Land Resource Liability Theoretical Analysis and Account Construction

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Abstract. The purpose is to study the theoretical innovation and account construction of natural resource liability taking land resources as an example. This paper adopts the empirical research method of land resource liability accounting based on the theory of liability. It forms the land resource balance sheet based on “the arable land red line” and “ecological red line”. The main conclusions are as follows: (1) Liability accounting for natural resources (including land resources) requires innovation in debt theory; (2) Construction of three-tier structure accounting system for land resources assets and liabilities of the accounting system; (3) The accounting of land resources liabilities must be limited to the "the arable land red line" and "ecological red line", which improves the third floor of the land resources balance sheet. In practice, the feasibility of land resource liability accounting is also constrained by various factors such as data caliber, land property rights and land valuation.

1. Introduction

The balance between economic development and environmental resources has become an important issue in the process of sustainable development in all countries. It is even more urgent for China which has a relative shortage of resources. Because of this, the "Decision of the Central Committee of the Communist Party of China (CPC) on Several Major Issues Concerning Comprehensively Deepening Reform" (hereinafter referred to as the "Decision") adopted by the Third Plenary Session of the 18th CPC Central Committee, proposed to "explore the preparation of natural resources balance sheet in the section of accelerating the construction of ecological civilization system, conduct the off-office audit on the natural resources assets for the leading cadres, and establish a lifelong accountability system for the responsibility of ecological environment damage." The pilot work has been carried out in many provinces, cities and regions across the country. One the one hand, the purpose to prepare the balance sheet of natural resources is to find out our "family property", systematically and comprehensively understanding the stock of natural resources and its changes in the region; On the other hand, it is for accountability, that is the establishment of an off-office audit system for leading cadres based on natural resource balance sheets, thereby building an accountability mechanism for ecological protection.

Since the introduction of the natural resource balance sheet, it has become the focus of research in academia. Because China is the first country in the world to propose a “natural resource balance sheet”, and its research issues span a variety of interdisciplinary subjects such as resources, accounting, audit,
statistics, etc., so the academic views are not uniform in its connection with traditional accounting theory, innovation and practical design. Since the account construction of natural resource assets can refer to the design framework and principles of SEEA2012, the focus of academic disagreement is mainly on the theory and practice of the natural resources balance sheet.

Liabilities, in law, refer to specific rights and obligations that arise between parties in accordance with contractual agreement or legal requirements. In business accounting, it is defined as the current obligation that are formed in the past transactions or events of the company, able be measured in currency, and need to be repaid by assets or labor services, which will lead to the outflow of company economic interests. From the perspective of “payment obligation”, the liabilities in law and in accounting are essentially the same, and natural resource liabilities certainly have the same qualitative prescription. According to this definition, some scholars believe that the environmental impacts of natural resources consumed by current economic activities are liabilities when discussing natural resource liabilities, with specific projects including pollution treatment costs, ecological restoration costs, ecological maintenance costs, and compensation costs, etc. [1, 2]. Geng Jianxin et al. (2016) believed that neither SNA2008 nor SEEA2012 has proposed the concept of natural resource liabilities. That the above projects are used to express natural resources liabilities does not meet the current regulations of the two major accounting frameworks. And under the current technical level, it is lack of practical feasibility to confirm natural resource liabilities, and natural resource liability accounting are not advocated [3]; Gao Minxue (2016) thought that there were many conceptual confusions and serious mismatches when the liabilities were confirmed according to the natural resource consumption and placed in the framework of the classic balance sheet, and advocated to define natural resource liabilities based on excessive resource consumption [4]. It is the most scientific definition of natural resources liabilities presently, and this paper also discusses the natural resources liabilities in this direction and investigate the design theory and practice of natural resource liability accounting by taking the land balance sheet as an example.

2. Theoretical explanation of natural resource liabilities

2.1. Basic conditions for the confirmation of natural resources and liabilities

With reference to the confirmation conditions of environmental liabilities, the confirmation of natural resources must have clear creditors, debtors, subject matter of repayment and repayment period, and has the requirements to be expressed and measured in currency [3]. But due to the different statistics calibers for each natural resource, in many cases, they cannot enter the economic system to circulate, and cannot be accurately measured in currency. So, in some cases the confirmation of natural resources liabilities can break through the monetary measurement and be measured by physical quantity [4].

2.1.1. Creditors of natural resource liabilities

Natural resource liabilities are the actual obligation that are caused by natural resource owners or controllers in the past transactions or events and need to be paid off through the economic benefits outflows in the future. In China, the owner of natural resources is the whole people, and the resources environmental liabilities borne by the government as agents refer to the damage on the future generations caused by the development and utilization of the regional environment [5]. It can be seen that the creditors of natural resource liabilities are “future generations” in sustainable development. They are relatively indistinct, and in the real society, generally agented by the government, the “owner of public resources”. Therefore, the creditor of natural resource liabilities can be considered as the government.

2.1.2. Debtor of natural resource liabilities

The academic community universally acknowledged that the “accountability” function of natural resource balance sheets should be realized through “natural resource liabilities”, and such natural
resources usually have public property rights, with externalities usually existing in the past and present development and utilization. Therefore, even if the amount of natural resource liabilities is clearly identified, in most cases, natural resources liabilities should be borne by the government. However, as the property rights of natural resources become more and more clear, natural resources liabilities will be borne by other entities increasingly, such as enterprises or individuals. For example, the reclamation obligation arising from the occupation of cultivated land resources should be recognized as land resource liabilities, which are usually paid by enterprises that occupy cultivated land. Moreover, the government will improve the land ecological environment, such as special land remediation, low- and medium-yield land transformation, etc., and these land resources liabilities will be borne by the government.

2.1.3. Subject matter of repayment for natural resources liabilities
In some cases, natural resource liabilities have no specific subject matter of repayment or subject matter cannot be defined, such as mobile water resources, marine resources or certain biological resources. For this reason, many scholars believe that under current conditions, natural resources liabilities cannot be affirmed. However, for natural resources such as land resources, of which economic value and ecological value are important, if the land resources liabilities are not actively accounted, it is unable to audit land resources liabilities through standardized statistics and also impossible to reform the existing cadre off-office audit system of land resource management. The subject matter of repayment for land resources liabilities can be clearly identified as the land that has been illegally occupied, polluted and ecologically destroyed in the past.

2.1.4. Repayment period of natural resources liabilities
The repayment period of natural resource liabilities is generally designed according to the liabilities project cycle that needs to be repaid, or the government's administrative management or planning cycle. The specific time limit is consistent with the natural resource management and the assessment work period. For example, the land reclamation work arrangement is carried out in principle taking five years as one stage, which is divided based on management requirements. But in actual work, the reclamation work phase should be reasonably divided according to the land damage prediction situation, combined with the service life of the land reclamation plan; while at present, the general planning period of land reclamation work is consistent with the overall planning of land utilization, and the whole reclamation work will be segmented to invest and implement.

2.2. Theoretical innovation of natural resources liabilities
The assets liabilities accounting of an enterprise recognizes the economic right to use of natural resources obtained by the enterprise as the increase of intangible assets. The national economic accounting system (SNA2008) treats natural resources as non-productive assets in non-financial assets to account, and the comprehensive accounting system for environmental economy (SEEA2012) also disclose natural resource assets only in asset accounts \( [6] \). As can be seen, that continue to confirm the natural resource liabilities in accordance with the current principle of asset-liability accounting faces theoretical difficulty. However, this does not mean that the preparation of natural resources balance sheets should avoid liability problems. On the contrary, how to break through the existing theoretical difficulties to account natural resource liabilities is the focus of the current preparation of natural resources balance sheet \( [7] \).

Theoretical innovations of natural resource liabilities should start with the purpose of preparing a natural resource balance sheet and include two purposes: First, through the natural resources balance sheet, it enables to find out the home property of the natural resource assets and its variation of a country or region so as to assess the quality of the ecological environment, which can be achieved by accounting the changes in the stock and flow of natural resource assets; Second, through quantitative accounting, the occupation, use, consumption, recovery and proliferation activities of natural resources by economic entities are reflected in the natural resources balance sheet, so as to realize the lifelong
accountability system of ecological environmental damage responsibility. This must be done through the accounting of natural resource assets, especially the accounting of natural resources liabilities.

In the process of preparation, the concept of resources sustainable utilization and corresponding management tools are introduced, focusing on resource consumption, especially excessive consumption, in the process of economic activities, and regarding excessive consumption of resources as “debt”, which is defined as the “liabilities” to the future and “liabilities” to the environment, taking this as the core to form a natural resource balance sheet[4].

2.3. Theoretical Explanation of Land Resource Liability Subjects

According to the principle of designing natural resource assets and liabilities by Professor Gao Minxue, combined with the current red line of land resources (red line of cultivated land and red line of ecological protection), land resource liabilities should include the area occupied by cultivated land (occupy one and compensate one) and the amount of forest land or grassland that exceeds the limit, equivalent to the area of over-exploited land. The consumption of the land resources in these types will affect the national cultivated land safety or ecology safety to a certain extent. Therefore, it is necessary to carry out remedial measures such as land reclamation or land ecological remediation within a certain period of time in the future. So, the behavior of occupying cultivated land and ecological land can be identified as land resource liability, which is in line with the general theory of liability recognition.

3. Principles and practices of land resource liability account construction

3.1. Land resource balance sheet construction framework

Land resources are non-renewable resources from the perspective of land utilization, and they are characterized by fixed totality, regional differences, and supply scarcity. Affected by these characteristics, the following problems should be dealt with well in the land resource accounting, that is, the following theoretical assumptions are made:

- The total physical quantity of land resources in the accounting area is fixed. The focus of land resource management is the control of the land resources utilization, and the purpose of preparing the land resource balance sheet should be to assist in land resources the management;
- Once agricultural land or ecological land is converted into construction land, in most cases it is irreversible and cannot be restored to the state before unconverted. For countries like China, especially where the cultivated land is scarce, the ecological environment has received more and more attention, and very strict control measures have been taken for the conversion of cultivated land or ecological land to construction land.
- In order to ensure food security, it is necessary to maintain the red line of 1.8 billion mu of cultivated land. China stipulates that the cultivated land in each province will not be reduced.
- China's land resource management system is to allocate and manage the construction land index through the overall land utilization planning system. It is necessary to allocate a certain amount of new construction land quotas in the provincial administrative area in each planning cycle to county administrative areas. Then, the county-level land use plan and the annual land use plan determine the quantity limit of the agricultural land converted to construction land in every planning cycle and each year. Only within the limit is it a compliant land.
- Even within the scope of new construction land utilization indexes, the conversion of cultivated land into construction land needs to compensate one mu for one mu that has been occupied, that is, to achieve a requisition-compensation balance in the counties. Therefore, the amount of cultivated land occupied and the illegal occupation of agricultural land (including forest land) should be recognized as land resource liabilities, which will be repaid in the subsequent planning cycle.
- In the important ecological function areas, ecological environment sensitive areas, vulnerable areas and other important ecological areas that are related to national and regional ecological safety, the red line of ecological protection is delineated and strict protection is implemented. Utilization control for the ecological land where has set the ecological red line, will be implemented. The allocation of land resources liabilities will also be extended to the scope of the land with ecological red line [8].

The account of the land resource balance sheet should include:

- Land resource physical stock and variation table (Table 1), that is the physical quantity account of land resource assets. This account is the framework of the most basic and most preliminary land resource balance sheet, which is the content being piloted at this stage.

|                     | Cultivated land | Garden land | Forest land | Grassland | Urban villages and industrial and mining land | Transportation land | Water areas and water conservation facilities | Other land |
|---------------------|-----------------|-------------|-------------|-----------|-----------------------------------------------|--------------------|-----------------------------------------------|-----------|
| Initial resource stock |                 |             |             |           |                                               |                    |                                               |           |
| Increased stock of current resources |                 |             |             |           |                                               |                    |                                               |           |
| Stock growth / new discovery |                 |             |             |           |                                               |                    |                                               |           |
| Reevaluation for up-regulation/reclassification |                 |             |             |           |                                               |                    |                                               |           |
| Decrease of current resource stocks |                 |             |             |           |                                               |                    |                                               |           |
| Normal decrease of development / stock |                 |             |             |           |                                               |                    |                                               |           |
| Disaster loss |                 |             |             |           |                                               |                    |                                               |           |
| Reevaluation for down-regulation / reclassification |                 |             |             |           |                                               |                    |                                               |           |
| Ending resource stock |                 |             |             |           |                                               |                    |                                               |           |

- Stocks and variation of land resource management equity (Table 2). The so-called management rights and their confirmation rights, the key targets of accounting are those land resources that can be set separately. Undoubtedly, the accounting scope of land resource management rights is certainly smaller than the natural resource entity accounting, which discards the part that is purely natural and has not yet been linked to the economic system. At present, it mainly includes commercial construction land in urban construction land, such as business use land, industrial and mining storage land and residential land, etc., and should be
extended to rural collective commercial land (flowing cultivated land and collective construction land) in the future. If there are conditions or necessary, the management equity can be subdivided. For example, according to the nature of the unit holding equity, it may be divided into enterprises, governments, households, or classified into state-owned land resources and collective land resources according to the nature of resource ownership. More detailed information can be counted.

- Land resource balance sheet is based on cultivated red line/ecological red line (Table 3). This article focuses on the setting of land resource liability subjects.

| Table 2. Table of land resources management equity (area) |
|----------------------------------------------------------|
| Whole and retail land                                    |
| Accommodation and dining land                            |
| Commercial and financial land                            |
| Mining land                                              |
| Industrial land                                          |
| Warehousing land                                         |
| Urban residential land                                   |
| Other urban land                                         |
| Initial equity stock                                     |
| Increased stock of current equity                        |
| New right confirmation/natural growth in the current period |
| Reevaluation for up-regulation/reclassification           |
| Decrease of the current equity                           |
| Normal reduction of current conversion/stock             |
| Disaster loss                                            |
| Reevaluation for down-regulation/reclassification         |
| Ending equity stock                                      |

3.2. Land Resource Liability Account Settings

- Land resource liabilities based on the red line of cultivated land. China implements most stringent utilization control system in the world for cultivated land, and implements the policy of “occupy one and compensate one” for the occupied cultivated land in county-level administrative regions. In the process of preparing the annual land asset balance sheet, the cultivated land occupied in a certain year requires to compensate cultivated land of equal quantity and equal quality. Therefore, the amount of cultivated land occupied can be
recognized as a liability increase in the year of cultivated land occupation, and it can be a liability reeducation until the supplement of cultivated land. The occupation of cultivated land can be divided into two situations: one is the normal occupation of cultivated land (within the scope of the indexes), and the land resource liabilities owed are the amount or cost of the cultivated land compensated (expense); the second one is illegal occupation of cultivated land (outside the scope of the indexes), and the land resources liabilities owed include not only the amount or cost of the cultivated land compensated (expenses) but also other expenses on dealing with illegal land.

- Land resource liabilities based on ecological red lines. The ecological protection red line refers to the strict control boundary legally delineated in key ecological function areas, ecological environment sensitive areas and vulnerable areas, as the bottom line of national and regional ecological safety. The “ecological protection red line” is another mentioned “lifeline” in the national level following the “red line of 1.8 billion mu of cultivated land”. The natural ecological land of forest land, grassland, wetland and desert in the ecological protection red line area cannot be converted into non-ecological land. The boundary of the ecological protection red line area is relatively fixed, and the area size cannot be reduced at will [7]. In reality, ecological management measures need to be carried out in the event that the ecological service function is reduced due to the reduction of ecological land types in the region. Therefore, the reduction in the ecological land area of forests, grasslands, and unused land within the ecological protection red line can be identified as an increase in land resources liabilities, and measures to restore these types of ecological land are regarded as reductions in land resources liabilities.

| Table3. Land resource balance sheet based on cultivated land red line/ecological red line |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Cultivated land                   | Garden land     | Forest land     | Grassland       | Other land      |
| Asset Liability                   | Asset Liability | Asset Liability | Asset Liability | Asset Liability |
| Initial stock                     | Current new increment | Current consumption | Ending stock |
| Asset Liability                   | Asset Liability | Asset Liability | Asset Liability | Asset Liability |
| Net asset                        | Net asset       | Net asset       | Net asset       | Net asset       |

4. Conclusions and issues to be studied
The natural resource balance sheet does not exist in isolation. It should be based on natural resource management practices and linked to other existing accounting systems. Therefore, Professor Gao Minxue constructed a set of natural resource accounting system with a three-layer framework, in which the asset accounting sheet based on natural resource entities directly linked the environmental asset accounts of environmental economic accounting. Then the asset accounting sheet under the operation rights and interests was used as a transition, and finally extended to the natural resources balance sheet which was based on mining rights and interest and defined liabilities by over-exploitation [4]. Based on this theoretical framework, this paper compiles an accounting framework of land resource balance sheet with a three-layer framework. Among them, the land resources balance sheet is designed beyond the “cultivated land red line” and “ecological red line” to improve the land resources balance sheet in the third layer. After the introduction of the natural resources balance sheet, this paper starting with the definition, confirmation and accounting framework design of the most controversial natural resource liability, firstly discusses the innovation of natural resource liability to the liability theory, and then sets up innovative research on the establishment of land resource liability account under this theoretical framework. The most important
thing is to fill the gaps in academic circles for the establishment of land resources liabilities based on red line management, which is worthy of an practical reference for natural resources balance sheet.

However, although the discussion on the setting of land resource liability account solves the problem of theoretical explanation and account setting, there are still problems that need to be improved and solved in the process of actual data collection and statistics. The first one is an issue on statistical caliber of land resources in various types between various departments, such as the difference in the statistical caliber of forest land in the Territory Department and Forestry Department, so the data is very different; the statistical caliber of the various ecological land types with “Ecological Red Line” and the red line quota of also need to be clarified. Second, accounting for land resources liabilities with different property rights has certain practical significance, such as the accounting of the ecological land liability for cultivated land, forest land and other ecological land occupied by enterprises, individuals and other users. However, the current statistics data of China in this field still need to improve on the basis of clear land property rights reform. Third, the accounting of land resources assets and liabilities is based on physical quantity. In the future, the land resources entering the economic system need to be accounted in the form of value, which requires intervention in more scientific land resource (asset) valuation methods, and it is also one of the supporting technologies that need to be perfected.

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