A Review of Research on Progress in the Theory and Practice of Eco-Product Value Realization

Jiemin Liu 1, Xuejiao Su 1, Yuanmeng Liu 2 and Wei Shui 2,*

1 School of Architecture and Urban-Rural Planning, Fuzhou University, Fuzhou 350108, China; liujiemin1987@fzu.edu.cn (J.L.); 211520014@fzu.edu.cn (X.S.)
2 College of Environment and Safety Engineering, Fuzhou University, Fuzhou 350108, China; 200620011@fzu.edu.cn
* Correspondence: shuiwei@fzu.edu.cn

Abstract: The value realization of ecological products is currently a rapidly evolving research topic; however, the definition of its concept, type, and operation mechanism remains relatively ambiguous. Operating in accordance with the PRISMA guidelines, this review employs keyword retrieval and screening, utilizing VOSviewer and word cloud mapping for analysis, in order to reveal three primary research domains related to ecological product value realization. Based on thorough screening and the analysis of high-quality literature, this study comprehensively accomplished the following objectives: (1) clarifying the fundamental concepts of ecosystem services and ecological products, their interrelationships, and the scope of research on ecological products; (2) clarifying the basic connotation of realizing the value of ecological products; (3) demonstrating government-led approaches, market-driven approaches and collaborative pathways for realizing the value of ecological products; (4) reviewing international cases related to realizing the value of public ecological products, quasi-public ecological products, and operational ecological products. The academic contributions of this study are (1) expanding the theoretical framework for realizing the value of ecological products; (2) providing a Chinese perspective on global research on pathways to realize value from ecological products; and (3) offering a novel approach to revitalizing regional economies and improving local ecological environments. Based on this research, several shortcomings and future directions in this field are identified: (1) insufficient clarity, standardization, and uniformity in evaluation and measurement methods; (2) the absence of comparison between ecological products and urban economic products; (3) inadequate exploration of multi-stakeholder allocation and coordination mechanisms; (4) limited research on the role of capital markets in allocating ecological product resources.

Keywords: eco-products; value realization; ecological industry; value accounting

1. Introduction

Research into realizing the value of ecological products is a rapidly developing topic of exploration. However, the relevant concepts, types, and operational mechanisms involved are unclear. Against the backdrop of China’s ecological civilization system reform in the past ten years, this paper reviews the theory and practice of realizing the value of ecological products. This not only provides a new way of revitalizing regional economies, but also makes a positive contribution to improving the local ecological environment. The research results outlined here are expected to provide a new window for the world to understand China’s ecological civilization. Overall, this work presents a developmental path combining both Chinese characteristics and international experience for application to global ecosystem services. This article is intended to enrich the theoretical and empirical research results related to global ecosystem services.

In China, the realization of the value of ecological products is based on a theoretical framework with Chinese characteristics developed against the policy background.
of “ecological civilization thought” and the Two Mountains theory. To propel China’s high-quality development and the realization of common prosperity, this policy aims to construct a distinctive theoretical framework for ecological product value realization in China. This framework should be adaptable to uncertainties arising from factors such as deglobalization, the post-pandemic era, and the international and domestic context of “dual circulation.” It aims to contribute to the forefront of thought, providing theoretical foundations and practical guidance for the more extensive promotion of shared prosperity and equitable development rights for urban and rural populations. Additionally, this policy agenda seeks to contribute to the higher-level enhancement of rural spatial governance [1,2], aligning with cutting-edge trends, theoretical underpinnings, and practical guidance. There is an additional aim to construct a theoretical framework with universal application, providing a theoretical system and practical experience applicable to the sustainable development of countries for the attainment of global ecosystem services.

2. Method

In accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, this systematic review aims to comprehensively explore the relevant literature on the value realization of ecological products [3] (Figure 1). During the literature search and screening, we initially targeted articles with themes and keywords such as “ecological products”, “value realization”, “value accounting”, and “ecosystem services” published within the past ten years. A thorough search was conducted across three databases, namely, Web of Science (WOS), China National Knowledge Infrastructure (CNKI), and ScienceDirect, resulting in the identification of 2037 closely related publications.

The bibliometric analysis software VOSviewer1.6.20 was used to extract the abstracts of the above research for co-occurrence analysis and the word cloud map software (https://www.wordclouds.com/, accessed on 26 November 2023) was used to identify the high-frequency words in the keywords. This approach allowed us to capture the latest advances and common concerns in the field of research.

Centering on the research theme of “value realization of ecological products”, high-frequency keywords selected based on their co-occurrence relationship were arranged into the following three principal research clusters. (1) High-frequency words in the green group include ecological product, mechanism, realization, China, theory and concept, which reflect scholars’ high degree of attention to the theoretical framework and mechanism of ecological products and their value realization, especially Chinese scholars. (2) The high-frequency words in the blue group include ecosystem, ecosystem service, service, accounting, and index. The research involves accounting for ecosystem services and their value. It also shows that the value accounting of ecosystem services is closely related to the value realization of ecological products. (3) The high-frequency words in the red group include impact, use, approach, account, need, and sustainability (Figure 2), indicating that scholars are concerned with the social and environmental impacts of ecological products and the question of how to achieve sustainable development of ecological products. Based on word cloud image analysis, notable keywords include production, ecosystem, China, mechanism, function, realization, service, innovation, and assessment, etc. This highlights the focus on functionality, value realization, and eco-product innovation (Figure 3). Comprehensively analyzing the above results, it can be seen that scholars pay attention to theoretical frameworks, mechanisms, ecosystem services, value accounting, realization paths, and other aspects in the study of the value realization of ecological products, forming a multi-level and multidimensional research network in order to comprehensively understand and promote the value realization of ecological products. After careful evaluation of titles, abstracts, keywords, and full texts, we selected 101 representative and high-quality articles. In addition, we suggested potential directions for further discussion in the future. It is important to note that, due to the limited data available for meta-analysis, no such analysis was performed in this study.
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**Figure 1.** Visual representation of the search outcome and screening process in this systematic review: a PRISMA flowchart.

**Figure 2.** Network visualization analysis graph representing 2037 articles.
3. Ecosystem Services and Eco-Products

3.1. Ecosystem Services

The concept of ecosystem services was comprehensively expounded by Paul and Anne in 1981 [4]. Since then, it has gained widespread acceptance within academia. Western scholars define ecosystem services as a complex natural system, comprising a variety of ecosystems and ecological processes, which preserves the natural environmental conditions necessary for human existence and utility [5]. Ecosystem services also provide goods and services [6], enabling people to enjoy the benefits of provisioning, regulating, cultural, and supportive services [7]. These services encompass all categories of unprocessed materials necessary for production and day-to-day functioning, as well as the components that establish and sustain the Earth’s eco-support system, thereby shaping the environmental circumstances imperative for human survival [8]. Furthermore, ecosystem services include the products and services that directly or indirectly maintain life, facilitated in this task by their structure, processes, and functions [9]. Research on ecosystem services in urban areas involves ecosystem service accounting, ecological certification, eco-labeling, forest tourism, and assessment studies on the provision of these services [10–16].

3.2. Eco-Products

The concept of eco-products first emerged in 2001 as part of the Millennium Ecosystem Assessment Board project, organized by the World Health Organization (WHO), the United Nations Environment Program (UNEP), and the World Bank. In the academic realm, the notion of eco-products is delineated into both broad and narrow senses. In a broad sense, eco-products encompass public, quasi-public, and operational ecosystem services, including ecological material products [17,18], which also include operational products with human labor issued by quality certification agencies [19,20]. In a narrow sense, eco-products specifically pertain to final products or services contributing to human well-being within the domains of industrial and agricultural production. Specifically, ecological products refer to the ability of ecological goods to enter the commodity market to carry out transactions, and their exchange value includes not only the human labor concentrated on the commodity, but also the ecological premium generated by the ecological attributes of the commodity.
(for example, as ecological agricultural products do not use pesticides and fertilizers, they display superior product quality while protecting the ecological environment and their price is often higher than that of similar general agricultural products. This part of the premium is caused by the better ecological effects of these products). Non-ecological products are those whose exchange price is generated solely by human labor concentrated on the commodity [17,20]. Wang Jinnan has identified eco-products as belonging to the fourth industry, emphasizing their role in promoting the sustainable well-being of both humanity and nature [13].

The research scope of the field of eco-products can be further segmented based on multiple attributes. From the perspective of eco-product attributes, they are categorized into public products, quasi-public products, and operational eco-products [13,17,21]. Considering their manifestation, form, and function, eco-products fall into three distinct categories: ecological material products, ecological and cultural services, and ecological regulation services [22,23]. In the context of product supply, a nuanced taxonomy emerges, comprising natural elements, natural attributes, ecological derivatives, and ecological labeling [24]. In addition, from the vantage point of human involvement in the production process, eco-products are stratified into primary eco-products and derivative eco-products.

3.3. Relationship between Ecosystem Services and Eco-Products

The conceptual definitions of eco-products and ecosystem services exhibit a considerable degree of overlap. In related research, the exploration initially focused on ecosystem services, characterized as “the benefits that human beings directly or indirectly receive from ecosystems, primarily encompassing universal access to clean air, water, and other essential resources” [25]. This focus gradually transitioned towards the study of eco-products, positing that “ecosystem services encompass a variety of valuable services provided by ecosystems for human beings, whereas eco-products place a greater emphasis on their commodity economic nature, representing a fusion of value and value in use” [26]. Chinese scholars tend to align their studies of eco-products closely with the concept of ecosystem services. The value of ecosystem services is widely considered as a prerequisite and foundation for realizing the value inherent in quality eco-products.

In summary, eco-products arise from specific ecosystem structures and processes, including both market-oriented material products and non-market-oriented services, i.e., public and operational aspects. Under the premise of human consumption, it is necessary to ensure that the structure and function of the ecosystem are not damaged in the process of consumption, meeting the basic principles of sustainable development [27]. While the concept of ecosystem services underscores the independence of humans and ecosystems, ecological products emphasize their transformation into economic entities within human society through human labor. In certain instances, ecosystems generate eco-products by harnessing partial ecosystem services, such as carbon sequestration, oxygen release, and the production of fresh air [28,29]. At this point, the relationship between ecosystem services and products is a process–outcome relationship (illustrated in Figure 4 and Table 1) [30,31].

Table 1. Definition of related concepts.

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Proper Term</th>
<th>Definition</th>
<th>Interrelation</th>
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<tbody>
<tr>
<td>1</td>
<td>Ecosystem services</td>
<td>It includes ecosystems and ecological processes that preserve the natural environmental conditions necessary for human survival and development, as well as goods and services that provide and regulate culture and support services.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ecological products</td>
<td>A well-functioning ecosystem service requires continuous input of human labor or capital, and its supplies and services generated by humans can be traded directly or indirectly in the commodity market to a certain extent.</td>
<td>2∈1</td>
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Table 1. Cont.

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Proper Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>3</td>
<td>Ecological products in a broad sense</td>
<td>Ecosystem services with public attributes, quasi-public attributes and management attributes. Among them, the public attributes refer to the specific ecosystem services that need to be maintained and operated by public funds invested by government departments. The operational ones are privatized and can be traded in the commodity market, and the quasi-public ones refer to both of the above.</td>
<td>3 ∈ 2 ∈ 1</td>
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<tr>
<td>4</td>
<td>Ecological products in a narrow sense</td>
<td>Specifically refers to operational ecological products, including ecological agricultural products, ecological industrial products, and ecological service products.</td>
<td>4 ∈ 2 ∈ 1</td>
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<tr>
<td>5</td>
<td>Pure public ecological products</td>
<td>The value realization of ecological products with significant externalities is led by the government, assisted by the market, and adopts multiple ecological compensation methods.</td>
<td>5 ∈ 2 ∈ 1</td>
</tr>
<tr>
<td>6</td>
<td>Quasi-public ecological products</td>
<td>Ecological products with significant externalities have the characteristics of “clear property rights, scarce market, and accurate quantification”. The realization of product value mainly depends on the market transaction mode of ecological resource ownership transaction and index transaction under government supervision.</td>
<td>6 ∈ 2 ∈ 1</td>
</tr>
<tr>
<td>7</td>
<td>Operational ecological products</td>
<td>Ecological products with a high degree of human participation can be directly traded in the market and their value realization is mainly reflected in the realization of the value of ecological private products.</td>
<td>7 ∈ 3 ∈ 2 ∈ 1</td>
</tr>
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Figure 4. Conceptual framework of ecosystem serving ecological products.
4. Eco-Product Value Accounting and Value Realization

4.1. Eco-Product Value Accounting

Eco-product value accounting was introduced in Agenda 21 in 1992, with the objective of enhancing techniques for measuring the worth of natural resources. The goal was to facilitate the adoption of a unified environmental–economic accounting system, supplementing conventional methods of accounting for gross national product and output value [32,33]. In 1997, Costanza conducted a comprehensive analysis of the unit area value of 16 biomes and estimated that the global ecosystem provided at least USD 33 trillion worth of pure public goods and quasi-public goods annually, as determined based on a monetary valuation method [6]. In 2005, the Millennium Ecosystem Assessment (MA) utilized various indicators, primarily employing the production function, replacement cost, contingent valuation, and hedonic price methods to evaluate the total economic value (TEV) of an ecosystem [7,34]. The production function method employs dynamic modeling to simulate the contribution of pure public ecological products or quasi-public products (e.g., forest or forest rights trading) to economic output [35]. The replacement cost method determines the value of ecological products via the estimation of the cost required to replace pure public ecological products (e.g., water conservation), such as the cost of building and operating water treatment plants [36]. The contingent valuation method typically designs questionnaires to assess people’s willingness to pay for pure public ecological products. The hedonic price method estimates the economic value of pure public ecological products (e.g., environmental quality) based on individuals’ willingness to pay for them. Additionally, scholars have extensively employed non-traditional valuation methods such as the factor income method, shadow pricing method, and market price method [37–40]. The factor income method is employed to estimate the future expected economic value of quasi-public ecological products or operational ecological products (such as land, water, wood, etc.) by examining market transactions, rent, income, and other approaches, while considering the influence of time. The shadow pricing method determines the value of pure public ecological products without a market through an analysis of regional particularities, market demand, risk factors, potential benefits, and other relevant factors [41]. The market price method assesses the value of ecological products by comparing their prices with those of comparable goods available in the market while adjusting for any differences.

The concept of gross ecosystem product (GEP) was first proposed in 2012, when Zhu Chunquan proposed incorporating GEP into the accounting system for the assessment of sustainable development and using GEP to assess ecological conditions. The objective of eco-product appraisal is the computation of GEP, which refers to the total sum of the final material products and services provided by ecosystems for human well-being and sustainable economic and social development (referred to as eco-products), as compared to the concept of GDP. This includes physical commodities, regulatory services, and cultural amenities. The process of GEP accounting entails calculating the monetary value of eco-products. This is based on quantifying the functional quantity of eco-products and the reference prices for different eco-products using specific mathematical operations [42,43]. By establishing a national or regional GEP accounting system, it is possible to evaluate the production values of diverse natural ecosystems, including forests, grasslands, deserts, wetlands, and oceans, as well as human-made ecosystems such as farmland, pasture, aquaculture farms, and urban green pockets. This assessment facilitates the measurement and demonstration of various ecosystem statuses and alterations [44,45].

Chinese scholars concentrate on eco-products, investigating the classifications of ecosystem services, their values, and their possible applications [46,47]. However, at present there is currently no consensus on the exact definition of the eco-product valuation object. Scholars, both domestic and international, primarily articulate their scientific understanding of the appraisal object in relation to national accounts and discussions of gross national product. In practice, eco-product utility accounting methods often center on aspects such as the quantity, flow, and quality of ecological resources. Challenges arise in assessment and pricing, primarily due to the inadequate categorization of ecosystem types.
This inadequacy contributes to difficulties in precisely calculating the value of eco-products and the resulting evaluation lacks widely applicable reference points. To date, there has not been an internationally recognized and precise method for accounting for ecological value [48–51].

4.2. Eco-Product Value Realization

The definition of the value realization of eco-products draws from three theoretical sources: the labor theory of value, the utility value of service, and the price theory of value of neoclassical school [52–55]. In this article, we mainly draw on the relevant theories of labor theory of value. The two most famous theories on labor value theory are Marx’s labor value theory and David Ricardo’s labor value theory. Marxist theory posits that natural eco-products without human processing lack value, possessing only use value. Therefore, only the introduction of human labor in the production process can produce both use value and value. In 1817, David Ricardo put forward the “labor theory of value”, which discussed the relationship between use value and exchange value. He asserts that exchange value must be premised on use value, insisting that use value is the material bearer of exchange value. On the theory that “labor” is the source of value, he divides labor into direct labor and indirect labor, as well as simple labor and complex labor, and holds that the value of commodities is directly proportional to the amount of labor invested in production and inversely proportional to the productivity of labor. The value of ecological products expands the concept of value, encompassing not only undifferentiated human labor or the abstract economic value condensed in commodities, but also the inherent natural value of the products themselves. The definition of the value of ecological products borrows the related concepts of “value”, “use value” and “exchange value” in the “labor theory of value”. The existing literature on the classification of the value of eco-products suggests a division based on the degree of availability into use value and non-use value [56], also termed theoretical value and potential realization value in some research [57]. Besides, referring to David Ricardo’s concepts of “direct labor” and “indirect labor”, the use value is divided into “direct use value” and “indirect use value”. The concept of value realization of ecological products is mainly aimed at “direct use value”. Based on its external debt manifestations, it can be divided into ecological service value and ecological exchange value [58]. It is further possible to distinguish between ecological capital value, product use value, performance incentive value, and stimulation-of-employment value [59]. It is precisely because of the extension of the concept of “value” of ecological products relative to that of ordinary commodities, this study categorizes the realization of value in ecological products into three levels: public, quasi-public, and operational. The connotations are as follows.

1) Publicness is reflected in the contribution that ecological products make to both the entire ecosystem and human society. This includes a wide range of externalities such as the maintenance of biodiversity, the preservation of ecological balance, and the purification of air and water. The realization path for such ecological products is primarily governed by government intervention through transfer payments, government purchases, ecological taxes, ecological compensation mechanisms, the establishment of nature reserves, and policy incentives.

2) Quasi-publicness is manifested in the fact that ecological products possess both external characteristics and private attributes. This includes trading forest rights, water rights, and land rights for development purposes or engaging in index trading related to ecological resources. The realization path for these types of ecological products is principally achieved through collaboration between governments and markets.

3) Marketability is embodied in how human labor imparts utility to natural products. Through scientific management practices and sustainable utilization approaches, the renewable nature of ecological products can support the development of the agricultural, industrial, and service sectors. At this level, the value of human labor
and the value of natural products are intertwined, promoting the sustainability of economic development.

In the current stage in China, the predominant approach for realizing the value of eco-products is government-led, complemented by market-oriented operations [60]. In certain regions, there have also been explorations of a market-based eco-product supply approach, utilizing government-guided enterprise investments as a means of development [17] (shown in Figure 5). To date, China has carried out pilot work in Zhejiang, Fujian, Hunan, Jiangsu, Guizhou, and Chongqing, achieving initial results. The relevant implementation path is shown below (shown in Figure 6).

4.2.1. Government-Led Path

(1) Transfer payment mode: The government finances different groups or units, aiming to achieve multiple goals such as social equity, economic development, and social security through targeted financial distribution. For example, the Beijing municipal government provides financial support to farmers participating in the conversion of paddy fields into dry land to encourage farmers’ environmental behavior [61].

(2) Government purchase pattern: The government purchases projects and services related to the protection, restoration, or improvement of the ecological environment through procurement procedures [62,63]. For example, as of 2020, China had invested RMB 508.3 billion in natural forest protection projects and completed 20 million hectares of non-profit forest construction tasks [64,65].

(3) Ecological tax and fee model: The government guides enterprises and individuals to adopt environment-friendly behaviors through taxation and fee collection. At present, China’s ecological taxes include a resource tax, consumption tax, value-added tax, income tax, urban maintenance and construction tax, and vehicle purchase tax [66].

(4) Government ecological compensation mode: The government compensates, restores, and comprehensively controls the damage inflicted on the ecosystem and natural resources and the pollution to the environment caused by human social and economic activities. For example, Zhejiang and Anhui provinces in the upper and lower reaches of the Xin’an River in China precisely calculate the amount of ecological compensation among the provinces in the upper and lower basins through a formula and cooperate to protect water quality safety [67].

(5) Setting up a protected nature area mode: Through detailed environmental assessment, the government will designate sites with high ecological value or special natural resources as protected nature areas to prevent irreversible environmental damage and over-exploitation of resources. For example, China’s Changbai Mountain National Nature Reserve has included ecologically sensitive areas and drinking water sources into the red line of ecological protection to enhance the supply capacity of ecological products [68].

(6) Policy and institutional incentive model: Higher-level governments guide local governments to act in line with public interests and sustainable development goals through a combination of rewards and constraints under the regulatory framework. For example, the governments of Ezhou City in Hubei Province [69] and Nanping City in Fujian Province [70] incorporated ecological value accounting into the local government assessment system [71].
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Figure 5. Categories of eco-products and approaches to value realization.

4.2.2. Government–Market Coordination Approach

(1) Trading mode of ecological resource rights and interests: The government formulates market rules, establishes trading platforms, and supervises trading activities to realize market trading of ecological resource property rights, development rights, pollution emission rights, and so on. For example, Fuzhou City of Jiangxi Province has adopted the property rights mortgage financing model, whereby farmers can use the management rights of rural contracted land and the property rights of rural housing as collateral to obtain loans from banks.

(2) Transaction mode of ecological resources indicators: The government lays out control requirements for quantities of ecological resources, encouraging local governments, enterprises or individuals—whether in economically developed regions or in those in need of developing and using ecological resources—to meet control requirements by purchasing indicators or quotas. For example, the Chongqing government has built a trading platform based on the forest coverage index, while districts and counties that fail to meet the forest coverage index can purchase the coverage index of other districts and counties.

Figure 6. The practical mode of realizing the value of ecological products.
4.2.3. Market-Led Path

(1) Industrial ecological management mode: Enterprises integrate ecological concepts into production and economic activities through technological innovation, clean production, renewable energy application, etc., so that enterprises can become more environmentally friendly and display greater sustainability in production and operation. For example, China’s rice-fishery integrated cultivation technology utilizes the circular ecological mechanism of rice–fish symbiosis to construct a three-dimensional circular ecological agriculture system \[73\].

(2) Ecological industrialization management model: Enterprises or social management groups conduct industrial development and the management of ecological resources by ensuring that ecosystem functions are not destroyed. For example, Anji County in Huzhou City, Zhejiang Province, \[74\] and Shadong Village in Xiangxi Autonomous Prefecture, Hunan Province \[75\] rely on the advantages of their ecological background to develop characteristic farm music projects and karst landform tourism projects, respectively.

(3) Ecological carrier premium model: The government attaches the value of ecological products to agricultural products, industrial products, or spiritual and cultural products, realizing their value through market premium sales. For example, both the Wuyuanwan ecological restoration and comprehensive development project in Xiamen, Fujian Province, and the Yangtze River Protection project in Jiangyin, Jiangsu Province, follow the government’s lead in terms of carrying out pollution control and ecological environment restoration, improving regional environmental quality, and promoting land premium and industrial transformation and upgrading \[69\].

(4) Green finance model: Banks and other financial institutions transform ecological resources into ecological assets and integrate them into social funds through financial transactions \[18,76\]. Representative cases include the forest rights acquisition and storage guarantee project in Nanping City, Fujian Province, the Fulindai project in Sanming City, Fujian Province \[77\], and the Two Mountains financial project in Lishui City, Zhejiang Province \[23\]. Forest households or rural collective economic organizations can pledge forest rights assets as a financial guarantee in order to purchase ecological financial products to meet their capital needs with regard to ecological protection and forestry management.

Figure 6. The practical mode of realizing the value of ecological products.
5. Review of Case Studies on Value Realization of Ecological Products

The core of realizing the value of ecological products lies in transforming their inherent ecological value into actual benefits in economic, social, or cultural terms. This process includes transforming the environmental protection, sustainability, social responsibility, and other characteristics of ecological products into the actual use value of the products and ensuring that they are reflected and exchanged in the economic system through a market mechanism or other means. In this process, the realization of the value of ecological products can be divided into three distinct modes: the realization of the value of pure public ecological products, which is primarily spearheaded by the government; the realization of the value of quasi-public ecological products, leading to various modes of coordination between the government and the market; and the realization of the value of operational ecological products, which is dominated by the market while the relevant support policies of the government play a role in guaranteeing the value.

5.1. Review of Typical Case Studies on the Value Realization of Pure Public Ecological Products

Pure public ecological products (such as climate regulation, soil and water conservation, water conservation, etc.) demonstrate significant externalities [78]. The value realization path is mainly led by the government, representative of the land ownership of the whole people. This actor is supplemented by market methods, while diversified ecological compensation methods are adopted (illustrated in Table 2).

(1) Comprehensive ecological protection products: Local governments and social institutions are encouraged to participate in the whole ecological protection action. This primarily takes place through the government’s establishment of a financial transfer system and the establishment of natural protection areas. Let us take Brazil as an example. The Brazilian government provides special ecological compensation and pays funds in stages, in collaboration with civil society, to support the ecological construction of the Amazon nature reserve [79]. In regional ecological governance, the government allocates fiscal revenue funds according to governance needs through the quantitative assessments of ecological environment levels in each region. The Conservation Plan for the Amazon Protection Area is projected to mitigate deforestation across an area of 1.76 million hectares, thereby averting the release of 510 million tons of carbon dioxide into the atmosphere, accounting for approximately 16% of global carbon dioxide emissions [80,81].

(2) Ecological products for soil and water conservation: The government guides individuals or non-profit social groups to participate in the protection and restoration of vegetation by paying for ecological services or providing ecological compensation. For example, in the cultivated land rotation protection plan of the United States and the National Forest Fund project of Costa Rica, the government and national institutions provide individual ecological compensation to landowners who participate in forest protection actions and farmland conversion actions, respectively, aiming to encourage a wide range of participants to contribute to soil and water conservation through paid incentives for ecological services [82,83]. In the United States, crop yield losses in dry years were reduced by 14.0—89.9% via the adoption of a diverse crop rotation [84]. In Costa Rica, the success of a program in which landowners were paid USD 22–42 per hectare per year to participate in ecological compensation helped to restore forest cover from 24.4% in 1985 to more than 50% in 2011 [85].

(3) Ecological products for water conservation: Local governments, enterprises, and individuals are encouraged to actively participate in the maintenance of water resources, primarily through the implementation of ecological taxation and compensation, political performance evaluation, and incentives from the government. For example, in the Camboriu water supply project in Brazil, the government hired people from low-income backgrounds to remove invasive species in order to improve the water supply [79], taking into account the dual goals of poverty alleviation and ecological environment governance. In the Catskill water supply project in New York, the gov-
ernment collected ecological taxes from the downstream residents and earmarked the funds for the construction of upstream water purification and filtration facilities, which reflected the consideration of social equity and ecological balance in the implementation process [86].

5.2. Review of Typical Case Studies on the Value Realization of Quasi-Public Ecological Products

Quasi-public ecological products have the characteristics of “clear property rights, scarce market and accurate quantification”. The realization of the core value of the product principally depends on the market transaction modes of ecological resource ownership transaction and index transaction (this refers to the degree of ecological environmental effects to be quantified by indicators, such as the basic unit of carbon emission allowances while trading activities are carried out according to the quantified value under the supervision of the government). Under the guidance of the market mechanism, quasi-public ecological products can realize the reasonable development of resources and ecosystem balance by optimizing the allocation of ecological resources such as grasslands, wetlands, and forests.

(1) Water rights products: The government grants trust funds the right to develop water resources and charges water users for services such as water storage and sustainable financial resources for ecological purification. For example, Ecuador has established a Water Fund (FONAG) with the aim of providing clean water to surrounding communities. This fund not only ensures water resource management, but also plans to invest an additional USD 600 million in water development projects from 2016 to 2050 [87].

(2) Wetland rights products: Taking the United States as an example, it is implementing the Wetland Mitigation Bank project [69], which requires developers to purchase ecological services from banks in order to offset the loss of wetlands caused by development activities. The annual loss of wetlands in the United States has decreased from $45.8 \times 10^4$ acres (1955–1975) to $1.38 \times 10^4$ acres (2004–2009) [88].

(3) Pollutant discharge rights products: The pollutant discharge activities of factories and other institutions are controlled through the supervision of the government and the market. For example, the United States promulgated the Clean Water Act [89] and established the rainwater interceptor credit mechanism, respectively, to increase the cost of pollutant discharge and reduce the cost of green facilities infrastructure. The estimated construction costs of green infrastructure are 5–30% lower than those of traditional infrastructure, with lifecycle costs being approximately 25% lower [90].

(4) Land rights products: Under the supervision of the government and the market, land rights holders can transfer rights such as land management rights, use rights, or easements to other individuals or economic organizations [91]. For example, a land trust fund mechanism in the United States limits the development of land through the signing of conservation easement contracts between landowners and land trust organizations, achieving the goal of safeguarding the conservation value of land. From its inception until 2023, the Land Trust has conserved a total of 61 million acres of privately owned land [92].

(5) Forest rights and carbon quota products: In such cases, the government establishes a market access system to allow enterprises to buy, hold, or sell forest rights or carbon quotas through market trading mechanisms such as index trading or quota trading. For example, countries with high carbon emissions can purchase carbon emission quota indicators to offset carbon emissions through the international carbon sink trading platform [17]. By the end of 2017, a total of 19 operational carbon markets encompassed more than 7 billion tons of greenhouse gas emissions, constituting more than 15% of global carbon emissions [93]. The US state of California sets a cap on the total carbon emissions allowed in a specific period of time and companies need to buy additional carbon emission permits when their carbon emissions exceed the specified
limit. In 2023, the California Greenhouse Gas Abatement Fund allocated USD 26,307 millions from accumulated funds for eco-building programs or projects [94].

5.3. Review of Typical Case Studies on Value Realization of Operational Ecological Products

Market-led operational ecological products have the characteristics of direct access to market transactions, while their value realization is mainly reflected in the value of ecological private products [24]. These products are ecological products with the highest participation of human labor, including ecological agricultural, ecological industrial, and ecological service products.

(1) Institutions with premium-quality organic eco-agricultural products: Farmers or agricultural production organizations use sustainable, environmentally friendly, and organic agricultural production methods to produce high-quality agricultural products. For example, drawing upon the principles of organic agriculture, Denmark utilizes innovative technologies and waste recycling measures to mitigate environmental pollution in the pig industry while ensuring the production of high-quality pork, thereby establishing itself as a global leader in pork export [95]. The Farm-to-Institution program in the United States is dedicated to establishing a comprehensive sustainable agricultural supply chain encompassing production, processing, distribution, and marketing, with the aim of supplying local produce. Thus far, an impressive number of 67,369 schools have actively engaged in this initiative, generating billions of dollars in local market value while simultaneously fostering abundant employment opportunities within the community [96].

(2) Ecological industrial products: Factories, enterprises or social production organizations adopt clean production technologies and circular economy methods to reduce resource use, improve energy efficiency, reduce waste generation, and reduce environmental pollution in order to produce green industrial products with environmental protection characteristics. For example, Sweden has not only successfully developed its forest industry through sustainable forest management, but also maintains an average annual forest growth rate of 5.1 cubic meters ha$^{-1}$ year$^{-1}$ [97,98].

(3) Ecological service products: Individuals, enterprises, developers, village collective organizations, or other social institutions attach the value of ecological products to the service industry through ecological industrialization management, ecological carrier premiums, or green finance, including ecological cultural goods, ecological tourism, and ecological finance products. For example, the French National Park brand value-added system [99] and the American Rainforest Certified coffee project [100] seek to drive the premium value of cultural goods through the certification of ecological certification bodies. The Hawaii Mountain Forest Tourism Project promotes the premium tourism industry by relying on the characteristic mountain forest landscape of Hawaii [101].
Table 2. List of typical cases of realizing the value of ecological products in various countries.

<table>
<thead>
<tr>
<th>Eco-Product Classification</th>
<th>Cases</th>
<th>Specific Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive ecological protection</td>
<td>Fiscal transfer payment system in Brazil [80]</td>
<td>The government transfers payments to local municipalities according to their ecological governance needs.</td>
</tr>
<tr>
<td></td>
<td>Amazonas regional reserve plan in Brazil [79]</td>
<td>The government, in partnership with NGOs, transfers funds to nature reserves in stages.</td>
</tr>
<tr>
<td>Soil and water conservation</td>
<td>National forest fund project in Costa Rica [85]</td>
<td>The government/state agency provides ecological compensation to landowners who protect forest resources/participate in reforestation operations.</td>
</tr>
<tr>
<td></td>
<td>Conservation reserve program in USA [82]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Natural forest protection project in China [65]</td>
<td>The government buys soil and water conservation and other ecological service products from the market.</td>
</tr>
<tr>
<td>Water conservation</td>
<td>Xin’an River interprovincial basin ecological compensation project in China [67]</td>
<td>The government allocates the amount of ecological compensation between the upper and lower provinces.</td>
</tr>
<tr>
<td></td>
<td>Water supply project in Camboriú, Brazil [79]</td>
<td>The government hired the local poor to rid themselves of invasive species to improve water supplies.</td>
</tr>
<tr>
<td></td>
<td>Water supply project in Catskill, New York, USA [87]</td>
<td>The government collects ecological taxes and fees from downstream residents for the ecological construction of upstream water resources.</td>
</tr>
<tr>
<td></td>
<td>Implementation plan of ecological value project in Ezhou, Hubei, China [69]</td>
<td>The government has established an audit system for outgoing leading officials' responsibilities for natural resource assets and the environment.</td>
</tr>
<tr>
<td>Species diversity</td>
<td>Changbai mountain national nature reserve in China [68]</td>
<td>The government has listed ecologically sensitive areas and drinking water sources as the red line for ecological protection.</td>
</tr>
<tr>
<td></td>
<td>The “Water Beauty Economy” mechanism in Nanping Fujian, China [70]</td>
<td>The government has established a watershed water environment assessment mechanism.</td>
</tr>
<tr>
<td></td>
<td>The establishment of nature reserves</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Cont.

<table>
<thead>
<tr>
<th>Eco-Product Classification</th>
<th>Cases</th>
<th>Specific Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water resources development right</td>
<td>Water fund project in El Guado Quito [87]</td>
<td>The government and water users pay into the trust fund for water maintenance services.</td>
</tr>
<tr>
<td>Wetland development right</td>
<td>Wetlands Mitigation Bank mechanism in USA [88]</td>
<td>Developers purchase wetlands from banks to offset and compensate for the occupation and destruction they cause.</td>
</tr>
<tr>
<td>Pollutant discharge right</td>
<td>Federal water pollution control mechanism in USA [89]</td>
<td>The government enacted the Clean Water Act to increase the cost of wastewater treatment for businesses.</td>
</tr>
<tr>
<td>Land right</td>
<td>Community land trust fund in USA [92]</td>
<td>The government or landowner donates or entrusts title to land to a trust to acquire property.</td>
</tr>
<tr>
<td>Property rights mortgage financing model in Fuzhou, Jiangxi, China [72]</td>
<td>Farmers use the management rights of contracted rural land and housing property rights as collateral for bank loans.</td>
<td></td>
</tr>
<tr>
<td>International carbon sink trading market [17]</td>
<td>Developed countries invest in afforestation in developing countries to offset total carbon emissions.</td>
<td></td>
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<tr>
<td>Forest right/ Carbon emissions right</td>
<td>Carbon emission quota mechanism in California, USA [94]</td>
<td>Companies buy and sell carbon credits through auctions or carbon markets.</td>
</tr>
<tr>
<td>Public welfare forest carbon inclusive project in Huadu, Guangzhou, China [70]</td>
<td>Enterprises offset carbon emissions by purchasing carbon emission right quotas or voluntary emission reduction certification.</td>
<td></td>
</tr>
<tr>
<td>Forest coverage index trading in Chongqing, China [69]</td>
<td>Districts and counties that do not meet the forest coverage index can buy indicators in other districts and counties.</td>
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</tr>
<tr>
<td>Eco-Product Classification</td>
<td>Cases</td>
<td>Specific Measures</td>
</tr>
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<tr>
<td>Market-led path</td>
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</tr>
<tr>
<td>Ecological agriculture</td>
<td>Eco-farming mechanism in Denmark [96]</td>
<td>Farmers solve pig pollution by means of technological innovation and ecological recycling.</td>
</tr>
<tr>
<td></td>
<td>Farm-institution program in USA [97]</td>
<td>Farms and social institutions build green industrial chains to produce high-quality fresh products.</td>
</tr>
<tr>
<td></td>
<td>Rice-fishery integrated breeding system in China [73]</td>
<td>Farmers use rice–fish symbiosis to build a circular ecological agriculture system.</td>
</tr>
<tr>
<td></td>
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<td>Mechanisms of forest industry in Sweden [97]</td>
<td>The factory follows the sustainable management of forests and produces ecologically friendly forest products.</td>
</tr>
<tr>
<td></td>
<td>Mountain forest tourism project in Hawaii, USA [101]</td>
<td>Local residents rely on mountain landscape characteristics to drive tourism industry premium.</td>
</tr>
<tr>
<td></td>
<td>Rainforest certified coffee project in USA [100]</td>
<td>The enterprise creates brand effect by obtaining standardized certification and creative marketing techniques.</td>
</tr>
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<td></td>
<td>National parks brand value-added system in France [99]</td>
<td></td>
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<tr>
<td></td>
<td>Rural revitalization project in Shibatong Village, Hunan, China [75]</td>
<td>Local residents rely on the karst landscape to drive the tourism industry premium.</td>
</tr>
<tr>
<td></td>
<td>Farmhouse project in Anji County, Huzhou Zhejiang, China [74]</td>
<td>Local residents drive a premium in the tourism industry through a standard system of farmhouse music.</td>
</tr>
<tr>
<td></td>
<td>Forest Ecological Bank Project in Nanping, Fujian, China [69]</td>
<td>Farmers use their forest rights as collateral to apply for loans at financial institutions or buy financial products.</td>
</tr>
<tr>
<td></td>
<td>Fulindai project in Sanming, Fujian, China [77]</td>
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</tr>
<tr>
<td></td>
<td>Yangtze River Protection Project in Jiangyin, Jiangsu, China [70]</td>
<td>The government, enterprises, or social organizations drive the land premium of industrial transformation and upgrading through the comprehensive treatment of ecological environment and the improvement of environmental quality.</td>
</tr>
<tr>
<td></td>
<td>Two Mountains Finance Project in Lishui, Zhejiang, China [23]</td>
<td>The bank evaluates the “ecological credit” of enterprises and launches “ecological loan” financial products.</td>
</tr>
<tr>
<td></td>
<td>Forest Ecological Bank Project in Nanping, Fujian, China [69]</td>
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| Ecological industry       |                                                                       |                                                                                 |
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|                           | Fulindai project in Sanming, Fujian, China [77]                     |                                                                                |
6. Evaluation of Existing Representative Conclusions and Views

6.1. The Concept, Classification, and Evaluation Methods of Ecological Products Show a Trend of Diversity and Continuous Evolution

The definition, connotation, indicator calculation, and valuation methods of ecological products exhibit diverse characteristics in research outcomes. With the development of economic and social factors and the evolution of major internal and external contradictions, relevant studies continue to progress. The primary controversy lies in the difference between broad and narrow interpretations. Specifically, there is debate as to whether the value of products in agriculture, industry, and services with ecological premiums should be included in the category of ecological product value. Furthermore, there is insufficient exploration and discussion regarding the recognition and calculation of the opportunity costs arising from human activities related to the conservation, restoration, and abandonment of ecological products. Existing assessment and accounting data sources, evaluation metric systems, spatial–temporal scale selection, assessment standards, and other evaluation methods for ecological product value possess a notable degree of subjectivity. The accuracy of evaluation results is influenced by factors such as sample size, public knowledge levels, and expert professional standards. Questions regarding the key issues of how to acquire source data and construct a scientific evaluation metric system, how to establish indicator thresholds for maintaining the stability of ecosystems based on the assessment results of ecosystem services, and how to formulate rational, achievable, and sustainable development plans that optimize benefits and adjust and maintain the stability of utilization plans in response to changes in natural and socioeconomic environments remain unresolved. The criteria or indicators for assessing the excellence of ecosystem services are still lacking a satisfactory resolution.

6.2. Research into Market-Government Synergies and Mechanisms for Realizing the Value of Eco-Friendly Products Is Expected to Be a Prominent Topic of Research in the Near Future

The realization pathways of ecological product value have been significantly informed by pioneering explorations and summative research conducted in exemplary provinces and cities, providing a rich foundation for scholarly inquiry. Across various regions, there has been an active exploration of diverse value realization models, encompassing governmental, market-oriented, and collaborative government–market approaches. As such, substantial research materials have been accumulated. Nevertheless, the existing research outcomes exhibit a relatively loose distribution and, given the heterogeneity pertaining to the types of ecological products, geographical locations, and developmental stages, a comprehensive and systematic framework is yet to be established. The coordination effects of market forces and government intervention in terms of promoting the balance of product supply and demand, as well as price formation, lack rigorous theoretical derivation and practical summaries of long-term operational mechanisms.

Given the inherent characteristics of ecological products, characterized by strong public goods attributes, low profit margins, low turnover rates, and frequently by being situated in economically and politically disadvantaged areas, the process of market-oriented operation raises questions about the clarification of property rights and the internalization of externalities. Factoring in the highly opportunistic nature of the mobile capital market and the dominant competition of urbanized economies, questions arise regarding effective resistance to market shocks, how to ensure stable and abundant cash flows, and ways of safeguarding the perpetual existence of ecological capital. Furthermore, the issue of how to strategically attract high-level talent and develop cutting-edge technologies for deployment in value creation or the continuous enhancement of the quality and efficiency of products necessitates systematic, creative, and targeted policy design, as well as practical exploration.
6.3. Cross-Regional, Multi-Scale Supply and Demand Balances for the Realization of Ecological Product Values Requires Systematic Exploration

There is significant heterogeneity, clustering, and non-uniformity in the spatial distribution, total quantity, and diversity of different categories of natural ecological products. Geographic variations contribute to divergent spatiotemporal patterns of development, accompanied by the emergence of ecological resource scarcity based on dimensions of human spatial utilization. According to the utility value theory of ecological product value realization, the value of ecological products is reflected in effectiveness and scarcity. Effectiveness pertains to the utility of resources in satisfying human needs, while scarcity is a crucial measure of economic value. Drawing on the trade formation mechanisms of traditional economic products, scarcity is expected to induce motives for inter-regional market transactions. There is an urgent need for a multidimensional perspective grounded in vertical and horizontal coordination as well as spatiotemporal correlation to initiate theoretical discussions on establishing mechanisms that balance the supply and demand of material and service flows within ecosystems. This requires us to explore theoretical frameworks for precise ecological compensation and long-term dynamic balance mechanisms, founded on various supply areas (supply sources) and beneficiary locations (consumption sources).

7. Conclusions

Based on a comprehensive literature review, this paper systematically expounds the basic concepts and mutual relations between ecosystem services and ecological products and determines the research scope of ecological products. This paper establishes a theoretical framework for realizing the value of ecological products, and divides ecological products into three categories: public, quasi-public and operational; categorizes the government path, the government–market cooperation path, and the market path clearly; and enumerates the empirical case studies in China to further explain the specific modes of action of the three paths. Based on the three paths used to realize the value of ecological products, corresponding to the pure public ecological products, quasi-public ecological products, and operational ecological products, respectively, this paper classifies and summarizes the value realization of developed and developing countries in order to obtain a relatively objective, clear, and comprehensive picture of the path to realizing the value of ecological products. The research results can deepen the existing theoretical system of value realization of ecological products, provide a relatively rich and comprehensive classification and generalization for relevant empirical studies, open a window through which the world can understand China’s ecological civilization thought and development path, and offer a systematic and comprehensive methodological introduction to enable developing countries to realize the value of ecosystem services and ecological products. China has a vast territory and abundant ecological resources with great heterogeneity. Simultaneously, due to the imbalance in the spatial distribution of economic resources and ecological resources, China has obvious differences in economic space and ecological space, providing a sound experimental base for the realization of the value of various ecological products. Under the background of the current national government’s commitment to ecological civilization construction, China displays practical advantages in carrying out cross-regional realization of the value of ecological products between urban and rural areas, coastal and inland areas, and eastern, central, and western regions. This paper discusses the regionalization model and model reconstruction for realizing the value of high-quality ecological products with Chinese characteristics, and contributes the “China plan”, “China model”, and “Chinese experience” to the global research on exploring the path of realizing the value of ecological products.

Our findings still exhibit limitations. Although this study classifies and summarizes the value realization paths and specific operation cases of various ecological products, it fails to provide clear, standardized, and unified evaluation and measurement methods to address the difficulty of planning the value realization of various ecological products and the economic and social effects generated. Currently, the academic focus on mechanisms
for realizing the value of ecological products primarily revolves around the exchange and distribution processes within the production phase. This can be summarized as the property rights system, compensation mechanism, price mechanism, financial mechanism, and accounting mechanism for realizing the value of ecological products. However, there is a noticeable lack of in-depth exploration from the perspective of contrasting ecological products with urban economic products, particularly in terms of delving into the protective aspects of the ecological product value realization mechanism. For ecological products characterized by public attributes, determining ownership and enhancing the transparency and marketization of ecological product value realization are essential considerations. Key questions remain unaddressed: How should society leverage the decisive role of the market in the allocation of ecological product resources? How is the social body to nurture a well-functioning trading market and stimulate enthusiasm of diverse market participants? How can humanity effectively counteract the influence of the capital market, ensure the permanent existence of ecological capital, continually enhance quality and efficiency in adding value to products, and establish a more diversified and seamless ecological product value realization mechanism? The existing research on the value of ecological products involves multiple stakeholders, and the causality and coping strategies based on local specific cases are rarely reflected. In view of the space ownership problems attached to ecological products, including the ownership of many rights such as ownership, contract rights, management rights, and regulatory rights, as well as the licensing of franchise rights, trial production access, exit mechanisms, and the distribution methods of various stakeholders, a multi-agent game model and a long-term and stable coordination mechanism have not yet been produced. For farmers (households), as the most vulnerable group unit in the game process of multiple stakeholders, the question of how to ensure the efficiency and fairness of their income distribution and solve the difficulty of farmers’ income increase is an important issue in need of urgent solution.

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

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

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