

**REPORT OF THE CCICED WORKING GROUP ON
ENVIRONMENTAL ECONOMICS**

By

Working Group on Environmental Economics

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Part I Executive Summary

The joint research of the Working Group (WG) on Environmental Economics has been focused on the studies of Environmental Tax, Environmental Damage Valuation, and Environment and Poverty Alleviation, since 1997. Meanwhile, the studies of environmental accounting, economic instruments for industry pollution control, sustainable development of grassland, green national accounting, and environmental issues in business education have been involved to enlarge the scope of the research. Five WG sessions had been held in Ma'anshan, Ha'erbin, Beijing, Xi'ning and Vancouver, Canada, and aperiodic meetings had been organized for academic or administrative discussing.

Based on the work and experience gained in the past years, studies conducted by the WG in 2001 were focusing on the following planned topics:

- Modeling and policy analysis of environmental tax and fee in China
- Case studies on Environment and Poverty Alleviation
- Environmental teaching materials for education of business administration
- Environmental damage valuation in China
- Sustainable development of grasslands

Part 2 Environmental Tax in China

1 Review of the environmental tax study by the WG

The study of environmental tax has been highlighted by the WG since 1998, aiming to develop policy recommendations to streamline the current disparate system of pollution charges and fees and environment related taxes and integrating them into an internally consistent and economically efficient environmental taxation system. The research focused on Green Taxation Reform in China in 1999, to identify opportunities and assess the potential for development of environmental taxation in China. As a result, the objectives and guidelines of environmental taxation reform were set up. Meanwhile, some main measures to this end were proposed, namely, environmental tax related with energy products and vehicle using, water pollution levies, environmental taxes on agricultural input and other products, investment tax incentives; and methods to implement the reform of environmental taxation were also put forward. Among the above, primary policy recommendations include designing SO₂ tax on coal, and increasing the rates of environment-oriented tax on petroleum and diesel oil while decreasing or abolishing the consumption tax of family cars.

During 2000 and 2001, the CGE model was employed for development of scenarios and simulation of the impacts of different environmental taxes.

The close interrelationships between the studies was emphasized; for

example, an appropriate system of green taxation requires knowledge of the costs of damage, as well as the incidence of the costs and benefits of alternative tax measures.

2 Main findings of the environmental tax study

2.1 Principles for the environmental tax reform

The following guidelines need to be observed in order to reconcile environmental taxes with fiscal reform. (a) avoid designing sophisticated environmental taxes that reflect closely environmental damage (use very broad measures of damage); (b) limit the number of new rates and taxes to a minimum by balancing administrative efficiency against economic efficiency; (c) recycle the revenues from environmental taxes to reduce the tax rates of existing distorted taxes.

2.2 Measures for the environmental tax reform

2.2.1 Environmental taxes on energy products and vehicle use

- SO₂ tax on coal. The tax rate of 865 Yuan/ton(SO₂) was suggested and deferent levy methods were proposed for large users and small users. Meanwhile, resources tax on coal will also benefit the rational use of the coal resource and air pollution control.
- Consumption taxes on gasoline and diesel oil. In spite of the existing mandatory standards for vehicle's tail gas control, the tax rate on gasoline and diesel oil should be increased according to the regional air pollution situation, while the consumption taxes on family cars should be decreased or abolished at the same time.

2.2.2 Water pollution and environmental taxation

- Tax on domestic sewage in cities, to raise the funds for the construction and operation of central wastewater treatment plant.
- Taxes on industrial water pollution. For large and middle-sized enterprises, effluent and emission taxes can be levied; for small ones and the service industry, output taxes can be levied by the standard emission rate.

2.2.3 Environmental taxes on agricultural inputs and other products

- Taxes on pesticide and chemical fertilizer may be levied in major watersheds. The 10% ad Valorem tax on nitrogen fertilizer was proposed.
- Taxes on plastic bags in some cities should be imposed to reduce its overuse or prompt the recycling.

2.2.4 Tax incentives for environmental investment

- Encourage environmental investment by tax remit, and prompt the development of environmental industry by accelerated depreciation or other

special tax articles.

2.3 Implementation implications for environmental tax reform

- The reform of environmental taxation should be announced in advance implemented gradually, especially when the tax rates are supposed to increase significantly.
- The significant distribution impacts of environmental tax may be addressed through (a) differential taxation, (b) retraining, compensation of impacts and gradual implementation, and (c) revenue neutrality.
- Prompt reforms and innovations on the use of funds raised by the pollution levy system, and establish the legislation basis of environmental taxation.

2.4 Modeling of environmental tax

A Computable General Equilibrium (CGE) model for China has been established and tested in efforts to analyze the quantitative economic impacts of alternative rates of SO₂ tax.

2.5 Development of environmental tax scenarios

Studies on this aspect included identifying proposed and potential environmental taxes, and setting alternative levels of tax rate and adjustment scenarios for each kind of tax.

3 Work plan for the next year

The main work of next year will concentrate on various simulations using the calibrated CGE Model for China, to predict the environmental and economic effects of different environmental taxes such as petroleum and diesel oil taxes, SO₂ tax, carbon tax, and other pollution taxes. Further simulations and policy recommendations will be built upon previous studies.

Another effort is to prepare a major publication on the prospects for a comprehensive green taxation reform in China. The key findings and recommendations of the damage valuation and environment and poverty alleviation studies will be included.

Part 3 Environmental Damage Valuation in China

This study has been aiming to provide the Chinese government with more precise, more practically reliable, and more theoretically sound valuation of environmental damage in China, and to support the environmental investment planning and environmental policy planning at the macro level as well.

1 Review of the damage valuation study by the WG

- In the early study, the environmental cost of rice production in Hu'nan Province and Hubei Province takes 1~4.5% of the GDP of rice production (1995), as revealed by marginal opportunity cost (MOC) method.

Environmental tax on fertilizer was proposed.

- Current efforts are mainly concerning with the damage of air pollution and water pollution. Therefore, representative dose/impact relationship of physical damage were established, while benefit transfer and contingent valuation methods were employed to assess the possible magnitudes of damage, which could be considered at low, middle and high levels.
- Methodology for establishing the framework of environmental damage valuation was studied drawn upon critical assessment and comparison of the existing valuation studies.
- Benefit transfer was employed to establish valuation framework, into which some of the existing references on pollution toxicology, dose-response relationship and valuation technology were integrated.

2 Proceedings of environmental damage valuation study

- Cost estimation of pollution control. To introduce and spread the economic instruments appropriately, the current efforts focus on the cost comparison between traditional command-and-control and market based instruments.
- WebGIS based environmental damage valuation. The spatial heterogeneity of pollution and complexity of the environmental damage always confuses the comparison and aggregation of the valuation results getting by different methods or on different scope. Therefore, the WebGIS based valuation approach was proposed to facilitate the extensive but comparable research and support the sharing of resources, in which the standardized valuation methods and spatial character of the objects is emphasized.

3 Proposed work plan for further study

The next phase of the work, for which additional funding is sought, will be concentrating on aggregation of values, and comparison with earlier estimates in China and obtained from comparable countries. Field survey on environmental damage in representative urban and rural sites in China is suggested. Moreover, a major publication on estimation of environmental damage in China and policy applications will be prepared.

Part 4 Environment and Poverty Alleviation

1 Review of the study on environmental and poverty alleviation

The environmental and poverty alleviation research has been initiated since 2000. Linkages between environment and poverty alleviation are complex. In some circumstances poverty is a cause of environmental degradation; in others, rapid industrialization and income-generating activities are major causes. Market and policy failures exacerbate the problems suffered by the poor, who tend to suffer the

most damage in physical terms from environmental degradation. The findings of this study would also add a new dimension to both the valuation and the green taxation studies. The policy context of this research is the West Development, which require the innovative solutions for environmental protection and poverty alleviation in the poor areas.

To this end, the existing studies on the poverty environmental degradation nexus at home and abroad were briefly reviewed, and the framework for cause-effect analysis was worked out. The *Review of Poverty and Environment in China* was drafted. Preliminary field surveys and formal surveys had been conducted in Muchuan County in Sichuan Province for pollution prevention of paper manufacture, and Zhuanglang County in Guansu Province for issues of return farmland to woodland, in 2000 and 2001, respectively.

2 Main contents of the study on environmental and poverty alleviation

- Review and analyze the poverty environmental degradation nexus theoretically.
- Probe into the poverty environmental degradation nexus, under the social economic and environmental context of poor areas in China. Preliminary studies show that poverty problems in China stemmed from environmental decline as well as institutional factors.
- Estimate incidence impacts of environmental taxation, other financial policies, or regulatory measures, as well as development strategy and urbanization.
- Estimate the incidence of damage caused by environmental degradation and the potential impact of alternative policy measures on different income groups.

3 Main policy recommendations

- Allow the rational use of forest resources premising that the forest coverage and woods reserves are qualified to ecological standards and the forest with ecological function is protected.
- Encourage pollution prevention investment by accelerated depreciation policy, and promote environmentally benign industry by favorable tax policy in the West Area.
- Technical guidelines and regulations should be issued to ensure the rational implementation of the return-farmland-to-woodland policy. Migration plan should be drafted in the ecologically sensitive areas.

Part 5 Other Researches

1 Economic instruments for industrial pollution control

1.1 Policy recommendations on pollution fee

- Charge the general emission fee instead of beyond-standard polluter.

- Enhance the levy performance of pollution fee of town-and-village enterprises.
- Reform the levy system to cut down the administration cost.

1.2 Total Emission Control (TEC)

The full introduction of TEC in China is excessively demanding from the administrative point of view, but if it is introduced with insufficient information and inadequate institutional structure, it could have very little impact on environmental performance in general. Main policy recommendation: Launch pilot projects for emission trading of coal power plant and other high stacks in the SO₂ emission and acid rain control zones, as a way out for the Total Emission Control.

2 The environmental accounting

The main concern was case study on the clean production auditing and environmental achievement of enterprises, in which the benefits were identified as the followings: conceptual shifting from traditional pollution treatment to clean production, and effective pollutants mitigation while cutting down the cost of production. Issues need further study are a) means of development and its implication of environmental cost system, b) coordinating mechanism for financing management and production management, and c) cost-benefit conception for budgeting and feasibility analysis.

3 Integrating environmental issues into business education

The environmental issues will be central to influence the competing ability of enterprises in the 21th century. As the future managers, MBA, are required to improve their environmental awareness and the elementary abilities of environmental management. The WG joint efforts with WRI to introduce the Business, Environment, Learning and Leadership (BELL) Program to China. Accordingly, an environmental management course was opened in Guanghua School of Management, Peking University in the fall, 2000. The outline of teaching materials was drafted, and the development of teaching cases is underway.

4 CGE model of Sulfur-tax

A static sulfur-tax CGE model had been constructed. The model equations were also formulated, with emphases on production functions. The production equations describe substitution of energy between coal, oil, gas and electricity. The model equations also described the substitution between the domestic goods, import goods and export goods. The program based on GAMS software has been debugged successfully. The impact of sulfur tax to the Chinese economy has been analyzed (GDP, the sector outputs, the prices, the welfare of the household, etc). And the impact of different sulfur tax level had been analyzed.

5 Green accounting of national income

An operational framework has been established, cooperated with the State Statistic Agency, for the construction of China State Environment and Economy Accounting (CSEEA). The SAM table of 1992, 1995 and 1997 had been worked out, which could support the further study of CGE modeling and policy analysis of environmental tax.

Current study concentrated on the development of necessary components, which would contribute to the practicability of the policy. The further study will discuss the issues of reform in this field.

6 The sustainable development of the grassland

The study in 1999 analyzed the social-economic, policy and natural factor of the grassland degradation in Inner Mongolia. Based on the survey results of 2000, considered the system of onerous contraction responsibility of grassland promoted the herdsman's enthusiasm in earlier stage, however, it did not resolve the grassland degradation and descent of productivity as a whole. Strengthening the ecological construction and reforming administrative system are of importance to hold back the trend of grassland degradation. In 2001, randomly sampled 78 herdsman in Hulunbeier, Xilinguole and Chifeng had been visited to analyze the economic, social and ecological trade-offs under different management modes in different areas. Policy recommendation: a) Facilitate the industrialization and integration of grassland agriculture for restoration of the grassland. 2) Replace livestock tax with grassland tax levied by land quality, and levy eco-tax upon the degrading grassland.

7 Eco-tourism of the Wolong Panda Protection Zone

A framework was established and applied to the economic analyses of the managed development of eco-tourism in the Wolong Giant Panda Protection Zone, in Sichuan Province. It was found that the proper management of the Zone could generate an estimated 1 hundred million US dollars per annum.

Part 6 Publications

- Li Yining & Jeremy J. Warford Ed., Natural Resource Pricing China: Water Supply, Coal and Timber. MRM International Press, 1998.
- Timothy Swanson, Wang Qiwen, Andreas Kontoleon, Qiao Xuejun, and Yang Tao, "The Economics of Panda Reserve Management", A Publication of the China Council, Aileen International Press, USA, 2001.2.
- Therodore Panayotou and Zhang Zheng. The Cost of Environmental Damage in China: Preliminary Assessment and Valuation Framework, Aileen International Press, Maryland, USA, July 2001

- Therodore Panayotou and Wu Yajun. Green Taxation: International Experience and Relevance to China, Aileen International Press, Maryland, USA, Oct., 1999
- Hilary Sunman, Mohan Munasinghe, and Zhang Shiqiu. Economics, Environment, and Industry in China, Aileen International Press, Maryland, USA, Sept., 1999
- David Norse, Li Ji, Jin Leshan, and Zhang Zheng. Environmental Costs of Rice Production in China: Hunan and Hubei. Aileen International Press, Maryland, USA, May 2001