

Article

Constructing a Model of Government Purchasing of Ecological Services: Evidence from China's Northeast Tiger and Leopard National Park

Hongge Zhu ¹ , Yutong Zhang ¹ , Yaru Chen ^{2,*}, Menghan Zhao ¹ and Cao Bo ¹

¹ School of Economics and Management, Northeast Forest University, Heilongjiang 150040, China

² Development Research Center, National Forestry and Grassland Administration, Beijing 100714, China

* Correspondence: chenylaru09@126.com

Abstract: The harmonious coexistence of man and nature is the primary goal of the establishment of national parks. Creating an ecological service supply model that takes into account the efficiency of ecological services, the fairness of residents' livelihoods, and the reasonable distribution of rights and responsibilities is an important way of achieving that goal. China's Northeast Tiger and Leopard National Park (NTLNP) is a typical national park with state-owned forest land as the main body. Before the establishment of the national park, state-owned forest enterprises (SOFEs) and local government forest departments (LGFDs) were always the undertakers of ecological services. Issues such as the distribution of rights and responsibilities between the NTLNP Administration, SOFEs, and LGFDs and the livelihood of forest workers need to be resolved urgently. This study takes the NTLNP as the study area and constructs a model of government purchasing of ecological services. The main results show the following: (1) The driving factors of the government purchasing of ecological services are increasing the workload of ecological services, the need for workforce transfer, and the optimization of subsidy standards. (2) In the construction of the responsibility system, the NTLNP Administration is the purchaser, SOFEs and Protection Stations are the undertakers, and groups such as third-party institutions and the public are the Supervisors and Evaluators. (3) Setting the purchase price in 2022 at CNY 47,654.44 per person while maintaining an average annual growth rate of 6.10% will match the per capita wage income level of urban workers nationwide in 2035. Based on the research results, it is proposed that payment for ecosystem services (PES) and ecological compensation (EC) have mature research paradigms in solving the problems of efficiency and fairness, but government purchasing of ecological services is a more appropriate policy tool in terms of arranging rights and responsibilities. This study attempts to construct a model of government purchasing of ecological services in order to provide a useful reference for national parks with state-owned land as the main body.

Keywords: Northeast Tiger and Leopard National Park (NTLNP); government purchasing of ecological services; payment for ecosystem services (PES); ecological compensation (EC); state-owned forest enterprises (SOFEs)



Citation: Zhu, H.; Zhang, Y.; Chen, Y.; Zhao, M.; Bo, C. Constructing a Model of Government Purchasing of Ecological Services: Evidence from China's Northeast Tiger and Leopard National Park. *Land* **2022**, *11*, 1737. <https://doi.org/10.3390/land11101737>

Academic Editor: Rui Yang

Received: 31 August 2022

Accepted: 5 October 2022

Published: 8 October 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

For national parks with state-owned land as the main body, the government is usually the provider of ecological services. Across the world, land in most national parks is owned by the central or federal government [1]. The provision of ecological services by the government is one of the best ways to solve the problem of positive externalities of ecological services. However, the government still faces many problems in providing ecological services. First, the government is not only the provider but also the producer of ecological services and faces the problem of low efficiency [2]. For example, national park management departments are scattered, and the management objectives of various departments are mixed, resulting in weakened protection power; national parks directly

managed by local governments are prone to the problem of focusing on development and ignoring protection [3]. Second, the government has strict ecological protection responsibilities. If the traditional production and lifestyle of residents in the national park is restricted and alternative approaches have not been formed, strict protection will have a negative impact on residents' income [4–6]. Third, there is the problem of distribution of rights and responsibilities between the government and multi-stakeholders after the establishment of the national park [7,8]. Therefore, it is of great functionality and research significance to explore an ecological service supply model that takes into account the efficiency of supplying ecological services and improves residents' livelihood and the sensible distribution of rights and responsibilities.

China's Northeast Tiger and Leopard National Park (NTLNP) is a typical national park dominated by state-owned land, the main protection targets are forest ecosystems with Siberian tigers and Siberian leopards as flagship species. From the early days of the founding of the People's Republic of China in 1949 to the establishment of the NTLNP, the ecological services within the NTLNP have mainly been undertaken by the state-owned forest enterprises (SOFEs) (also known as Forest Bureau) and the local government forest departments (LGFDs). The workers of SOFEs and LGFDs who are engaged in afforestation, tending, and management are the most direct producers of ecological services. After the establishment of the NTLNP, problems related to the supply of ecological services gradually surfaced. First, the wage income level of the workers who engaged in ecological services in the NTLNP is lower than that of workers in the same province and across the country, and significantly lower than that of on-the-job workers in the forest and grass industry¹. By comparing the income sources of sample worker families engaged in ecological services inside and outside the NTLNP, it was found that the wage income level of workers and families engaged in ecological services within the NTLNP is lower than that of worker families engaged in ecological services outside the park [9]. Second, because the protection and management of various natural resource assets in the park and the control of land and space use are all performed by the NTLNP Administration [10], the distribution of rights and responsibilities between the NTLNP Administration, SOFEs, and LGFDs must be clearly defined. Therefore, the NTLNP urgently needs to construct an ecological services supply model that embeds ecological, social, and management goals.

Government purchasing of public services is a means to improve government administrative efficiency and the quality of public services. It is widely used in promoting social justice and improving the environment [11]. This study is based on the first-hand data obtained from an investigation of the NTLNP in 2020, based on the theory of government purchasing of public services. The government purchasing of ecological services model is constructed with the five following components: institutional environment analysis, driving factor analysis, responsibility system construction, purchase price strategy, and the whole process evaluation chain. It attempts to address the following three core questions: (1) Why purchase?—Analyze the drivers of government purchases of ecological services. (2) How to purchase?—Clarify the distribution of rights and responsibilities of multiple stakeholders in the government's purchasing of ecological services. (3) How much?—Develop pricing strategies for government purchases of ecological services. Solving the above problems is of great significance for constructing a government purchasing ecological services model that can be used as a reference.

The government purchasing of ecological services is still in the exploratory stage in terms of theoretical system construction and practical operation. Compared with the literature, the marginal contribution of this study is mainly reflected in the following three aspects: (1) Based on the research question, we explore the model of government purchasing of ecological services, and further clarify the elements of the model. The current international concept that is most similar to the government purchasing of ecosystem services is government-funded payment for ecosystem services (PES) [12]; China's Sloping Land Conversion Program and Natural Forest Protection Program are representative

of such PES projects [13]. Current research themes focus on the effect evaluation after the implementation of the project [14–16]. There are no studies specifically addressing normative processes for government-funded PES projects. (2) From a theoretical perspective, most existing studies are based on the idea of ecological economics and take the Coase Theorem and Pigou Theory as their theoretical foundation. The research perspective is how to incentivize and compensate producers of ecological services. The research on PES represented by Wunder has formed a mature analytical framework [17]. It is applicable to situations where the beneficiaries of ecosystem services are easily defined. There is a lack of research on government-funded PES, which is difficult for users to identify and define. This study focuses on the theoretical basis of public economics. The research is based on the creation of a policy tool that embeds ecological, social, and management objectives. It is more applicable to the issue of the supply mode of ecological services in national parks under state-owned property rights. (3) In terms of research method, based on the minimum wage standard method and the opportunity cost method, this study formulates a pricing plan for the government purchasing of ecological services. This plan includes aspects ranging from meeting the basic living needs of ecosystem service producers to covering their opportunity costs. The connotation of the price of government purchasing of ecological services and the standard of EC are similar. The calculation methods of EC standards can be roughly divided into two types: based on the results of ecological services [18–20] and the opportunity cost of, or willingness to pay, personnel engaged in ecological services [21–23]. However, there is no precedent for formulating compensation standards from the perspective of meeting the decent living needs of ecological services practitioners. There is also no decision-making range and development space that can be used as a reference for the price setting of the government's purchasing of ecological services.

The rest of this study is structured as follows. Section 2 provides the research background, research area, theoretical analysis framework, data, and methods. Section 3 elaborates the research results for five components: institutional environment analysis, driving factor analysis, responsibility system construction, purchase price strategy, and the whole process evaluation chain. Section 4 provides a discussion of the results, and Section 5 sets out conclusions and policy implications.

2. Materials and Methods

2.1. Research Background

Based on the experience of developed countries in the management of nature reserves over the past 100 years, China proposes to establish a national park system. Since 2016, China has successively launched 10 national park system pilots, including Sanjiangyuan, Wuyishan, and Siberian Tiger and Leopard, involving 12 provinces. The ownership by the whole population of natural resource assets in the national parks is exercised by the central government and provincial governments at different levels. Among them, the ownership of natural resource assets owned by the whole population in the NTLNP is directly exercised by the central government.

After a five-year pilot period, in October 2021, China announced the official establishment of the first batch of five national parks: Sanjiangyuan, Giant Panda, Siberian Tiger and Leopard, Hainan Tropical Rainforest, and Wuyi Mountain (Table 1). The protected area is about 230,000 km², covering 30% of China's terrestrial national key protected wildlife species. Ecological services such as wildlife monitoring and protection, forest tending and patrolling, grazing prohibition and restoration of grasslands, and publicity and education of conservation concepts within the park require a lot of human capital and capital injection.

Table 1. Overview of China’s officially established national parks.

National Park	Geographical Location and Area	Land Tenure	Land Use Type	Ecological Service Supply Method
Siberian Tiger and Leopard National Park	42°31′06″N~44°14′49″N 129°5′0″E— 131°18′48″E Total area 14,926 km ²	State-owned 13,644 km ² (91.41%) Collective 1282 km ² (8.59%)	Woodland 1431 km ² (95.92%) Arable land 545 km ² (3.65%)	The national park administration established ecological public welfare posts; SOFE workers, farmers, poor households, etc. undertake ecological services. The national park administration jointly handled by NGOs, local communities, public welfare foundations, SOFEs, and other stakeholders to provide ecological services [24]. The national park administration undertakes ecological services and implements unified management of collective forest land. One is that the national park service purchases the ownership of the prohibited trees. The second is to implement “separation of two rights” national park agency exercising access rights, use natural forest logging subsidy and scenic spot ticket income as EC funds [25].
Giant Panda National Park	28°51′03″N~34°10′07″N 102°11′10″E~108°30′52″E Total area 27,134 km ²	State-owned 19,378 km ² (71.41%) Collective 7,756 km ² (28.59%)	Woodland 23,231 km ² (85.61%) Arable land 1809 km ² (6.67%)	The national park administration undertakes ecological services and implements unified management of collective forest land. One is that the national park service purchases the ownership of the prohibited trees. The second is to implement “separation of two rights” national park agency exercising access rights, use natural forest logging subsidy and scenic spot ticket income as EC funds [25].
Wuyishan National Park	27°31′20″N~27°55′49″N 117°24′13″E~117°59′19″E Total area 1001 km ²	State-owned 335 km ² (33.4%) Collective 667 km ² (66.6%)	Woodland 956 km ² (95.50%) Garden 18 km ² (1.80%)	The national park administration has established ecological management and protection posts, and implemented “one post for one household”, and poor households living on pastures undertake ecological services [26].
Sanjiangyuan National Park	32°22′36″N~36°47′53″N 89°50′57″E~99°14′57″E Total area 123,100 km ²	—	Grassland 86,832 km ² (73.58%) Rivers, lakes, and wetlands 29,843 km ² (25.29%) Woodland 495.2 km ² (0.42%)	The national park administration undertakes ecological services, switching between collective land and state-owned land in the park. Taking the natural village as a unit, the replacement of land ownership between the place emigrated to and the place emigrated from shall be carried out, all the land collectively owned by the peasants who moved from the land will be transferred to the state, and the original state-owned land at the move-in place is determined to be collectively owned by farmers [27].
Hainan National Park	18°33′16″~19°14′16″N 108°44′32″E~110°04′43″E Total area 4402 km ²	State-owned 3553 km ² (80.7%) Collective 849 km ² (19.3%)	Woodland 4020 km ² (91.30%) Garden 178 km ² (4.04%)	

The NTLNP is a typical national park dominated by state-owned land. The land area of key state-owned forest areas² The Jilin and Heilongjiang provincial governments hand over the responsibility of the owner of natural resource assets within the NTLNP to the NTLNP Administration. The NTLNP is managed according to the vertical management system of “Administration Bureau–Management Sub-bureau–Protection Station”. The NTLNP Administration is an agency directly under the State Forest and Grassland Administration (SFGA), co-located with the Commissioner’s Office of the SFGA in Changchun. The man-

agement branch is co-located with the SOFEs and the LGFDs. All township governments and state-owned forest farms within the scope of the national park will establish Protection Stations, exercising the responsibilities of ecological services within their respective jurisdictions (Figure 1).

Table 2. The area and number of workers of the management branch included in the NTLNP.

Management Branch	Affiliated Unit	Area			Number of People		
		Total Area (km ²)	Included in the Park Area (km ²)	Proportion (%)	Total Number of People	Number of People in NTLNP	Proportion (%)
Hunchun Bureau	Changbai Mountain Forest Industry Group	4051	2719	67.10%	1754	1226	69.90%
Tianqiaoling Bureau	Changbai Mountain Forest Industry Group	2035	1992	97.90%	3689	2791	75.66%
Wangqing Bureau	Changbai Mountain Forest Industry Group	3042	2952	97.00%	4142	3327	80.32%
Daxinggou Bureau	Changbai Mountain Forest Industry Group	1272	594	46.70%	2454	1884	76.77%
Suiyang Bureau	Longjiang Forest Industry Group	5165	2563	49.60%	4366	1172	26.84%
Muling Bureau	Longjiang Forest Industry Group	2675	679	25.40%	3,928	403	10.26%
Dongjingcheng Bureau	Longjiang Forest Industry Group	4180	712	17.00%	6228	586	9.41%
Hunchun Municipal Bureau	Hunchun Municipal Government	1403	659	47.00%	147	34	23.13%
Wangqing County Bureau	Wangqing County Government	3289	1229	37.40%	1706	1049	61.49%
Dongning Municipal Bureau	Dongning Municipal Government	3065	513	16.70%	507	149	29.39%

2.2. Study Area

The study focused on an analysis of the jurisdictions of seven SOFEs included in the NTLNP. The total area of these is 12,211 km², accounting for 81.81% of the total area of NTLNP. The NTLNP is located in the southern part of Laoyeling, where the two provinces of Jilin and Heilongjiang meet in China. It is the connecting area of the border between China, Russia, and North Korea. Covering 6 counties (cities), 17 townships, and 105 administrative villages in Jilin and Heilongjiang provinces, with a total area of 14,926 km². The physical coordinates are 42°31′06″N–44°14′49″N, 129°5′0″E–131°18′48″E (Figure 2).

Historically, when large virgin forests were not developed, Siberian tigers and leopards were distributed across the mountain plains of northeast China. With the construction of the Chinese Eastern Railway in northeast China and war aggression, forest resources in Northeast China have been severely damaged, the number of Siberian tigers has also dropped sharply from thousands to about 500 [28]. In the early days of the founding of the People’s Republic of China in 1949, the forest resources of the state-owned forest areas in northeast China were important strategic materials. The high-intensity exploitation and utilization of wood seriously threatens the integrity of the ecosystem, resulting in the near extinction of the Siberian tiger and leopard in China. In the 1980s, the northeast state-owned forest area fell into a crisis of recoverable resources and an economic crisis for SOFEs. In 1998, major floods broke out in the Yangtze River, Songhua River, Nen River, and other basins. To date, key state-owned forest areas in northeast China have begun to implement natural forest protection projects, which have greatly reduced timber production. In 2015, the commercial logging of natural forests will be completely stopped, the function of SOFEs has changed from producing timber to protecting natural forests, the role of forest workers has also changed from “lumber jacks” to “forest rangers”.

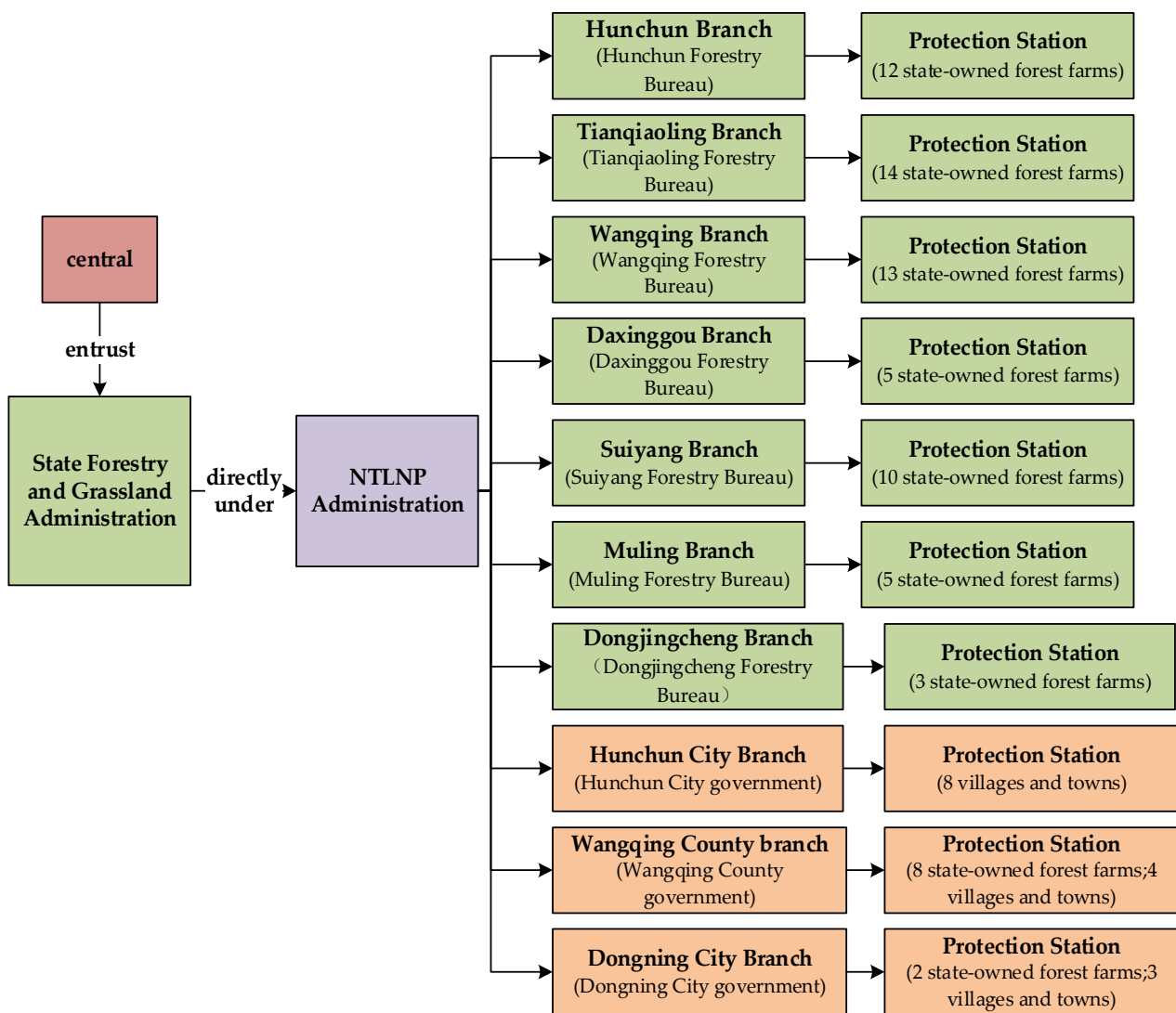


Figure 1. Organizational structure of the vertical management system of the NTLNP.

2.3. Theoretical Analysis Framework

The government purchasing of public services originated in the western administrative reform movement in the late 1970s, aiming to improve the efficiency of government administration and the quality of public services. International scholars generally believe that the connotation of government procurement of public services is similar to outsourcing public service contracts. The representative point of view, as suggested by Savas, is that “Government purchasing of public services means that the government provides public services by signing contracts with the private sector or the non-profit sector” [29]. The practice of purchasing public services by the Chinese government originated in 1998 when the Shanghai Pudong New Area Social Development Bureau purchased elderly care services from the Shanghai Young Men’s Christian Association to improve the efficiency of management of the civic leisure center. Subsequently, the research of Chinese scholars in the field of government purchasing of public services has gradually increased. In discussion on the definition of government purchasing of public services based on China’s national conditions, the most common view, as suggested by Wang, is that “The government will hand over the public service matters undertaken by itself to professional enterprises or social organizations through direct funding or public bidding, and finally pay the service fee according to the quantity and quality of public services provided by the undertakers” [30]. The concept of government purchasing of public services, a theo-

retical system based on public goods theory, new public management theory, new public service theory, governance theory, and transaction cost theory, has gradually formed. Based on the abovementioned classical public economics theory and following the logical sequence of “institutional environment analysis–driving factor analysis–responsibility system construction–purchase price strategy–whole process evaluation chain”, we developed a theoretical analysis framework (Figure 3).

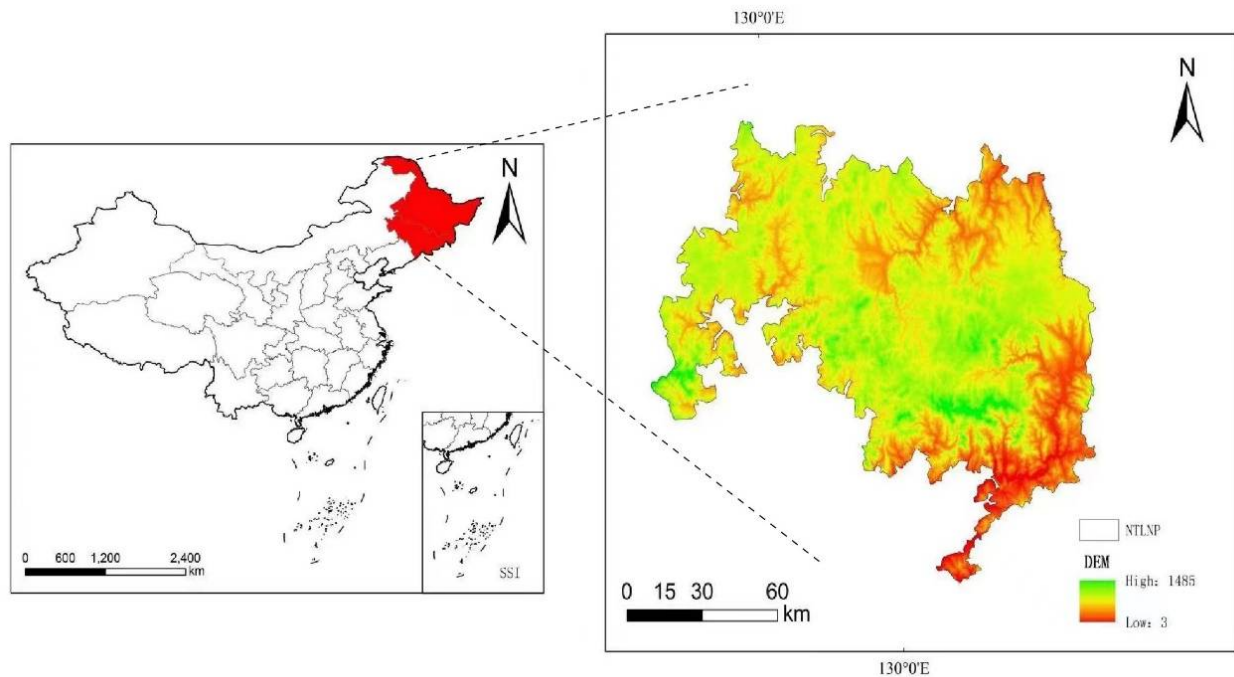


Figure 2. Study area.

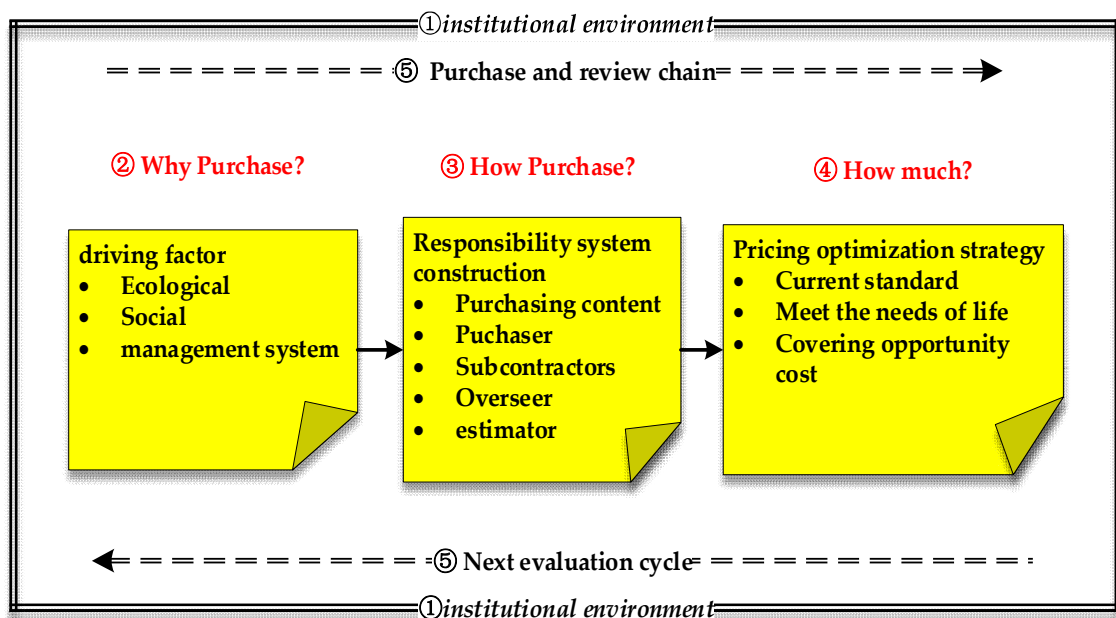


Figure 3. Theoretical analysis framework.

- Institutional environment.

First, government purchasing of services is embedded in a certain institutional environment [31], which is a prerequisite for the smooth implementation of government

purchasing of ecological services. Research experience shows that different political parties in some countries have different political preferences for public services providers. For example, Gradus analyzed the production models of waste collection in all cities in the Netherlands and concluded that conservative liberals preferred government purchase or privatization, while Christian Democratic parties held a negative attitude toward privatization [32]. Ferris also suggested that the American Republican Party may be more in favor of the government purchasing of public services [33]. For China, government purchasing of public services is one of the most important governance tools, and policy documents issued by administrative agencies at all levels provide strict implementation and constraints for the government to purchase public services. For example, government procurement-related documents issued by the Ministry of Finance of the People's Republic of China will regulate the content and boundaries of government purchasing of public services, and national park development plans formulated by relevant departments such as the SFGA will clearly encourage the types of ecological services in which the government purchase public services. Therefore, giving priority to the institutional environment in which the NTLNP is located is the guarantee of practical advancement and the basis for theoretical research.

- Why purchase?

Second, the theory of public goods is the theoretical starting point for the government purchasing of ecological services, and satisfying the public interest is the primary motivation for the government purchasing of ecological services. All natural resource assets within the NTLNP are owned by everyone; ecosystem services (such as clean air, clean water) formed by strict ecological protection in national parks have the attributes of public goods or quasi-public goods. This ecological benefit has a positive externality to the surrounding residents and even the whole country [34]. As the beneficiaries of national park ecosystem services are difficult to define, the government, as the main supplier of ecological services, can make up for market failures and improve the efficiency of resource allocation. However, government organizations that integrate supply and production often lead to inefficiencies in the supply of public services or even bureaucratic systems due to scale imbalances, while government purchasing of services from social institutions is a cheaper and more flexible solution [35]. Ostrom proposed two ways for the government to provide public services: The first is produced by the government's own officials and workers; at this time, the government is both the provider and producer of public services. The second is to pay the funds to social institutions, which provide professional services to citizens. In this case, the government is the provider of public services, while the social institutions are the producers [36]. Based on this, Ostrom regarded the interests and needs of citizens as the primary motivation for the government purchasing of public services. Wang has a similar view and regards the lack of administrative resources and the limited financial capacity of local governments as the basic motivation for the government to purchase public services [30]. Lin pointed out that the more complex the social population, the greater the residents' demand for public services [37]. The NTLNP is located in the border area of northeast China, where the economic development level is underdeveloped and a large number of agricultural and forestry people are distributed in the area. Therefore, clarifying the ecological services needs of the public, especially the ecological services needs of multiple stakeholders within the NTLNP, is the logical starting point for constructing a government purchasing of ecological services model.

- How purchase?

Third, new public management theory, new public service theory, and governance theory are the theoretical basis for the construction of the responsibility system in the government purchasing of ecological services. A perfect responsibility system needs to take into account social needs and administrative efficiency by building a collaborative platform for multiple stakeholders. Therefore, the central aim of this study is to reasonably allocate the rights and responsibilities of the purchaser, undertakers, supervisors, and evaluators. The practical exploration of developed countries is the root of the evolution of the theory

of government purchasing of public services, from new public management theory to new public service theory and governance theory, which reveals research trends shifting from market value priority to public value priority [38]. In the process of the new public management movement, new public management theory, which advocates improving the quality and efficiency of public service supply through market forces, emerged as the times required [39]. However, overemphasizing market efficiency would be out of touch with public needs, leading to the destruction of fairness, justice, and citizenship [40,41]. Therefore, Denhardt proposed new public service theory, the active participation of the public and the negotiation between the government, with the public being regarded as the prerequisites for the effective operation of government purchasing of public services. However, the government has reached cooperation agreements with social organizations in the form of service outsourcing, and it is becoming increasingly difficult to realize the coordination and orderly management of the public services system [42]. Governance theory has gradually become a theoretical guide to coordinate the power–responsibility relationship between participating subjects [43]. Ostrom proposed that a good governance structure can help reduce the cost of social governance. Governance structures include relationships within and between organizations, the relationship between organizations includes the relationship between the government and other social organizations as well as between its own branches. Public services reform under the guidance of governance theory pays more attention to the construction of coordination systems between departments behind public services outsourcing. In this study, the NTLNP involved multiple stakeholders such as the Administration Bureau, SOFes and LGFDs, community residents, and social organizations. Clarifying the rights and responsibilities of multiple stakeholders is the core link of constructing a government purchasing of ecological services model.

- How much?

Fourth, transaction cost theory aims to optimize the price of government purchasing of ecological services. Relevant research on the minimum wage theory and the semi-market theory provides innovative ideas for designing the purchase price range. Williamson divides transaction costs into search costs, information costs, bargaining costs, decision-making costs, monitoring costs, and default costs. He also proposes that comparing transaction costs and organizational costs can help the government choose whether to produce services by itself or purchase services from social institutions [44]. Reducing the transaction cost is the motivation for the government to optimize the purchase price of ecological services. This study focuses on the purchase price in the bargaining cost and divides the purchase price of the government purchasing of ecological services into three stages: The first stage is the current wage level of workers engaged in ecological services within the NTLNP. The second stage is to formulate a benchmark price to meet the living needs of ecological services producers (ecological management workers) based on the minimum wage theory. In the third stage, the purchase price to compensate the opportunity cost of ecological management workers is formulated based on semi-market theory. Marx's minimum wage theory is the representative theoretical basis for the establishment of the minimum wage standard. The minimum wage should consist of the value of the means of subsistence necessary for the owner of the labor force to sustain themselves and their descendants [45]. The government purchasing of ecological services is similar to EC. The relevant theories of ecological compensation standard can be used as the theoretical basis for the price of government purchasing of ecological services. Among them, the theory of semi-market theoretical value is the core theory of ecological compensation standard [46]. The semi-market theory can establish the standard of EC when the establishment of the ecosystem service function market is difficult; the main purpose is to determine the compensation standard from the two aspects of market supply and demand, such as opportunity costing. This study integrates the classical theories of public economics, labor economics, and ecological economics to set the price of government purchasing of ecological services, aiming to meet the needs of the public and reduce government transaction costs.

- Purchase and review chain

Fifth, new public service theory, transaction cost theory, and governance theory are the theoretical foundations for designing the whole process evaluation chain. The whole process evaluation chain runs through the government purchasing of ecological services. Satisfaction of public demand and efficiency of fund use are the main components of the evaluation chain, and third-party evaluation is the primary evaluation method. Huang proposed that government departments should form a comprehensive and transparent institutional framework for purchasing public services that transcends departmentalism, and make the public participate in the demand assessment, design, and acceptance of purchasing services [47]. This study attempts to construct the whole process evaluation chain of the government purchasing of ecological services according to the characteristics of the NTLNP. The analysis framework is based on the whole process evaluation chain of government purchasing of public services constructed by Jiang, which includes project evaluation, process evaluation, and result evaluation. The chain also includes evaluation procedures and evaluation methods.

2.4. Data and Methods

2.4.1. Research and Data

The data sources consist of primary data obtained from field research and statistical yearbook data. The survey data include two parts: the symposium survey data and the questionnaire survey collection data. The survey was conducted from September to December 2020.

(1) Symposium survey data. The research object of the symposium is the NTLNP Administration and its 7 administrative branches. Participants are management cadres responsible for natural resource management, comprehensive management (financial planning, personnel management, etc.), and ecological protection and restoration in each branch. The symposium survey consists of three parts: (i) types and tasks of ecological services undertaken by ecological management and protection positions within the NTLNP; (ii) the composition and number of personnel included in the NTLNP and engaged in ecological services; (iii) salary composition and current standards for personnel assigned to the NTLNP and engaged in ecological services.

(2) Questionnaire data. The data of the questionnaire come from the “NTLNP Resident Livelihood Survey Project” launched in 2020. The survey uses a combination of computer-assisted interview techniques (CAPI) and computer-assisted telephone interview techniques (CATI) to conduct structured interviews. A multi-stage random sampling technique was used for sample selection. First, the level of SOFEs includes seven SOFEs included in the NTLNP. Secondly, in each SOFE, according to the list of forest farms and communities, 2 forest farms on the mountain and 1 community under the mountain were equally selected. Finally, in each sample forest farm and community, 10 worker families were randomly selected as sample households according to the household registration list. The structured interview consists of two parts: (i) demographic and sociodemographic characteristics of the respondents; (ii) living standard of the families of forest workers. The survey obtained the survey data of 209 sample worker families from 7 SOFEs, among which are 78 worker families engaged in ecological services. This study focuses on these 78 worker families and their family members. Unfortunately, due to COVID-19, we have not been able to visit more households engaged in ecological services.

(3) Statistical Yearbook Data. The regional average income level and minimum wage data come from the *Heilongjiang Statistical Yearbook 2020* [48], the *Jilin Statistical Yearbook* [49], and the *China Forest and Grassland Statistical Yearbook 2020* [50].

2.4.2. Research Methods

Qualitative research and quantitative research were used to analyze the different sub-problems of the central problem of “constructing the model of government purchasing of ecological services”. First, in order to answer the question of “the driving factors of the

government purchasing of ecological services”, qualitative research was used to conduct textual analysis of the symposium data obtained from field research. From this, we can interpret the changes in the types and tasks of ecological services in the NTLNP, the composition and number of personnel assigned to the NTLNP and engaged in ecological services, and the salary composition of personnel assigned to the NTLNP and engaged in ecological services with current standards. At the same time, quantitative research was used to analyze the sample data obtained by the questionnaire survey, and the current wage income level of the workers who are assigned to the NTLNP and engage in ecological services was calculated. Second, in order to address the issue of “the distribution of rights and responsibilities of multiple stakeholders in the government purchasing of ecological services”, qualitative research was used to analyze the text of policy documents. From this, the specific requirements of the central government for the participants of the government purchasing of ecological services can be obtained, and the responsibility system for the government to purchase ecological services was constructed in combination with the multiple stakeholders involved in the NTLNP. Finally, in order to answer the question of “the price at which the government purchases ecological services”, the sample data obtained from the questionnaire survey were used to formulate a price strategy through quantitative research.

The pricing strategy is divided into three parts: The first part is the current income level of the personnel engaged in ecological services obtained according to the survey data. The second part refers to and improves the minimum wage standard calculation method specified in *Order No. 21 of the Ministry of Labor and Social Security of the People's Republic of China*; thus, a benchmark price that can fully meet the living needs of the ecological service workers in NTLNP was calculated. The proportion method was calculated by multiplying the per capita consumption expenditure of residents of poor households based on the survey data of urban households by the dependency coefficient of the employed person and the ratio of wage income to disposable income, plus an adjustment coefficient [51]. Appropriate adjustments were made to the selection of indicators according to the purpose of the research. The reason for the adjustment is that this study measures the price of government purchasing of ecological services, and the price should meet or improve the basic living standards of workers engaged in ecological services, not the minimum wage standard for poor households. Therefore, the indicators of poor households were replaced by the indicators of the sample workers engaged in ecological services in the NTLNP, so as to calculate the benchmark of the purchase price of ecological services through the adjusted proportion method. The calculation formula is as follows:

$$M = C \times S \times B \quad (1)$$

where M is the annual salary standard of ecological service workers in NTLNP; C is the per capita expenditure of sample worker families engaged in ecological services in the NTLNP; S is the per capita support coefficient of sample workers engaged in ecological services; and B is the ratio of the per capita wage income to the per capita total income of sample worker families engaged in ecological services in the NTLNP.

The third part, with reference to the opportunity cost method [52], takes the calculation result of the proportion method as the benchmark price to meet the basic living needs of workers, and calculates that it will catch up with the average annual growth rate of the per capita wage income of urban workers in 2035. The difference in wage income level can reflect the economic losses borne by the workers engaged in ecological services in the NTLNP due to their restricted development rights. In November 2020, the *Proposal of the Central Committee of the Communist Party of China on Formulating the Fourteenth Five-Year Plan for National Economic and Social Development and the Vision for 2035* proposed the goal of doubling the total economic volume or per capita income by 2035. The calculation formula is as follows:

$$P_1 = P_0 \times (1 + i)^n \quad (2)$$

where P_1 represents the target salary income value that should be achieved, P_0 represents the benchmark price of government purchasing of ecological services, i is the average annual growth rate of wages, and n is the number of years required for the increase.

2.4.3. Sample Description

Among the surveyed worker families, there are 78 worker families engaged in ecological services, with an average family size of 3 people and a family support coefficient per capita of 1.82. The wage income of these 78 families from SOFEs accounts for 86.88% of the total wage income, and the wages of SOFEs are the main source of family livelihood. The average wage income for SOFEs was CNY 41,056.46, and the average wage income for all workers was CNY 47,254.54 yuan. The total household income is slightly larger than the total household expenditure, at CNY 64,028.94 and CNY 62,352.06, respectively (Table 3).

Table 3. Family characteristics of ecological service workers.

Survey Item	Mean	Std	Scope	Frequency (Sample = 78)	Percentage (%)
Family members	2.62	0.81	1	5	6.41
			2	29	37.18
			3	37	47.44
			4–5	7	8.97
Support coefficient	1.82	0.66	1	12	15.38
			1–2	55	70.52
			3	9	11.54
			4	2	2.56
Salary from Forest Bureau (CNY)	41,056.46	17,650.14	≤30,000	19	24.36
			30,001–60,000	45	57.69
			60,001–90,000	12	15.39
			≥90,001	2	2.56
Income from salary (CNY)	47,254.54	20,450.83	≤30,000	16	20.51
			30,001–60,000	41	52.56
			60,001–90,000	16	20.52
			≥90,001	5	6.41
Total income (CNY)	64,028.94	23,430.11	≤30,000	4	5.13
			30,001–60,000	35	44.87
			60,001–90,000	25	32.05
			≥90,001	14	17.95
Total outcome (CNY)	62,352.06	42,803.34	≤30,000	10	12.82
			30,001–60,000	41	52.56
			60,001–90,000	14	17.95
			≥90,001	13	16.67

There are 81 workers engaged in ecological services in 78 worker families, and most of these workers are male, with 66 male workers (81.48%) and 15 female workers (18.52%). The workers engaged in ecological services are mainly middle-aged groups, with an average age of 46.07, of which 53 (65.43%) are 45–59 years old. The average number of years of education for workers is 11.47, and most of them have a high-school and junior high-school education. The average wage income of workers engaged in ecological services from SFES is CNY 33,496.35, the number of workers with wages between CNY 30,001 and 40,000 is 49 (60.49%), and the number of workers ≤ CNY 30,000 is 24 (29.63%) (Table 4).

Table 4. Characteristics of sample workers engaged in ecological services.

Survey Item	Mean	Std	Scope	Frequency (Sample = 81)	Percentage (%)
Gender	0.81	0.39	Male	66	81.48
			Female	15	18.52
Age	46.07	7.64	25–35	12	14.81
			36–44	16	19.76
			45–59	53	65.43
Education	11.47	2.42	≤9	30	37.04
			10–13	31	38.27
			≥14	20	24.69
Salary from Forest Bureau (CNY)	33,496.35	5932.37	≤30,000	24	29.63
			30,001–40,000	49	60.49
			≥40,001	8	9.88

3. Results

3.1. Institutional Environment Analysis

The plans and measures related to government purchasing of services issued by the Ministry of Finance of the People’s Republic of China and the SFGA have created a favorable institutional environment for the NTLNP to explore government purchasing of ecological services. In December 2017, the SFGA and the provincial governments of Jilin and Heilongjiang jointly formulated the *General Plan for the Northeast Tiger and Leopard National Park (2017–2025) (Draft for Comment)* (referred to here as the “Plan”) [28] to encourage the government to purchase ecological services to solve the problems of ecological protection and improve people’s livelihoods. The 2020 Ministry of Finance of the People’s Republic of China Order No. 102 *Administrative Measures for Government purchasing of Services* (referred to as the “Measures”) formulated detailed implementation rules for government purchasing of services, providing action guidelines. The details are as follows.

First, the *Plan* proposes to “explore ways of purchasing services to manage and protect state-owned natural resource assets”. The specific method is to set up ecological public welfare posts, and give priority to the state-owned forest areas, forest farm reform, and diversion of workers, farmers who have abandoned farmland and prohibit grazing, and poor people who have been filed and registered, so that they can benefit from participating in the ecological protection and operation of the NTLNP. The *Plan* clarifies the three functions of ecological public welfare posts, namely, field patrol, forest tending, and resource monitoring. For the NTLNP, the government purchasing of ecological services has the functions of ecological protection and improvement of people’s livelihoods.

Second, the *Measures* clearly define the government purchasing of services, the identity requirements of participating subjects, the restricted scope of purchase content, the implementation conditions of purchase activities, and the supervision and management responsibilities. It provides a reference for the construction of a government purchasing of ecological services model in NTLNP. First, the core of the definition of government purchasing of ecological services is that the government acts as a purchaser and supervisor of ecological services and social institutions as undertakers of ecological services. The government pays the corresponding fees according to the quantity and quality of ecological services to provide high-quality ecological services to the public. Second, the purchaser must be a state agency at all levels, such as the NTLNP Administration. The undertaker must be a legally established enterprise or social organization, excluding public institutions. SOFEs and Protection Stations are the best choices for this role. Third, the specific scope and content of the government purchasing of ecological services shall be managed by an instructive catalogue, and ecological services such as field patrol, forest tending, and resource monitoring within the NTLNP have been included in the government-purchased services guidance catalogue. Fourth, the government purchasing of ecological services

should highlight public welfare and prioritize projects that are related to the livelihood of national park residents and are conducive to transforming government functions and improving financial performance. The purchaser implements the performance management of the purchase project and conducts performance evaluation on the implementation of the purchased services on a regular basis. Fifth, the purchaser and they should consciously accept the supervision of finance, audit, society, and service objects.

3.2. Driving Factor Analysis

The increase in the content and tasks of ecological services is the first driving factor for the government to purchase ecological services. Based on the data obtained from the symposium, the contents and tasks of ecological services after the establishment of NTLNP were summarized and the following conclusions were drawn: After the establishment of the NTLNP, the content of ecological services has been significantly expanded and the intensity and difficulty of the task have increased. In particular, management and protection services have expanded from forest resource management and protection to wildlife protection and resource monitoring.

The transfer of participants in ecological services is the second driving factor for the government purchasing of ecological services. Based on the data obtained from the symposium, the identity types of ecological services personnel were summarized, and the following conclusions were drawn: Forest workers engaged in forest tending and management in the forest departments of 7 SOFes and 3 LGFDs are the main producers of ecological services in NTLNP. Filed and registered poor households in rural areas are secondary subjects engaged in ecological services, and community residents and one-time resettlement personnel³ are supplementary. There are a large number of people engaged in ecological services in the NTLNP, and their identities are mixed. Ecological services participants originally belonging to SOFes and LGFDs can only be transferred to the NTLNP by government purchasing of ecological services. It is not only helpful to solve the problem of connecting the vertical management system and the SFE management system, but it is also helpful to lift the poor population out of poverty.

Optimizing the subsidy standard for ecological services and improving the income level of forest workers are the third driving factor for the government purchasing of ecological services. According to the family data of workers and families of 7 SFEs engaged in ecological services in the NTLNP collected through questionnaires, the following conclusions are drawn: First, the wage income level of frontline workers engaged in ecological services is significantly lower than that of the urban employed population in Heilongjiang, Jilin, and the whole country. The prevailing wage system ignores the need to improve the livelihoods of workers. Specifically, the survey data involved 81 front-line workers of SFEs engaged in ecological services; in 2019, the per capita wage income was 33,496.35 yuan, and the average wage income of the urban employed population⁴ in Jilin, Heilongjiang, and the whole country was CNY 36,307.87, 41,597.86, and 49,020.14, respectively. Therefore, the salary level of forest workers in the NTLNP is significantly different from the regional and national average levels. Second, the wages of forest workers come from financial subsidies issued by the central government according to the amount of afforestation, tending, and management tasks that SOFes are responsible for each year. The subsidy standard is CNY 7500/ha for artificial arbor forest; CNY 4500/ha for replanting, reconstruction, and cultivation; CNY 1800/ha for forest tending; and CNY 75/ha for forest management. The management and protection tasks of forest workers are arranged according to the area, and the management and protection wages are hourly wages, which comprise file wages + seniority allowance + other various allowances. Piece rate wages are implemented for afforestation and tending, and the unit price for afforestation or tending is determined on the basis of the number of afforestation or tending plants per Mu. Management and care wages are the main source of income for front-line workers, but according to the current management and care wages, the wage level of young workers with the same workload is significantly lower than that of middle-aged workers with long working years. At the same

time, it is unfair to SFEs with small areas and many personnel that the central government issues the total amount of subsidies based on the area under management and protection. Therefore, NTLNP undertakes the dual mission of ecological protection and improving the livelihoods of residents. Relying on the way the government purchasing of ecological services to reassess the wages of ecological management and protection workers is an important way to promote a decent life for producers of ecological services.

3.3. Responsibility System Construction

Participants in the government purchasing of ecological services include purchaser, undertakers, evaluators, and supervisors (Figure 4). The purchaser establishes a relationship with the undertaker by purchasing the ecological services provided; evaluators establish relationships with purchaser and undertakers by evaluating the performance of the whole process of government purchasing of ecological services; the supervisors establish contact with the other three subjects through the supervision of the purchasing of ecological services and the evaluation of the behavior.

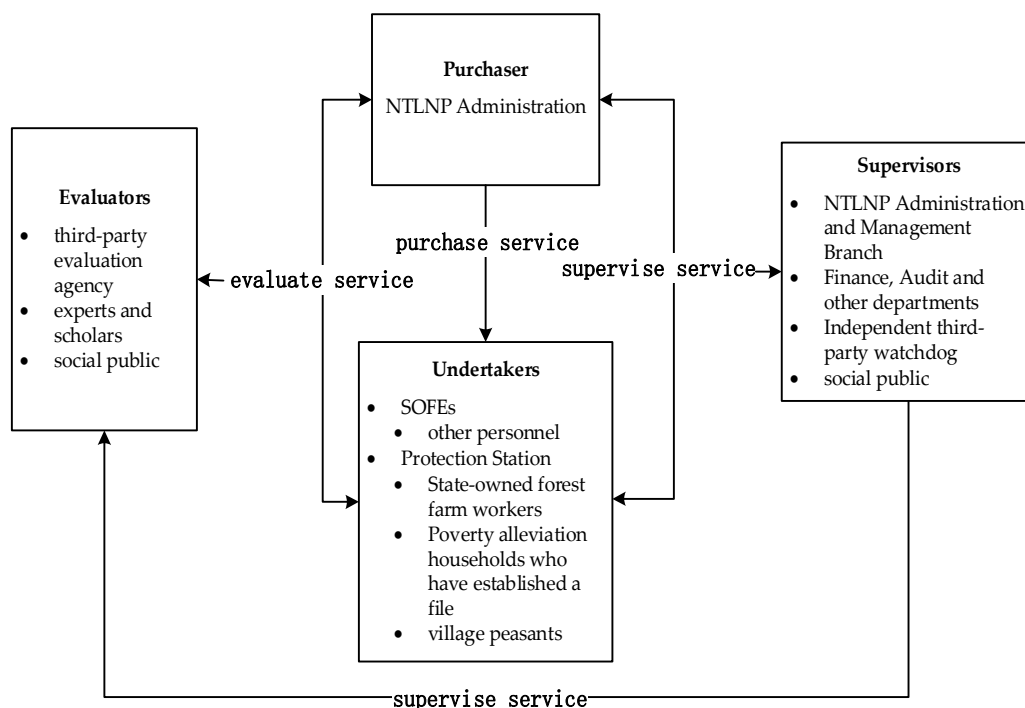


Figure 4. Construction of government purchasing ecological services responsibility system.

(1) Purchaser—NTLNP Administration.

(2) Undertakers - SOFEs and Protection Station. (i) The NTLNP involves 7 SOFEs from the Changbai Mountain Forest Group (Wangqing, Hunchun, Tianqiaoling, and Daxinggou) and the Longjiang Forest Group (Suiyang, Muling, and Dongjingcheng). It is a public welfare enterprise with forest management as its main business. At the same time, most of the forest farms established by SFEs are divided into the NTLNP as a whole, which is an important component of the Protection Stations. In addition, after the commercial logging of natural forests was completely stopped, SOFEs generated a large number of people who were transferred and diverted, and they took on ecological services through SOFEs. (ii) The NTLNP also involves 11 state-owned forest farms under the jurisdiction of three counties and cities of Hunchun City, Wangqing County, and Dongning City, which should establish Protection Stations as the main body of purchasing services. Registered and on-the-job workers from local state-owned forest farms are regarded as the main body of the ecological management and protection public welfare positions. In addition, according to the requirement that government should pay attention to public welfare in purchasing

services, the Protection Stations also provide ecological services to households that have been released from poverty and the peasants in the villages under their jurisdiction.

(3) Evaluators—Third-party evaluation agencies, experts and scholars, and the general public. The talent, technology and resource advantages of third-party institutions can ensure the fairness, impartiality and professionalism of the evaluation results. During the evaluation process, experts and scholars present professional opinions to ensure the scientific nature of the evaluation. As the direct beneficiaries of ecological services, the public can evaluate the effect of public services through information feedback mechanisms such as satisfaction surveys.

(4) Supervisors—NTLNP Administration and Management Branch, as well as financial and auditing departments, independent third-party monitoring agencies, and the public. First, the government carries out supervision and inspection of the purchase behavior, which is called internal supervision. The supervision carried out by finance, audit, and other relevant departments in accordance with their functions is called external supervision; this is called government supervision and constitutes the main supervision subject of the government's purchasing of ecological services. Second, the public, as the supervisor, can supervise and provide feedback on whether the purchasing subject is fair and impartial, whether there is delay in fund allocation, and other behaviors in the purchasing process.

3.4. Purchase Price Strategy

According to data from the 2020 survey on the livelihood of residents around the NTLNP, 78 family members who were engaged in the ecological services of the NTLNP were screened. For these 78 households, the per capita expenditure, average dependency coefficient, per capita wage income and per capita total income were calculated. The results are as follows: the per capita expenditure of the family is CNY 24,519.66; the average maintenance coefficient is 1.82; the per capita wage income is CNY 19,088.29; the total per capita income is CNY 21,349.89. The benchmark price for the government purchasing of ecological services calculated by the proportion method is CNY 39,898.56.

Taking the benchmark price measured by the proportion method as the baseline, it is estimated that the average annual growth rate of the wage income of the urban employed population in 2035 will catch up with the average wage income of the urban employed population in China, and it is estimated that the value of the government purchasing of ecological services should reach it in 2022 under this growth rate. In 2020, the average wage income of the urban employed population nationwide was CNY 51,438.13; the benchmark price for purchasing ecological services in the NTLNP tracks the average wage income of the national employed population, that is, by 2035, it will reach the goal of twice the wage income (CNY 102,876.26) of the current national urban employed workers, providing that it maintains a growth rate of 6.10%. Under this growth rate, the price of ecological services purchased by the government will reach CNY 47,654.44 in 2022.

Based on the above results, the government's price strategy for purchasing ecological services is divided into three stages. (1) Initial stage: according to the survey data, the average wage income of 81 forest workers in the NTLNP is CNY 33,496.35 (Figure 5). The benchmark price for the government purchasing of ecological services is CNY 39,898.56 per person. (2) Development stage: the proposed price for the government purchasing of ecological services in 2022 is CNY 47,654.44 per person. (3) Flat stage: to catch up with the per capita wage income level of urban workers nationwide in 2035, it is necessary to maintain an average annual growth rate of 6.10%.

Compared with the growth rate of the wage income of workers in the province where the NTLNP is located and China's forest and grass industry, it is relatively easy to achieve a growth rate of 6.1% for the price of ecological services purchased by the government. From 2015 to 2019, the average annual growth rate of the average wage income of urban on-the-job workers in Heilongjiang Province was 6.8%, and from 2015 to 2019, the average annual growth rate of the average wage income of on-the-job workers in the national forest and grass system was 7.7%. Compared to other industries in China, it is also easy to achieve

a growth rate of 6.1% in the price of government purchasing of ecological services. From 2015 to 2019, the average annual growth rates of wage income of on-the-job workers in the five industries of manufacturing, construction, transportation, education, and health and social work were 7.2%, 6.1%, 7.1%, 8.0%, and 8.7%, respectively. Therefore, it is feasible for the government purchasing of ecological services with an average annual growth rate of 6.1% to catch up with the wage income level of urban workers across the country.

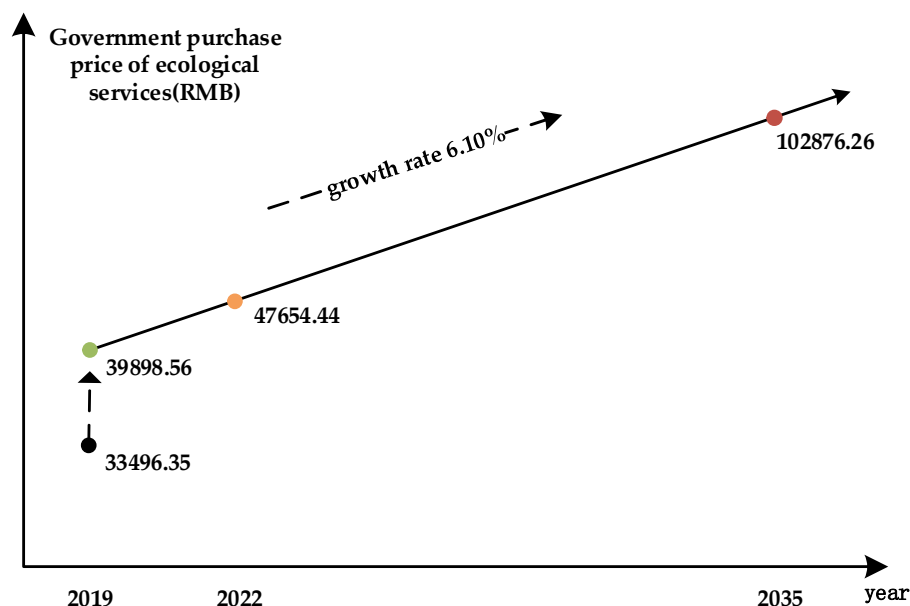


Figure 5. The price strategy of government purchasing of ecological services.

During the pilot period of the NTLNP, the funds of each branch mainly came from the forest reform and development funds in the special funds of the central fiscal year, and a small part of the funds came from the investment of non-profit organizations. National park financial subjects and special accounts have not yet been established [10]. In order to ensure the implementation of the government purchasing of ecological services, it is a prerequisite to establish a special account for national parks and financial items, and the budget items include the cost of purchasing ecological services. Fundraising can be divided into three parts. First, the forestry reform and development funds issued by the central government to the seven SOFES can be partially transferred to the special account for national parks. Second, encourage local residents or enterprises to engage in production and operation activities through franchising in the ecological experience area or surrounding areas and use the franchise income to feed back to ecological services. Finally, raise funds for the whole society and allow large donations of enterprises or individuals to set up special funds under the name.

3.5. The Whole Process Evaluation Chain

The government purchasing of ecological services should establish a whole-process evaluation chain based on the purchase chain. The performance evaluation system includes project evaluation, process evaluation, and result evaluation, and the evaluation chain also includes evaluation procedures and evaluation methods (Figure 6). (1) Project evaluation. Set performance goals, demonstrate conduct requirements, and ensure the efficiency and quality orientation of ecological services projects. The evaluation indicator system should be set up according to the budget preparation, and the index system should include indicators such as the efficiency and quality of ecological services, and the satisfaction of the public. (2) Process evaluation. In the implementation process of government purchasing of ecological services, it is necessary to supervise the efficiency of budget execution, supervise the performance of contracts, and focus on evaluating the

quality of services. (3) Results evaluation. First, disclose project information and evaluation results in a timely manner and accept social supervision. Second, establish a mechanism compatible with incentives and punishments, so that ecological management workers have the motivation to improve their abilities. Third, investigate the responsible subject through the accountability mechanism, and make timely rectification in the follow-up work. (4) Evaluation procedure. First, the pre-event, in-process and post-event evaluation should be connected to effectively prevent the information asymmetry in the purchase process through the evaluation procedure. Second, regular inspection is combined with random inspection, and the completion of the responsibilities of ecological public welfare positions should check irregularly. Third, the mid-term acceptance check is combined with the final acceptance check, and the results of the mid-term acceptance check are the main reference for the final acceptance check. (5) Evaluation method. First, expand the scope of third-party evaluation and adopt the evaluation mechanism of experts and third-party institutions. Second, optimize the evaluation index system and establish a quantitative index system for the three major benefits of ecology, economy, and society. Third, establish a dynamic tracking and monitoring mechanism to monitor the entire process of purchasing services in real time.

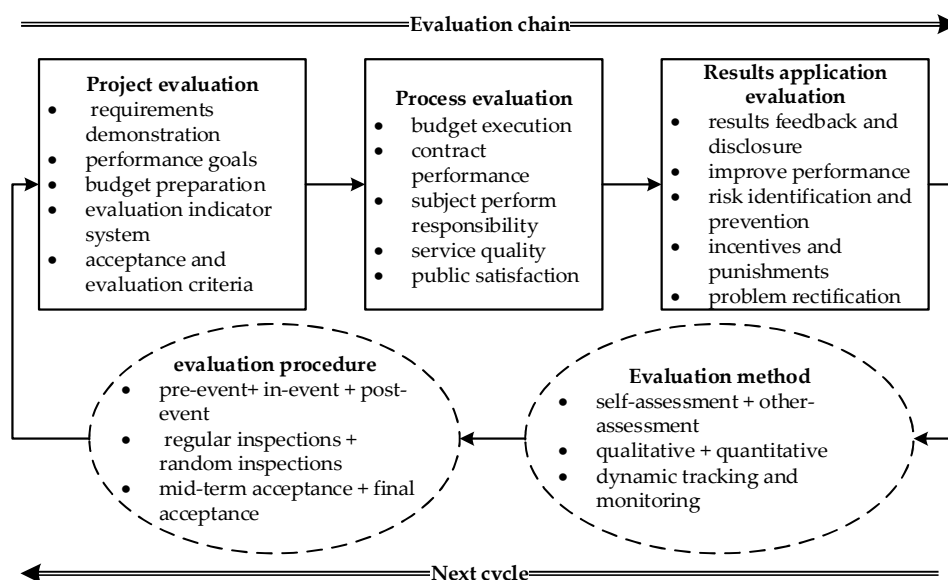


Figure 6. The whole process evaluation chain of government purchasing of ecological services.

3.6. Purchase Costs Analysis

Cost savings is an important factor for government to consider when providing ecological services. Based on the transaction cost theory, analyzing the costs of the two modes of direct government provision and purchasing provision, and comparing the financial burden under the two modes are the key stages of government decision-making.

The most important parts of the costs of the government's direct provision of ecological services are: The first is the labor costs, including the costs of additional posts created by the NTLNP Administration to provide ecological services and the costs of personnel management. The second is the costs of sites and materials, including the costs of establishing protection sites within the national park, and purchasing materials required for protection. The third is the costs of information, including the costs of the NTLNP Administration to search for grass-roots information and coordinate powers and responsibilities with SOFEs and state-owned forest farms. Fourth, the management costs of the NTLNP Administration itself, including office expenses, postal and telecommunication expenses, and transportation expenses.

The most important parts of the costs of the government purchasing of ecological services are: The first is the purchase costs of the NTLNP Administration, which includes

the salaries of the employees discussed in this article, and the management costs of the ecological caretaker organized by the protection stations. The second is the third-party fees, which involves the costs of third-party supervision and evaluation. The third is the management costs of the NTLNP Administration itself, including office expenses, postal and telecommunication expenses, and transportation expenses.

Comparing the costs of direct provision of ecological services by the NTLNP Administration and of the purchasing of ecological services under the condition of providing the same quantity and quality of ecological services, several conclusions can be drawn: (1) In terms of labor costs, the costs of government provision is similar to that of government purchases. When provided directly, a large number of ecological management workers need to be recruited, and the wages and management costs of these workers must be paid. When purchasing services, it is necessary to pay the salaries of ecological protection workers and the management fees for the participation of residents in the protection stations. (2) In terms of sites and material costs, government purchases costs tend to be zero. When directly provided, a management sites needs to be established in the park and management equipment needs to be purchased. When purchasing services, SOFes and state-owned forest farms have ready-made protection sites and professional ecological protection equipment, and no additional purchases are required. (3) In terms of information cost, the government purchase cost tends to zero. When providing direct information, it is necessary to search for basic social and ecological information in the park and to coordinate power and responsibility relations with SOFes and state-owned forest farms. when purchasing services, SOFes and state-owned forest farms have a similar grasp of the ecological and social conditions in the park. They have professional ecological management teams and technologies without additional information costs. (4) In terms of third-party fees, government purchases need to be paid to experts, scholars, auditing departments and other third-party institutions for supervision and evaluation, while direct provision does not require third-party fees. (5) In terms of the management cost of the national park itself, the cost of government provision is similar to that of government purchases.

Based on the above analysis, it is concluded that government purchases are more cost-effective than government provision, especially in terms of sites and material costs and information costs. SOFes and state-owned forest farms have “natural” advantages, which can reduce the financial expenditure of the NTLNP Administration.

4. Discussion

4.1. *Links between Ecosystem Services and Ecological Services*

Ecological services in this study mean the ecological protection services provided by humans in the process of generating ecosystem services. In the literature, there are rich research results on ecosystem services based on the theoretical background of ecology or economics [53–55]. The definition of ecosystem services is generally understood as follows: “Ecosystem services are the benefits that humans derive from ecosystems”, which was proposed by MAE [56]. The definition describes the flow of individual services from ecosystems to humans. However, recent research on ecosystem services seems to have reached a consensus that ecosystem services are not produced by ecosystems independent of humans but by human interactions with ecosystems [57–60]. In order to explain the role of humans in ecosystems, Comberti proposed the concept of “Services to Ecosystems” to reflect human actions to maintain and improve ecosystems. On the basis of the original “single service flow from ecosystem to human”, the service flow from human to ecosystem is added, and a closed loop of a reciprocal relationship between human and ecosystem is constructed [61]. The concept of ecological services in this study is similar to the abovementioned “Services to Ecosystems”, which reflect the important role of humans in ecosystems. The government purchasing of ecological services is a way of providing such services, and it is suitable for national parks with state-owned land as the main body, and such a national park is used as the study area, and the ecological services at this time belong to the category of public services.

4.2. A Policy Tool That Takes into Account Efficiency and Fairness and Can Clarify the Rights and Responsibilities of Stakeholders

Driven by realistic problems such as the increase in the content and tasks of ecological services in NTLNP, the connection between the old and new management systems, and the low subsidy standards for ecological services, this study proposes the government purchasing of ecological services as a new policy tool. The connotation of government purchasing of ecological services is similar to “government-funded” PES [62] and government-funded EC [63]; all three are applicable to situations where it is difficult for users to identify and define the ecosystem when it is a public good, and government intervention is an inevitable approach. In order to improve the efficiency of natural resource management and alleviate poverty, PES and EC have been widely adopted by the international community, especially developing countries, and have achieved remarkable results. In the study of PES and EC, watersheds, forests, grasslands, wetlands, biodiversity, and habitats are the main areas of research [13,64]. The research content revolves around key links such as conceptual connotation, theoretical basis, purchasers, and sellers (subject and object of compensation), payment standard (compensation standard), and effect evaluation [19,65–67]. Although the research frameworks of PES and EC are becoming more mature, and a mutually beneficial situation between efficiency and fairness has been achieved in practice [68], the relationship between rights and responsibilities among relevant stakeholders is a blind spot for research.

The issues involved in the government purchasing of public services include efficiency, fairness, and the relationship between the rights and responsibilities of the stakeholders. Wang divides government purchasing of public services into three models according to the relationship between the purchaser and the undertakers: the independent relationship–competitive purchasing model, the independent relationship–non-competitive purchasing model, and the dependent relationship–non-competitive purchasing model. Whereas the SOFEs and LGFD specializing in ecological services existed before the establishment of the NTLNP Administration, in this study, the NTLNP Administration is the purchaser, the SOFEs and Protection Stations are the directional undertakers, and the forest workers are the most direct producers of ecological services. The model of government purchasing of ecological services is independent and non-competitive. The government purchasing of ecological services clarifies the relationship of rights, responsibilities, and interests between stakeholders on the basis of taking into account the efficiency of supplying ecological services and the livelihoods of forest workers. This is the main reason for constructing the model of government purchasing of ecological services instead of following the existing research framework of PES or EC.

Due to the severe aging of ecological management and care workers, they retire at an average rate of 5% every year, and the ecological management and protection positions are recruited in the form of only decreasing and not increasing. After the retirement of existing ecological management and conservation workers, the government purchasing of ecological services model with community organizations as the undertakers is a future research direction. The research aim is to investigate the willingness of community residents and social organizations to participate and to carry out evolutionary game analysis on the multi-stakeholders of government purchasing of ecological services.

4.3. Enterprises, NGOs, Community Residents and Indigenous People Are the Main Undertakers of Ecological Services in National Parks

Based on the natural resources and management system background of state-owned forest areas in northeast China, a model of government purchasing of ecological services for the NTLNP, which is also applicable to other national parks in China. Among the five national parks officially established in China, the Giant Panda National Park was established in the state-owned forest areas of northwest and southwest China. Before the establishment of the national park, SOFEs and state-owned forest farms were the main body of ecological services supply in this area. The general situation of its natural resources and management system is similar to that of the northeast state-owned forest

areas. Sanjiangyuan National Park and The Hainan Tropical Rainforest National Park belong to mountainous and subtropical national parks. There are a large number of farmers and herdsmen, forestry workers, and even urban residents living in and outside these national parks [69]. The government purchasing of ecological services is an important means to solve the problems of the connection of management systems and the livelihood of community residents. For the Giant Panda National Park, the Giant Panda National Park Administration can be the purchaser of ecological services, 15 SOFEs and protection stations can be the undertakers of ecological services, state-owned forest farm workers, people who have been released from poverty and resettlement of immigrants Residents can participate in ecological services through protection stations. For the Sanjiangyuan National Park, it is impossible to complete such a large-scale ecological environmental protection work with only the management team of more than 400 people from the Sanjiangyuan National Park Administration [26]. It must rely on the strength of local herdsmen. Therefore, the three management committees under the Sanjiangyuan National Park Administration (Sanjiangyuan, Yellow River and Lancang River Source Management Committee) [70] can be the purchasers of ecological services. The surrounding herdsmen voluntarily participate in ecological services through the protection stations. For Hainan Tropical Rainforest National Park, there are almost 40 ethnic groups, mainly Li and Miao, in the park [71]. Tropical rainforests provide the material base and living conditions for minority residents to thrive, and it is very important to guide residents to participate in the ecological services of national parks. Hainan Tropical Rainforest National Park Administration can be the main purchaser of ecological services, and community residents can participate in ecological services through the protection stations.

From an international perspective, some national parks with state-owned land as the main body have begun to use the government purchasing of ecological services, and these cases provide lessons for other national parks. For example, about half of Melbourne's water sources are located in Kinglake National Park, Yarra Ranges National Park and Baw Baw National Park. The Victorian Government of Australia protects these forest water sources by purchasing the ecological services of Melbourne Water Company [72]. The Serbian government has entrusted the management of the Secovlje Salina National Park to a private mobile phone company through a combination of concessions and government purchases. The company's revenue comes from both concessions and the government's annual budget. On the one hand, the government franchises it for sea salt production; on the other hand, the government purchasing of its ecological services for national parks [72]. These experiences show that for national parks with fewer residents, it is more efficient for the government purchasing of ecological services from state-owned or private enterprises and NGOs. For national parks with more community residents or aboriginal people, such as China's national parks, residents' participation in national park ecological services through protection stations or community organizations is the best choice to solve the contradiction between protection and development.

5. Conclusions and Policy Implication

5.1. Conclusions

This study takes China's NTLNP as the research area and constructs a government purchasing of ecological services model based on the classical theory of government purchasing of public services. The government purchasing of ecological services model is divided into five components: institutional environment analysis, driving factor analysis, responsibility system construction, purchase price strategy, and the whole process evaluation chain. Among them, the driving factors, responsibility system, and purchase price of the government purchasing of ecological services are the focus of the study. In the literature, the text analysis method was used to analyze the relevant policy texts and the symposium data obtained from field research. From this, we obtained the incentives and constraints for the government purchasing of public services in the current policies, as well as the status of ecological services tasks, composition, number, and salary standards of the NTLNP. We

adopted the revised minimum wage standard method and opportunity cost method to formulate the purchase price strategy. Comparing the two environmental policy tools, PES and EC, the government purchasing of ecological services is more suitable for national parks with state-owned land as the main body, and the ability to clarify the rights and responsibilities of multiple stakeholders is the unique feature of the government purchasing of ecological services. At the same time, formulating purchase price strategies from the perspective of meeting the decent living needs of ecological service participants and narrowing the gap with the average wage income level of urban workers is more conducive to achieving efficiency and fairness. The core conclusions of the study are as follows.

First, the driving factors for the government purchasing of ecological services are: (1) the content and tasks of ecological services in the NTLNP have increased; (2) ecological services workers in the forest sector need to be transferred; (3) subsidies for ecological services need to be improved. First, since the management and protection services in the NTLNP have expanded from forest resource management to wildlife protection and resource monitoring, if the NTLNP Administration establishes a special agency to engage in ecological services, it will inevitably increase government financial expenditure. The government purchasing of services is an ecological services supply method that not only saves costs but also provides professional services. Secondly, there are a large number of participants engaged in ecological services in the NTLNP, and their identities are diverse. Through the process of government purchase, all the participants engaged in ecological services from the forest department can be transferred to the NTLNP. Finally, the per capita wage income of the sample workers engaged in ecological services is CNY 33,496.35, which is significantly lower than the average wage income level of urban employed population in Jilin, Heilongjiang, and the whole country. Public services related to improving people's livelihoods are the priority items for the government purchasing of services. Increasing the wage income level of ecological services participants is an important way to improve the livelihood of residents in national parks.

Second, this research constructed a responsibility system for the government purchasing of ecological services under the institutional environment related to government purchasing of services. Among them, the purchaser is the NTLNP Administration, which uniformly exercises the management and protection responsibilities of state-owned natural resource assets in the region. Undertakers are seven SOFes and three Protection Stations; the registered and on-the-job workers directly transferred by the SOFes are the main body that performs ecological services, and a small number of one-time resettlement personnel, registered and off-duty personnel, urban workers, and other transferable personnel will undertake ecological services through the SOFes. The registered and on-the-job workers of local state-owned forest farms are the main body of ecological services, and the poor people in the villages and towns under their jurisdiction undertake ecological services through the Protection Stations. The evaluators are third-party evaluation institutions, experts, and scholars, and the general public. The supervisors are the NTLNP Administration, the management branch, the financial and auditing departments, independent third-party supervision agencies, and the public.

Third, we divided the government's price strategy for purchasing ecological services into three stages: (1) Initial stage. According to the livelihood data of the sample forest workers in the NTLNP obtained through the survey, the benchmark price for the government purchasing of ecological services is calculated by the proportion method to be CNY 39,898.56 per person. (2) Development stage. It is estimated that the price of ecological services purchased by the government in 2022 was CNY 47,654.44 per person. (3) Flat stage. To catch up with the level of per capita wage income of urban workers nationwide by 2035, it is necessary to maintain an average annual growth rate of 6.10%.

Fourth, the whole process evaluation chain of the government purchasing of ecological services was designed, comprising three main parts: project evaluation, process evaluation, and result application evaluation. The evaluation procedures and methods are also described in the chain. In the project evaluation stage, it is necessary to set up an

evaluation system that includes indicators such as ecological service efficiency and quality, and social public satisfaction. In the evaluation of the process, it is necessary to supervise the efficiency of budget execution, supervise the performance of contracts, and focus on evaluating the quality of ecological services. In the application for the evaluation of results, the project information and evaluation results are made transparent, and an incentive and punishment mechanism is established.

Fifth, compare the financial burdens of government provision and government purchases based on transaction cost theory. The costs of government purchases are lower than those of government provision, especially in terms of sites and material costs, and information costs.

5.2. Policy Implications

According to the research results, this study puts forward the policy implications of implementing the government purchasing of ecological services in stages. The purchase content expands from traditional ecological resource management to intelligent management. The purchase method extends from economic payment to franchising. The participant subjects change from administrative to market-oriented and diversified. The fund utilization expands from EC to ecological product value. Finally, it will realize the coordinated development and evolution of ecological, economic, and social benefits from guaranteeing ecological benefits.

The first stage combines the ecological protection goal of the government purchasing of ecological services with the consolidation of poverty alleviation achievements, so as to achieve the coordinated development of ecological and social benefits. We completely strip the social management functions undertaken by the SOFes, and at the same time, increase the efforts to withdraw and merge forest farms, and gradually establish a management system of “Administration Bureau–Management Sub-bureau–Management and Protection Station”. The Protection Stations will be established with SFEs and LGFDs as the main body to undertake the purchasing of ecological services. The border villages in the park realize “one household, one post”, responsible for natural resource management and protection, ecological experience, environmental education services, ecological protection projects, and ecological monitoring.

In the second stage, the government purchasing of ecological services includes a combination of economic payment and franchise, so as to realize the transformation from ecological protection compensation to ecological product value. Government-funded franchising is also an option for the government purchasing of ecological services, and the undertakers of ecological services are encouraged to exploit their own advantages to carry out franchising. As an enterprise unit, SOFes have established the cultivation and breeding bases of cattle, forest frogs, forest medicine, and black fungus through franchising, and carried out moderate-scale intensive management. Priority will be given to diverting workers from the reform of SFEs, farmers who have returned farmland to forests and banned grazing, and poor people who have been filed and registered. The implementation of single or joint household contracting is explored for forest workers’ families to undertake ecological management and protection or under-forest planting and breeding and broaden the channels for local residents to increase their income.

In the third stage, the government purchases ecological services to transform them into intelligent ecological management and protection, using integrated monitoring technology to realize a new type of intelligent ecological management and conservation system. An early warning and response mechanism is established to greatly improve the efficiency of management and protection. It is important to build the brand system of “NTLNP”, and incorporate various ecological products such as forest food, forest health care, nature education, and ecological research into the brand scope. Brand cultivation and protection are strengthened, and the premium of ecological products is increased. The franchise system is improved, and an interest linkage mechanism and a profit feedback mechanism are established. The moderate-scale operation and brand value-added income will feed

back to the ecological management and social services public welfare positions. Finally, the government changes from government purchase to user payment, realizes the diversification and marketization of purchasers, and further realizes multiple ecological, economic, and social benefits.

Author Contributions: Conceptualization, H.Z. and Y.Z.; methodology, Y.Z. and C.B.; software, M.Z.; validation Y.C. and H.Z.; formal analysis, Y.Z.; investigation, H.Z. and C.B.; resources, Y.C.; data curation, Y.Z.; writing—original draft preparation, H.Z. and Y.Z.; writing—review and editing, Y.Z.; visualization, M.Z.; supervision, C.B.; project administration, H.Z.; funding acquisition, Y.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the State Forest and Grassland Administration Project of “Research on Ecological Services Purchased by the Government of the Northeast Tiger and Leopard National Park”, grant number JYCL-2020-00046.

Data Availability Statement: Not applicable.

Acknowledgments: The authors are particularly grateful to all researchers and institutes for providing data for this study. The authors are also very grateful to the editors and reviewers for their comments and suggestions for improving this study.

Conflicts of Interest: The authors declare no conflict of interest.

Notes

- ¹ A survey found that in 2019, the per capita wage income of sample workers engaged in ecological services in the NTLNP was CNY 33,496.35. In the same year, the average wage income of the urban employed population in Jilin, Heilongjiang, and the entire country was CNY 36,307.87, 41,597.86, and 49,020.14, respectively. According to the “China Forest and Grassland Statistical Yearbook 2020”, the average annual salary of workers in the China’s forest and grassland system in 2019 was CNY 67,782.
- ² In 1949, the early days of the founding of New China, in order to meet the demand for wood in national economic construction, the government of China invested in the establishment of state-owned forest areas and a number of state-owned forest farms. In the nine provinces and regions with rich forest resources in the northeast, southwest, and northwest, 138 SFEs have been established, which specialize in timber harvesting. Among them, 87 SOFEs in Heilongjiang, Jilin, and Inner Mongolia constitute the key state-owned forest areas. State-owned forest farms are public institutions dedicated to afforestation and forest management and protection set up in concentrated state-owned barren mountains and wasteland suitable for forest. There are 4855 state-owned forest farms in 31 provinces. accounts for 83.28% of the total area of the NTLNP. It involves 7 SOFEs and 3 LGFDs; the former is a public welfare state-owned enterprise, while the latter is a public institution (Table 2). The NTLNP is the first national park in China that is directly handled by the central government.
- ³ From 2000 to 2020, China implemented two phases of Natural Forest Protection Projects, from cutting down logging tasks to complete logging bans. The increase of surplus personnel in forest enterprises and the heavier burden of enterprises have led to the layoff of some forest workers, the state issues a one-time resettlement fee for these groups. A small number of one-time resettlement personnel will also participate in the forest operations of SFEs during the afforestation and tending season, and their wages are calculated according to the piece-rate system.
- ⁴ The statistical yearbook does not include the average wage level of the urban employed population in Jilin, Heilongjiang, and the whole country. Therefore, this information is obtained indirectly through the calculation of (urban per capita disposable wage income × total urban population)/urban employment.

References

1. Yang, R. China’s National Park Governance System: Principles, Goals and Paths. *Bio. Sci.* **2021**, *29*, 269–271.
2. Wedel, K.R. Government Contracting for Purchase of Service. *Soc. Work.* **1976**, *5*, 101–105.
3. Peng, L. Analysis on the Problems of Protected Area System in China and the Countermeasure. *China Landsc. Archit.* **2017**, *33*, 108–113.
4. Kideghesho, J.R.; Røskaft, E.; Kaltenborn, B.P. Factors Influencing Conservation Attitudes of Local People in Western Serengeti, Tanzania. *Biodivers. Conserv.* **2007**, *16*, 2213–2230. [[CrossRef](#)]
5. Vedeld, P.; Jumane, A.; Wapalila, G.; Songorwa, A. Protected Areas, Poverty and Conflicts. *For. Policy Econ.* **2012**, *21*, 20–31. [[CrossRef](#)]
6. Liu, Y.; Zou, X.; Chen, J.; Pan, T. Impacts of Protected Areas Establishment on Pastoralists’ Livelihoods in the Three-River-Source Region on the Qinghai–Tibetan Plateau. *Land Use Policy* **2022**, *115*, 106018. [[CrossRef](#)]

7. Zhou, D.; Wang, Z.; Lassoie, J.; Wang, X.; Sun, L. Changing Stakeholder Relationships in Nature Reserve Management: A Case Study on Snake Island-Laotie Mountain National Nature Reserve, Liaoning, China. *J. Environ. Manag.* **2014**, *146*, 292–302. [CrossRef]
8. Musakwa, W.; Gumbo, T.; Paradza, G.; Mpofu, E.; Nyathi, N.A.; Selamolela, N.B. Partnerships and Stakeholder Participation in the Management of National Parks: Experiences of the Gonarezhou National Park in Zimbabwe. *Land* **2020**, *9*, 399. [CrossRef]
9. Zhu, H.G.; Zhao, M.H. Research on the impact of national parks on the livelihood and income structure of different types of forest workers' families—Taking the Siberian Tiger and Leopard National Park as an example. *J. Agric. For. Eco. Manag.* **2022**, *21*, 78–86.
10. Chen, Y.R.; Han, J.K.; Qin, L.N.; Yang, H.C. Research on the problems and development paths of the pilot system of the Northeast Tiger and Leopard National Park. *Environ. Prot.* **2019**, *47*, 61–65.
11. Hafsa, F.; Darnall, N.; Bretschneider, S. Social Public Purchasing: Addressing a Critical Void in Public Purchasing Research. *Public. Admin. Rev.* **2021**, *82*, 818–834. [CrossRef]
12. Sattler, C.; Matzdorf, B. PES in a Nutshell: From Definitions and Origins to PES in Practice—Approaches, Design Process and Innovative Aspects. *Ecosyst. Serv.* **2013**, *6*, 2–11. [CrossRef]
13. Salzman, J.; Bennett, G.; Carroll, N.; Goldstein, A.; Jenkins, M. The global status and trends of Payments for Ecosystem Services. *Nat. Sustain.* **2018**, *1*, 136–144. [CrossRef]
14. Bennett, M.T. China's Sloping Land Conversion Program: Institutional Innovation or Business as Usual? *Ecol. Econ.* **2008**, *65*, 699–711. [CrossRef]
15. Long, K.; Omrani, H.; Pijanowski, B.C. Impact of Local Payments for Ecosystem Services on Land Use in a Developed Area of China: A Qualitative Analysis Based on an Integrated Conceptual Framework. *Land Use Policy* **2020**, *96*, 104716. [CrossRef]
16. Yost, A. Mechanisms behind Concurrent Payments for Ecosystem Services in a Chinese Nature Reserve. *Ecol. Econ.* **2020**, *11*, 106509. [CrossRef]
17. Wunder, S. *Payments for Environmental Services: Some Nuts and Bolts*; CIFOR: Bogor, Indonesia, 2005.
18. Zhou, C.; Ding, X.H.; Li, G.P.; Wang, H.Z. Research on the ecological compensation standard of the water source area of the middle route of the South-to-North Water Diversion Project—From the perspective of ecosystem service value. *Resour. Sci.* **2015**, *37*, 792–804.
19. Sheng, W.; Zhen, L.; Xie, G.; Xiao, Y. Determining Eco-Compensation Standards Based on the Ecosystem Services Value of the Mountain Ecological Forests in Beijing, China. *Ecosyst. Serv.* **2017**, *26*, 422–430. [CrossRef]
20. McDonald, J.A.; Helmstedt, K.J.; Bode, M.; Coutts, S.; McDonald-Madden, E.; Possingham, H.P. Improving Private Land Conservation with Outcome-based Biodiversity Payments. *J. Appl. Ecol.* **2018**, *55*, 1476–1485. [CrossRef]
21. Li, X.G.; Miao, H.; Zheng, H.; Ouyang, Z.Y.; Xiao, Y. The Application of Opportunity Cost Method in Determining Ecological Compensation Standard—Taking the Central Mountainous Area of Hainan as an Example. *J. Ecol.* **2009**, *29*, 4875–4883.
22. Hu, Z.T.; Liu, D.; Kong, D.S.; Jin, L.S. Estimation of grazing prohibition subsidy standard in grassland ecological compensation based on opportunity cost method. *J. Arid. Environ.* **2017**, *31*, 63–68.
23. Liu, D.; Hu, Z.T.; Jin, L.S. Research on fallow compensation standard in groundwater overexploitation area based on farmers' willingness to pay. *Chinese J. Popul. Resour. Environ.* **2019**, *29*, 130–139.
24. Li, S.; Feng, J.; Li, B.B.; Lv, Z. Experience and Challenges of the Pilot System of Giant Panda National Park. *Bio. Sci.* **2021**, *29*, 307–311.
25. He, S.Y.; Su, Y. Wuyishan pilot experience and suggestions for improvement: Difficulties in the protection of national parks in the southern collective forest area and a way out for reform. *Bio. Sci.* **2021**, *29*, 321–324.
26. Zhao, X.; Zhu, Z.Y.; Lv, Z.; Xiao, L.Y.; Mei, S.N.C.; Wang, H. Community-based protection: Reflections on the public welfare post of ecological management and protection in Sanjiangyuan National Park. *Bio. Sci.* **2018**, *26*, 210–216.
27. Long, X.; Du, Y.; Hong, X.; Zang, R.; Yang, Q.; Xue, H. Hainan Tropical Rainforest National Park Pilot Experience. *Bio. Sci.* **2021**, *29*, 328–330. [CrossRef]
28. State Forestry Administration. People's Government of Jilin Province.; People's Government of Heilongjiang Province. General Plan for the Northeast Tiger and Leopard National Park (2017–2025) (Draft for Comment). Available online: <https://www.forestry.gov.cn/uploadfile/main/2018-3/file/2018-3-9-599430e5ec1249bab08927453227ff14.pdf> (accessed on 20 September 2022).
29. Savas, E.S. *Privatization and Public-Private Partnerships*; Academia: San Francisco, CA, USA, 2000.
30. Wang, P.Q.; Salamon, L.M. *Research on the Government's Purchase of Public Services from Social Organizations: An Analysis of Chinese and Global Experiences*; Peking University Press: Beijing, China, 2010.
31. Lv, F. Heterogeneous governance and the predicament of grassroots government purchasing services—Taking the government purchasing service project in S Street as an example. *J. Manag. World.* **2021**, *37*, 147–158.
32. Gradus, R.; Dijkgraaf, E.; Wassenaar, M. Understanding Mixed Forms of Refuse Collection, Privatization, and Its Reverse in the Netherlands. *Int. Public. Manag. J.* **2014**, *17*, 328–343. [CrossRef]
33. Ferris, J.; Graddy, E. Contracting out: For what? With whom? *Public Admin. Rev.* **1986**, *332*–344. [CrossRef]
34. Wang, Y.F. On the legal path of ecological compensation in national parks in my country. *Environ. Protect.* **2018**, *46*, 56–59.
35. Dorwart, R.A.; Schlesinger, M.; Pulice, R.T. The promise and pitfalls of purchase-of-service contracts. *Psychiatr. Serv.* **1986**, *37*, 875–878. [CrossRef] [PubMed]
36. Ostrom, V.; Robert, L.B.; Ostrom, E. *Local Government in the United States*; Peking University Press: Beijing, China, 2004.

37. Lin, M.W. Government Procurement of Public Services: An Integrative Analytical Framework. *J. Beijing Inst. Technol.* **2017**, *19*, 91–98.
38. Peng, J. From market value priority to public value priority—Progress, deficiencies and prospects of research on government purchasing responsibility. *J. Financ. Serv. Res.* **2018**, *1*, 43–52.
39. Osborne, D.; Gaebler, T. *Reforming Government: How Entrepreneurship Is Reforming the Public Sector*; Shanghai Translation Publishing House: Shanghai, China, 1996.
40. Terry, L.D. Administrative Leadership, Neo-Managerialism, and the Public Management Movement. *Public Admin. Rev.* **1998**, *58*, 194–200. [\[CrossRef\]](#)
41. Denhardt, R.B.; Denhardt, J.V. The new public service: Serving rather than steering. *Public Admin. Rev.* **2000**, *60*, 549–559. [\[CrossRef\]](#)
42. Huang, X.C. Rethinking the growth conditions of Chinese social organizations: A general theoretical perspective. *Socio Stud.* **2017**, *32*, 101–124.
43. Christensen, T.; Lægreid, P. Post New Public Management Reforms-Exploring the “Whole-of-Government” Approach to Public Reform. In *Rethinking the Reform Questio*; Cambridge Scholars Publishing: England, UK, 2007; Volume 24, pp. 24–45.
44. Williamson, O.E. Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization. *Account. Rev.* **1975**.
45. Marx, K.; Engels, F. *Marx & Engels Collected Works*; Progress Publishers: Moscow, Russia, 1975; Volume 2, pp. 1838–1842.
46. Li, X.G.; Miao, H.; Zheng, H.; Ouyang, Z.Y. The main methods of determining ecological compensation standards and their applications. *Acta Ecol. Sin.* **2009**, *29*, 4431–4440.
47. Jiang, A.H.; Yang, Q. Research on the “whole process” performance evaluation of government procurement of public services. *J. Cent. Univ. Financ. Eco.* **2020**, *3*, 3–9.
48. Statistics Bureau of Heilongjiang Province. *Heilongjiang Statistical Yearbook 2020*; China Statistics Press: Beijing, China, 2020; pp. 37–82.
49. Statistics Bureau of Jilin Province. *Jilin Statistical Yearbook 2020*; China Statistics Press: Beijing, China, 2020; pp. 39–54.
50. State Forestry and Grassland Administration. *China Forest and Grassland Statistical Yearbook 2020*; China Science Press: Beijing, China, 2020; pp. 166–173.
51. Wu, Z.; Guan, J.; He, J. An empirical study on the calculation of the minimum wage standard—A dynamic combination calculation based on the objective weighting of the CRITIC-entropy weight method. *Mod. Eco. Sci.* **2019**, *41*, 103–117.
52. Gong, F.; Chang, Q.; Wang, F.; Liu, X. An empirical study on the ecological compensation standard of grassland in Inner Mongolia. *J. Arid. Land Resour Environ.* **2011**, *25*, 151–155.
53. Costanza, R.; d’Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O’Neill, R.V.; Paruelo, J.; et al. The Value of the World’s Ecosystem Services and Natural Capital. *Nature* **1997**, *387*, 253–260. [\[CrossRef\]](#)
54. Daily, G.C. *Nature’s Services: Societal Dependence on Natural Ecosystems* (1997); Yale University Press: New Haven, CT, USA, 2017; pp. 454–464.
55. Boyd, J.; Banzhaf, S. What Are Ecosystem Services? The Need for Standardized Environmental Accounting Units. *Ecol. Econ.* **2007**, *63*, 616–626. [\[CrossRef\]](#)
56. Toth, F.L. *Ecosystems and Human Well-Being: A Framework for Assessment*; Island Press: Washington, DC, USA, 2003.
57. Fischer, A.; Eastwood, A. Coproduction of Ecosystem Services as Human–Nature Interactions—An Analytical Framework. *Land Use Policy* **2016**, *52*, 41–50. [\[CrossRef\]](#)
58. Jones, L.; Norton, L.; Austin, Z.; Browne, A.L.; Donovan, D.; Emmett, B.A.; Grabowski, Z.J.; Howard, D.C.; Jones, J.P.G.; Kenter, J.O.; et al. Stocks and Flows of Natural and Human-Derived Capital in Ecosystem Services. *Land Use Policy* **2016**, *52*, 151–162. [\[CrossRef\]](#)
59. Palomo, I.; Felipe-Lucia, M.R.; Bennett, E.M.; Martín-López, B.; Pascual, U. Disentangling the Pathways and Effects of Ecosystem Service Co-Production. In *Advances in Ecological Research*; Woodward, G., Bohan, D.A., Eds.; Academic Press: Cambridge, MA, USA, 2016; Volume 54, pp. 245–283.
60. He, S.Y.; Su, Y.; Wang, L.; Cheng, H.G. Constructing a social situation analysis tool to promote the coordination of community resource use and protection goals in protected areas—Practice in the pilot area of Wuyishan National Park. *Acta Ecol. Sin.* **2019**, *39*, 3861–3870.
61. Comberti, C.; Thornton, T.F.; Wyllie de Echeverria, V.; Patterson, T. Ecosystem Services or Services to Ecosystems? Valuing Cultivation and Reciprocal Relationships between Humans and Ecosystems. *Global. Environ. Chang.* **2015**, *34*, 247–262. [\[CrossRef\]](#)
62. Engel, S.; Pagiola, S.; Wunder, S. Designing Payments for Environmental Services in Theory and Practice: An Overview of the Issues. *Ecol. Econ.* **2008**, *65*, 663–674. [\[CrossRef\]](#)
63. Jin, L.S.; Chu, Z.L.; Zou, C.G. The role of different types of ecological compensation in ecological protection and restoration of mountains, rivers, forests, fields, lakes and grasses. *Acta Ecol. Sin.* **2019**, *39*, 8709–8716.
64. Liu, G.H.; Wang, X.H.; Wen, Y.H.; Xie, J.; Zhang, Y.F.; Hua, Y.Y.; Zhu, Y.Y.; Hao, C.X. Research progress and practice mode of ecological compensation in my country in the past 20 years. *China J. Environ. Manag.* **2021**, *13*, 109–118.
65. Wunder, S. The Efficiency of Payments for Environmental Services in Tropical Conservation. *Conserv. Biol.* **2007**, *21*, 48–58. [\[CrossRef\]](#)
66. Tacconi, L. Redefining Payments for Environmental Services. *Ecol. Econ.* **2012**, *73*, 29–36. [\[CrossRef\]](#)

67. Liu, D.; Hu, Z.T.; Jin, L.S. A review of research on the analytical framework of ecological protection compensation. *Acta Ecol. Sin.* **2018**, *38*, 380–392.
68. Liu, J.; Li, S.; Ouyang, Z.; Tam, C.; Chen, X. Ecological and Socioeconomic Effects of China's Policies for Ecosystem Services. *Proc. Natl. Acad. Sci. USA* **2008**, *105*, 9477–9482. [[CrossRef](#)] [[PubMed](#)]
69. Rui, Y.; Xiaoli, S.; Keping, M. Recommendations on building up China's National-Park-centric Protected Area System. *Bio. Sci.* **2019**, *27*, 137–139. [[CrossRef](#)]
70. People's Government of Qinghai Province. Overall Planning of Sanjiangyuan National Park. Available online: <http://www.gov.cn/xinwen/2018-01/17/5257568/files/c26af29955e141bda0d736a673dac4c5.pdf> (accessed on 23 September 2022).
71. State Forestry and Grassland Administration. Hainan Tropical Rainforest National Park Planning (2019–2025). Available online: https://www.forestry.gov.cn/html/main/main_4461/20200423094840466465936/file/20200423094937861802994.pdf (accessed on 23 September 2022).
72. Borrini, G.; Dudley, N.; Jaeger, T. Governance of Protected Areas: From understanding to action. In *Best Practice Protected Area Guidelines Series No.20*; IUCN: Gland, Switzerland, 2013; pp. 46–47.