29,959	19	3.5
Philippines	40,893	36	93,261	49	3.7
Korea	34,722	48	48,184	83	1.1
Sri Lanka	13,811	22	20,860	14	1.5
Thailand	42,399	24	69,122	34	1.8
Viet Nam	49,896	19	87,848	30	2.2
Total	1,407,034		2,153,680		1.5

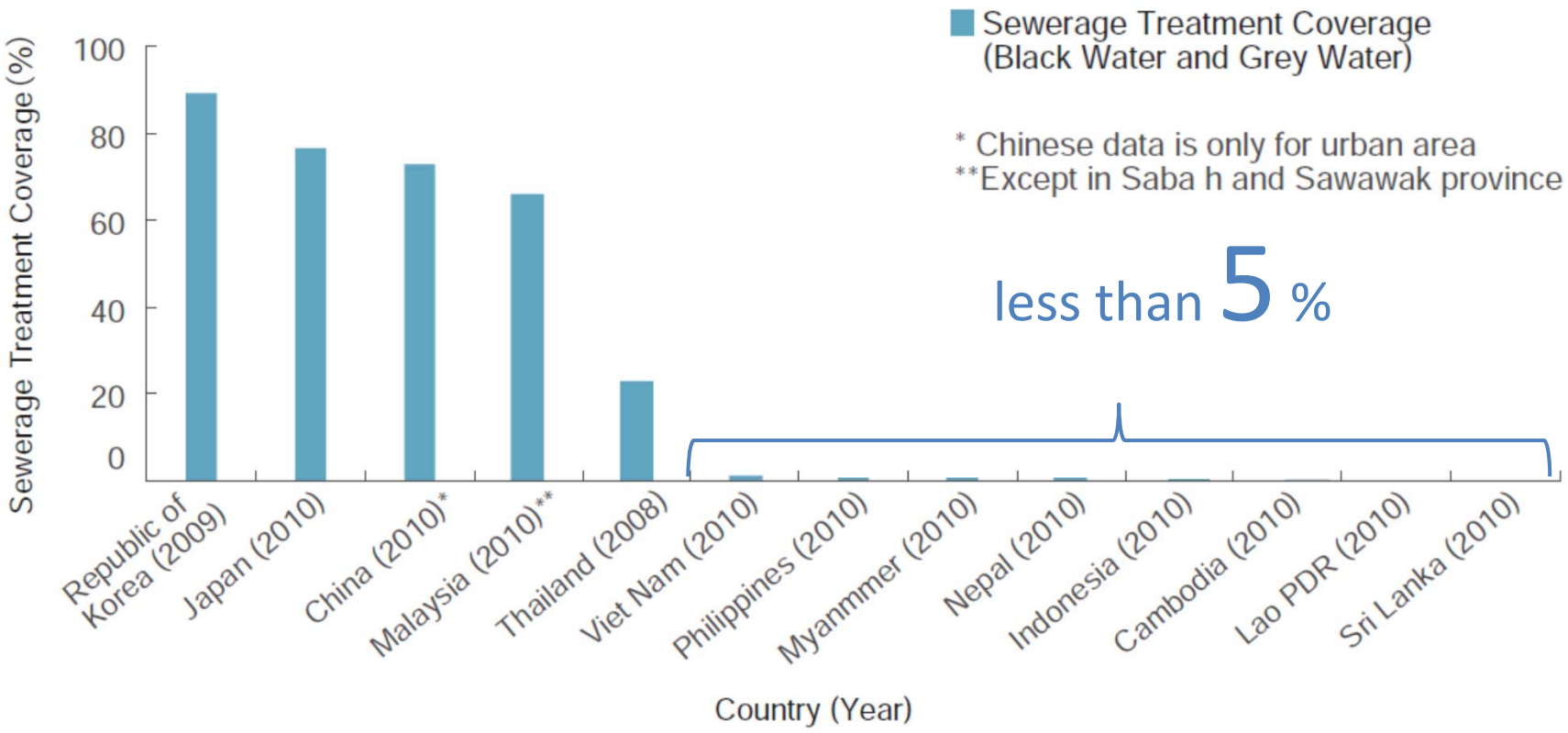
Change of Domestic Water Withdraws



Source :FAO, AQUASTAT

Change of Water Withdraws per Persons for Domestic Purpose

Service Coverage Ratio of Sewerage Treatment in Asia

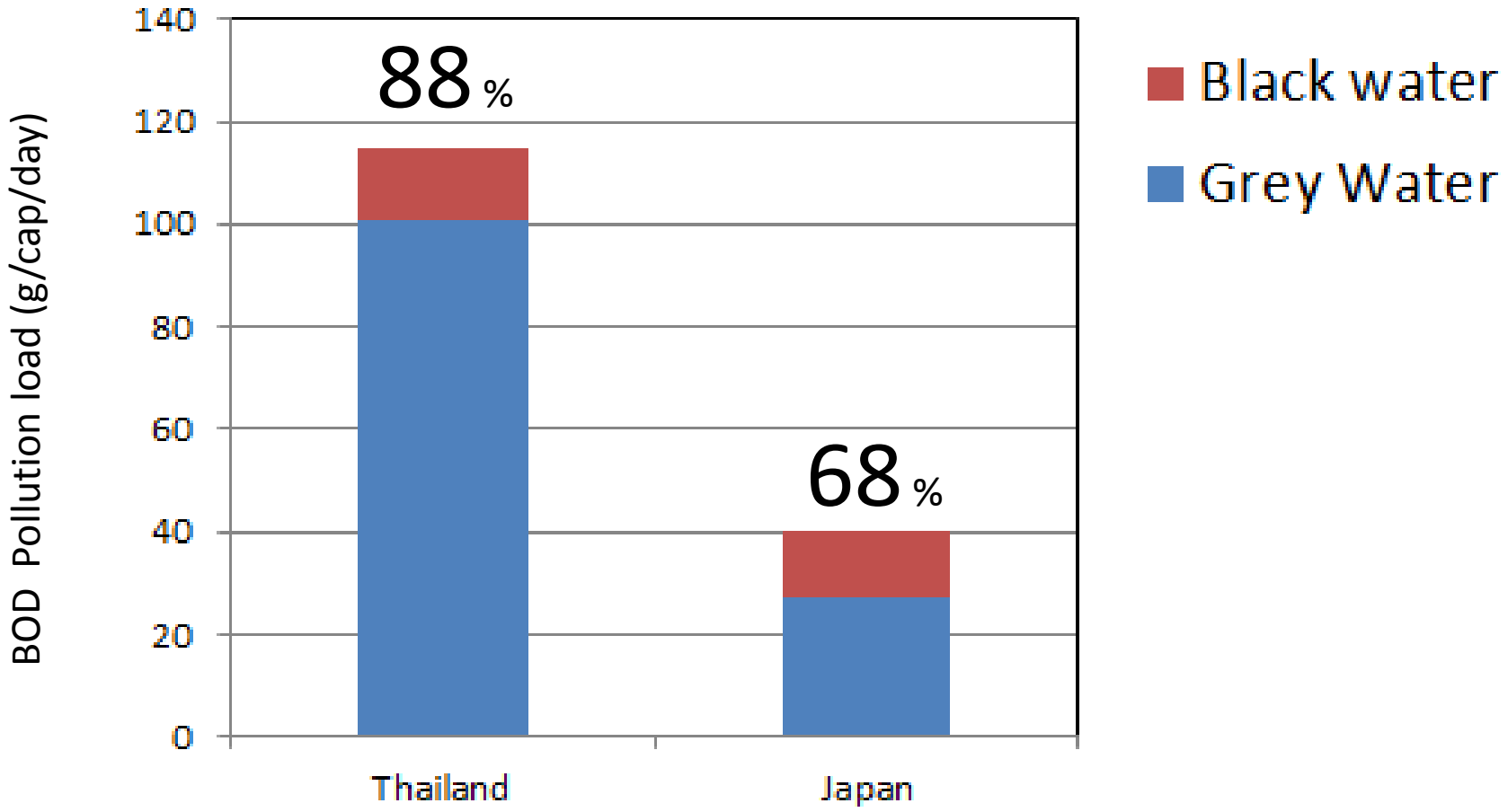


Service Coverage Ratio of Sewerage Treatment in WEPA Countries

Percentage of Septic Tank Installation in Selected WEPA Countries

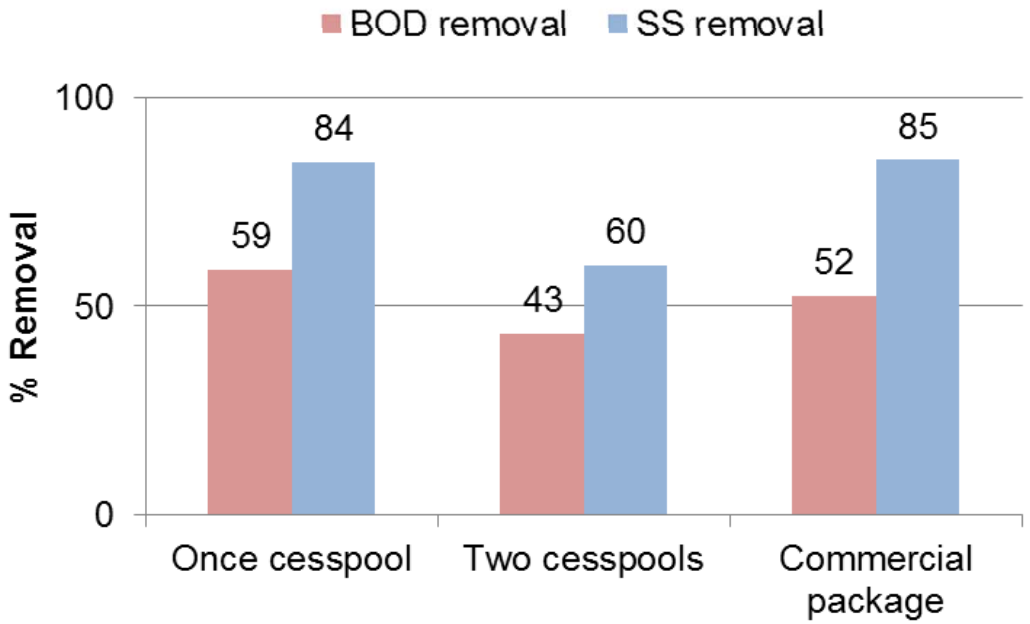
Malaysia (2010)	20%
Vietnam(2008)	41%
Indonesia (2012)	53%
Cambodia (2008)	43%
Manila/Philippines (2010)	71%

Pollution Load from Grey Water



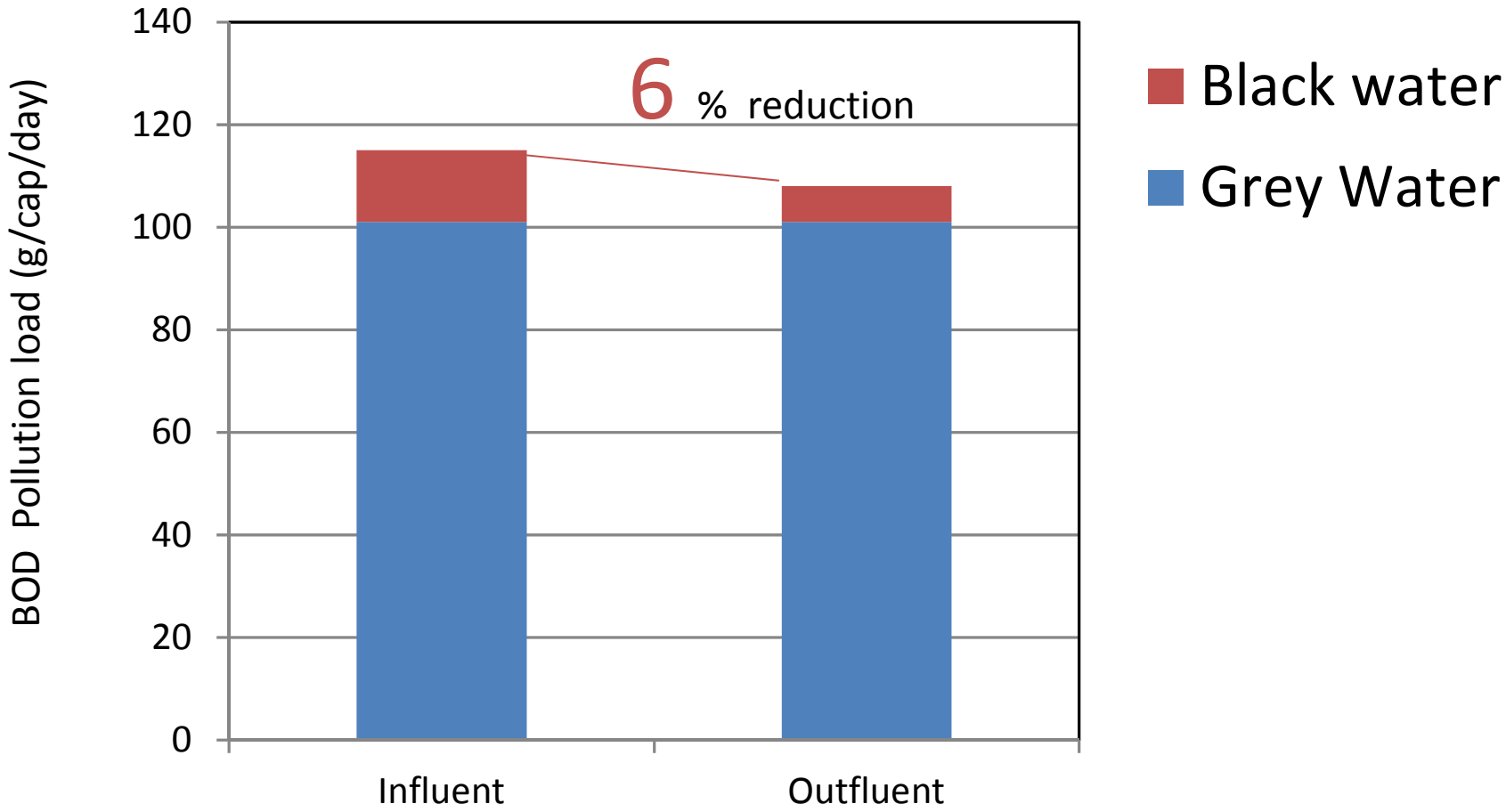
BOD Removal Ratio of Septic Tank (Black Water)

	BOD (mg/L)				SS (mg/L)			
	Influent		Effluent		Influent		Effluent	
	Range	Avg.	Range	Avg.	Range	Avg.	Range	Avg.
Once cesspool	705-4,520	2,289	123-3,000	946	68-11,685	2,998	8-2,115	470
Two cesspools	66-6,450	2,537	25-9,517	1,436	102-1,556	608	4-1,068	245
Commercial package	519-3,075	1,783	658-1,157	849	204-4,030	1,461	64-356	220

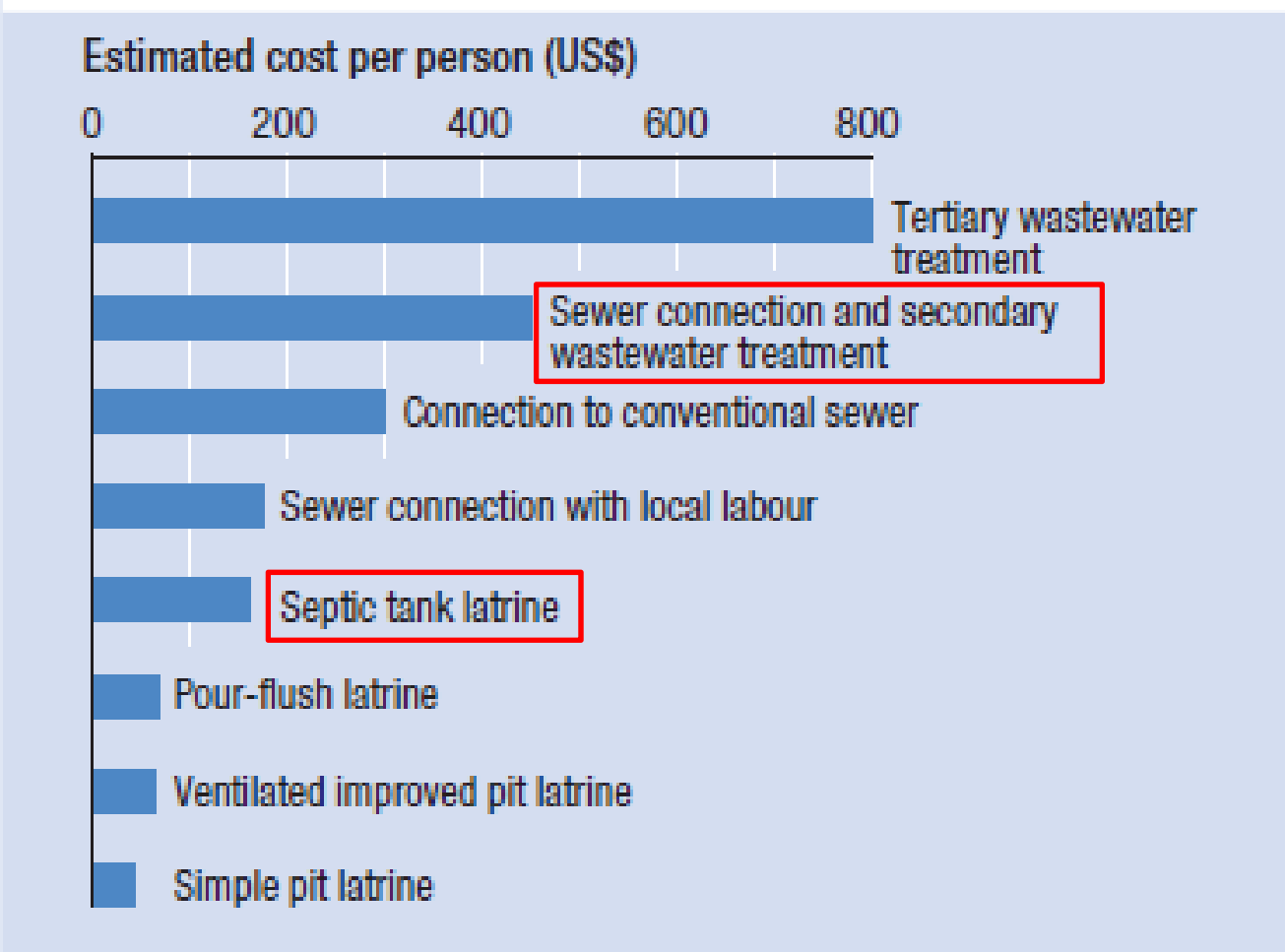


Source: Dulyakasem, S., *et. al*., 2013. Determinations of Blackwater characteristics and sludge accumulation rates in Decentralized Wastewater Treatment Systems (DEWATs) in Thailand

BOD Removal Ratio of Septic Tank(Black + Grey Water)

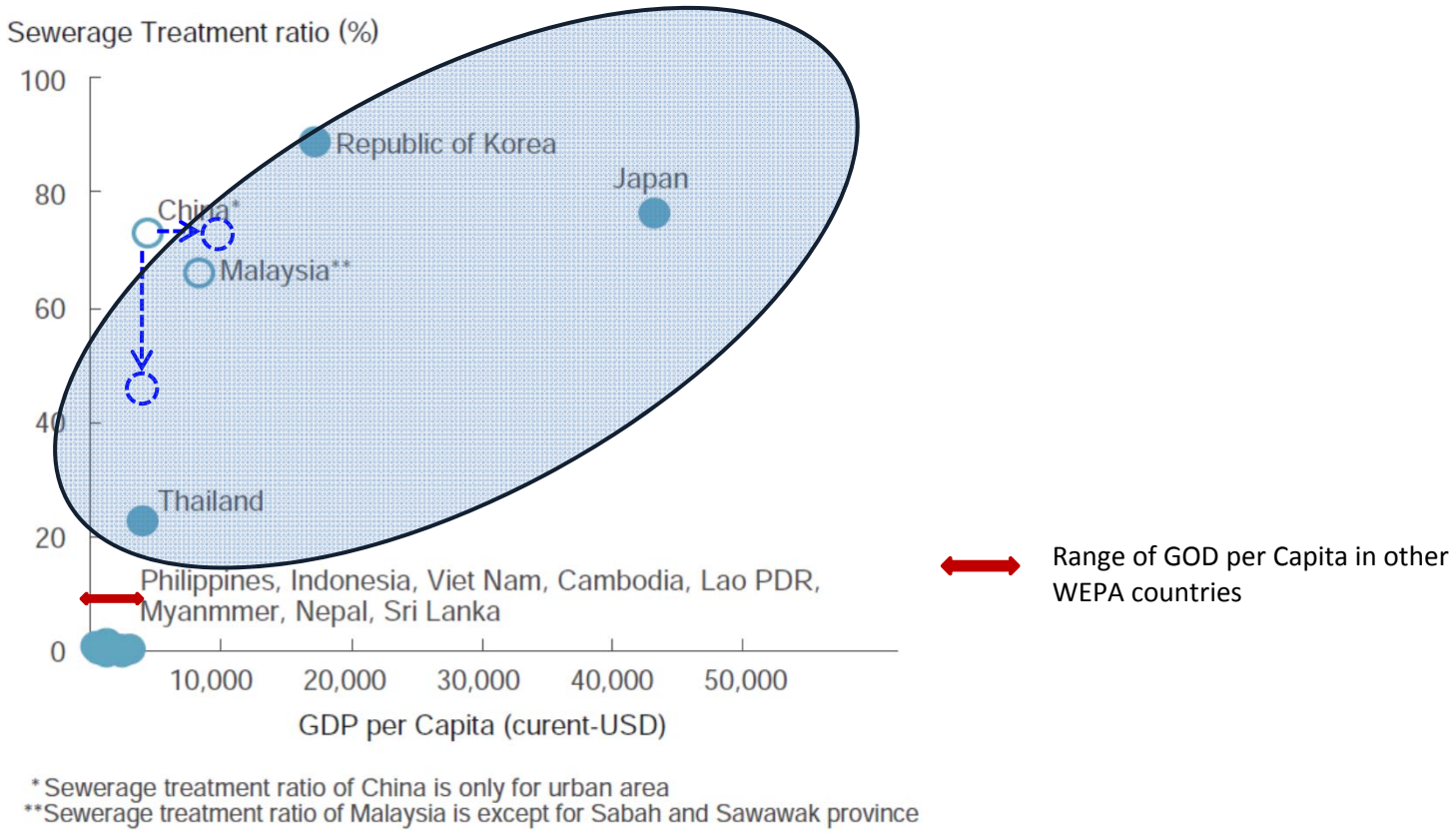


Cost of Domestic Wastewater Treatment



Source : Human Development Report 2006, UNDP

Relationship between Sewerage Treatment Coverage Ratio and Economic Situation



*Sewerage treatment ratio of China is only for urban area
**Sewerage treatment ratio of Malaysia is except for Sabah and Sawawak province

Relationship between Sewerage Treatment Coverage Ratio and GDP per Capita in WEPA Countries

Summary

- Domestic wastewater is major pollution source to water environment in many Asian countries. In the respect of water environmental conservation, it is important to reduce the pollution load from domestic sector.
- When we plan to develop domestic wastewater treatment in Asian countries, it is essential to consider social-economical situation in the region.