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Exploration of the Theoretical Basis of Natural Resource Balance Sheets

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Abstract:

Based on traditional financial accounting, this article elaborates on the theoretical basis of natural resource balance sheets; combined with ecosystem service functions, attempts to solve the problem of value accounting in natural resource balance sheets, and can also be used for theoretical research. Better promote the development of natural resource balance sheet practice.

Keywords:

Natural Resources, Ecosystem Services, Natural Resource Balance Sheets, Theoretical Basis

1. Introduction

Since the Third Plenary Session of the Eighteenth Central Committee of the Communist Party of China was first put forward at the New Concept of "Natural Resource Balance Sheet", and requires that through the preparation of the natural resource balance sheet, the leading cadres be audited for the departure of natural resource assets, and a lifelong accountability system for ecological and environmental damage be established. In the academic community, the first is to discuss the macro aspects such as the disciplinary attributes, compilation basis and framework system of the natural resource balance sheet itself, and the second is to discuss the micro aspects of the definition of the concept of assets, liabilities, owners' equity, balance relationship and value accounting in the balance sheet of natural resources. In the practical world, since the National Development and Reform Commission and the Ministry of Finance have jointly issued a series of notices, mandatory for all localities to begin to declare the national ecological civilization pilot demonstration zone, and require these demonstration areas as pilot units in the country to take the lead in compiling the balance sheet of natural resources, the relevant regions of the five pilot areas of Inner Mongolia, Zhejiang, Hunan, Guizhou and Shaanxi have initially completed the preparation of the balance sheet of natural resources to varying degrees.

2. Literature Review

The preparation of the balance sheet of natural resources is still in the exploratory stage, and there is no completely unified consensus in terms of natural resource account design, asset classification, existence or non-existence of liabilities, the practical significance of owners' equity, and the accounting of value quantity. In terms of the basic theory of natural resource balance sheet, Song Xin [1] believes that the "continuing operation assumption" of the traditional balance sheet should be changed to the "continuous use assumption", which is more in line with the "ecological responsibility lifetime system"; Yao Lin [2] believes that the liability account has the necessity of existence, but the content of the accounting should focus on the natural resource loss that is believed to be caused for the time being; Qiao Yongbo [3] et al. elaborated on the definition of the elements in the natural resource balance sheet, arguing that liabilities should exist and be prepared in line with the basic accounting equation. In terms of natural resource balance sheet accounting methods, mainly focusing on the accounting and measurement of various types of resources themselves, Shi Wei et al [4]. believe that the critical value of water resource liabilities should be calculated from the perspective of water quality and water quantity; Costanza R [5] and others quantified the service value of ecosystems and natural resources; Bartelmus P et al [6]. proposed the SNA Satellite Integrated Environmental and Economic Accounting System (SEEA) after considering environmental issues.

In summary, the contradictions and conflicts between scholars are obvious. First, scholars have different views on the classification of natural resource assets, the definition of natural resource liabilities, and net equity, but the existing views are difficult to effectively solve the problem of duplicate measurement. Second, there is no uniform accounting standard for accounting for the amount of value in the balance sheet of natural resources. This paper argues that the preparation of the natural resources balance sheet is first necessary to clarify the theoretical basis on which the statement is based, such as accounting subjects, accounting elements, etc., and when it is reflected in the natural resource balance sheet, it is understandable. Second, to give practical significance to natural resource liabilities and net equity, it is debatable whether it should conform to the accounting identity of "assets = liabilities + owner's equity".

3. Recognition of the Basic Elements of the Balance Eheet for Natural Resources

3.1. Natural Resource Assets

3.1.1. Definition and Recognition Conditions for Natural Resource Assets

First of all, based on the definition of assets in traditional financial accounting, combined with the function of ecosystem services, natural resource assets can be defined as: the main body with ownership and management rights over natural resources has been fully defined, and the entity can substantially control the use and distribution of natural resources, and the direct or indirect economic benefits generated belong to the natural resources of the owner or manager.

Second, when recognizing natural resource assets, the following four conditions must be met at the same time to be called natural resource assets: First, natural

resources have a clear property rights registration. If the property rights are in a vague state, then the accounting of natural resources, whether in terms of physical quantity or value quantity, will certainly face the problem of difficult to unify the standards, which will lead to the problem of double measurement. Second, when accounting for natural resources, it is necessary to be able to value them and measure them. Third, natural resources can bring direct or indirect economic benefits to all subjects or controlling entities [7]. Fourth, ownership of natural resources is owned or controlled by the State.

3.1.2. Classification of Natural Resource Assets

At present, China's classification is land resources, marine resources, biological resources, agricultural resources, water resources, climate resources, forest resources, mineral resources and other resources nine categories; the international classification is mainly proposed by the United Nations and other international organizations in the "environmental and economic comprehensive accounting system" for the classification of natural resources, mainly divided into seven categories, namely mineral and energy asset accounts, land resources asset accounts, soil resources asset accounts, Timber resource asset account, aquatic resource asset account, other biological resource asset account and water resource asset account. On the basis of referring to these two classifications, combined with the function of ecosystem services, this paper classifies natural resources into: water resources, land resources, mineral resources, energy resources, forest resources, marine resources and biological resources in accordance with the principle of importance; then there are secondary and tertiary subjects, such as "forest resources" is divided into "forest resources and forest ecological resources", and then "forest ecological resources" is divided into three levels of subjects such as "water conservation and environmental purification". This combines the supply function of the ecosystem services function and the other three types of functions in the preparation and accounting process of the natural resource balance sheet.

3.2. Natural Resource Liabilities

3.2.1. Concept and Recognition Conditions for Natural Resource Liabilities

At present, there is considerable disagreement as to whether natural resource liabilities should be recognized, and this article considers that natural resource liabilities should be recognized. First of all, for the natural resource balance sheet as a whole, this concept is put forward under the premise of the audit of the leading cadres' natural resource assets leaving office, and the content of the natural resources statement itself should be able to achieve the purpose of the audit, because the natural resources are consumed and the reasons for the increase are diverse, there are normal mining losses in production and life, and there are also excessive losses caused by human error decisions, relying only on the assets and owners' equity in the balance sheet of natural resources [8]. It is difficult to fully reflect the degree of protection or depletion of local natural resources by leading cadres. Secondly, since the natural resource balance sheet is now being explored, if there is no related item of the liability in the table, then the owner's equity item will not exist, then the preparation will only be the nominal "natural resource balance sheet", and the essence of the preparation is the "natural resource asset balance sheet".

On the basis of the existing research results, the natural resource liability is defined as follows: natural resource liability refers to the fact that human beings cannot restore their regenerative capacity within a time due to the overexploitation and utilization of natural resources in the past, and in order to restore the negative impact caused by excessive consumption, it is necessary for specific entities to bear the current obligations that can be determined. In essence, therefore, natural resource liabilities are an economic compensation for the damage done to the environment in the past and the need to restore its functions.

The conditions for the recognition of natural resource liabilities are as follows: First, the premise of the existence of natural resource liabilities is that in the process of developing and utilizing natural resources, due to human decision-making errors, pollution to the ecological environment or waste of natural resources. Second, the recognition of liabilities for natural resources must be a current obligation of the Government or the relevant responsible person and must be caused by past conduct [9]. Obligations resulting from possible future uses of natural resources are uncertain and difficult to value account for, and are therefore not current obligations. Third, natural resource liabilities can clearly calculate changes in physical quantity and value. For example, the coal mines in Shanxi are over-logged, resulting in environmental pollution and soil erosion, so the debt at this time is the various cash expenditures caused by the state in order to control water sources and purify the air.

3.2.2. Specific Content of Natural Resource Liabilities

As mentioned above, due to the excessive exploitation and utilization of natural resources by human beings, the ecological environment has been destroyed, and the natural resource liabilities that need to be compensated and treated beyond the natural recovery capacity of natural resources have been formed. The specific content of natural resource liabilities includes two aspects: First, the cost of excessive consumption of natural resources. That is, due to the excessive exploitation and use of natural resources, a certain natural resource is less than the part of the relevant provisions of the national policy. For example, the State Council's "Opinions on implementing the strictest water resources management system" clearly puts forward the main objectives of controlling the development and utilization of water resources, controlling the efficiency of water resources utilization, and restricting the acceptance of pollution in water functional areas, and the "National Comprehensive Water Resources Plan (2010-2030)" approved by the State Council contains relevant quantitative indicators, providing specific standards for the accounting of water resources liabilities. Second, conservation and restoration inputs to natural resources. It includes social management costs, environmental protection equipment input costs and environmental protection capital input costs.

3.3. Net equity in Natural Resources

The practical significance of this paper for the net rights and interests of natural resources is the incremental change of natural resources caused by the capital invested by the government to protect the ecological environment and optimize the function of ecosystem services. The accounting of net equity in natural resources must not only reflect the value of the net assets of natural resources, but also be able to determine which administrative entity the ownership of the net assets of natural resources belongs to in law. According to the development and utilization of natural resource

assets, natural resource capital can be divided into two categories: undeveloped resources and exploitable resources.

4. Quantitative Measure of Value in the Balance Sheet of Natural Resources

In the value of ecosystem services, the value of natural resources is divided into use value and non-use value, and use value is divided into direct value, indirect value and selective value. Among them, the direct value is the products and entertainment that can be circulated in the market provided by various types of natural resources. Indirect value refers to the function and service value of ecosystems, and selective value refers to the future use of biological resources and potential uses of biological resources and biodiversity by individuals and societies [10]. Non-use value is divided into existential value and heritage value. Existential value is the fee that people voluntarily pay to ensure the continued existence of a resource; The main existing methods for evaluating the functional value of ecosystem services are shown in the following Table 1:

Table 1. *The main existing methods for evaluating the functional value of ecosystem services.*

Type	Evaluation methods
Market value method	The prices of factors of production remain unchanged
	Changes in the prices of factors of production
Alternative market value method	Opportunity cost method
	Shadow pricing method
	Shadow engineering method
	Protection Fee Act
	Restoration Fee Method
	Asset value law
	Travel Expense Act
Imaginary market value law	Conditional value method

For the accounting of direct value, the market value method, the travel expense method, the asset value method, etc., the protection cost method, the relocation method, etc. can be used for indirect value, and the conditional value method can be used for non-utilization value. For example, for forest resources, among the direct value, products such as trees can be accounted for by the market value method; the value of tourism and recreation can be accounted for by the cost method. In the indirect value, the nutrient recycling value can be calculated using the market value method; the reduced ambient temperature value can be calculated by the shadow engineering method. Among the selected values, the conservation of biodiversity values can be based on the method of willingness to pay.

5. Conclusions

On the basis of summarizing the predecessors, this paper elaborates in detail the three major elements of the natural resource balance sheet, namely the recognition and measurement of assets, liabilities, owners' equity and other related theoretical bases, and highlights the relevant theoretical basis of natural resource assets and natural resource liabilities. For the existence of natural resource liabilities, this paper analyzes the introduction of relevant policies in China to try to demonstrate the necessity of the existence of natural resource liabilities from the source; for the accounting of the value of natural resources, this paper attempts to use the accounting methods related

to the function of ecosystem services to account for the relevant value of natural resources.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Author Contributions

Conceptualization: F.Y.; Methodology: F.Y.; Writing – original draft preparation: X, X.L.; Writing – review and editing: X, X.L.; Supervision: F.Y.; Project administration: F.Y.; Funding acquisition: F.Y.

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