

A Review and Reflection of Value Account of Forest Resources

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Abstract: The framework of forest valuation accounting has been formed through the development stages of timber value calculation, forest ecosystem valuation and entire value accounting of forest resources, including the forest values of resources in kind, environmental resources and social benefits in China. These theory and methods still face deviation of theories and methods from vague position of discipline, larger accounting results from ignoring differences between forest ecological functions and ecosystem services, and unrealistic and other problems from non-standard index system and accounting methods due to the development history and other reasons. Five suggestions are proposed to make explicit the object and purpose of the forest resource value accounting, establish universal, scientific, measurable and concise index system for value evaluation, calculate forest resources value in consideration of forest type and position, distinguish accurately the functions from benefits of the forest resources, and suit value calculation result to the practice of social economy.

Key words: Forest resource value, accounting, review, suggestion.

1. Introduction

The forest is one of the important biological resources on the earth's surface, and is considered as an important part of ecological system of the earth, providing fundamental conditions for human survival, living and socio-economic development. Historically, we have various evaluations for the value and benefits of forest from domestic to abroad. For thousands of years, forest (basically natural forest) and other natural growth or evolved resource had been regarded as no value. To the last century, people started to pay attention to the benefit of forest timber production and all kinds of forest by-products, in many cases, the value of the timber and forest by-products is measured

by wood processing and harvest time. From the 18th century or even earlier abroad, people began to pay close attention to the valuation of forest resource, and many useful conclusions were made. Afterwards, a group of environmental economists used the value concept of non-market goods and the accounting method, and established framework to value forest resource. Some countries have carried out the case studies in succession.

In the early 1980's, the study of forest benefit had focused on the timber production value, but the ecological and social values were less involved in research. In the Conference of Environment and Development of United Nations in 1992 and "21st Century Agenda" formulated by China, it was advocated to account the social and ecological values of forest, and to bring the values into the national economic accounting system. As the understanding to non-wood value and other functions of forest resource are deepened, studies on the environmental and social values of forest resources are developed gradually.

Since the beginning of this century, as the problem of global ecological environment gaining increasing

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attention, the market economy has developed and the researches in environmental economics and ecology has deepened constantly, the valuation of forest benefit has been changed greatly in both object and technical methods. It is generally recognized that forest benefit should include physical output and ecological environmental effects. Not only could the output of timber and forest products be quantified in value, but also the benefits such as soil and water conservation, and windbreak and sand-fixation by forest could also be valued in quantification. Especially, study of the social benefit of forest is going towards quantification.

However, on account of the differences of concept and aim of evaluation, the theory and method to evaluate forest resources benefit are troubled, i.e., the benefit evaluation index is uneven; the concepts of monitoring and evaluation are not distinct; evaluation object is partial and the results are not accepted.

In order to develop and complete the benefits evaluation theory and method of forest, the evaluation objects ought to return to the index of final benefit rather than monitoring objective. Moreover, it also demands to make amendment for the index system and method of evaluation.

From the 1960s, with the resource and environment issue getting increasingly sharper, as a significant composition of earth's surface, forest resource, closely related to human survival, has been paid extensive attention day by day, measuring the function of forest resource or the effect on environment is becoming urgent. It has also become the key point which matter to people. Along with the market economy's development and in-depth study of environment economics, forest resource value accounting has drawn more people's attention.

It is thought that reviewing present problems and raising counter measure for amendment and development can have significant effect on promoting and completing forest resource value accounting and development of economics area. Based on research

practice and related achievement, it discusses some key issues, aiming to promote the progress of the study area.

2. Review

At abroad, study of forest resource value accounting started earlier. From the 18th century or earlier, people have initiated value accounting of forest resource and have obtained a large number of conclusion and ideas. Then, many environmental economists set measurement framework of forest value, using the concept of non-market goods' value and its measurement methods, following which, countries launched case analysis about forest resource value. Now, the typical achievements in the field mainly include the forest resource value accounting methods proposed by The European Framework for Integrated Environmental and Economic Accounting for Forest, drawn up by EEC in 2000, and widely used in the United Nations, the International Tropical Timber Organization and other international organizations. Several countries such as Denmark, Germany, France, Austria, Finland and Sweden experienced and expanded it, and achieved certain effects [1].

In the early 1980s, the related studies were focused on forest's woods value, less concern was paid on its social value and ecological value. The United Nations Conference on Environment and Development in 1992 and "21st Century Agenda" formulated by China both advocated measuring the social and ecological value of forest and bringing them into national economic accounting system. With non-timber value and other functions of forest resource being studied deeper, research of environmental and social value of forest resource has been carried out. Zhang et al. [2] have preliminarily discussed the connotation and classification of forest's economic and social benefits. In early 1990s, based on the related theory of ecological economics, environmental economics and the research output of forest resources value, a good number of scholars began to pay attention to ecological value accounting of forest resources. The

representative books, such as “Green Crisis” edited by Jin Jianming [4], “Study on Forest Resource Accounting in China” edited by Hou [5], “Assets Management of Natural Resources” written by Qian Kuo and Chen [6], “Ecological Value Theory” edited by Li [7], effectively promoted the study on ecological economics in China. The Institute of Forest Sci-tech Information in Chinese Academy of Forest studied and introduced the methods of forest resources value accounting raised by Japan Forest Policy Research Association, and also Kong Fanwen had studied forest woods value and ecological value in part. These achievements attracted people’s strong focus on forest resources value accounting.

In the book of “Study on Forest Resource Accounting in China”, Hou et al. evaluated the value of woodland, forest woods and 3 ecological benefits (water storing, soil conservation, carbon fixation and oxygen production) of forest of the country. Based on it, Hou, Zhou, Li etc. put forward and built a relatively perfect index system and methods to account value of forest resources, accomplished value accounting of Beijing forest resources [8]. After it, the value accounting was carried out in the area of Loess Plateau [9], Hainan province [10], Shandong province [11] as well as other province and regions [12-14].

Until now, the framework to study forest resources value has been built in China. A large number of research results reveal that forest resource value could be divided into 3 kinds of values from physical, environmental resources and social benefit. The views on values of physical and environmental resources are consistent that the former includes the values in forest woods, woodland, forest products and forest animals and plants, and the latter includes values of forest carbon sequestration, water conservation, soil protection, environmental purification, farmland protection, biodiversity conservation, and improvement of living environment [3]. The connotation of forest social benefit value is various in different areas because of the influence of natural

condition and social economy features, mainly including offer of employment, promotion of local industrial development (such as eco-tourism), improvement of production and living environment and development of ecological culture. Now, the method has been used by many local governments and related departments to account value of forest resources. The results are regarded as important basis to make development plan of local forest or management of resource environment.

3. Discussion

There are five steps to account value of forest resource, of which the first is to determine the account object, the second to determine accounting index, the third to choose the appropriate method, then to distinguish between functions and benefits, and the fifth to calculate value and structure analysis.

Scholars have elaborated on basic theory and main accounting method of forest resource value as well as ecological value accounting of forest resource in part, having accounted lots of areas’ forest resource value. Not only can study results contribute to know about forest resource value objectively and comprehensively for people, but also it can provide research basis for the study of national green GDP. However, due to short period of development of the study area, the current theory and methods are not mature and normative enough with slow innovation and development. Some concepts, index and calculating methods are thought to be in need of being completed further.

3.1 Ambiguity of Disciplinary Positioning Leading to Deviation of Theory and Method

In recent years, researchers in the field of environmental economics applied the shadow price method and the cost method to account the value of forest environmental benefits. Meanwhile, scholars in ecological area assessed the ecological service function of forests and analyzed the dynamic changes

of ecosystems using the value amount. Due to the different disciplinary concepts and study purposes, functional evaluation in ecological area and value accounting in environmental economics are essentially distinct--the former describe, monitor and evaluate the dynamic changes of forest ecosystems with amount of value, aimed at studying the law of ecosystems; but the latter quantifies forest environment resources using ecological principle and methods to calculate its value in order to account resource value.

The current issue is that many ecological and forest economics researchers have confused the distinction between them, busy with calculating the value, paying less attention to the aim. Advantageously, this phenomenon can be regarded as that the measurement methods of ecological research promote the value measurement of forest economics. Meanwhile, the latter provides a new way for dynamic analysis of ecosystem. Disadvantageously, the lack of economics basic knowledge brings about garbling relative concept, misled by theory, improper method and wrong results. Logically, the results of many books are valid from the only aspect of ecological research, but practically, they are not accepted for going against the economy law.

3.2 Neglecting the Difference between Forest Ecological Function and Ecological Service Leading to Larger Accounting Results

Nowadays, the phrase "Forest Ecosystem Service Value" appears in a lot of books, which, in fact, is because of misunderstanding the concepts [3, 15-17]. Forest ecological function refers to the role and ability that forest itself has, such as carbon sequestration and oxygen production. Forest ecological service refers to the beneficial effect of forest ecological function on a certain object or environment. For example, farmland shelter-belt increases crop yields due to the regulation of regional climate and industrial and mining area forest purify environment. Due to the location, tree species, forest species and the level of local economic

development, not all the forest ecological function provide service. In other words, not all forest ecological functions have service value, just like the air condition put on the wild that itself has a thermostat function but no service value. It is the current problem that forest ecological functions have been thought as ecological service value so that nonexistent benefits are contained in the results.

3.3 Un-standard System of Indicators and Calculation Method Cause Unrealistic Results

(1) Inattention in the concept of flow and stock. The former refers to increase or decrease of the forest service value, and the latter to accumulation or storage after a period. The standing volume of forest, carbon sequestration stored in the volume and soil is the stock, described with stock value, but the annual wood increment and production of oxygen amount are regarded as flow, described in flow value. Thus, incorporating stock and flow values is neither accurate nor scientific.

(2) Unrealistic set of indicator system. Although all kinds of forests have ecological functions, but not all have the same service value because of difference in location, tree species, etc. In many case studies, the indicators for value account include absorbing atmospheric nitrogen oxides or sulfur dioxide. In fact, some trees or forests do not have this function or benefit. Even if they do, calculating the value is out of thin air, when the place is of no nitrogen oxides or sulfur dioxide emissions.

(3) Mixture of accounting and monitoring indicators due to inaccurate indicator hierarchy. Monitoring indicators are to reflect the dynamic or intermediate change states in the process of behavior, while accounting indicators reflect the end results of behaviors. The current indicators for value account include both, and the accounting levels are in disorder, leading to adverse consequences of account for some benefit values of some indicators and omission of other indicators. The value of water conservation by forest

is expressed in the increment of standing volume, for example, but it is also calculated independently.

(4) The value of collection is calculated repeatedly. The value of material is shown as usefulness for human beings. In general, two aspects of real value and environmental value are considered, when the values of forest resource are accounted. If the forest has been cut down to use or to sale, its value is seen as real value, but the environmental value is lost; If it is kept as shelter forest without cutting down to use, the forest could provide only environment value, while the real value is potential. In other words, the real and environmental values could not be used simultaneously. Unfortunately, the value collection of forest resources is to accumulate real and environmental values in some cases.

4. Suggestion

4.1 The Objects and Purposes of Value Accounting the Forest Resources should be Determined Clearly

Firstly, it is needed to distinguish the difference of the value assessments of forest ecological function from value accounting of forest resources. The purposes of the former are to assess the environmental impact of forest and to know the forest ecological functions and its dynamic change, while the latter is to account the economic value. The objects of the value account are physical and environmental resources (including ecological and social benefits), and purpose of the account is to calculate values of substantial and environmental resources of the forest economic, serving the market.

Researchers engaged in the study of forest economy should not be entangled in the modeling study of ecological process, and in forest ecological they should not pour too much energy to the study about currency rates and discounted present value.

4.2 A Universal, Scientific, Measurable, Concise Accounting Indicator System should be Established

The common indicators should be selected from all

kinds of forest types to form the accounting indicator system. It will facilitate the longitudinal comparisons of the value in the same area or the same forest type, and also facilitate the crosswise comparisons, in areas where the indicators could show the effects of forest from different aspects comprehensively. All of the indicators can be represented quantitatively, especially the ecological indicators should be widely used and recognized in ecological studies and measurements. In each account system, all kinds of indicators should be in the same level, relatively independent and not be packaged in other indicators.

The value account in special locations such as desert or wetland, should be modified by kind and number of indicators on the basis of the universal indicator system.

4.3 The Types and Locations of Forest should be Considered

Ecological functions of the forest produce different benefits under influence of different environmental conditions, the purposes of the operation or management methods. The real outputs of the forests for timber, shelter, fuel, economy and special timber should be analyzed concretely. The types and values of physical outputs should be determined according to their characteristics, the difference of ecological functions and benefits in terms of biodiversity conservation of natural and plantation forests should be distinguished, and evaluated with proper account indicators; the difference of effects in rainfall interception and air purification between coniferous and broad-leaved forests should be distinguished.

In addition, the benefits of forest effects should be calculated and its function and efficiency should be decided according to the specific locations, such as tanabe, bank of river, wild field, suburbia, suburban and city.

4.4 The Function and Benefits of the Forest Resources should be Distinguished Accurately

Because of the difference of time, space, methods

and purposes of forest management, all sorts of functions and benefits of forest resources are not synchronous, namely some functions do not produce benefits. Therefore, the function evaluation of forest resources and the value account of service should be researched separately. The former could be used as the basis of the latter, but not be seen as substitute of the latter, the two could not be confused. The value accounting should be with the practical observations, investigations, surveys, analysis of historical data and many other methods to determine whether the forest functions have possessed the environmental conditions to create the benefits. The functions of carbon-fixation and oxygen production of forest, for example, usually come into play anywhere, while that of air purification is not necessary to work due to the difference of trees species or environmental pollutants.

The value accounting should be set up on the basis of observed datum of the benefits rather than theory of hypothesis, furthermore, it should be avoided that the observation datum of a special tree is used to calculate the benefits of all other species.

4.5 The Accounting Results should Conform to the Actual Economy of the Society

The account results of forest ecological functions should be combined with the production and social practice. For example, the value of oxygen generation of forest is calculated at the price of industrial oxygen, and it is reasonable logically. In fact it is not possible because oxygen is short not scarce at the majority of places on the surface of the earth. Then there is no trading market, its value is difficult to reflect. Similarly, the evaluated results about protecting values of rare wildlife resources, the special natural landscape and old trees and famous wood species are often questioned by the social departments related because of the effects from consciousness of environmental protection, the level of economic development, the forest management planning and the

influence of factors such as geographical locations, natural conditions and so on. Although several parameters such as coefficient of social development stage, price index have been used to dispose the results in some cases, the existing calculation results of forest resources value could only be accepted in the field of ecology, while obstacles in the practical economic activities are met. This might be the urgent and key problem to be solved in value account of forest resources.

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