Improving the Energy-Water-Material Nexus
toward sustainable future in East Asia

Water Use Charge System to Preserve Water Environment of Korea: 15 year's Achievement and Future Challenge

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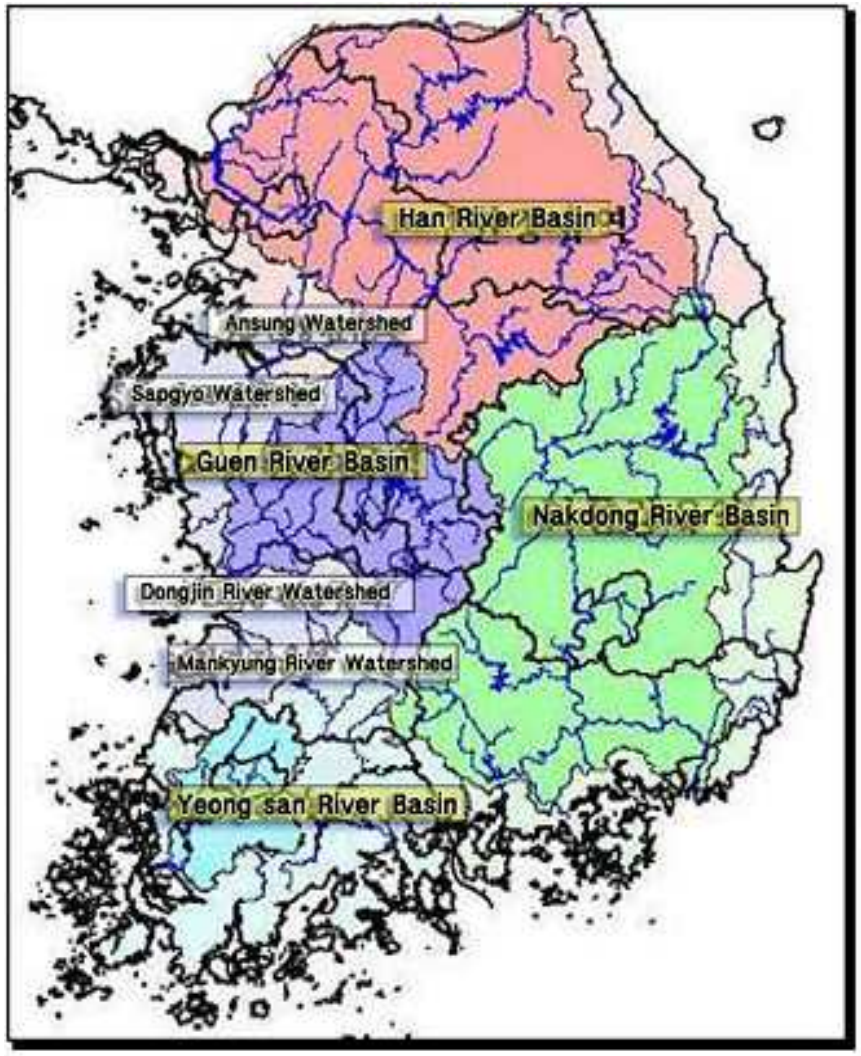
Contents

1 Water Management Policies in Korea

1950s-1960s	1970s-1980s	1990s~
Water Resource Development for Water Use	**Water Resource Development for Water Use & Flood Control**	**Water Quality Conservation, Water Use & Flood Control**
· Lack of drinking water in islands · Drought in south area('67-8) · Flood Damage ('59 Typhoon Sara)	· Expansion of water supply · Flood Damage ('84, '87 disastrous floods)	· Increase of water pollution · Increased distrust on tap water
· Reservoirs for irrigation · Dams for hydro-power generation · Investigation of 4 river basins	· Large scale multipurpose dams · Wide area water supply system · River improvement projects	· Water resource management and flood control in watershed · Middle scale dams
· River Act('61)	· River maintenance master plan	· Long-term comprehensive plan for water resource mgt. · Water environment conservation act('91)

1 Water Management Policies in Korea

Water Quality Issues in River Basins



'60s~

- Increase and diversification of water pollution with economic growth and industrialization

→ Water pollution in retention area

'80s~

- Increase of pollution discharge with economic growth,
  Lack of pollution treatment facility

  → heavy pollution

'90s~

- Improvement of water quality

- Huge water pollution accidents since 1991

→ Establishment of sewage and wastewater treatment facilities

→ Special acts and countermeasures for water environment management in 4 major rivers

Changes in Water Quality Management Policy in Korea (late 1980's)

■ Difficulties in Water Quality Management

- Limitation of end-of-pipe approaches
- Difficulties in pollution source control
- Resident's resistance on tighter regulations
- Upstream-downstream conflicts on environmental regulation

⇨ Comprehensive Water Management Measures for the Four Major River Basins

(1989) Water pollution of tap water

(1990) THM, (1991) Phenol pollution accident in Nakdong river

(1994) Organic solvent pollution accident in Nakdong river

Demand for Establishing Countermeasures

Changes in Water Quality Management Policy

2 Water Use Charge – Background

Reforming Water Quality Management Schemes (1998~2002)

Conventional Policy by Water Quality Preservation Act
Special Measure Zone
Water Quality Criteria & Effluent Standard
Emission Charge
Support for Water Source Protection Area

Watershed-based Policy by Special Acts
Riparian Buffer Zone Land Purchase System
Total Pollution Load Management System
Water Use Charge TPL Excess Charge
· Financial Supports for Water Source Area · Support for Civilian Water Quality Monitoring Activities · River Basin Management Committee

Reforming Water Quality Management Schemes (1998~2002)

■ Special Measures for Four Major Rivers

* Strong resistance of residents & regional government / conflict between up- and down-stream region

⇨ Approach for 'agreement' with the community through more than 420 public hearings, explanatory meetings and panels for convincing the residents of its need for the system

Special Measures

- Reaching a compromise should be based on the agreements between interest groups (esp. upper and down stream) → Community culture based on enhanced community participation
- '**Water-use charge**' base on user pay principle for reasonable cost-sharing and secure funds for watershed management
- 'Butter zone system' & TPLMS as an effective measures for watershed mgt.
- 'Basin management committee' as a decision-making body / 'watershed environment office' as an executive body

2 Water Use Charge – Background

Introduction of Water Use Charge

Background

- For improving the availability of clean and safe source water for water supply, the area around the water abstraction sources can be designated as special management zone intended to prevent soil erosion and contamination of water sources by human activity

[Designated Zones for WSP]

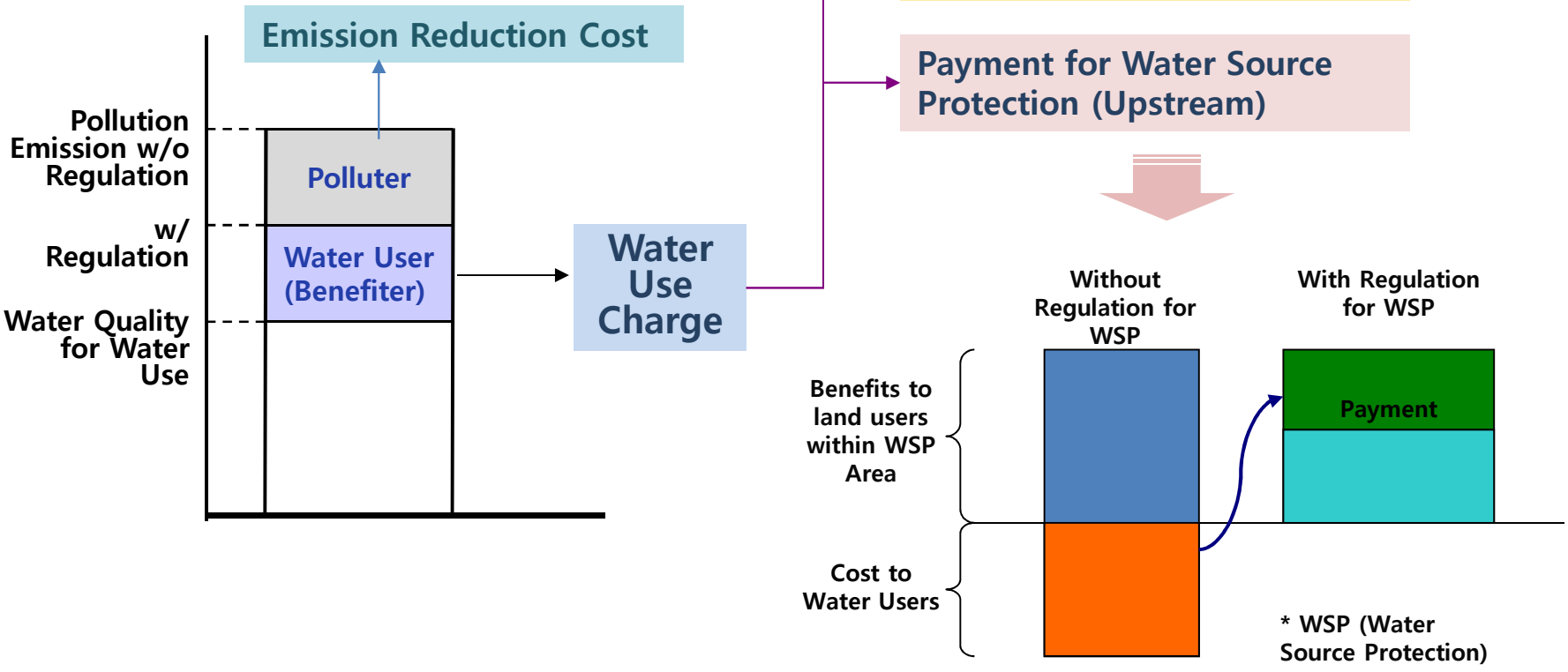
Protection Areas	Regulation on pollution discharge and activities
Special Measure Zones	Restrictions in land use and facilities construction
Restricted Areas	Restrict the construction of industrial facilities that discharge any of 17 contaminants
Buffer Zones	Riparian buffer zone

- While identifying protected zones is essential for water source protection, their implementation cause burden to local managers and citizens. Local government (for fear of constraining economic development in their district) and individual citizens (who view the zones as fettering their private property rights) at times oppose the imposition of these zones

The introduction of a metric-based surcharge for piped water, coupled with environmental regulations, aims to resolve these conflicts (compensate the burden)

Cost-Sharing for Water Resource Management and Water Use Charge

▪ **Polluter – Benefiter Cost-Sharing for Water Quality Management**



▪ **PES for Water Source Protection**

3 Water Use Charge System

Water Use Charge

Introduction of surcharge for piped water: **Water Use Charge (1999)**

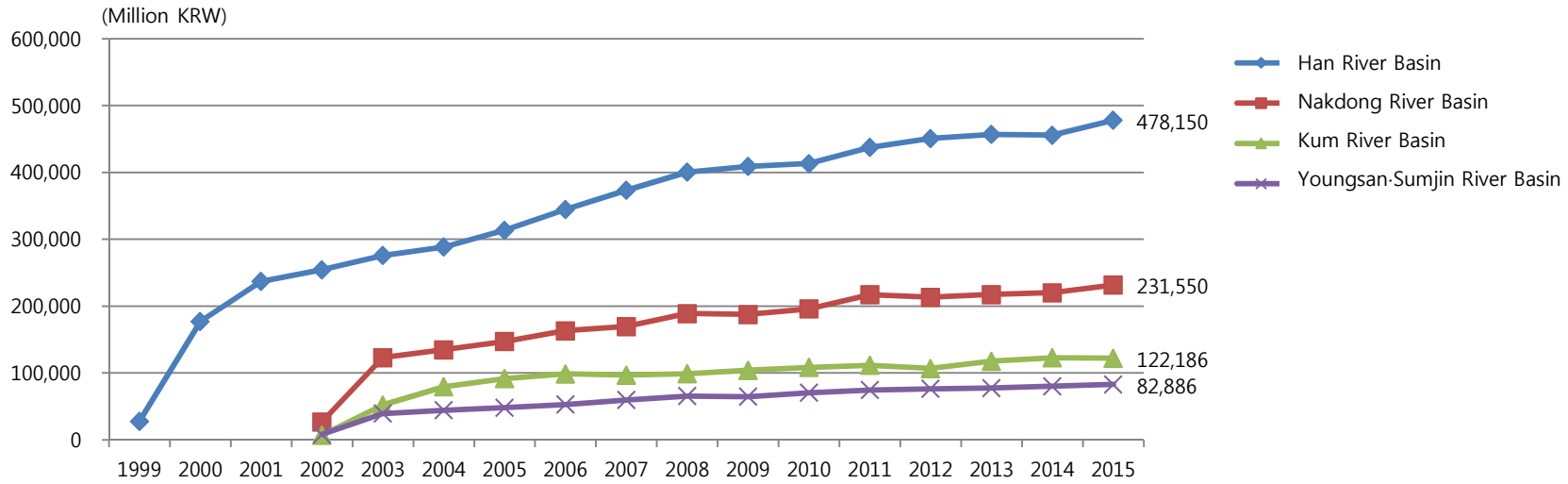
- Charge is levied on all end-user of water along the rivers in proportion to the amount of water use
- Charge levels are different in each river basin
- Setting of charge level is based on the fund requirement for protecting water source and relevant water quality management activities

⇨ Watershed Management Committee

(KRW/m^3)

Year	'99-'00	'01	'02	'03	'04	'05	'06	'07	'08-'10	'11-'14	'15
Han River Basin	80	110		120		130	140	150	160	170	
Nakdong River Basin	-		100		110	120	140		150	160	170
Kum River Basin	-		110	120	130	140	150	160			
Youngsan / Sumjin River Basin	-		110	120	130	140	150	160	170		

Watershed Management Fund



• **Water Use Charge**

(Million KRW)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Annual Increasing Rate
Han River Basin	27,675	175,358	230,688	246,741	268,644	283,731	304,326	337,907	362,800	386,266	397,652	403,584	430,860	443,187	444,701	443,462	457,664	6.8%
Nakdong River Basin				26,827	120,738	130,215	139,979	158,546	166,813	186,040	184,527	193,799	212,033	210,872	211,808	214,429	223,877	5.4%
Kum River Basin				7,011	44,658	52,457	60,270	68,724	75,972	80,820	83,728	89,748	94,637	99,184	101,932	102,600	105,766	7.6%
Youngsan·Sumjin River Basin				7,820	38,492	43,274	46,773	51,371	57,549	63,931	62,483	69,184	73,245	75,222	76,188	77,613	78,851	6.3%
Total	27,675	175,358	230,688	288,399	472,532	509,677	551,348	616,548	663,134	717,057	728,390	756,315	810,775	828,465	834,629	838,104	866,158	6.5%

Utilization of Fund from Charge

Water Use Charge

Watershed Management Fund

Projects and provisions for encouraging participation of residents and compensating the regulatory burden

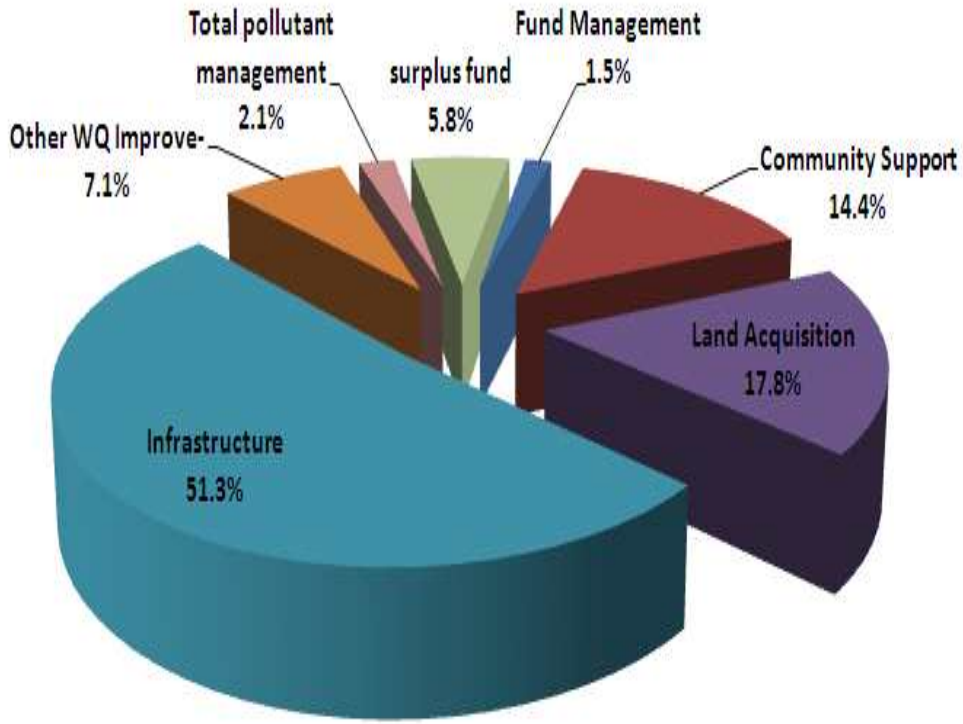
- **Community support project**
- **Support for vitalizing local economy**

Increased infrastructure investment in wastewater treatment and other expenditure for source water quality improvement

- **Purchasing of land for establishing 'buffer zone'**
- **Subsidies for wastewater treatment of water source protection area under strengthened regulation**
- **Supporting of various water quality management activities in water source protection area**

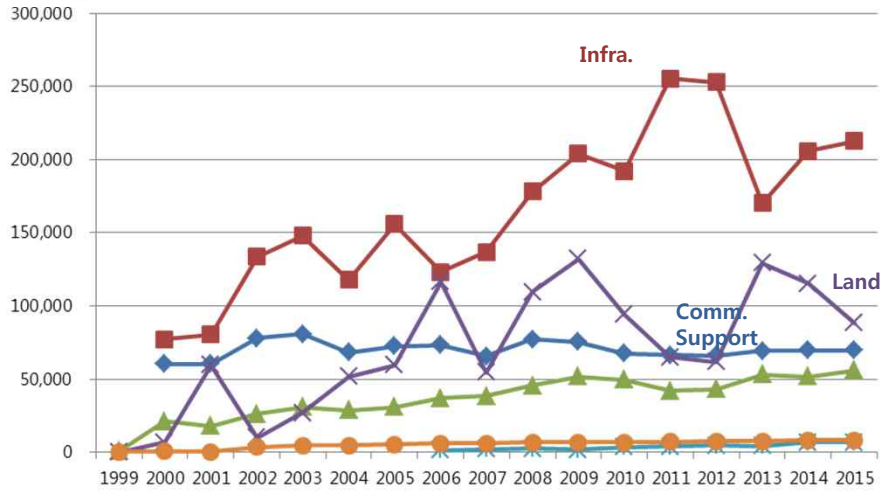
Expenditure from Watershed Management Fund

- Recent annual revenue came to the equivalent of 570 million Euro in one year, and roughly 50% of this was used for infrastructure and other water quality improvement projects, 18% on land acquisition (e.g. for example purchase of riparian zones for conservation purposes) and 15% on community support programs.

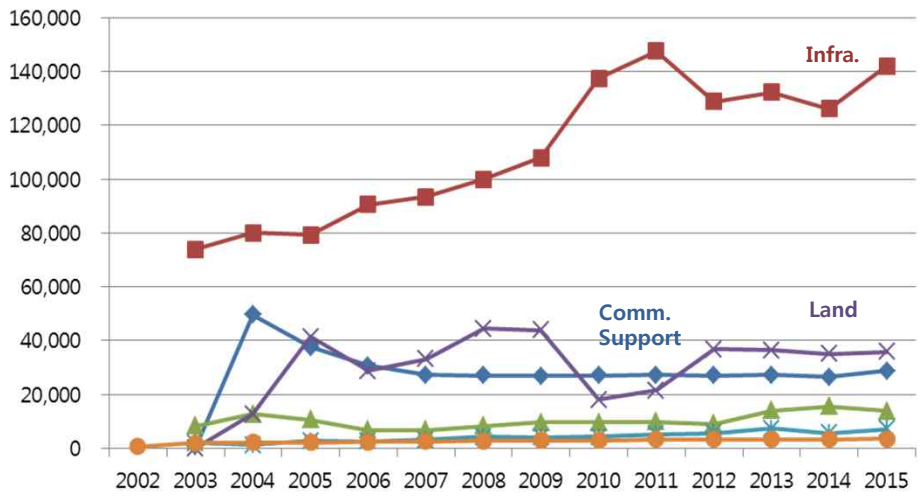


Expenditure from Watershed Management Fund

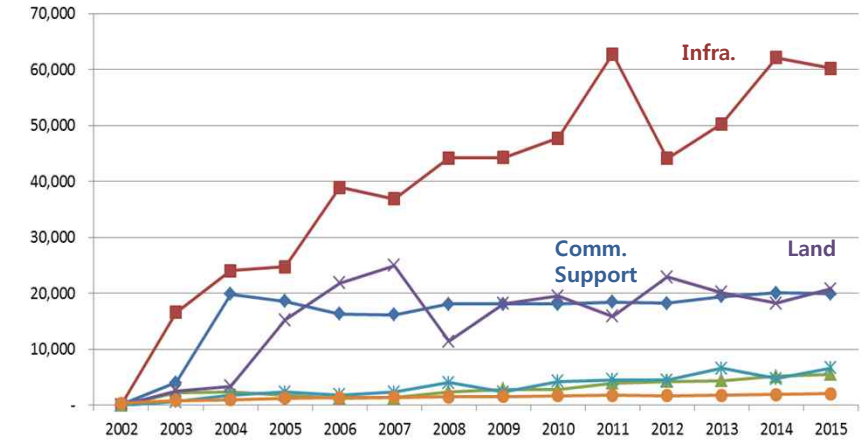
Han



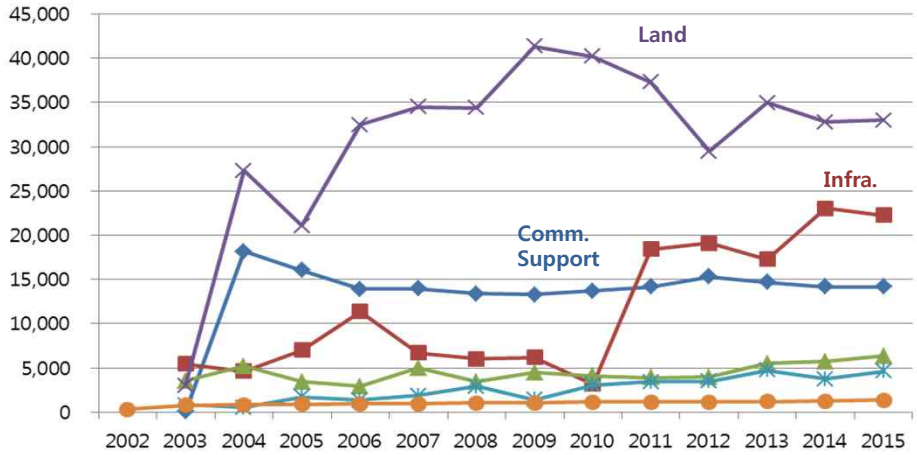
Nakdong



Kum



YS·SJ



4 Contribution of Watershed Management Fund

Contribution of WMF System

Community Support	**Compensation to the residents for the regulation of WSP areas**	· Help to resolve the conflict between the upstream and downstream residents · Enhance the regulatory compliance of water source mgt. area
Infrastructure	**Subsidies for wastewater treatment of WSP areas under strengthened regulations**	· Facilitating water quality mgt. in the WSP areas with financial vulnerability
Land Acquisition	**Purchasing of land for establishing 'buffer zones'**	· Ban the location of pollution sources in the effected area · Long-term effect of water quality improvement
Other Water Quality Improvement	**Support to various water quality mgt. activities in WSP areas**	· Encouraging flexible application of water quality mgt. tools or activities with changing needs

4 Contribution of Watershed Management Fund

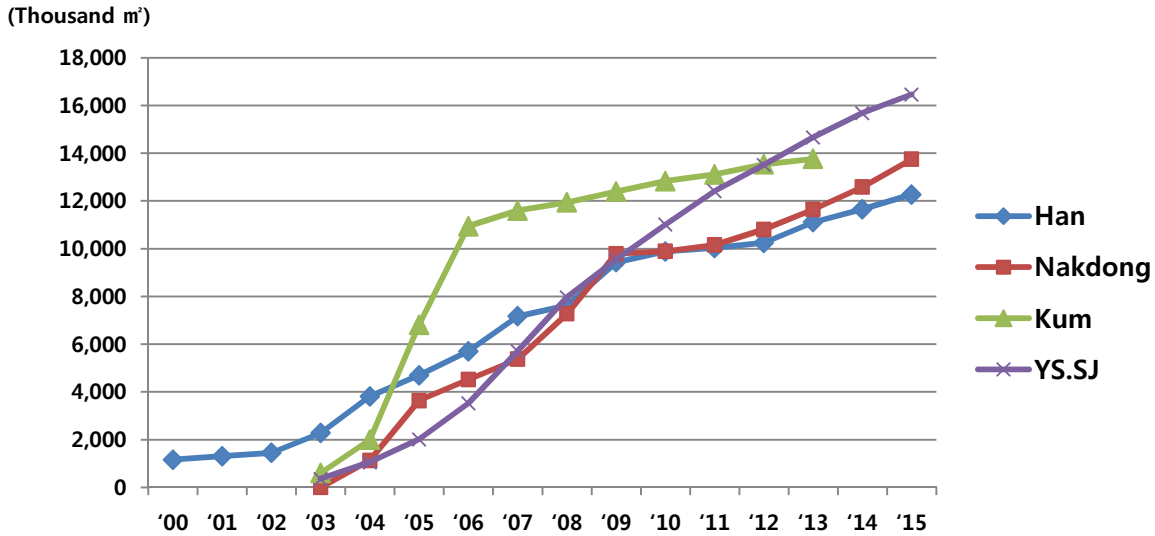
Contribution of WMF System

Increased Investment for Water Quality Mgt. in the WSP Areas

Sewage Treatment Rate in the WSP Area

	1999	2002		2015
Han	37.0	→		79.7
Nakdong		41.7	→	73.5
Kum		29.9	→	72.7
Youngsan Somjin		40.5	→	73.3

Establishment of Riparian Buffer Zone



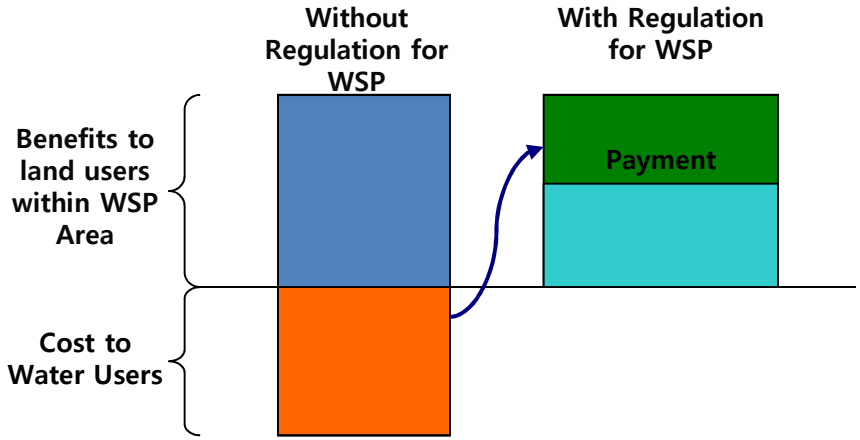
4 Contribution of Watershed Management Fund

Contribution of WMF System

Payment for Environmental Service

- **The revenues collected from downstream beneficiaries are used to compensate upstream residents for losses due to land use regulation with beneficial impacts on water sources**

Cooperative solution to the conflict between upstream and downstream residents under the consensus of a cost-sharing principle



5 Challenges and Issues in Watershed Management Fund

Implication and Challenges

- The water use charge system is both to collect revenue via a levy and to achieve a win–win situation for both upstream and downstream users through two major policy measures: investment for water quality management in water source protection area and providing subsidies to upstream residents to compensate for the losses imposed by environmental regulations.

- The case of water use charges in Korea indicates the possibility of a cooperative solution to the conflict between upstream and downstream residents under the consensus of a cost-sharing principle.

- The central government played a key role in resolving the conflict, aiming to both strengthen environmental regulations and provide a payment scheme for affected residents.

Challenges

- Imperfect / Asymmetric information on the benefit (water user) / cost (residents in regulated area) of water source protection.

⇨ Difficulties in the process of reaching consensus regarding water use charge and utilization of fund

5 Challenges and Issues in Watershed Management Fund

Challenges and Issues in Watershed Management Fund

Deviation of Fund Utilization

- Kum River Basin '06~
- YS·SJ River Basin '11~

Fund Utilization for Downstream Region (Infrastructure) → Non-relevant to water source protection

Increasing Demand of Fund Utilization for Downstream Region

Polluter-User Cost Sharing Issues

Infrastructure Subsidy
- Too much subsidy to polluter
- Users sharing the role of government (subsidy)

→ · Adverse effects from underpayment of polluters
→ · Non-acceptance of users for Cost-sharing

Utilization for Other Policy Purpose

Utilization for general policy purpose not directly related to water source protection

- Support for TPLM application, Subsidy for compliance to strengthened T-P regulation, Support for restoration of ecological stream, etc.

→ Conflicts for Watershed Fund Utilization → Sustainability of Watershed Fund?

* Han Nakdong

6 Vision for Improvement of WMF System

Improvement Plans for WSF System

Plan 1

- Rational Cost-Sharing for WSP – PES for WSP Service
  - · Rearrange the Utilization of Watershed Fund in accordance with PES for WSP

Plan 2

- PES for WSP Service
- Pollution Charge for Infrastructure Service
  - · Polluters pay for Emission Reduction Costs

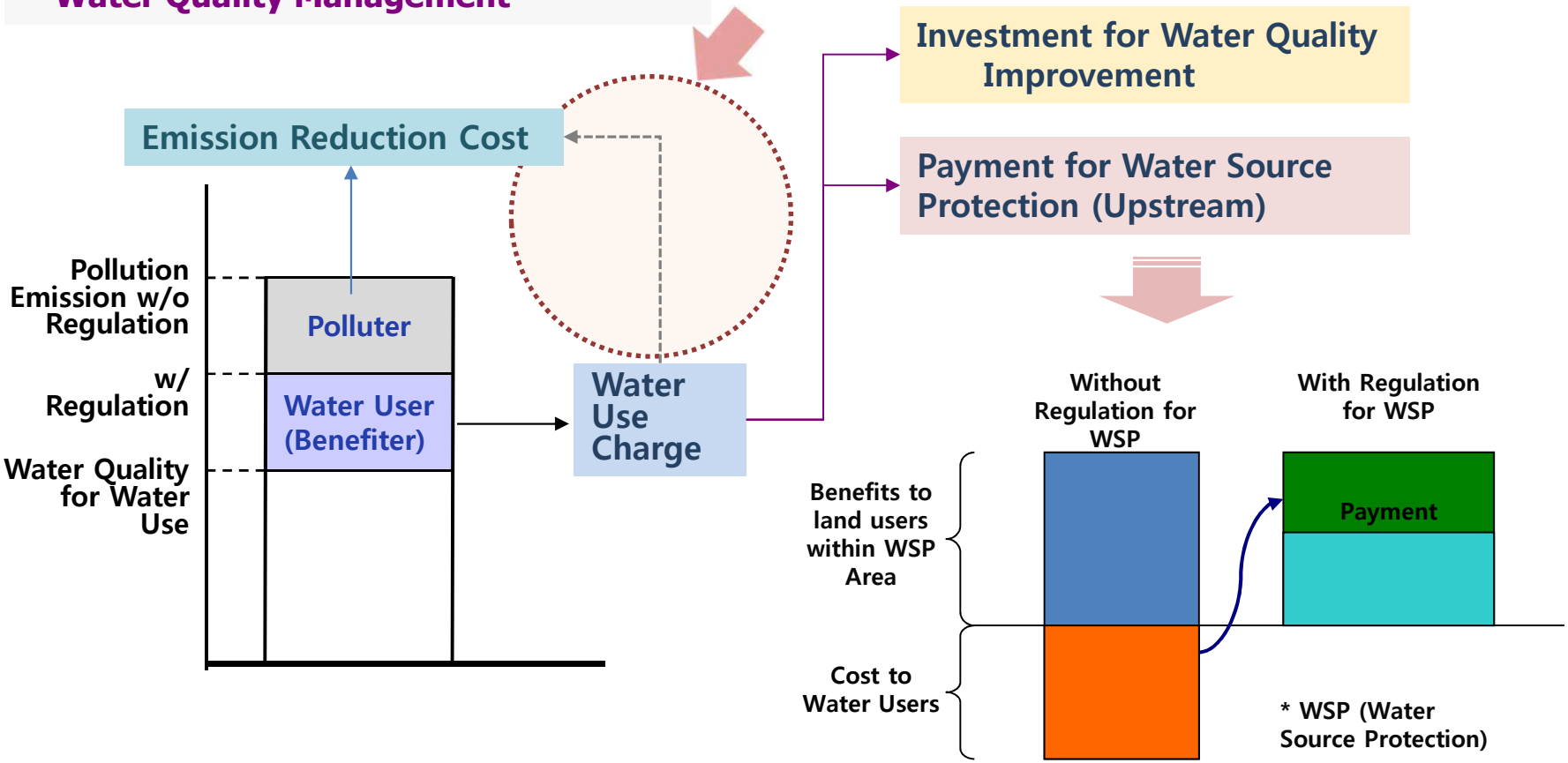
Plan 3

- Watershed Management Tax
  - · Special Purpose (Watershed Management) Tax
    - levied to the residents (benefiter of WM) in the watershed

6 Vision for Improvement of WMF System

Plan 1 PES for Water Source Protection Service

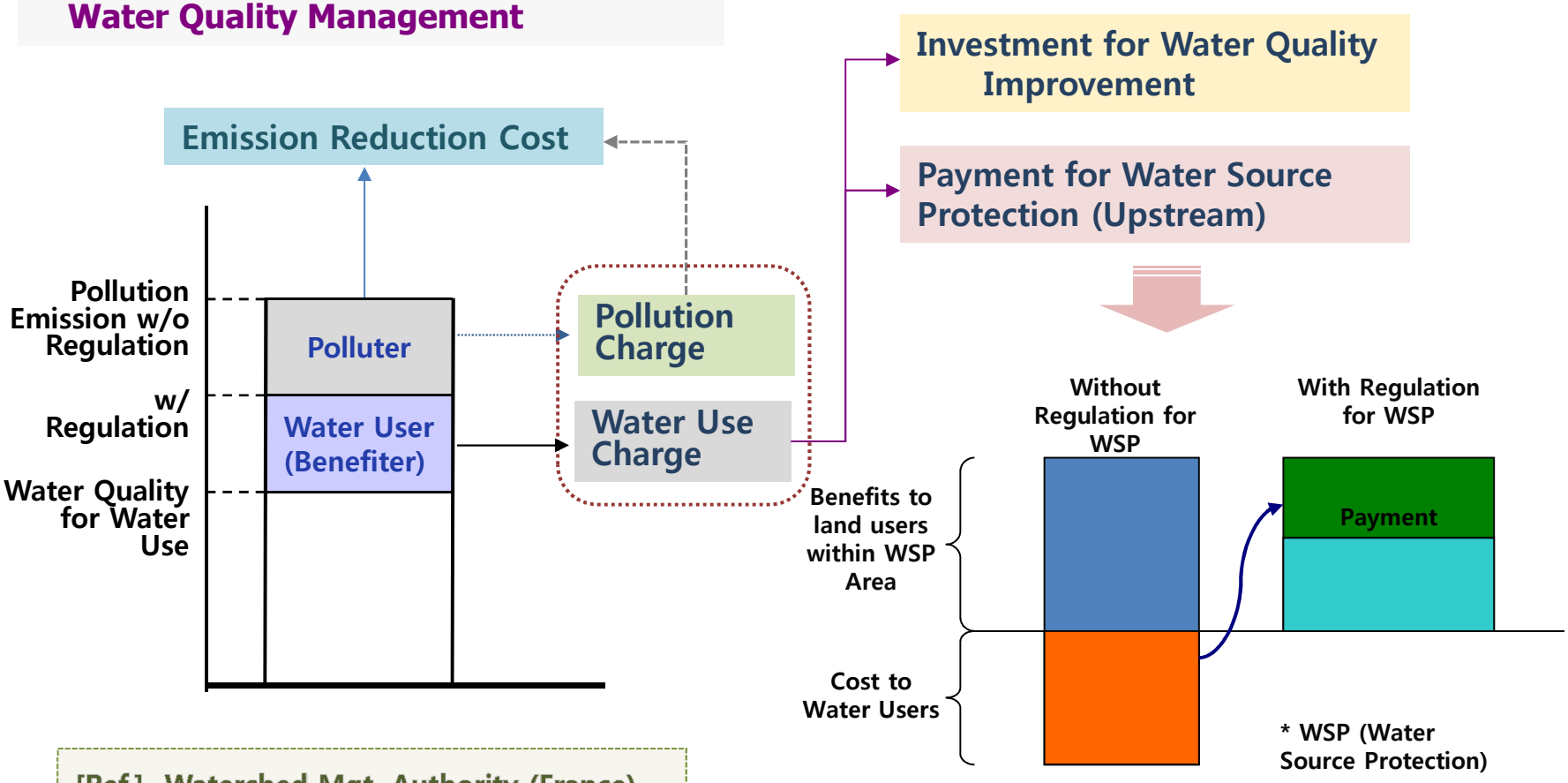
▪ **Polluter – Benefiter Cost-Sharing for Water Quality Management**



▪ **PES for Water Source Protection**

Plan 2 PES for WSP / Pollution Charge

- **Polluter – Benefiter Cost-Sharing for Water Quality Management**



[Ref.] Watershed Mgt. Authority (France)

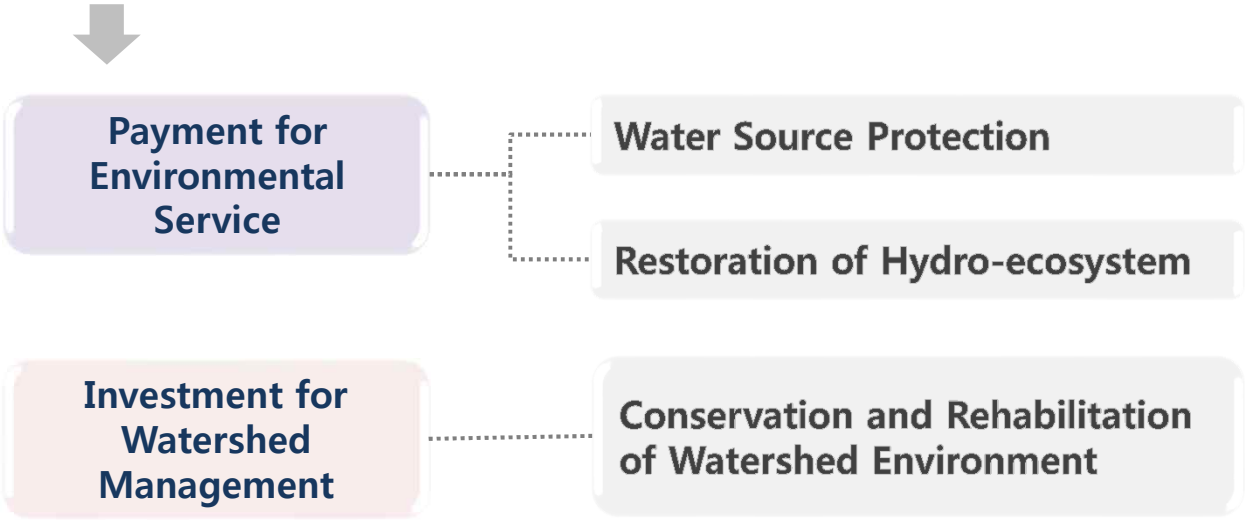
- Pollution Charge / Abstraction Charge

- **PES for Water Source Protection**

6 Vision for Improvement of WMF System

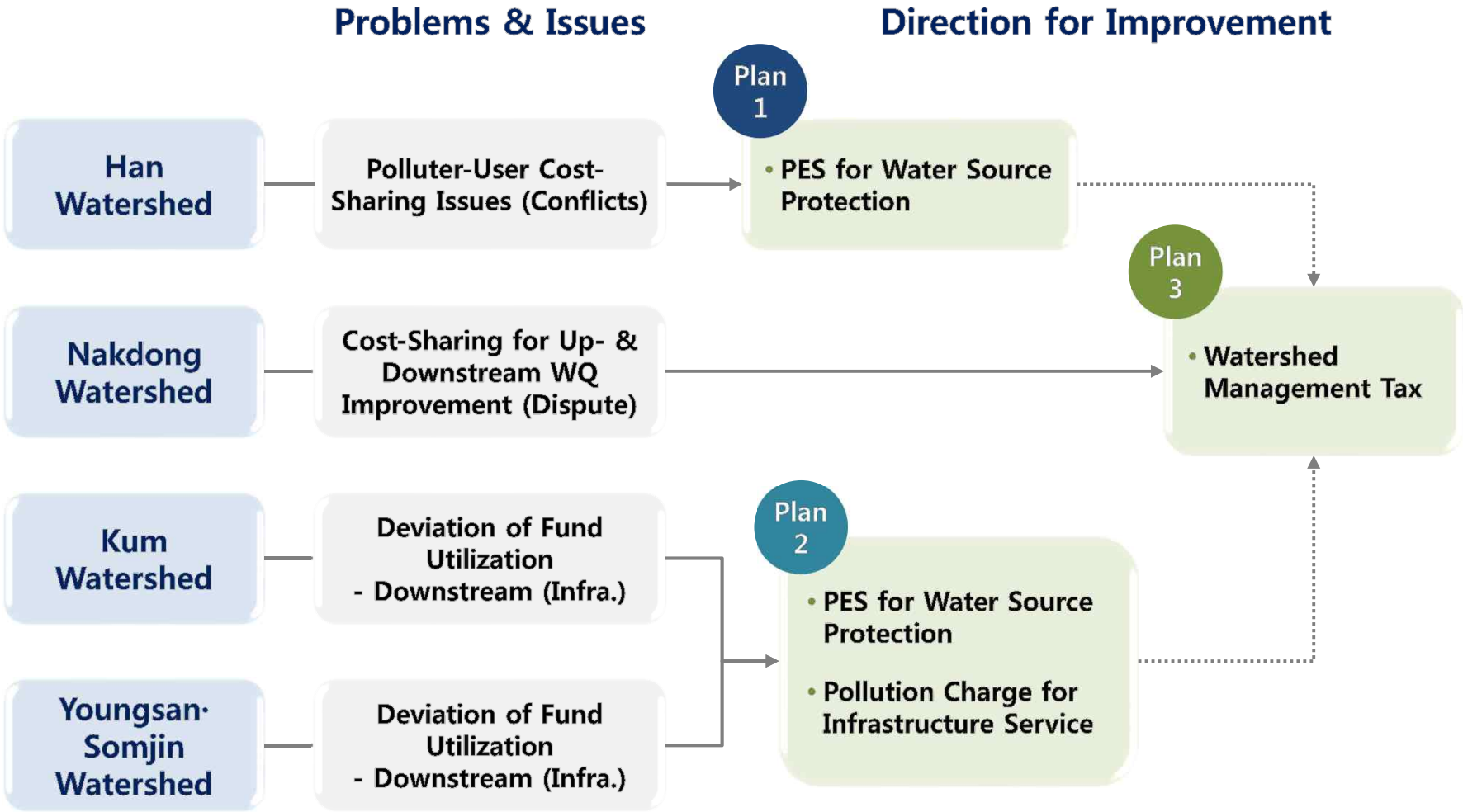
Plan 3 Watershed Management Tax

Purpose	Watershed (Environment) Management
Target for Charge	Residents in Watershed (Benefiter of Watershed Management) - Joint burden for the cost of watershed management
Way of Charge	Per Capita Rate + Pro Rata Income
Utilization of Fund	Service Costs for Watershed Management



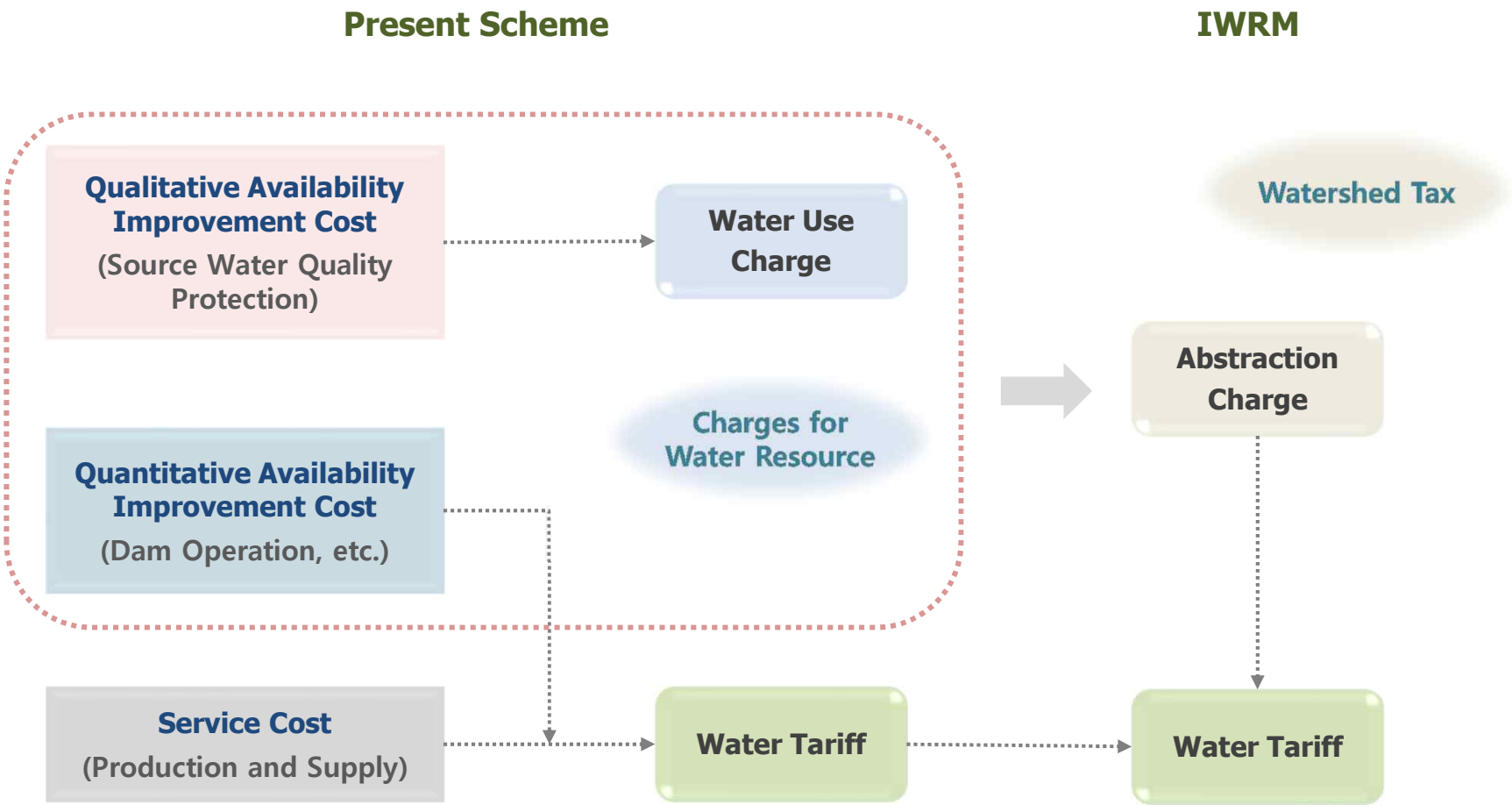
6 Vision for Improvement of WMF System

Improvement Plans for Watersheds



7 Challenges : Integrated Water Resource Management

Integrated Water Resource Management and Cost-Sharing Schemes



Thank You!

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