Institutional and Technical Transformations for Water Security in South Korea

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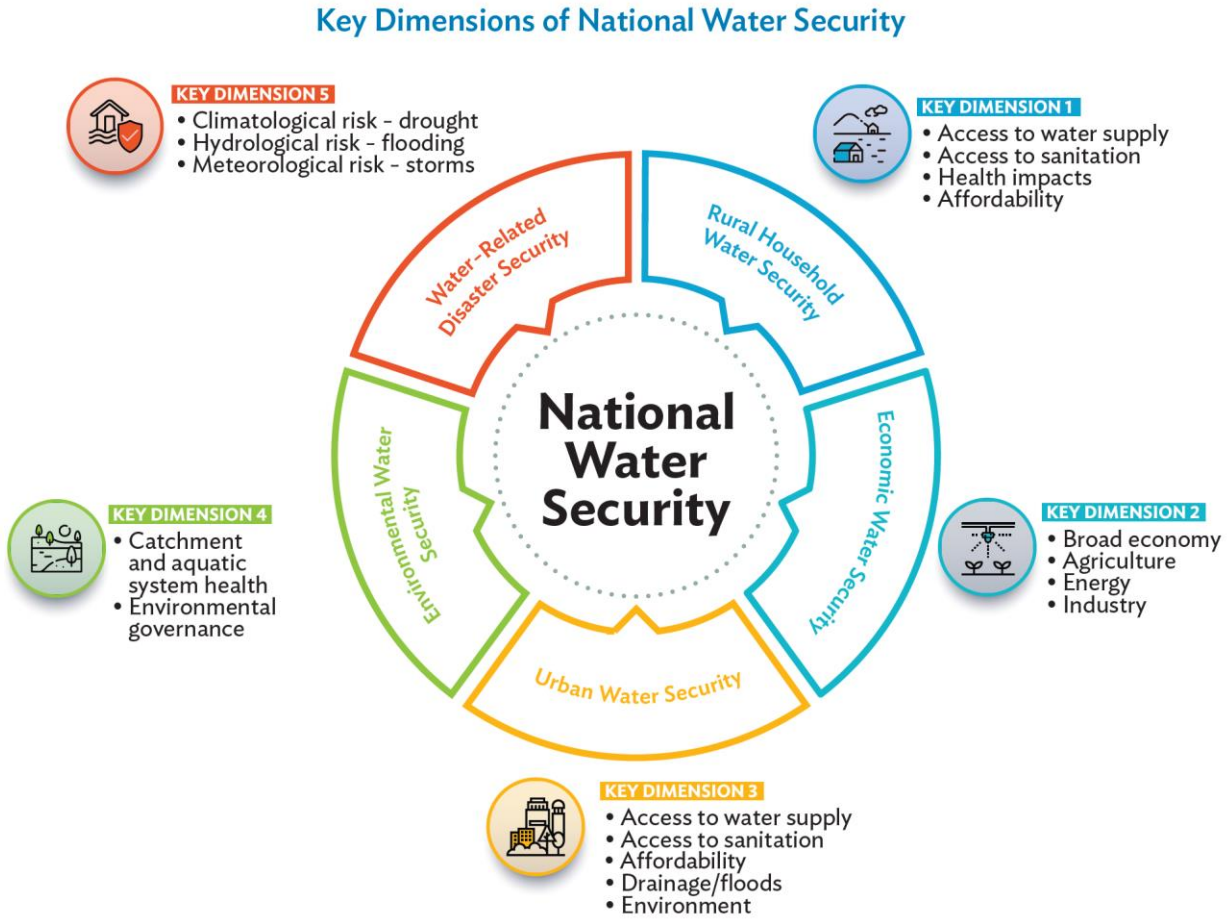
  - A useful framework to assess water security in Asia
  - Good practices for countries with water insecurity

Concept of Water Security

- Definition of UNESCO-IHP (2012)
  - The capacity of a population to safeguard sustainable access to adequate quantities of 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
- Major components
  - Adequate water supply, safeguarding a good quality of water, protection from water-related disasters and water-borne diseases
  - Ecosystem protection & the roles of sound water management for SD

Concept of Water Security

- *Asian Development Bank's 5 key dimensions for water security*



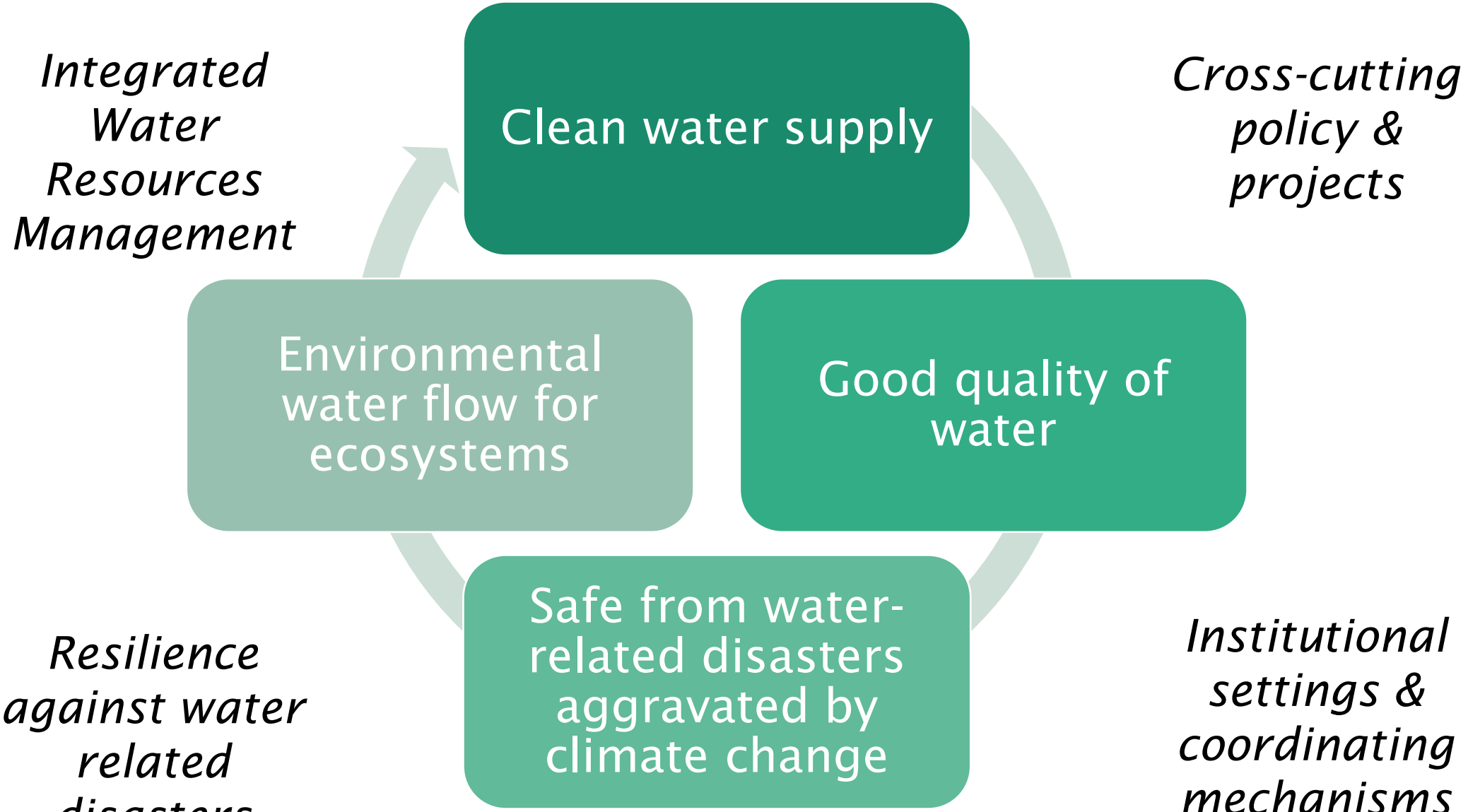
Source: ADB (2020)

1) *Household water security*: access to piped water supply & improved sanitation and hygiene
2) *Economic water security*: agricultural, industrial, energy and impacts on broad economy
3) *Urban water security*: water supply, wastewater treatment, drainage/flood & river health
4) *Environmental water security*: river health, hydrological alteration & environmental governance
5) *Resilience to water-related disasters*: floods & windstorms, droughts and storm surges & coastal floods

Concept of Water Security

- **Definition of water security in the Korean context**
  - To ensure access to clean water for human beings & ecosystems and cope with water related disasters
  - Recognition of water supply, water quality control, safety from water related disasters and water for ecosystems
- Major principles
  - IWRM, including river basin management
  - Cross-cutting policy & projects
  - Resilience against Climate Change induced water events
  - Institutional settings & coordinating mechanisms

Korea's Water Security

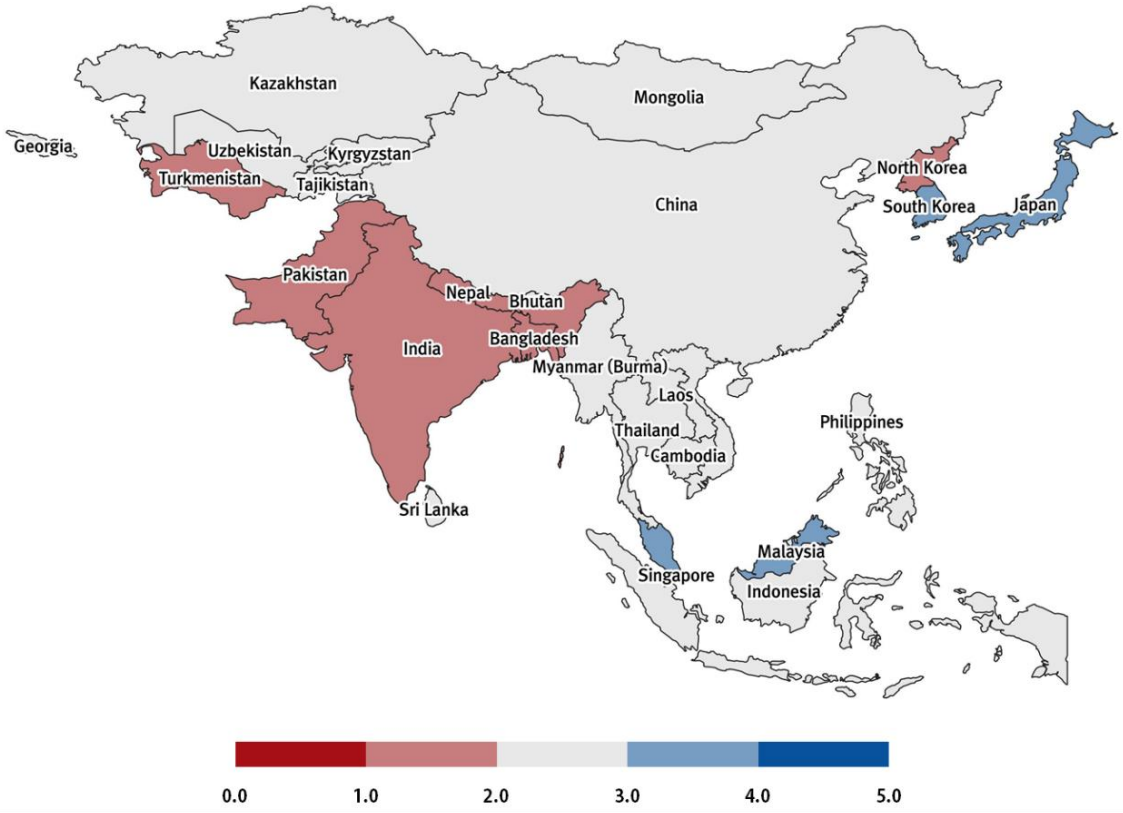


Assessment of Water Security for Asia

- **5 key areas**: 1) social equity; 2) economic efficiency; 3) resilience to water-related disasters; 4) environmental sustainability); and 5) government competence
- *Social equity*: basic water services for human dignity, i.e., clean water and adequate sanitation services
- *Economic efficiency*: effectiveness of water use in agriculture and industry
- *Resilience to water-related disasters*: to construct and operate dams, embankment or reservoirs and related systems and regulations
- *Environmental sustainability*: to restore water-related ecosystems and promote economic regulations such as burdening environmental costs for pollutants and paying for ecosystems.
- *Government's competency*: strengthening institutional aspects, e.g., water resources planning and management, institutions, and organizations, and ensuring democratic political decisions, the progress of policy establishment and enforcement, and a social system

Water Security Assessment Framework

Assessment Result of Water Security Index in Asia

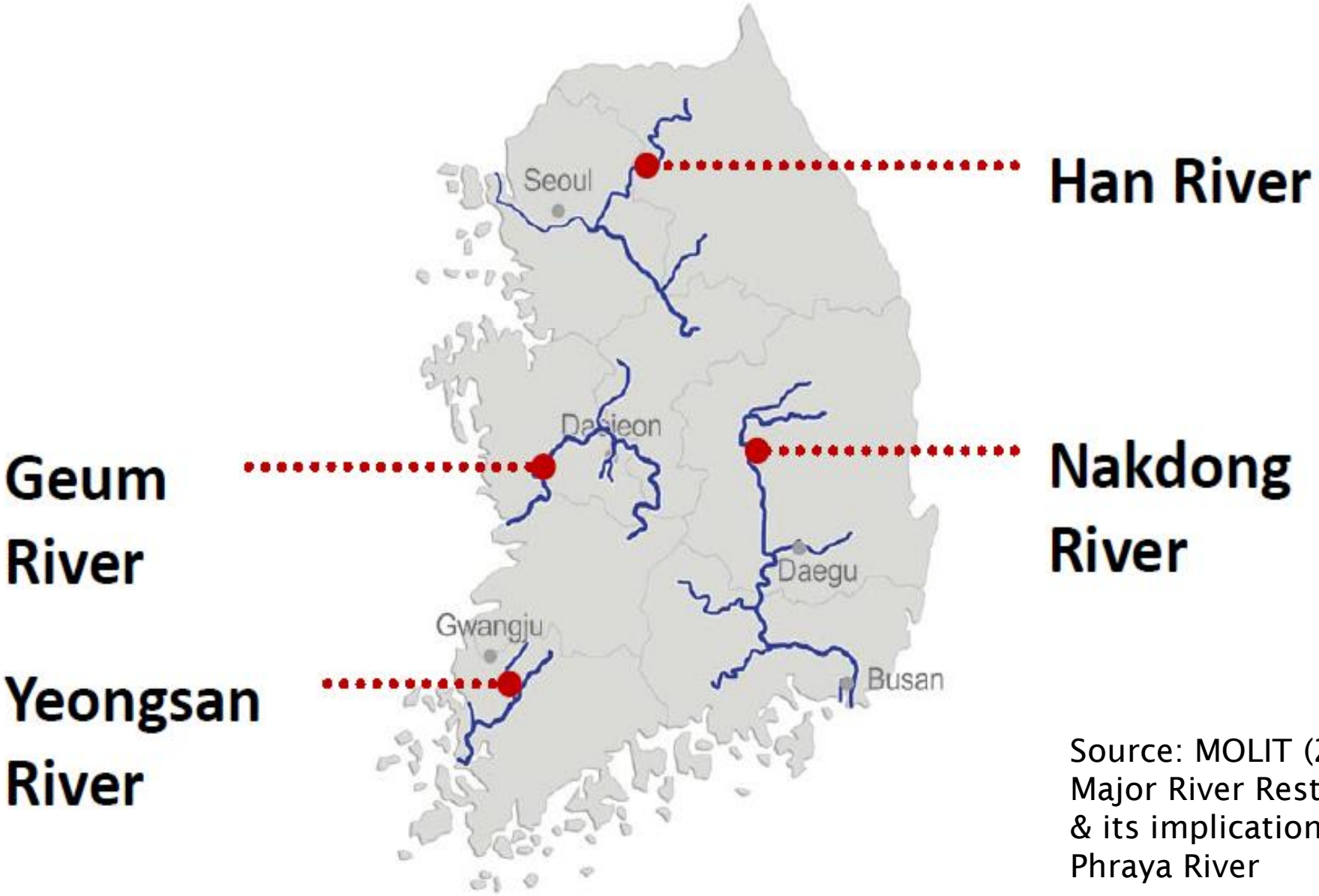


Nations	Core Area 1	Core Area 2	Core Area 3	Core Area 4	Core Area 5	Result
Bangladesh	2.0	1.3	2.2	1.0	2.0	1.7
Bhutan	3.8	1.3	2.5	3.0	3.7	2.9
Brunei Darussalam	3.3	1.0	2.5	3.0	3.7	2.7
Cambodia	2.3	2.7	2.7	2.0	2.2	2.4
China	3.0	2.0	3.0	2.0	2.8	2.6
Georgia	3.5	1.0	3.3	1.5	3.5	2.6
India	1.5	1.0	2.3	1.0	2.8	1.7
Indonesia	2.0	1.3	2.0	3.0	2.8	2.2
Japan	4.0	3.3	2.8	1.5	4.3	3.2
Kazakhstan	3.8	1.3	3.0	2.0	2.7	2.6
Kyrgyzstan	3.8	0.7	4.0	2.0	2.3	2.6
Laos	3.0	1.0	3.2	3.0	2.0	2.4
Malaysia	4.0	2.7	2.5	3.0	3.5	3.1
Mongolia	2.0	1.7	2.8	3.5	3.2	2.6
Myanmar	2.8	1.0	2.0	3.0	2.0	2.2
Nepal	1.8	1.3	2.5	2.0	2.3	2.0
North Korea	3.0	0.0	3.3	1.5	1.3	1.8
Pakistan	2.0	1.3	2.3	1.0	1.8	1.7
Philippines	2.5	1.0	2.2	2.0	2.7	2.1
Singapore	4.0	2.7	2.5	-	4.7	2.8
South Korea	4.0	3.3	3.0	1.0	4.0	3.1
Sri Lanka	3.0	1.0	3.2	1.0	3.0	2.2
Tajikistan	3.3	1.0	3.5	2.5	1.8	2.4
Thailand	3.5	1.7	3.2	1.0	2.7	2.4
Timor-Leste	2.3	1.0	2.5	2.0	2.5	2.1
Turkmenistan	2.3	0.3	3.5	2.0	1.8	2.0
Uzbekistan	3.5	0.3	3.5	2.0	2.0	2.3
Viet Nam	2.5	0.7	3.0	2.0	2.8	2.2

Water Sector Reform 2018 in Korea

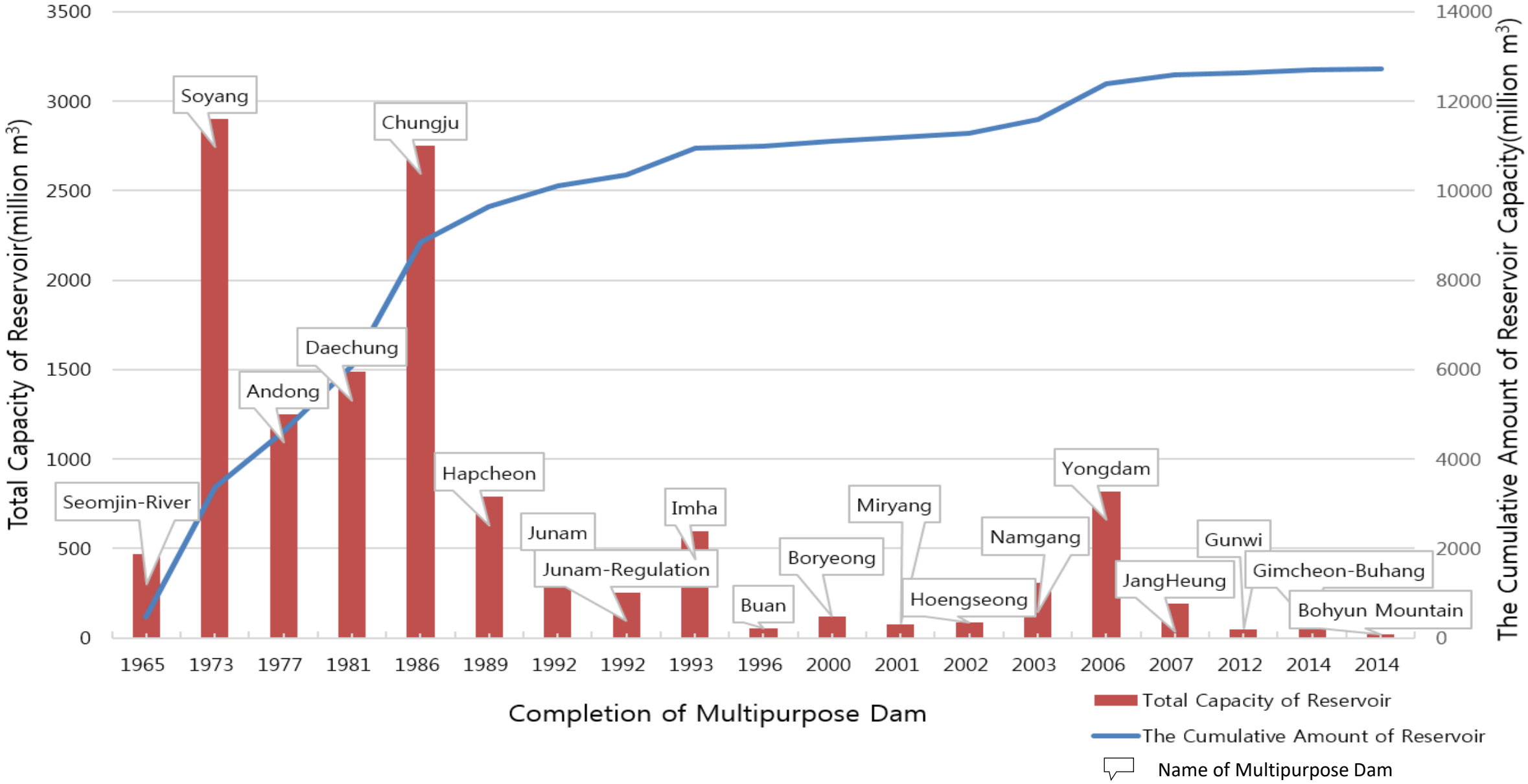
- Overview of water resources management
- Large dams (multi-purpose): 1) water supply for industries; 2) flood prevention (typhoons); and 3) hydropower ➔ 20 multi-purpose dams
- 17,000 dams for irrigation as of 2018
- Multi-regional water supply systems
- Water quality control in the Four Major Rivers (Han, Geum, Nakdong, Youngsan-Sumjin)
- More attention to ecosystem services since the mid-1990s after phenol discharge in the Nakdong River

Four Major Rivers in South Korea



Source: MOLIT (2011) The Four Major River Restoration Project & its implications to the Chao Phraya River

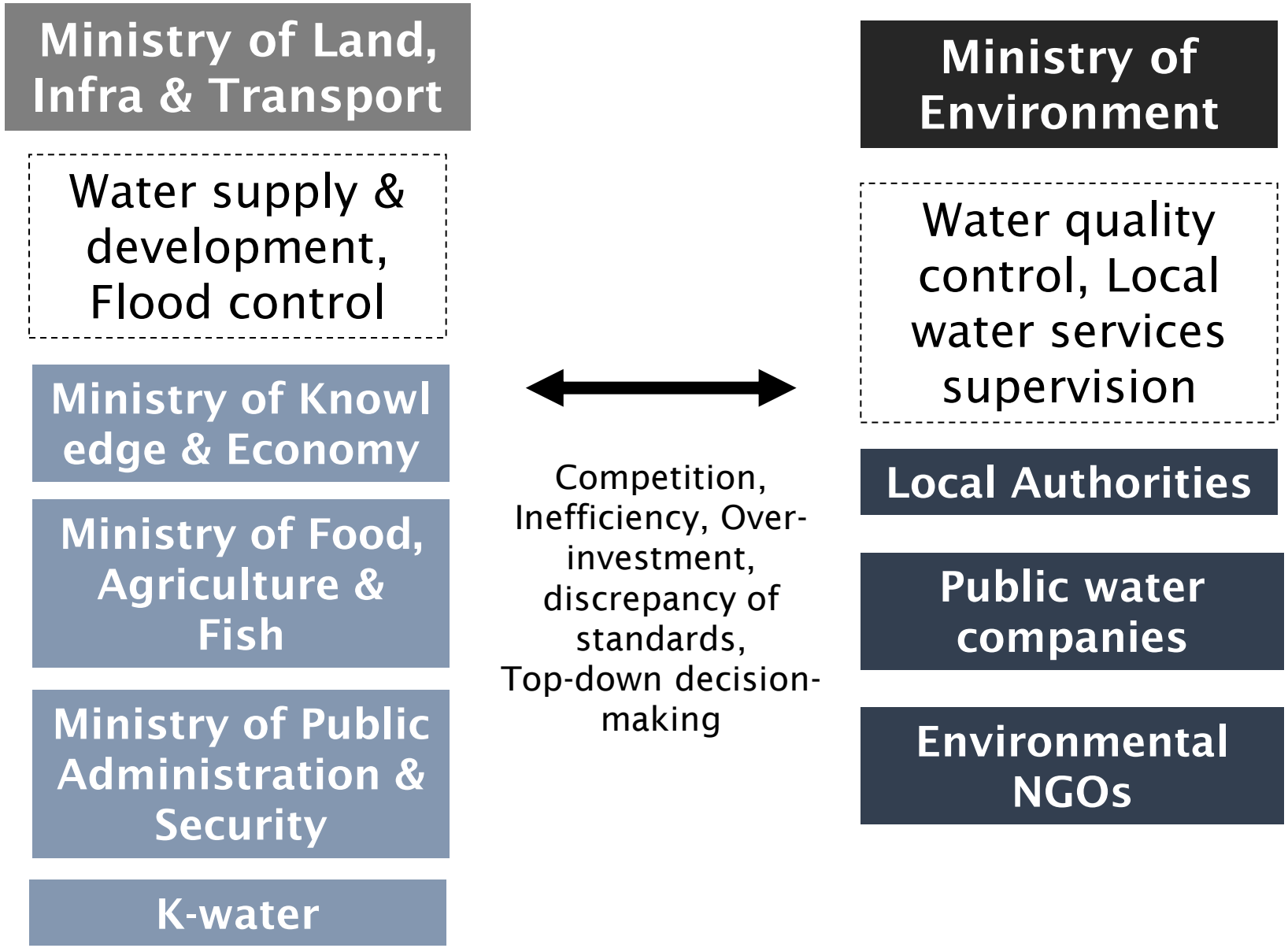
Multi-Purpose Dams: Total Capacity of Reservoir



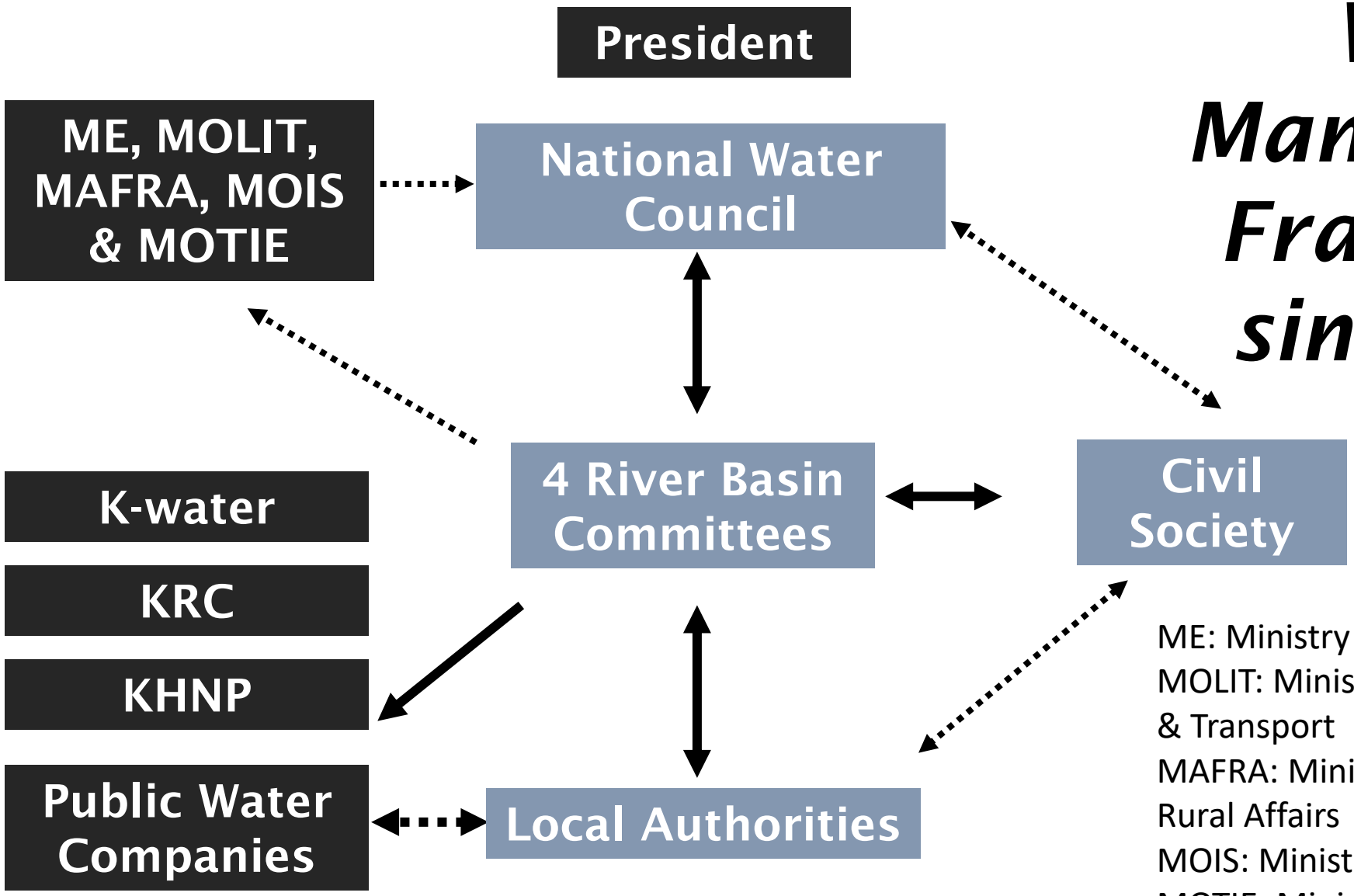
Multi-Purpose Dams

River Basin	Multipurpose Dam	Basin Area (km^2)	Data		Total Capacity of Reservoir (million ㎥)	Active Capacity of Reservoir (million ㎥)	Installed Capacity of Power station (MW)	Enterprise Effect		Construction Period
			Height (m)	Length (m)				Flood Control (million ㎥)	Water Supply (million ㎥/year)	
Han-River	Soyang	2,703	123	530	2,900	1,900	200	500	1,213	"67-"73
	Chungju	6,648	97.5	447	2,750	1,789	412	616	3,380	"78-"86
	Hoengseong	209	48.5	205	86.9	73.4	1.3	9.5	119.5	"90-"02
Nakdong-River	Andong	1,584	83	612	1,248	1,000	91.5	110	926	"71-"77
	Imha	1,361	73	515	595	424	51.06	80	591.6	"84-"93
	Hapcheon	925	96	472	790	560	101.2	80	599	"82-"89
	Namgang	2,285	34	1,126	309.2	299.7	14	269.8	573.3	"87-"03
	Miryang	95.4	89	535	73.6	69.8	1.3	6	73	"90-"02
	Gunwi	87.5	45	390	48.7	40.1	0.5	3.1	38.3	"00-"12
	Gimcheon-Buhang	82.0	64	472	54.3	42.6	0.6	12.3	36.3	"02-"14
	Bohyun Mountain	32.61	58.5	250	22.11	17.88	1.414	3.49	14.87	"10-"14
Guem-River	Daechung	4,134	72	495	1,490	790	90.8	250	1,649	"75-"81
	Yongdam	930	70	498	815	672	26.2	137	650.43	"90-"06
Seomjin-River	Seomjin-River	763	64	344.2	466	370	34.8	32	350	"61-"65
	Junam	1,010	58	330	457	352	1.44	60	270.1	"84-"92
	Junam Regulation	134.6	99.9	562.6	250	210	22.5	20	218.7	"84-"92
Others	Buan	59	50	282	50.3	35.6	0.193	9.3	35.1	"90-"96
	Boryeong	163.6	50	291	116.9	108.7	0.701	10	106.6	"90-"00
	Jangheung	193	53	403	191	171	0.8	8	127.8	"96-"07

Water Management Framework prior to 2018



Water Management Framework since 2018



ME: Ministry of Environment
MOLIT: Ministry of Land, Infrastructure & Transport
MAFRA: Ministry of Agriculture, Food & Rural Affairs
MOIS: Ministry of the Interior & Safety
MOTIE: Ministry of Trade, Industry & Energy

Water Sector Reform 2018 in Korea

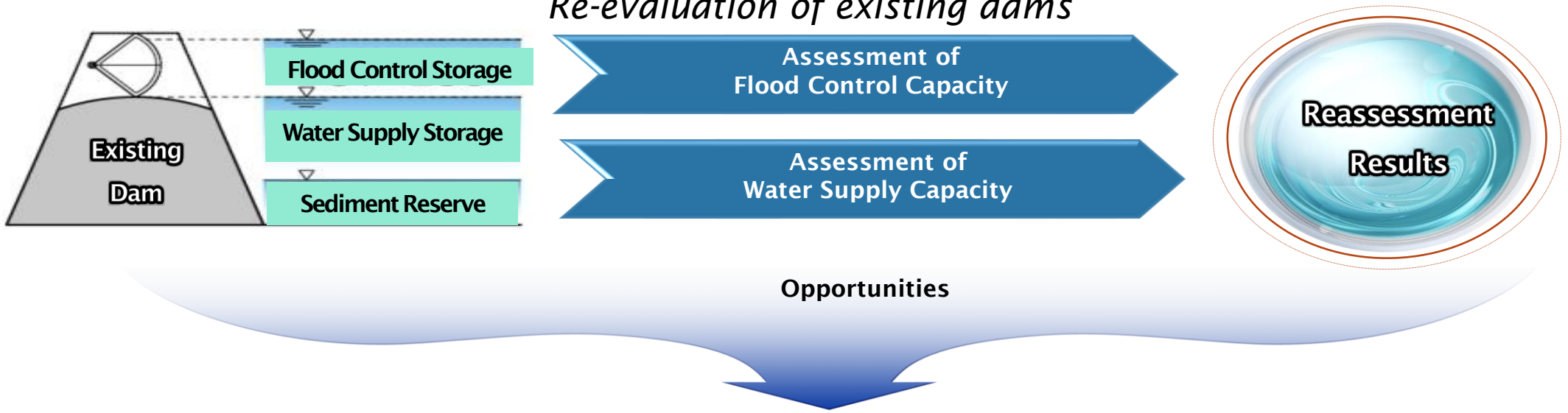
- Basic Water Law 2018
  - Principles: IWRM, River Basin Management, Stakeholder Participation, Demand Management
  - National Water Council & River Basin Committees
  - IWRM Plan & River Basin Plans
- Empowerment of the Ministry of Environment
  - Reflection of growth-centered water policy
  - More mandate shifted from MOLIT to ME due to political bargaining
  - Voices accepted in favor of fundamental environmentalism

Water Sector Reform 2018 in Korea

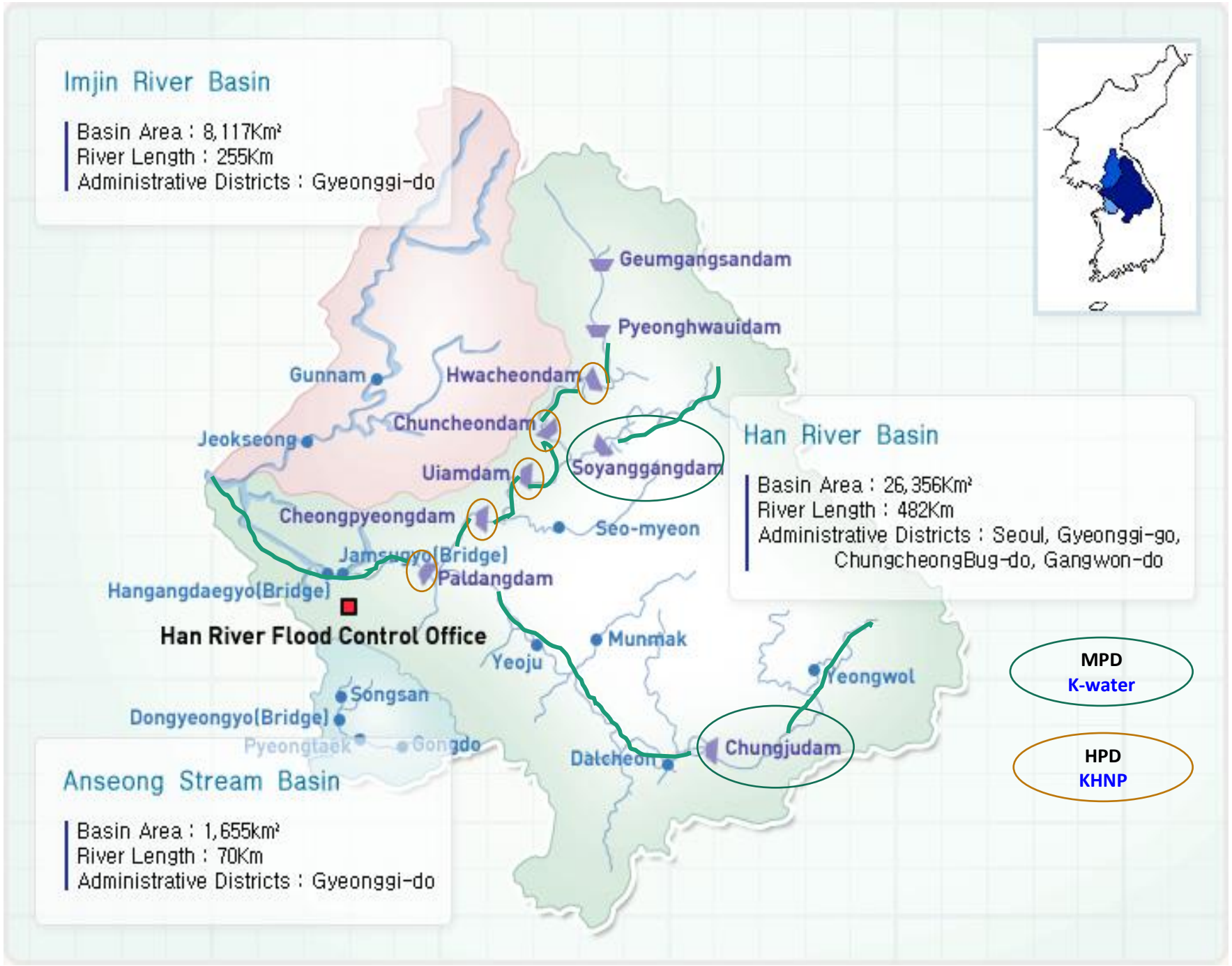
- Challenges
  - Basic water law as a foundation for a further institutional reform
  - Launch of river basin management & stakeholder participation
  - River basin management as a basic unit for water resources management, not administrative boundaries
  - More responsibilities given to one ministry → more coherent & efficient planning & management expected
  - More emphasis placed on eco-friendly policies instead of construction & development-oriented policies

Integration of Dam Operation in Korea

Re-evaluation of existing dams



- Temporary use of storage allocated for future conservation purposes and sediment
- Seasonal use of flood control space during the dry season and for the multi use space
- Reallocation of flood control or water supply space
- Modification of reservoir operation (hydropower) plan and the method of regulation
- Elevating existing dams for an increase of storage capacity
- Use of water supply storage not under contract

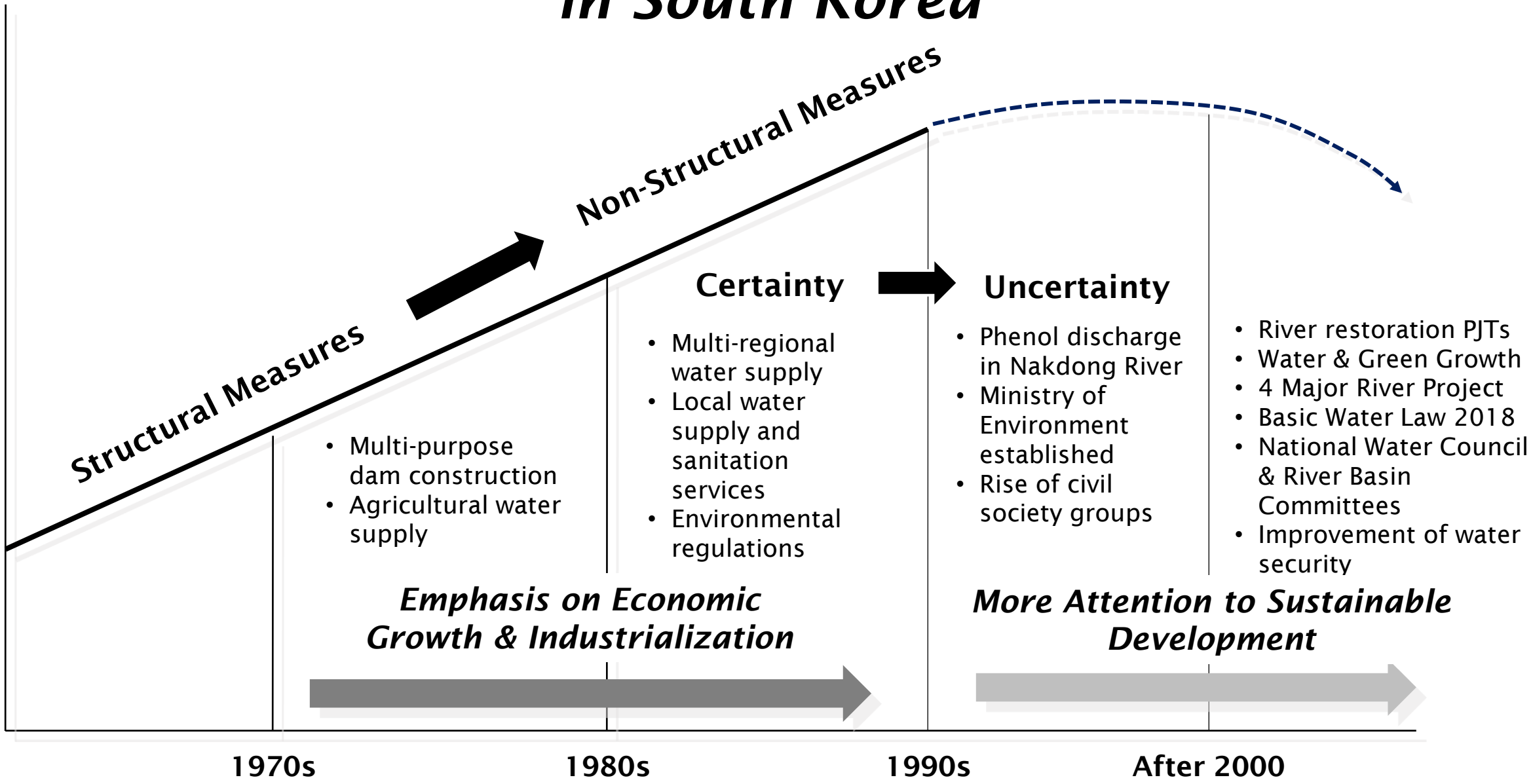


Integrated Hydropower Dam Operation in the Han River

Towards the integrated dam operation in Korea

Issues	Progress	Challenges ahead
Assessment	Adequate & effective assessment of dams in the Han River Basin	• Socio-economic aspects • Technical aspect: single/joint operation
Management	Adequate & effective management pl ans & processes	• Transfer of dam ownership • Consignment management
Stakeholders Engagement	Effective stakeholder engagement	• Communication & consultation for good governance
Expected Outcomes	Socio-economic & environmental imp acts avoided, minimized & mitigated without significant gaps between reg ions	• Increased flood control capacity • Increased water supply capacity • Increased hydropower generation

Trajectory of Water Resources Management in South Korea



Conclusions

- Towards a water-secure society
  - Various dimensions of water resources management
  - Water security assessment ➔ disclosing the risk of water insecurity & unlocking the potential for int'l cooperation, i.e., in Asia & the Pacific
- Good practices of South Korea
  - Water sector reform: the institutional path to water security
  - The integrated approach to dam operation ➔ linking dams with dams for sustainability in river basins