

Eco-Efficient Water Infrastructure: Concept & Application



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Introduction

□ Purpose

- Conceptualization of eco-efficiency in water infrastructure
 - Benchmarking cases
 - Practicability – policy framework & actions
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Definition of Eco-Efficiency

‘The delivery of competitively priced goods & services while reducing ecological impact in line with the earth’s carrying capacity’(WBCSD 2000)

$$\text{Eco-efficiency} = \frac{\text{Product/Service Value}}{\text{Environmental influence}}$$

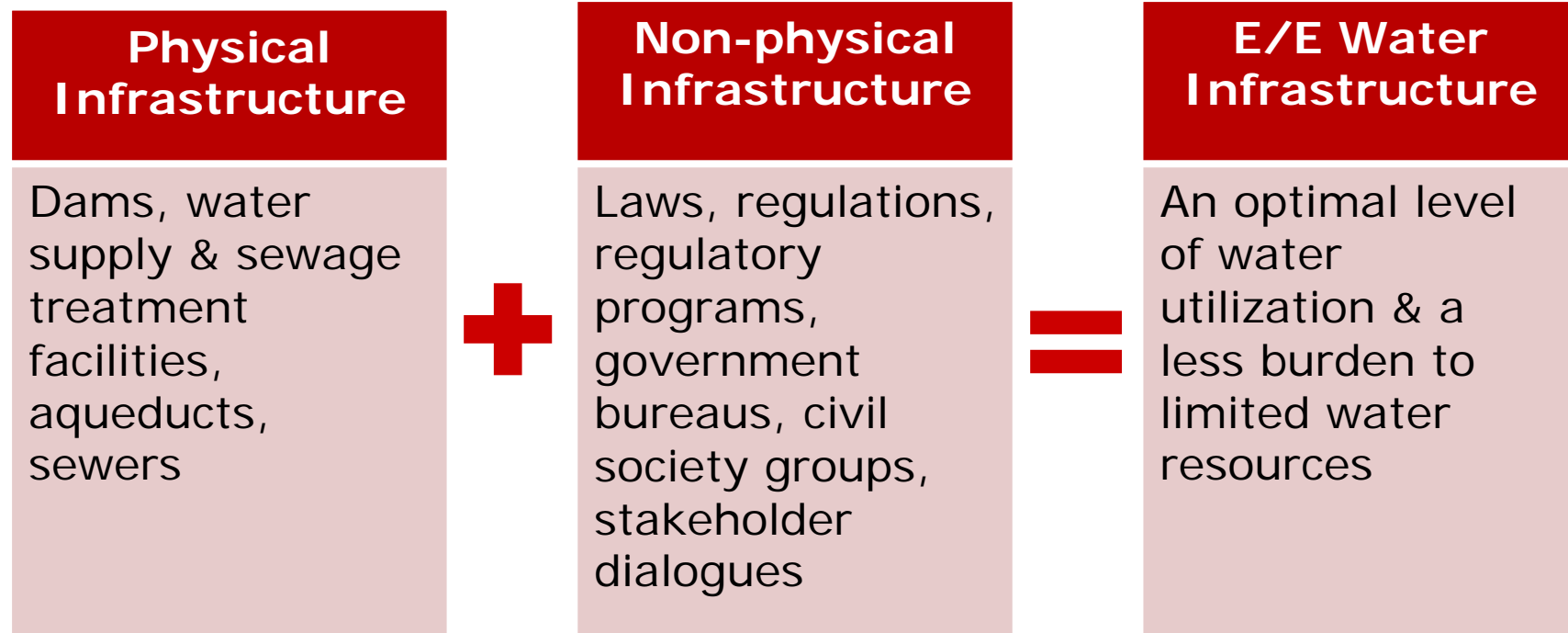
Conceptualization

- Application in Industries
 - To maximize productivity with less impacts on the environment
 - Monitoring of material & energy flows of stocks & life cycle thinking
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Conceptualization

- Eco-Efficient Water Infrastructure
 - Application of E/E to water infrastructure, not simple
 - Infrastructure – physical & non-physical
 - Definition of E/E water infrastructure
 - Sustainable processes of design, construction, operation & maintenance with less environmental impacts
 - Institutional & policy arrangements
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Eco-Efficient Water Infrastructure



Application – Case Studies

- Republic of Korea
 - Good achievement in water resources development & water quality control
 - 16 multi-purpose dams - criticism
 - Regulations for sustainable dam construction & operation
 - Residential councils, eco-parks, wild animal passages
 - Physical (dams) & non-physical (laws)
-

Application – Case Studies

□ Singapore

- Lack of freshwater – ‘four taps’
 - NEWater – treated used water, 15% of total water supply now → 30% by 2010
 - Water pricing reform – no subsidies for households, consumption level down 11% between 1995 & 2004
 - Physical (NEWater) & non-physical (water pricing reform)
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Practicability

- Physical Infrastructure
 - Introduction of E/E indicators
 - Main focus in the region so far
 - Non-Physical Infrastructure
 - Sanctioned discourse
 - IWRM – Political Process
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Definition of IWRM

‘A process which promotes the coordinated development and management of water, land and related resources, in order *to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems* (GWP 2000)’

IWRM

- IWRM – political process
 - Allocation of water, financial resources and implementation of environmental goals
 - Political willingness crucial
 - Integrating what?
 - Natural systems
 - Human systems
-

Integrating Natural & Human Systems

Natural System	Human System
Freshwater & coastal zone	All policies considering impacts on water
Land & water resources	Integrated with economic, food, energy policies
Surface & ground water	Stakeholder participation in policy planning & decision process
Quality & quantity	Water & wastewater services
Upstream & downstream	Public-private partnerships

Policy Approaches

Policy Approaches	Actions
Political Willingness	Political stability
Legal, regulatory & administrative settings	Basic Water Law Adequate legislations & regulatory programs Cross-sectoral collaboration River Basin Management
Financial & Economic Practices	Rational water tariffs, water savings, full-cost recovery
Stakeholder Participation	Institutionalization of stakeholder participation in planning, policy-making
Private Sector Involvement	Enhancement of service quality

Policy Framework for E/E Water Infrastructure

Political Willingness

Legal, Regulatory &
Administrative Settings

Financial & Economic Practices

Stakeholder Participation

Private Sector Involvement



**Eco-Efficient
Water
Infrastructure**

Conclusion

- Eco-efficiency
 - Useful concept to complement SD
 - More value with less impact
 - Eco-efficient water infrastructure
 - Physical & non-physical infrastructure
 - Benchmarking cases – Korea & Singapore
 - Policy framework
 - Institutional dimension & IWRM
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