

# RESEARCH ON GREEN GDP ACCOUNTING IN CHINA: REVIEW AND OUTLOOK

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**Abstract:** The background of the proposal of green GDP accounting in China was analyzed. The historic development of relevant researches and practices on green GDP in China was discussed from three stages, and existing problems pointed out. Four suggestions for the future work on green GDP accounting in China were provided.

**Keywords:** green GDP; environmental economic accounting; development; outlook; China

## 1 Background

The establishment of green national economic accounting system in China is based on the inherent shortages of traditional GDP measurement for economic development, current special national situations in China, and the development trend of green GDP accounting<sup>1</sup> in the international society.

### 1.1 Inherent shortages of traditional GDP accounting system

Traditional national economic accounting system (GDP) is undoubtedly correct and has played huge roles in the times when the resource and environmental problems have not affected the life quality and threatened social and economic sustainable development. However, with the rapid economic development and population growth, various resource and environmental problems, such as environmental pollution, ecological destruction, energy crisis and grain deficit, become more and more outstanding, which has weakened the welfare and even threatened the human existence. Under these circumstances, it is obviously unreasonable to still continue to use traditional national economic accounting system (GDP) to measure the economic development status.

Original national economic accounting system should be modified, mainly because it has some fatal shortages as follows: (1) It only records the consumption of man-made capital, but rarely or does not consider the input of natural resources and the resulting environmental problems; (2) It does not account the natural resources as national wealth; (3) It adds the environmental treatment costs into the GDP, but does not deduct the loss by environmental destruction from the GDP.

One country can realize rapid national economic growth in a short time, with the cost of depletion of its natural resources and pollution of its existence environment. However, the resulted serious consequence of this may be the lack of sustainable momentum for future social and economic development for the country, forming the phenomenon of “hollow-out” of resources and environment in the process of rapid economic development.

### 1.2 Development trend of green GDP accounting in the world

In last decade, common attention has been paid to resource problem and environmental problem in the world. Many experts, scholars, governmental departments and international organizations have been in an effort to deal with these problems, trying to account for the resources and environment and integrate them into national economic accounting systems. In 1992, the United Nations Conference on Environment and Development (UNCED) adopted *Agenda 21*. In Chapter 8 “Integrating Environment And Development In Decision-Making” of Section 1 of this document, it is pointed that: “The resulting systems of integrated environmental and economic accounting (SEEA) to be established in all member States at the earliest date should be seen as a complement to, rather than a substitute for, traditional national accounting practices for the foreseeable future. SEEA would be designed to play an integral part in the national development decision-making process.” At present, green GDP accounting has become an irresistible international trend and will gradually become the important basis for formulating and implementing sustainable development strategy by different countries. It is even more important and urgent to China.

### 1.3 Specific situations of China in implementation of green GDP accounting

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<sup>1</sup> In China, the System of Integrated Environmental and Economic Accounting (SEEA) proposed by UNSD is usually called green GDP accounting. In this paper, the term of *environment* is a concept with narrow sense, mainly referring to environmental pollution and ecological system, not including the use and conservation of natural resources. This is totally different from the broad definition of *environment* in SEEA.

Green GDP accounting is closely related to the basic situation of a country. China as a developing country is at the stage of rapid economic development. It has wide territory, huge population and is relatively lack in natural resources. At the same time, the soaring development of economy has resulted in rapid growth of exploitation and utilization of natural resources. The rapid economic development in China thus mainly depends on the competition of resource, competition of environment and competition of investment. At the back of this phenomenon of “Three Competitions” lie one-sided chase of GDP growth rate and ignorance of resource and eco-environmental costs. This has brought about negative effects and, in particular, serious “after-effect” as a result of destruction of resources and environment.

In order to radically improve the old extensive economic development pattern, the Government of China first proposed “a human-centered, comprehensive, coordinated and sustainable development view” and the new development strategy of “five syntheses and coordination”. President Hu Jintao of Chinese government pointed out that “we should study the method for green national economic accounting, explore an assessment system that integrates resource consumption, environmental loss and environmental benefit into economic development level, so as to establish and maintain the balance of human beings and the nature” in the earlier of 2004 on the conference of environment and population. This requires integration of resource and environmental costs into national economic accounting system, so as to radically change the achievement view of party leaders and administration leaders, promote the change of extensive growth patterns to intensive patterns with low consumption, low emission and low input, and thus truly carrying out the scientific development view in all the levels and fields of economic construction. Therefore, the establishment of green GDP accounting system in China fully embodies the political willing of top leaders of Central Government of China.

## 2 Development History

The work of green GDP accounting and environmental economic accounting in China began late compared to advance countries, but developed very fast. The achievements in this field are noticeable. The progress can be divided into three stages.

### 2.1 Initial Stage (from early 1980s to early 1990s)

Early in the beginning of 1980s, Chinese researches began to rethink and discuss the irrationality of resource and environmental prices which were far away from their values, and proposed the concept of cost of environmental pollution and ecological destruction. They also began some basic researches on green national accounting, such as environmental pollution loss research, environmental cost and benefit analysis, and natural resource accounting, etc. However, these have not reached the level of integrating the resources and environment into national economic accounting, there were also no practices, and enough attention has not been paid to by related state departments. The achievements at this stage are listed in Table 1.

### 2.2 Exploration Stage (from early 1990s to 2003)

With the rapid development of economy in China, the conflict between resource and environmental problems and economic development became further deepening. The researches on resource and environmental accounting and its integration into national economic accounting system were gradually highlighted. Many institutes set up research project teams, such as on resource accounting and environmental accounting, to carry out a series of theoretical researches on resource and environmental accounting, involving resource and environmental physical quantity and value quantity accounting methods and theories, shortcomings of existing national economic accounting system, and possibility of and forms, theories and methods of integrating resource and environment into national economic accounting system. A series of practices were also performed. The implementation of these research projects has laid solid foundations for the construction of green GDP accounting system in China. The achievements at this stage are shown in Table 2.

**Table 1**

**Resource and Environment Accounting Researches in China (from early 1980s to early 1990s)**

Time	Researchers	Research contents
1981	Yu Guangyuan	Proposed the need to account the environment, called on carry-out of calculation economic loss from pollution and ecological destruction.

Sixth and Seventh Five-Year Plan Periods(1981~1990)	Chinese Research Academy of Environmental Sciences (CRAES)	Carried out several case studies, including calculation of economic loss of pollution.
1984	National Environmental Protection Agency	Held International Workshop on Environmental Cost-Benefit Analysis.
1985	Chinese Research Academy of Environmental Sciences	Carried out <i>Study on Projection and Countermeasures for the Environment in 2000</i> ; accounted national economic loss from environmental pollution for the first time.
1987	Li Jinchang, et al.	Translated research reports, e.g. <i>Natural Resource Accounting and Analysis in Norway</i> .
1988	East-West Center of USA	Translated <i>Environment, Natural System and Development: Economic Assessment Guideline</i> into Chinese.
1988	State Council Development Research Center	Set up project team of Resource Accounting and Its Integration into National Economic System.
1989	National Environmental Protection Agency and WHO	Held International Training Workshop of Environmental Economic Assessment.
1990	Guo Xiaomin, et al.	Carried out research on account of economic loss from environmental pollution and ecological destruction, focusing on that from environmental pollution.
1990	Jin Jianming, et al.	Accomplished research of Ecological Destruction Economic Loss and Calculation Method for Typical Ecological Zones in China.

**Table 2**  
**Resource and Environment Accounting Research and Practice Progress in China**  
**(from early 1990s to 2003)**

Time	Researchers	Research contents
1991	Li Jinchang, et al.	Published <i>Natural Resource Accounting for Sustainable Development</i> .
1994	Li Jinchang, et al.	National ecological environmental cost accounting.
1996	Chang Yongguan, etc.	Air pollution accounting in Chongqing City.
1997	Fu shouning, et al.	Ecological environmental loss in Three Gorges project.
1998	Zhang Kunmin, et al.	Pilot studies on genuine saving rate in Sanming and Yantai cities.
1998	Xia Guang, et al.	Published <i>Econometric Study on Environmental Pollution Economic Loss in China</i> .
1999	Zheng Yisheng, et al.	Environmental pollution loss in China in mid-1990s.
1999	Peking University	Carried out research project "Green Accounting for Sustainable Development", with pilot study in Ningxia Hui Autonomous Region.
1999	Chinese Academy for Environmental Planning (CAEP)	Carried out studies on sustainable development and environmental economic indicator system.
2000	Wang Jinnan (CAEP)	Proposed "Initial Design Scheme of Environmental Resource Accounting Based on Satellite Accounts".
2000-	SEPA & World Bank	Conducted evaluation method study for environmental pollution loss in China and planned to carry out two provincial pilot studies.
2002	Wang Jinnan (CAEP)	Carried out study on environmental physical quantity accounting scheme in national economic accounting system, i.e. the scheme of environmental satellite account.

2003	CAEP & OECD	Carried out studied on environmental comprehensive indicator system and environmental performance evaluation.
2003-	CAEP	Carried out study on environmental economic I/O accounting model.
2003	State Statistical Bureau	In <i>China National Economic Accounting System</i> (2002 ), newly set up an annex account - Natural Resource Physical Quantity Accounting Table, and complied for trial national physical quantity table of land, forest, mine and water resources in 2000.
2003	China National Bureau of Statistics & Norwegian Central Statistics Bureau	Complied China energy production and usage accounts in 1987, 1995 and 1997.
2003	National Bureau of Statistics	Carried accounting pilots on items of forest, water, industrial pollution and environmental protection expenditure, etc. in Heilongjiang Province, Chongqing Municipality and Hainan Province; accomplished technical summary report and work progress report.
2003	Statistics College of Renmin University of China	Translated UN <i>System of Integrated Environmental and Economic Accounting 2003</i> (SEEA2003) into Chinese.

### 2.3 Piloting stage (from 2004 to present)

Since 2004, the proposition of scientific development view, ever-increasing over-investment of extensive production, promotion of new system of achievement examination and reform of national economic accounting, etc. all made carryout of green GDP accounting in China being paid unprecedented high attention, especially by Central Government and top leaders. Therefore, the green GDP accounting in China should be upgraded and normalized on the original basis, and gradually put into practical operation stage.

In this stage, there will be three most important works: (1) Integrated Environmental and Economic Accounting (Green GDP) Study jointly carried out by State Environmental Protection Administration (SEPA) and National Bureau of Statistics (NBS); (2) National Environmental Damage Evaluation and Survey carried out by the SEPA, which should provide good basis and platform for the first work; (3) Forest resource accounting project jointly carried out by the NBS and State Forestry Administration (SFA).

Integrated Environmental and Economic Accounting (Green GDP) Study includes physical quantity accounting, value quantity accounting, environmental protection I/O accounting and environmental-adjusted green GDP accounting. In March 2004, SEPA and NBS organized a work meeting on green GDP accounting, and formally initiated the project of Integrated Environmental and Economic Accounting (Green GDP) Study, which is supported technically by the Technical Team of the project from CAEP and Renmin University of China. In June 2004, SEPA and NBS held *International Seminar on Establishing China's Green National Economic Accounting System* in Hangzhou. In September, the two departments jointly organized two expert appraisal meetings, especially for *China Resource and Environmental Economic Accounting Framework* and *China Environmental Economic Accounting Framework*. Currently, the *Guideline on China Environmental Economic Accounting Techniques* has been drafted by CAEP and Renmin University of China, and pilot work of accounting in 10 provinces has been initiated in 2005. The forest resource accounting work also enters into scheme design phase for survey techniques. Also the World Bank and SEPA have launched a new project of China's Green National Accounting in September 2005. This means that the establishment of green national economic accounting in China has achieved some advancement, and is going ahead step by step.

## 3 Existing Problems

In consideration of the actual situation in China, the work of green national economic accounting is not long, the accounting base is not very solid, and there are still some problems as follows.

### 3.1 Imbalance of research work

Although the researches on resource and environmental accounting have been carried out for long, there exists great difference among the researches for different resources and environments. For some resources, e.g. forest resource and land

resource, the research develops fast and pilot work has begun, while for other resources, e.g. water resource, air resource, environmental degradation and pollution accidents, etc., the accounting develops slow, mature theories and methods are to be developed. This has constrained the overall progress of resource and environmental accounting and its integration into national economic accounting system. Therefore, from viewpoint of short term, the accounting of a complete environment-adjusted green GDP in China is impossible.

### **3.2 Theories and methods to be improved**

Despite some advance in resource and environmental accounting theories and methods, they are still not perfect. Firstly, the resource value theories are not uniform, the value origin, value determination methods and value measurement models are not normalized and have big debates. This has become the biggest barrier of integrating resource and environment into the national economic accounting system with value quantity forms. Secondly, essential breakthrough has not been achieved in how to synthesize individual resource and environmental accountings (such as water resource accounting, forest resource accounting, mineral resource accounting and environmental pollution accounting) to form integral resource and environmental accounting system, and how to determine the accounting and expression methods of physical quantity and value quantity. Thirdly, the progress is also slow in how to integrate resource and environment into current national economic accounting system, although it is a very important and key work that will decide the transfer of research results into the productivity. If breakthrough is not made in this issue, it will be difficult to actually integrate resource and environment into current national economic accounting system.

### **3.3 Lack of practicability of research achievements**

Undoubtedly, some research achievements have been reached in resource and environmental accounting and its integration into national economic accounting system. However, most of these research achievements are still limited at professional communication stage and have wide gap with the practicability. This is possibly because of the lack of close cooperation between the academic community and the governments, as well as the lack of promoting power and wide practicability of the research achievements. Therefore, in order to increase the practicability, man should walk out of the pure academic circle, study in depth the real problems, strengthen linkage and cooperation among related departments, and speed up the pilot work of accounting.

## **4 Outlook of the Work**

As the green economic accounting is a brand new research field, facing many difficulties, it is necessary to grasp the main contradictions and breakthrough points, work in a down-to-earth manner on step by step, and guarantee the work quality and smooth realization of the objectives. Currently, a framework of China's green GDP accounting has been set up. The next step is to, in addition to improve the current framework, speed up the local pilot work so as to verify the practicability of the theoretical framework. Besides, it is also imperative to strengthen international cooperation to establish a green national economic accounting system that keeps pace with the international society.

### **4.1 Further improve the green GDP accounting method**

The green GDP accounting is a complex system, involving not only a complicated economic system but also various kinds of natural resource and environmental elements. As seen from the international research experience, green GDP generally begins with local accountings, or focuses on specific resource types or environmental problems. The statistical institutions within international organizations have timely summarize these local accountings and upgrade them into theoretical and methodological researches, which can serve as methodological direction on the green GDP accounting in China.

The improvement of China's green GDP accounting theories and methods can be considered from the following four aspects: (1) Further improving the theoretical framework of green national economic accounting. Currently, two relatively ideal frameworks, i.e. China Resource and Environmental Economic Accounting Framework and China Environmental Economic Accounting Framework, which are connected with China's national statistical accounting system and keep pace with the international society, have been formulated. However, there are still leave many detailed problems in the two frameworks. These problems are to be further improved in combination with pilot work. (2) Formulating technical guideline on physical quantity accounting for both the environment and the resources. (3) Formulating technical guideline on value quantity accounting for both the environment and the resources, which are a focus as well as a difficult for carrying out green GDP accounting. The value quantity accounting mainly includes two parts, i.e. natural resource consumption and environmental degradation. (4) Carrying out countrywide survey for environmental pollution loss accounting. The theories and methods of environmental pollution loss accounting will be accomplished on the basis of the national environmental pollution loss evaluation work already undertaken. This is a basic work for green GDP accounting.

#### **4.2 Speeding up local pilot accounting work**

As a new accounting system, green GDP has the problems of being not in line with traditional national economic accounting system and having difficulty in collection and analysis of statistical data. In addition, it requires huge data and involves many departments for data collection and thus will be difficult to promote. It is possible to first carry out some pilot work in some areas. This will be of realistic significance for the promotion of green GDP in China.

Therefore, SEPA and NBS have determined to first choose 10 provinces (municipalities) to carry out pilot work on green GDP accounting and environmental pollution loss survey during 2004~2006, in order to earn experience for establish national green GDP accounting and environmental pollution loss evaluation system. It has been planned to establish an initial framework of green GDP accounting system that is fit for China's own situations in 3 to 6 years. At the same time, the public awareness on green GDP will accordingly be enhanced.

The pilot work will be uniformly led by NBS and SEPA. In order to coordinate the surveys and guarantee the quality, NBS and SEPA have jointly established Steering Group and Working Group for green national economic accounting and environmental pollution loss survey. The pilot provinces (municipalities) are selected on a voluntary basis, and the environmental protection bureaus (EPBs) and statistical bureaus of the piloting provinces, autonomous regions and municipalities directly under the Central Government will establish corresponding steering institutions and technical support systems. It is planned all pilot provinces (municipalities) finish the work and issues the report of green GDP accounting in the later of 2006.

#### **4.3 Accelerating construction of green GDP accounting system**

The construction of green GDP accounting system will include four aspects: (1) Setting up the work platform for green accounting. This is mainly to strengthen the role of overall design and overall coordination in green GDP by NBS in order to construct a uniform resource and environmental accounting framework on which both environmental protection departments and statistical departments can carry out environmental accounting and resource accounting respectively. (2) Reforming existing environmental and resource statistics system to provide environmental and resource data for green GDP accounting and, at the same time, speeding up the "greening" process of national economic statistics system. (3) Speeding up construction of relevant regulations and standards (e.g. accounting framework, accounting technical guidelines, accounting result publishing, etc.). (4) Studying the way to utilize green GDP accounting to formulate green development policies, e.g. economic restructuring, environmental taxation, environmental compensation, and governmental performance examination, etc.

#### **4.4 Strengthening international cooperation on green GDP accounting**

Currently, a new-round wave of carrying out green national economic accounting has surged in the world. United Nations Environmental Programme (UNEP) and United Nations Statistics Division (UNSD) are setting up a new UN committee on environmental economic accounting to promote green national economic accounting in developing countries. The World Bank, European Union, ADB, Norway, Korea, Japan and Canada have all expressed interests in cooperation with China in setting-up green national economic accounting. China would fully utilize this good international cooperation platform to establish its green national economic accounting that will keep pace with the international society.

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