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Commentary

Introduction to the New Book Ecological Value-Added Economics - Theoretical Exploration and Practice in Reconstructing the Economic Growth Paradigm

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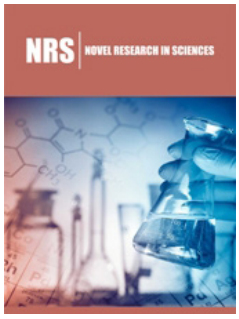

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Introduction

In the context of an intensifying global climate crisis and tightening ecological resource constraints, China has proposed the strategy of "dual carbon goals" and "high-quality development", marking a profound shift in the economic growth logic from "scale first" to "quality first." However, traditional economics views natural resources as exogenous variables, which has caused ecological value to remain outside of the market pricing system for a long time, leading to the "tragedy of the commons" and the dilemma of green transformation. With the support of the Natural Science Foundation, Professor Zhang Ying of Beijing Forestry University published the monograph Ecological Value-Added Economics, which breaks through the constraints of the neoclassical growth model and for the first time constructs a production function framework centered on ecological factors, systematically demonstrating the synergistic value-added mechanism between ecological capital, physical capital, and human capital, providing an innovative theoretical system to solve the problem of ecological product value realization.

Features of the Monograph

Ecological Value-Added Economics constructs a theoretical paradigm and practical path for ecological factors to participate in the modernization of the economic cycle, featuring distinct characteristics, specifically:

Reconstructing the theoretical paradigm of the transformation of production and ecological factors.

As a pioneering work in constructing a theoretical framework for the value-added of ecological factors, this book reconstructs the underlying logic of economics, elevating ecological factors to the fourth productive factor alongside capital, labor, and land. It also reveals the theoretical mechanism of ecological resources' transformation from "passive depletable goods" to "actively value-added assets," and provides a paradigm breakthrough for solving the "zero-sum dilemma" between high-quality development and ecological protection. Its theoretical construction not only responds to the core proposition of "natural capital pricing" within the United Nations' "Economics of Ecosystems and Biodiversity" (TEEB) framework, but also resonates deeply with China's "dual carbon" strategy and the ecological product value realization mechanism.

Traditional mainstream economics excludes ecological factors from the production function, resulting in the long-term dilemma of the "resource curse" and "tragedy of the commons." This book proposes the groundbreaking "Ecological Factor Integration Value-Added Model," introducing the concept of eco-capital and constructing a four-dimensional production function--$Q = AK^{\alpha}L^{\beta}T^{\gamma}E^{\delta}$. This innovative model incorporates ecological factors (E) as independent variables into economic system analysis. Through the regulation of ecological factor parameters, it reveals the nonlinear mechanism by which ecological factors influence total factor productivity. This theoretical framework strongly supports the improvement of the Ecosystem Gross Production (GEP) accounting system.

Addressing the "time discounting" problem in current ecological value assessments, the monograph proposes a "triple discount correction model," incorporating the time-lag effects, spatial spillover value, and intergenerational fairness weight of ecosystems into the accounting system, thus providing a quantifiable theoretical benchmark for the transformation from "green mountains and clear waters" to "golden mountains and silver mountains." These innovations also corroborate the accounting methods for human capital, production capital, and natural capital proposed in the United Nations' Inclusive Wealth Report, providing theoretical support for the institutional design of China's GEP accounting pilot.

Constructing a six-fold market-driven ecological product value realization mechanism

The monograph breaks through the traditional administrative-dependent path of ecological compensation and systematically proposes a "six-dimensional driving system" for market-based ecological value realization:

1. Property rights securitization trading system, innovatively designing financial tools such as ecological rights pledge securities (EAA);
2. Ecological factor price formation mechanism, using the Hedonic price model to dynamically capture ecological premiums;
3. Industrial integration value-added model, establishing value transmission channels for ecological factors with digital economy and sharing economy;
4. Carbon sink value multi-dimensional development system, creating a blockchain-based carbon footprint tracing system;
5. Ecological brand premium capture mechanism, constructing a consumption transmission model based on "eco-origin" certification;
6. Green finance innovative tools, developing risk-hedging products such as ecological options and futures.
7. Especially, the "ecological bank" system design proposed in the monograph, by constructing a distributed ecological account system, integrates fragmented ecological rights into tradable and divisible standard asset packages. This mechanism is validated in the case study of the "Forest Ecological Bank" in Nanping, Fujian, where the ecological asset securitization rate in the pilot area was significantly improved, driving the compound growth rate of the ecological industry to more than three times that of traditional agriculture and forestry.

Proposing the "digital ecological twin system" framework with foresight

Facing the governance challenges of the digital economy era, the monograph proposes the "Digital Twin Ecosystem" framework with foresight. By integrating ecological monitoring, data collection, model simulation, network management, and AI technologies, it constructs a complete technical chain from ecological factor perception and value assessment to market transactions. Using methods such as Social Network Analysis (SNA), it realizes for the first time the networked, dynamic, and real-time evaluation of ecological value, applying current cutting-edge digital technologies and methods to the research of ecological product value realization and value-added.

The monograph revolutionarily proposes the concept of the "Ecological Metaverse," establishing an ecological model database through digital twin technology, creating a high-precision, interactive three-dimensional ecological asset trading space, promoting the cross-temporal and spatial configuration of ecological rights, enhancing the efficiency of regional ecological asset allocation, and providing a technical implementation path for the construction of a unified national ecological element market. It not only provides a "theoretical engine" for ecological product value realization mechanisms, but also forges an "ecological compass" for high-quality economic development, contributing unique academic wisdom to the path of Chinese-style modernization.

Main Innovations

Reconstructing the traditional framework from "exogenous factors" to "endogenous ecological capital" and breaking through the theoretical paradigm

Mainstream economics views land, labor, and capital as core production factors, yet treats ecosystem services such as carbon sequestration, water conservation, and biodiversity protection as "free goods." This theoretical flaw leads to two consequences: first, ecological depletion is not included in production costs, resulting in resource misallocation and over-exploitation; second, the marginal returns of ecological restoration investment lack quantifiable basis, suppressing market participants' enthusiasm. This book creatively proposes the ELKT production function: Y=AF(E,L,K,T):

1. E (Eco-capital) refers to quantifiable ecological capital stocks, such as forest carbon sinks, water conservation, biodiversity protection, air purification, and 18 other types of ecosystem services;
2. By introducing the marginal output elasticity coefficient of ecological capital, traditional production factors including L (Labor), K (Capital), and T (Technology) proves that when the elasticity coefficient exceeds a certain threshold, investment in

ecological capital can improve total factor productivity (TFP). It is seen in the Anji bamboo forest carbon sink project, which increased local GDP growth by 1.8 percentage points.

Additionally, in the theoretical paradigm research, this book proposes a value composition system for ecological product basic value, carrier value, and premium value, incorporating the price composition of production costs, producer surplus, and consumer surplus in ecological product market competition into the theoretical quantitative research paradigm from "exogenous factors" to "endogenous ecological capital."

In the research on the value-added mechanism of ecological factors, this book proposes three paths for the value multiplication of ecological capital: (1) direct value-added, mainly achieved through ecological product market transactions such as carbon emission rights trading and water rights trading. (2) Indirect value-added, through improving ecosystem service quality to promote enterprise productivity growth, improving the regional business environment and labor efficiency, etc., to realize value-added. (3) Systemic value-added, mainly achieved through reducing climate disaster losses, thus indirectly realizing the system value-added of ecosystems. These are all breakthroughs in the theoretical paradigm research of this book.

Constructing a closed-loop system for the value realization mechanism of "three rights separation-market pricing-multiple compensation"

Breaking through the current dilemma of unclear natural resource property rights, this book proposes the "three rights separation" reform for ecological resources. First, ownership belongs to the state, ensuring the national ecological security boundary. Second, operational rights are granted to operating entities, activating the market through franchising. Third, income rights, establishing a "ecological contributors-beneficiaries" distribution mechanism, incentivizing market entities to actively participate in the construction of the ecological product market.

In the value accounting of ecological products, this book proposes to build a "three-dimensional accounting matrix" for the value accounting of ecological products. That is, material supply services, including agricultural products, forest products and other direct value, use the market price method for direct accounting; Regulation services, including carbon sinks, soil and water conservation, air purification and other indirect values, use the shadow price method for value accounting; Cultural services, including ecotourism, health care services and other derived values, use the Hedonic model for value accounting.

The book proposes a transmission path for ecological products, which is "ecological resources - ecological assets - ecological capital - ecological products - value realization". It points out that the main channels for increasing ecological value include the appreciation of natural capital and the appreciation of social and cultural capital. The ecological value chain is mainly reflected in the fact that ecosystem services are the cornerstone of the corporate value chain, and social relationships also play a role as a lubricant in the value chain.

Promoting institutional design and policy innovation for ecological value-added and high-quality development

In the innovation of ecological product value realization trading mechanisms, this book proposes a multi-level trading system from government-led to market-driven. Specifically, it includes: First, the primary market for ecological protection quota trading, such as wetland compensation balance indicators set by the government; Second, the secondary market for trading pollution rights and carbon emission quota among enterprises, drawing on ETS experience from the EU; Third, the ecological derivative market developed by issuing green bonds, using ecological trusts, and other financial instruments. By improving the ecological product value realization market trading mechanism, ecological value-added and high-quality development are promoted.

In terms of institutional design, by establishing a comprehensive ecological account system, preparing provincial ecological asset-liability tables, marking the natural resource debt red line, and implementing dual assessment of GDP and GEP, ecological value-added is incorporated into performance evaluations to promote policy innovation. In terms of innovative green finance policy tools, by piloting the issuance of ecological special bonds, conducting low-interest loans for ecological projects, etc., high-quality development of the ecological product market is promoted.

In terms of the implementation of regional ecological compensation, it establishes a regional ecological compensation 2.0 mechanism that encompasses vertical compensation, horizontal compensation, and market-oriented compensation. This will be achieved through the establishment of a central fiscal inter-basin ecological transfer payment fund, pilot water rights trading, and the creation of a "carbon sink insurance + futures" portfolio product to hedge risks. The mechanism aims to promote institutional design and policy innovation that enhance ecological value and facilitate high-quality development

Academic Contributions and Practical Implications

Currently, the world is undergoing a paradigm revolution from "gray growth" to "green prosperity." *Ecological Value-Added Economics* not only injects an ecological dimension into economic theory but also provides an actionable policy toolkit, which has significant guiding implications for achieving the 2030 Sustainable Development Goals (SDGs). This book deeply analyzes the value spillover patterns of ecological factors within the market economic system, constructing a three-in-one theoretical framework of "production system restructuring--property rights system reconstruction--value accounting reshaping," providing solutions with both theoretical depth and practical operability for ecological product value realization and high-quality development. This book fills the gap in the theoretical model of endogenous growth of ecological capital and provides an implementation framework for the "Opinions on Establishing and Improving the Mechanism for Ecological Product Value Realization" (Central Office Document [2021] No. 24).

Future research could further explore the deep integration of digital technology and value realization mechanisms, advancing

ecological economy toward a smart stage. This book also forecasts the future development trends of ecological value-added economics, pointing out that the development of ecological value-added economics is crucial for addressing the environmental crises faced by the world today. With the advancement of relevant theoretical research and technological methods, we have reason to believe that a more sustainable and green economic growth model can be realized in the future, creating a better production and living environment for humanity.

Ecological Value-Added Economics has achieved a dual breakthrough in academic value and practical significance. The research and practice of ecological value-added economics are not only important issues in academia but also a cause that governments, enterprises, and every citizen should actively participate in. Only through collective effort can the beautiful vision of harmony between humans and nature be truly realized (Figure 1).

Figure 1.