Water Pollution: Control policies

Class EE375

By Dr. Supawan Saelim

Reference: [TL] – Tietenberg, T. and Lewis, L. Environmental Natural Resource Economics, 2015 (10th edition), Pearson, Chapter 18.

Photo credit: Earth.org

Nature of water pollution problems

Surface water

- Rivers, lakes and oceans – source of drinking water and recreational benefits
- Source of contamination – mainly dumping human and industrial waste directly into the water (the role of law enforced/enacted to limit this activity

Ground water

- A vast natural resource – groundwater used primarily for irrigation and as a source of drinking water.
- Source of contamination – when polluting substances leach into groundwater

- **Sources of water contamination**:
  - **Point sources** = discharge into surface waters at a specific location (e.g., through a pipe)
  - **Nonpoint sources** = affect water indirectly through, for example, the runoff of fertilizers and pesticides from farms after rainstorms -> more difficult to control

Source: water-pollution.org.uk

Water pollution controls

- Recently, the policy concerns on water pollution have shifted from ‘conventional pollutants discharged into surface waters’ towards **toxic pollutants**.
- Early attempts – legistration or laws (too ambitious and unrealistic enactment of law, so little progress)
- Similar to the evolution of air pollution controls, a **wave of reforms have been made for water pollution control to be more cost-effective**. Moving from reliance on direct regulations towards emissions charges or tradable effluent permits which are more flexible and cost-effective

Policy towards cleaning up rivers and lakes was based on the following:

- **Subsidization of municipal waste-treatment facilities**: The challenges of this approach are delays, problems in allocating fund and unsatisfactory performance of the plants.
- **National effluent standards imposed on industrial sources**: This approach also results in delays and the need to define standards in a series of court suits. In addition, the control responsibility excessively raises cost (e.g., from effluent standards among point sources)

Case: Policy brief on Tackling Industrial Water Pollution: Lessons from China

A note on terms:

- **Market-based mechanisms** include grants, loans, taxes, fines and other user charges.
- The '**polluter pays**' approach dictates that those who produce pollution should bear the costs of managing it.
- **Command/control instruments** are used to define, monitor and manage polluting behaviours and practices, which are applied in the form of permits, licenses and rules. The result of regulation mostly depends on the authority and ability of the government to exercise direct command and control over the industry.

This policy brief provides useful insights on the following:

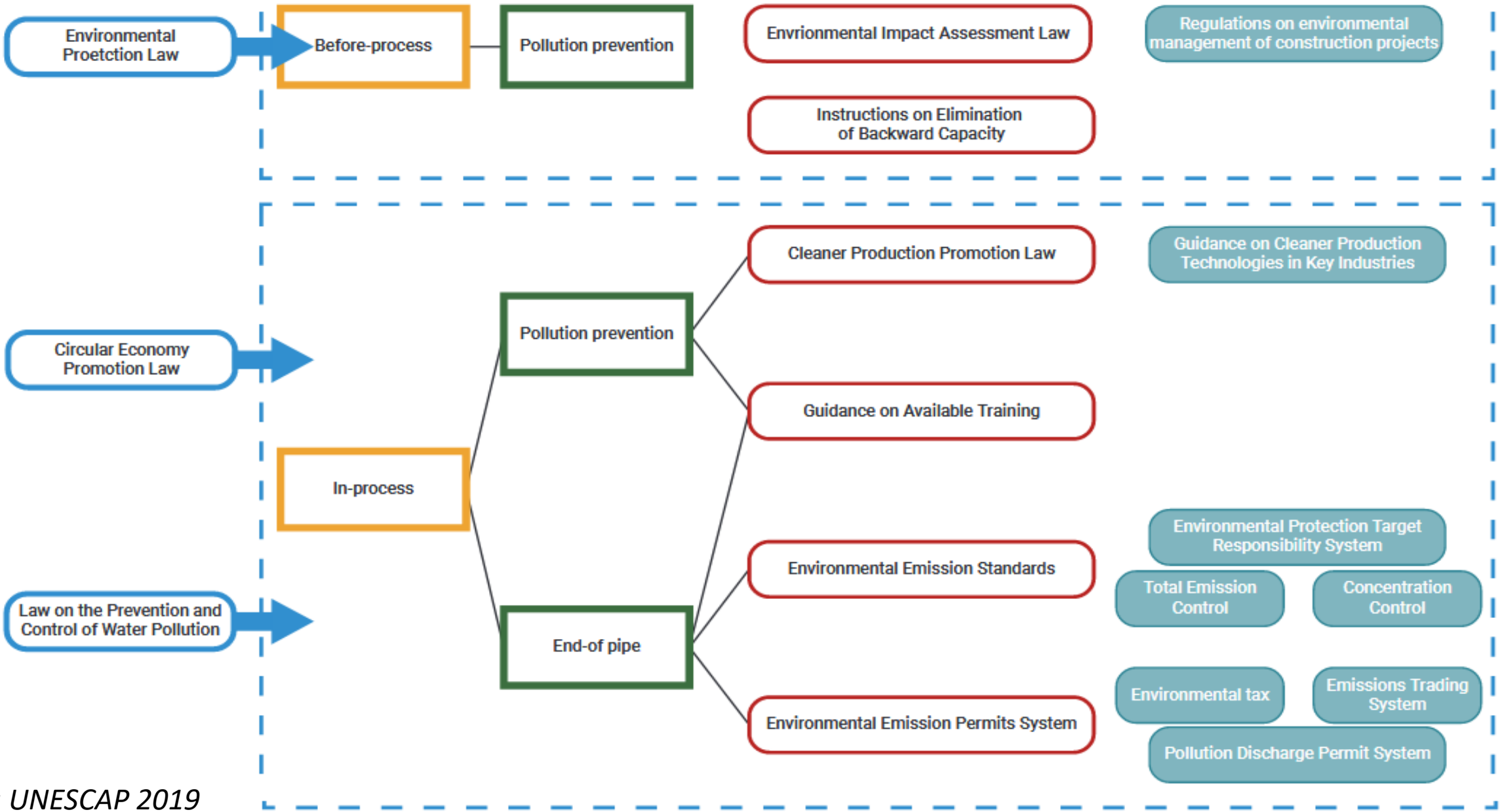
a. Overview of policy framework related to industrial water management in China

b. Key policy instruments' benefits, challenges and lessons learned based on command and control and market-based mechanisms

c. A holistic policy package – Water Ten to control water pollutions

Source: UNESCAP 2019

Case: Policy brief on Tackling Industrial Water Pollution: Lessons from China



Source: UNESCAP 2019

Case: Policy brief on Tackling Industrial Water Pollution: Lessons from China

Table 1: Key policy instruments, benefits, challenges and lessons learned

Policy instrument	*Main features and benefits*	*Challenges and lessons learned*	*Policy mechanism*
Subsidies for promoting water reuse	• Makes water recycling economically viable	• Need large operational budget from Government	Market instrument
Discharge fee	• Using the polluters pay model, issuing pollution fees directly to emitters to discourage pollution	• Fee set can be too low to effectively incentivize factories to change their polluting behaviours • May not holistically account for the environmental capacity of the industrial area	Market instrument
Environmental tax	• Highly developed regions experience higher taxation rates to compensate for the exponential cost of environmental degradation • Strengthen tax net and more efficient revenue generation	• Less developed regions may attempt to attract investments from those industries through setting lower environmental taxes • Policy not specific regarding under what conditions companies receive tax concessions	Market instrument
Tiered water pricing	• Industries experience higher water fees in production costs and are forced to re-examine the amount of water consumed on a regular basis • Tiered water pricing is an effective approach to controlling water consumption and usage behaviours	• Lack of national standards to regulate local policies on tiered pricing can make implementation difficult • Lack of disparity in the fee structures applied to regular industries and more heavily polluting industries can be problematic and may send wrong signals	Market instrument
Pollution discharge permit	• Improves transparency in terms of manufacturing capacity, discharge data, and corporate reporting on environmental information • Enhance coordination and inter-ministerial cooperation through unified data availability	• Complicated design • Not flexible as single standard used for all firms • Accurate reporting from entities is crucial	Command/ Control
Industrial parks	• The problems of zoning can be minimized by grouping various types of industrial activities • Costs of infrastructure and utilities can be reduced by concentrating activities in planned area • More effective and efficient way of controlling mass pollution • Promotes industrial symbiosis by sharing infrastructure and reuse of products/waste as inputs by other industries • More space for policy innovation as there is greater and high frequency data available	• Industrial zones have resulted in environmental problems such as magnified pollution, water treatment costs due to pollution, increased safety problems and health care costs, loss of biodiversity and increased challenges to coastal zone management • If a mix of industries exist in the industrial park, setting of standards and managing pollution can be challenging. • Risk of 'free rider effect'	Command/ Control

Source: UNESCAP 2019

Case: Policy brief on Tackling Industrial Water Pollution: Lessons from China

*"When the **Water Ten policy package** was introduced, one of its main tenants was to **strengthen** the implementation of the **polluter pays principle,** through the tightening of environmental enforcement and supervision and stricter accountability regimes. Previously the PRC experienced multiple challenges in this regard, including but not limited to **corruption, monitoring technology, legal awareness and reliable data**."*

Table 2: Enforcement evaluation of environmental management measures before introduction of Water Ten

Measures	*Enforcement evaluation*	*Major problems*
Environmental impact assessment	Good	Corruption, reliability of conclusions
Pollution levy	Not good	Corruption, no incentive
Emission permit	Average	Reasonableness of emission allocation, illegal emission
Environmental supervision	Not good	Capacity, lack of finance, lack of long-term effectiveness
Environmental monitoring	Not good	Capacity, low technology level, lack of money
Information disclosure	Not good	Accuracy, timeliness, completeness
Public participation	Not good	Not enough legal support, low environmental awareness

Source: Qi and Xin Zhou (2009)[38]

Source: UNESCAP 2019

Case: Policy brief on Tackling Industrial Water Pollution: Lessons from China

Table 2: Water Ten policy measures[43]

I.	Overall control of pollutant discharge	1	1) Control and prevent industrial pollution (targeting 10 sectors) 2) Clean production and circularity (targeting 10 sectors) 3) Water pollution in industrial clusters
		2	1) Strengthen control over urban domestic pollution 2) Fully reinforce supporting pipe network construction 3) Promote sludge treatment and disposal
		3	1) Boost prevention and control of agricultural and rural pollution 2) Control agricultural non-profit source pollution 3) Adjust planning structure and layout 4) Accelerate rural environment management
		4	1) Strengthen control over ship and port pollution 2) Enhance ability to prevent and control port and terminal pollution
II.	Promotion of transformation and updating of economic structure	5	1) Adjust industrial structure 2) Permission standard for technologies
		6	1) Optimize spatial layout 2) Promote exit of polluting enterprises 3) Proactively protect ecological space
		7	1) Promote seawater utilization 2) Advance cyclic development 3) Promote utilization of reclaimed water
III.	Water resources saving and conservation	8	1) Control total water consumption 2) Strictly control groundwater over-exploitation
		9	1) Increase water use efficiency 2) Industrial water saving 3) Strengthen water saving in cities and towns 4) Agriculture water saving
		10	1) Science-based water resources conservation 2) Strengthen water dispatch and management in rivers, lakes and reservoirs 3) Scientifically measure the ecological flow
VII.	Strengthen water management capacity	20	1) Strengthen the outcome-oriented management approach focusing on environmental quality
		21	1) Tighten environmental risk control 2) Appropriate management of water pollution incidents
		22	1) Fully operationalize the pollution discharge permit system 2) Appropriate management of water pollution incidents
		23	1) Fully operationalize the pollution discharge permit system 2) Strengthen the management capacity of the pollution discharge permit system
VIII.	Ensure water ecology and evironmental safety	24	1) Ensure safety of the drinking water sources 2) Strengthen the protection of drinking water sources 3) Control and prevent groundwater pollution
		25	1) Strengthen the control and prevention in seven major river basins 2) Strengthen the protection of clean water bodies
		26	1) Enhance environmental protection in offshore areas 2) Promote ecologically friendly aquaculture 3) Strictly control pollutions of endocrine disrupting chemicals
		27	1) Control black and odorous water bodies in cities
		28	1) Protect water and wetlands ecosystems 2) Protect marine ecology
IX.	Roles and responsibilities	29	1) Strengthen the responsibility of local governments on water environment protection
		30	1) Strengthen intern-department coordination and joint action
		31	1) Enforce the liability of discharging entities
		32	1) Strictly implement the outcome-oriented appraisal system 2) The appraisal result is regarded as a reference for the allocation of water pollution prevention and control fund 3) In the event of failure to pass the annual appraisal, local governors or officials in charge of environmental protection at the provincial level will be called to a meeting for inspection and supervision, and in the meanwhile the EIA approval will be suspended in the concerned areas; lifelong liability for government officials includes after retirement.

Source: UNESCAP 2019

Case: Policy brief on Tackling Industrial Water Pollution: Lessons from China

IV.	Strengthen the sci-tech support	11	1) Disseminate and demonstrate appropriate technologies
		12	1) Develop prospective technologies
		13	1) Proactively promote the development of the environmental protection industry 2) Accelerate the development of the environment service industry
V.	Effectively utilize market mechanisms	14	1) Streamline the pricing and taxation schemes 2) Improve the charging policies 3) Improve the taxation policies
		15	1) Promote diversified financing 2) Increase public financing
		16	1) Set up incentive mechanism 2) Implement green credit system 3) Implement trans-boundary water environment compensation
VI.	Tighten environmental enforcement and supervision	17	1) Improve regulatory standards 2) Refine relevant standards
		18	1) Strengthen law enforcement 2) Improve environmental supervision and law enforcement mechanism. 3) Crack down on environmental illegal behaviours.
		19	1) Enhance supervision level 2) Refine water monitoring system 3) Increase environmental supervision capacity
X.	Strengthen public participation and scrutiny	33	1) Environmental information disclosure 2) Local governments shall regularly publish water environment quality data; major discharging entities shall disclose information of pollutant discharges
		34	1) Strengthen public scrutiny
		35	1) Public engagement

Source: UNESCAP 2019