

**A Summary Report on
The Project Establishment of China Green National
Accounting System**

Sponsored by

The World Bank

State Environmental Protection Administration, China

Implemented by

Chinese Academy for Environmental Planning

Renmin University of China

Policy Research Center for Environment and Economy, SEPA

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1. Background

Currently, China has stepped into the critical period of social and economic development, but many facts manifest that environmental situation of China is quite serious, relationship between human and nature is becoming tenser and conflicts among resources, environment and economic growth are growing more and more protruding, thus, resources and environmental issues increasingly become major obstacles for social and economic development of China. Therefore, in the viewpoint of sustainable development, Chinese government required policy-makers and leaders at all levels to attach importance to coordinated development of economy, society and environment and harmonious relationship between human and nature, and abandon unilateral economic growth concept which is merely in pursuit of GDP index, and also put forward setting up green national economic accounting system of China with guidance of scientific concept of development.

In order to support the establishment of green national accounting system of China and make scientific assessment on China's economy development level with new accounting index---Green GDP instead of traditional GDP, the World Bank launched the Research Project on Establishment of Green National Accounting System of China with the aid of Italian Trust Fund so as to promote application process of green national accounting system in China. The project started from July, 2005 and finished on Dec, 2006.

2. Objectives

This project aims to establish China's framework of green national accounting system, **focusing on developing integrated environmental and economic accounting system** through various research approaches and particularly by referring to international experience. In this process, it is proposed to choose two representative provinces and two prefecture-level cities to **make pilot study on physical pollution accounts, monetary accounts and environmentally adjusted GDP (EDP)** and lay a foundation for the implementation of national accounting. Meanwhile this project shall put forward suggestions for Chinese government on relevant policies and decisions conforming to Chinese situation in this field.

The specific objectives of the project involve:

- Learn from the international research findings and practical experience to hold a training program of Green National Accounting System for local

government officials;

- Perfect China Environmental Pollution Cost Valuation System on the basis of the related study results of *China Environmental Cost Model*, a World Bank project etc;
- Establish China Green National Accounting System, including constructing the framework of Green National Accounting System, focusing on the development of environmental and economic accounting system and annual accounting method for environmentally adjusted GDP, and compiling technical guide for China Environmental and Economic Accounting;
- Collect data, carry out China Environmental and Economic Accounting in 2001 and 2004 and finish the relevant Environmental and Economic Accounting Report.
- Select two provinces and two cities for data collection and as the experimental accounting spots and finish their Environmental and Economic Accounting Report respectively.

3. Activities and main conclusions

The project is implemented by SEPA and is completed by Chinese Academy for Environmental Planning (CAEP) with joint efforts of China Renmin Univ. and Policy Research Center of Environment and Economy (PRCEE), SEPA. Local affiliations include EPBs (Environmental Protection Bureau), BS (Bureau of Statistics) and the other related departments of Anhui Province, Guangdong Province, Beijing and Shennongjia Forestry Region. According to TOR of the project, the major consulting service contents and tasks involve the following five aspects: 1) to summarize and learn international experience in Green National Accounting; 2) to establish the framework of Green National Accounting in China; 3) to value national environmental pollution cost; 4) to compile Technical Guideline for China Environmental and Economic Accounting; 5) to carry out environmental and economic accounting at national and local levels.

With hard work of 18 months, the implementing agencies have completed overall design for the China's framework of environmental and economic accounting, physical accounting for water pollution, air pollution and solid waste pollution in 31 provinces or municipalities and 39 industrial sectors across the country, monetary accounting for environmental pollution from aspects of imputed treatment cost and environmental pollution cost, and deduced environmentally adjusted GDP of China in 2004. They also completed the accounting for green wealth of Shennongjia Forestry Region with reference to accounting approaches for national wealth proposed by the World Bank. Even though there exists improvement on accounting approaches, the research practice proves that it is still practical and feasible to make initial accounting for maintenance cost of environmental pollution by adopting treatment cost method

and then conduct environmentally adjusted GDP accounting in the light of preliminary accounting results, which could be extended and applied in local statistical and environmental protection departments. It also accords with actual conditions of China to make accounting for environmental degradation cost by using damage cost approach, which is of significant reference to the integrated decision-making on economy and environment and could be applied at the national level. Experimental experience on green wealth accounting for Shennongjia Forest District is worthwhile to be popularized.

The organization form of the project - implemented by the domestic research institutions and supported by the international research institutions with guidance of two state governmental departments and active participation of local sectors, is worthwhile to be promoted since it has produced plentiful and substantial fruits, made remarkable social effects and exerted far-reaching international influence. The project on Establishment of Green National Accounting System of China is a successful example for jointly conducting government-led academic studies by the World Bank and Chinese Government.

4. Outputs

Reports submitted by Dec, 2006¹

- *Establishment of China Green National Accounting System Final Report (in Chinese)*
- *Establishment of China Green National Accounting System Final Report (in English)*
- *Feature Report I - Framework of Green National Accounting System in China (in Chinese)*
- *Feature Report I - Framework of Green National Accounting System in China (in English)*
- *Feature Report II - International Experiences with Environmental Accounting (in Chinese)*
- *Feature Report II - International Experiences with Environmental Accounting (in English)*
- *Feature Report III - China Environmental and Economic Accounting Report 2004 (in Chinese)*
- *Feature Report IV - Technical Guideline for Environmental and Economic Accounting of China (in Chinese)*
- *Feature Report V - Environmental and Economic Accounting Report*

¹ The following twelve reports are zipped to 'finalreport.zip' in attachment.

2004 Beijing (in Chinese)

- *Feature Report VI - Environmental and Economic Accounting Report 2004 Anhui Province (in Chinese)*
- *Feature Report VII - Environmental and Economic Accounting Report 2004 Guangdong Province (in Chinese)*
- *Feature Report VIII - Green Wealth Accounting 2004 Shennongjia Forestry Region (in Chinese)*

Reports submitted by Sept, 2006²

- *Interim report (in Chinese)*
- *Interim report (in English)*

Reports submitted by July, 2005³

- *Inception report (in Chinese)*
- *Inception report (in English)*

Translated report

- World Bank. *Where is the Wealth of Nations?. Translated by Jiang hongqiang, Yufang, Zhaoyue et al. China Environmental Science Press, 2006.*

5. Conferences and Training Workshop

- Inception workshop, Beijing, July,2005
- Workshop for international experiences, Beijing, Nov,2005
- Training workshop, Beijing, July,2006
- Interim workshop, Beijing, Nov,2006
- Symposium on China Green National Accounting System, Beijing, Dec,2006

6. Comments on 'REVIEW of The Study on the Establishment of China' prepared by Prof. Bartelmus

Terms used in the report

Prof. Bartelmus: The report should use the standard terms in SEEA as following:

² The following two reports are zipped to 'InterimReport.zip' in attachment.

³ The following two reports are zipped to 'InceptionReaport.zip' in attachment.

- actual treatment cost – commonly called environmental protection expenditures
- imputed (pollution) treatment cost – (part of) commonly called maintenance cost
- environmental degradation cost or pollution cost – commonly called damage values
- resource cost – commonly called resource depletion cost.

Chinese team: The explanation on it has been inserted into the final report.

Environmental protection expenditure accounts” (EPEA)

Prof. Bartelmus: Environmental protection expenditures are not really a cost concept in the accounting sense, since they are in part market values of investment. Only the use of current intermediate consumption goods for environmental protection can be considered as a cost of primary and secondary production. Internal ‘ancillary’ protection activities, which are not traded in the market, but are usually part of the corporation’s overhead cost, are not sufficiently discussed in the report.

Chinese team: “Environmental protection expenditure accounts” (EPEA) is designed in the framework of CEEA as shown in table 4.32 [4.5.1], however, EPEA is not included in the final accounting contents of CEEA due to the difficulties of acquisition of the detailed statistics of environmental protection expenditure, and of separating expenditure of overhead cost from the so-called ‘treatment cost’ in the environmental report. That is why “Internal environmental protection is mentioned and tabulated in the report, but its possible externalization is not clearly explained” as Prof. Bartelmus pointed out.

Break-up of Resource Depletion Accounts and Environmental pollution accounts” in CEEA

Prof. Bartelmus: The break-up of the green *system* of national accounts into independent accounting *frameworks* or modules sacrifices the system character of the – monetary – SNA for the incorporation of a host physical statistics and indicators (Bartelmus, in press). Physical data do not need, or cannot, be aggregated and are therefore presented in different statistical units (unless some common, but controversial measuring rod such as tons are used). This applies both to the CRA for natural resource statistics and ecological damage data [4.3.2] and the CEEA for emission and abatement statistics [4.3.4, 4.3.1.2]. Their compilation and presentation is therefore better pursued in statistical or indicator frameworks such as the pressure-state-response framework (UN (1984, 1991; OECD 2003), rather than pressing them into an accounting system [notably Tables 4.9-14]. This is not to deny the need to process environmental data into tabulations suitable for environmental accounting. Such processing will also facilitate the identification of data gaps and the corresponding adaptation of the accounting system to China’s ‘realities.

Chinese team: That we split GSNA (Green system of National accounts) into ‘CRA’ (China Resource Accounting) and ‘CEEA’ is due to the hereditary management mode in China. NBS (National Bureau of Statistics) is mainly responsible for the collection and analysis of data associated with macro economics such as GDP, population, fixed capital, capital formation, export etc. NBS also collect some aggregate data on resources which are provided by other ministries: subsoil- Ministry of Land and resources, forestry- National Bureau of Forestry, grassland and farming land – Ministry of Agriculture, Fishery- National Bureau of Fishery, Pollution Discharge and environmental quality- SEPA, etc. The pilot study on Green GDP sponsored by SEPA and NBS focus on Environment depletion. So we just design the framework for resource depletion as the content in CRA and put emphasis on pollution discharge (maintenance cost) and the pollution damage (damage value). That is the work the environmental departments and research institutes can do until now.

Framework for Ecological damages

Prof. Bartelmus: In particular, the mechanistic application of stock (and stock change) accounts for ecological damage [Tables 4.9-14] is hardly feasible as admitted by the report; it should therefore be omitted from the practical *and* theoretical framework [4.1.2, (6); 4.3.2.2, ((4)] of the CEEA.

Chinese team: The fact is that we (researchers in CAEP) are trying to integrate negative ecological impact into the accounting, i.e. to fill the figure in tables 4.9-4.14, which Mr.Bartelmus suggest to delete. The reason we design the tables in the framework is that we want to calculate both the environmental cost and the ecological deterioration cost. The latter is really difficult and the first challenge is that most of resource data are not open to us.

Definition of EDP

Prof. Bartelmus: These partial indicators should not be termed EDP [p. vi] [2.1] since EDP (at least in the original SEEA) is based on NDP and accounts for depletion and degradation. The partial accounting for EDP might explain why EDP is presented as an “index” of percentage share of environmental cost, rather than deducting this cost from NDP or GDP [4.2.4].

Chinese team: GDP is a more commonly-accepted indicator than NDP in China. To acquire the recognition of common people, we decide to deduct maintenance cost from GDP rather than NDP although we realize the definition of EDP in SEEA. It has been explained in [3.2.5] of interim report.

Environment industry

Prof. Bartelmus: Due to the difficulties of separating pollution control and environmentally sound natural asset management, the separation of resource management [3.2.3, 3.3.2.4] from environmental protection [4.5.2] could be reconsidered. The SEEA suggests, therefore, accounting for a combined ‘environment industry’.

Chinese team: In china, resource management is completely separated from environmental prevention.

Environmental and economic assets

Prof. Bartelmus:

- Economic natural assets can be produced (cultivated) and non-produced (such as mineral resources, fish in the oceans or tropical forests) [3.2.1].
- Identify ownership (governmental, corporate, other non-governmental, by economic sector). Accounting for property rights is a particularly important task for China's economy in transition.
- Subsoil assets can be classified according to the probability of their existence (proven, probable, speculative) and profitability according to the so-called McKelvey box. Clarify in the report [3.2.1, 3.4.1].
- Clarify the concept of national wealth. Note that the World Bank definition differs considerably from the national accounts definition of 'net worth', i.e. the net value of financial and non-financial assets and liabilities [3.3.2.1].

Chinese team: The above points have been taken into account in the final report as possible as we can.

Natural resource valuation and depletion

Prof. Bartelmus:

- Contrary to a statement in the report [3.3.3], there is a generally accepted valuation method for economic non-produced natural resources, viz. their net present (discounted) value of resource 'rents' (net economic benefit) obtained from the exploitation of the resource over its lifetime. It is at this value that a resource stock would be traded (as a minimum) if a market existed for the resource stock.
- Natural resource depletion can be defined as the rent obtained from the non-sustainable exploitation of the resource during an accounting period; it is also the change in economic value of the resource stock from this exploitation. Note that 'non-sustainable' excludes natural re-growth and replenishment of the resource, as well as 'other volume changes' (OVC) of discovery and natural and political disasters, among others. OVC do not stem from production/extraction and are not 'cost' of capital consumption in national accounting terms; they do not affect the income and production accounts, but are recorded in the asset accounts as indicated in Annex II. These conventions should be clearly described in the report [3.2.1, 3.2.4, 3.3.3].
- Simplified valuations: section 3.3.3 of the report should explain (or

cross-reference to the SEEA] the net price method, which assumes compensating increases of the prices and discount rates), and the user cost allowance, which assumes constant rent values over the lifetime of a resource.

Chinese team: The above points have been taken into account in the final report as possible as we can.

Pollution coverage

Prof. Bartelmus: *CO₂ and ozone layer depleting substances:* China can be expected to become the world's largest emitter of CO₂. Green physical and monetary accounting in China should therefore include global atmospheric emissions [4.7.2.1, 4.7.2.2].

Chinese team: The necessary data to calculate ozone layer depleting substances is in scarcity. CO₂ is too sensitive to be involved.

Prof. Bartelmus: *Health effects:* Table 4.38 of the report indicates particulate matter only for air pollutants affecting human health – omitting other significant pollutants (O₃, SO₂, CO etc.). It is not clear how the 'health' column differs in this regard from the 'households' column characterized by 'dust'.

Chinese team: There are three reasons why we only select PM as causal agent of health effect: 1) SO₂ has not been the primary air pollutant in most of Chinese cities in recent years and the preliminary calculation result illustrated that health cost from SO₂ pollution is less than 15 percent of health cost from PM; 2) SO₂ and PM has synchronized effects on health effect. 3) In nowadays china, there hardly monitoring data of Ozone and CO, whose health effect on people cannot be valued. So PM become the only air pollutant to evaluate health damage.

The column of 'household' characterized by 'dust' refers to extra cleaning cost spent by public sectors and households.

Prof. Bartelmus: Explain in this context the full sequence of emission, ambient concentration of pollutants, human exposure, health effects (via dose-response functions) [5.2].

Chinese team: The full sequence of pollution cost valuation is illustrated in technical guideline (Feature report 4, in Chinese)

Purposes of Green National Accounting

Prof. Bartelmus: The calculation of environmental cost as a capital consumption allowance serves two purposes. From a micro-economic point of view, it caters to the allocation of environmental cost to those who caused them according to the polluter/user principles. The idea is to achieve a better (possibly optimal) allocation of scarce resources by means of market instruments of environmental cost internalization. Green accounting thus facilitates the rational setting of these market-based, behaviour-changing environmental policy tools. On the other hand, macro-economic

analysis would focus on the overall sustainability of economic performance and growth. To this end overall accounting aggregates such as Environmentally-adjusted net Domestic Product (EDP) or capital formation (ECF) would alert to non-sustainability of economic performance.

Of course, predicting the sustainability or non-sustainability of economic growth and corresponding policy scenarios would have to model future trends. Such modelling should be based as much as possible on the integrative accounting data. All these uses should be more clearly elaborated in the report since they will eventually determine the actual implementation of green accounting in China.

Chinese team: We have involved the above good suggestions in the final report.

Environmental costing

Prof. Bartelmus:

- Damage costs are the economic values that should be internalized in theory for achieving (Pareto optimal) welfare maximization. Inconsistency with market price valuation and measurement problems of damage values discourages the inclusion of welfare measures in green accounting (see section 1.2.1) [5.2]. A practical approach of measuring externalities is standard costing (Baumol and Oates 1971), which is similar to maintenance costing.
- Valuation mix is a further hazard of separating natural resource and environmental accounting. This seems to be the case in Table 4.38 of the report, where different pollution costs cannot be compared or added up. Productivity loss and water scarcity seem also to indicate a mix of resource use and pollution costing [4.7.2.2].
- Marginal vs. average costing: the need for marginal cost estimates in accounting is a frequent misunderstanding [4.7.2.2, 5.2]. Ex-ante analysis (modeling) attempts to equalize marginal cost with market prices for attaining optimal production and consumption patterns. Ex-post accounting, on the other hand, describes a past situation, in which average cost is the appropriate weight for environmental impacts during the accounting period.
- The above points need further discussion.

Chinese team: The above points need further discussion.