

Industrial Expansion and Sustainability: Water Management in Yuhang, Zhejiang

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Rural Planning & Development
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Rapid modernization; Serious water pollution



- National GDP – 4 fold increase in past decade
- reforms beginning in 1978
- 1984 reforms increased opportunities for SMEs
- increasing surface water pollution
- national & local goals to decrease pollution

Environmental Protection Bureau

- SEPA – provincial EPB – county EPB
- County EPB = monitoring, collection of fees/fines & implementation of national & local policies & Five-Year-Plans
- 8 tools, including discharge permits based on water source classification

Research Questions

- How has the issue of increased water pollution influenced industrial expansion?
- What are the industrial practices relating to water and what are the existing policies?
- What, if any, CP methods are being used?
- What are the forces driving industry management decision - making?

Framework for Change

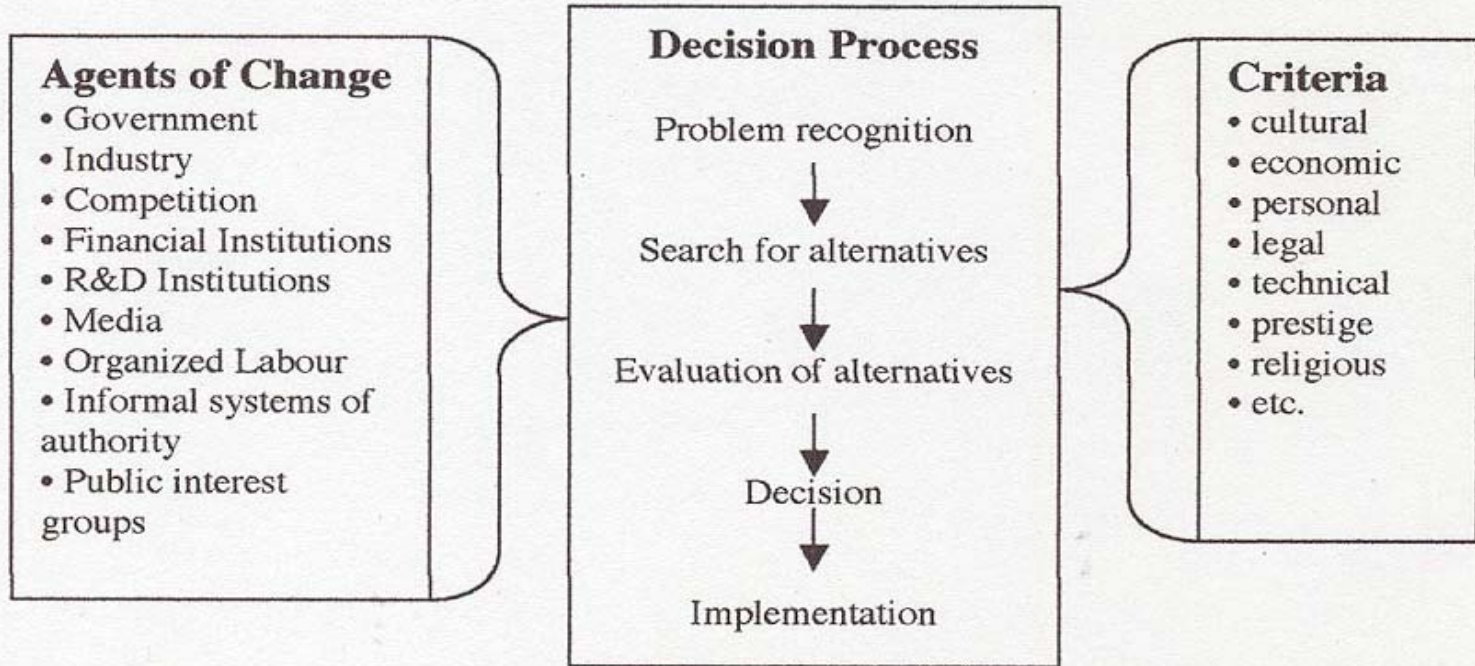



Figure 1.1 Framework for Change (Yap, 1988)

Yuhang County case study

- 3 breweries
 - 3 dyeing factories
 - 3 metal finishing industries
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- water reliant
 - prominent industries
 - private & state-owned
 - remote to within SEZ
 - 1950s to 1990s
 - medium sized
 - 80 to 750 employees

CP: good housekeeping; source segregation; resource recovery; process modification; recycling; new technologies



B2 –
bagging
sludge for
pig feed



D1 – removal
of dyed
cotton fabric

recycling &
housekeeping
opportunities



M2 – source segregation & recycling





Findings

- Absence of CP knowledge & training opportunities → Director's own initiative
- Good housekeeping & process modification most common CP adoptions
- Primary driving forces:
 - Director's knowledge & initiative
 - Access to capital
 - Government regulations

Recommendations

- Increased access to capital – e.g. wastewater treatment scheme applied to CP initiatives
- Policy level: increased cost of pollution
- CP as an economic tool, with environmental benefits; compliance through CP
- Use of local capacity; shared knowledge

Questions, Comments



Water Classes

Appendix B: National Classes of Water Use in China

Classes	Description of Use
I	Water that flows through national nature reserves
II	Source of municipal drinking water supply (first grade conservation area); conservation areas for rare aquatic species; and areas for fish spawning
III	Source of municipal drinking water supply with treatment required (second grade conservation area); conservation areas for common aquatic species; and areas for swimming
IV	Source of industrial water supply and recreational use other than swimming (e.g. boating and fishing)
V	Source of industrial cooling water; irrigation water; and ordinary landscape

Environmental Protection

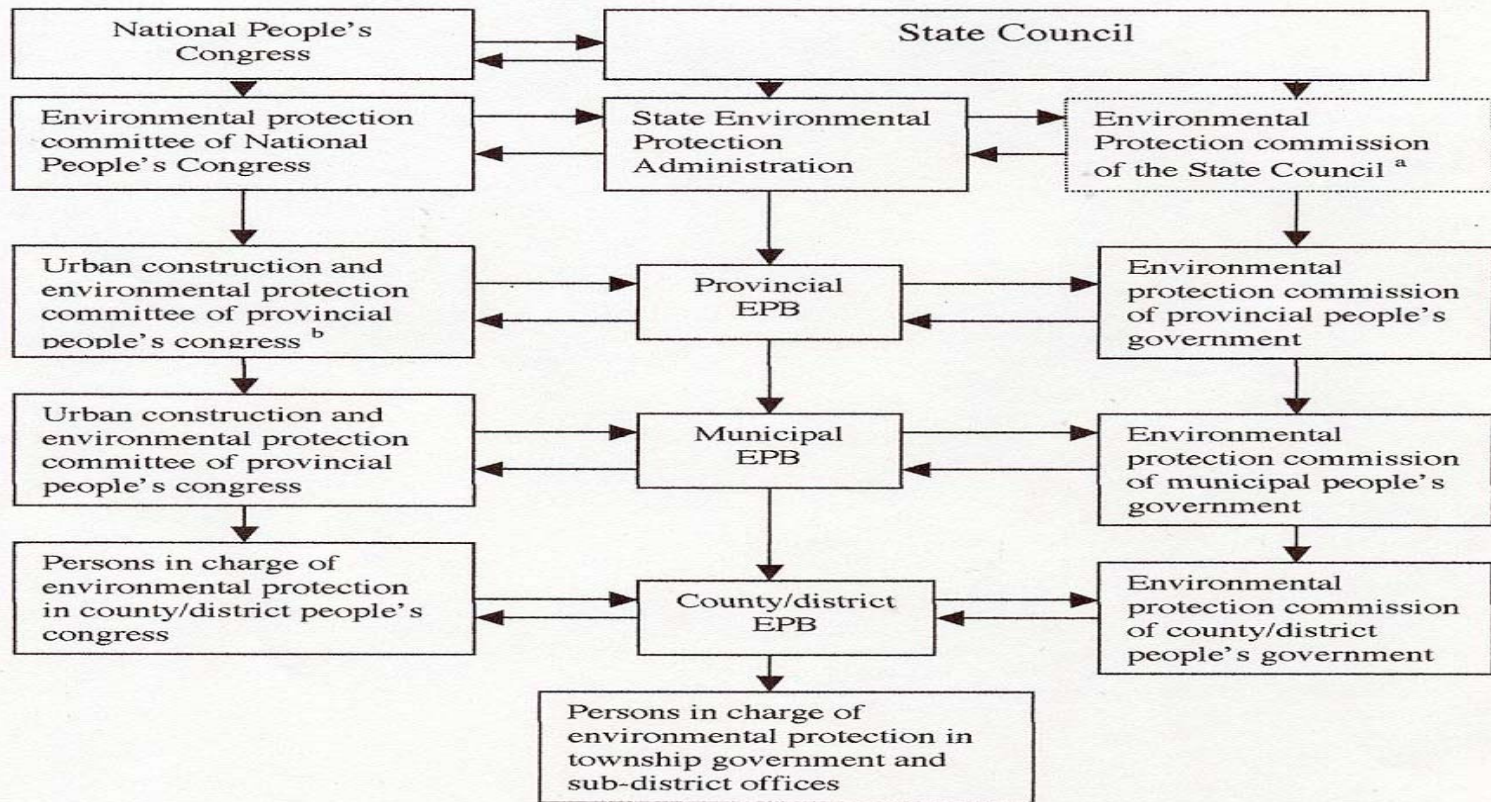


Figure 4.2: Organizational Structure for Environmental Protection in China.

^a This was eliminated in 1998 in an effort to streamline the government administration system; responsibility was transferred to SEPA

^b "province" refers to provinces, autonomous regions and centrally-administered municipalities (Ma and Ortolano, 2000, p. 56)

Environmental Programs

TABLE 4.1: ENVIRONMENTAL PROGRAMS IN CHINA

English Translation

Chinese (pinyin)

The Three Old Systems

- Environmental Impact Assessment
- Three Synchronizations
- Pollution discharge fee system

lao san zhidu

- huanjing yingxiang pingjia
- san tongshi zhengce
- paiwu shoufei

The Five New Systems

- Discharge permit system
- Environmental responsibility system
- Assessment of urban environmental quality
- Centralized control of pollution
- Pollution control with deadlines /
Limited time treatment

xin wu zhidu

- paiwu xuke zheng zhidu
- huanjing baohu mubiao zeren zhi
- chengshi huanjing zonghe
- jizhong chuli
- xiangi zhili

(Sinkule and Ortolano, 1995, p. 26)