Compilation of Natural Resource Balance Sheets: Theoretical Framework and Empirical Research

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Abstract: In the context of the unsustainable "land finance" model and ongoing reforms to the territorial spatial planning system, exploring new natural resource development models to activate resource value is critical for supporting high-quality growth. Drawing on accounting theory, this study constructs a theoretical framework for a natural resource balance sheet, proposes a natural resource asset-equity identity, and develops a three-level, six-class system for natural resources based on land use regulation. Furthermore, a four-level reporting framework—comprising master, sub, extended, and auxiliary tables—is established. Through an empirical case study of Suzhou City, Anhui Province, the paper proposes three application scenarios for natural resource balance sheets: natural resource asset audits upon the departure of leading cadres, evaluation of ecological restoration planning, and optimization of territorial spatial functional structure adjustment tables. The innovation of this research lies in integrating balance sheet theory into territorial spatial planning to conduct comprehensive physical and value-based analyses of natural resource protection and utilization. By employing resource segmentation to diagnose spatial protection and value performance, this approach enhances the scientific basis of spatial planning and strengthens the nexus between auditing and resource regulation, thereby improving government oversight. The findings suggest that the three-dimensional, dynamic, and equity-based characteristics of natural resources provide vital insights, indicating that a multidimensional, dynamic, and equity-oriented perspective should become a guiding principle for future territorial spatial planning.

Keywords: balance sheet; accounting equation; natural resource asset; natural resource asset audit upon departure of leading cadres; territorial spatial functional structure adjustment table

1. Introduction

The book *The Other Side of the Economy* explores how robust economies can lose momentum and descend into long-term stagnation, identifying "balance sheet recessions" as a primary trigger and advocating for the government to act as the "borrower of last resort". Historically, urban planning supported the "land finance" model to fuel forty years of rapid economic growth in China. As current territorial spatial planning assumes responsibility for natural resource protection and utilization, it is worth exploring whether the introduction of balance sheet theory can facilitate a transition to a "natural resource finance" model, thereby triggering a new wave of development. This study aims to establish a correspondence between land use and accounting statements, effectively transforming spatial planning issues into economic performance metrics.

Since the 2013 Decision of the Central Committee of the Communist Party of China on Comprehensively Deepening Reforms proposed the exploration of natural resource balance sheets, subsequent initiatives—such as the 2015 pilot programs and the 2022 pilot mechanism for managing state-owned natural resource assets—have underscored national commitment to sustainable development. The core responsibilities of natural resource departments involve managing the "equity" side of the balance sheet, where the volume of equity determines the scale of the debt side and, consequently, the state of the national balance sheet, influencing economic expansion or contraction. By integrating balance sheet theory with territorial spatial planning, this research proposes a foundational framework to provide a more scientific tool for resource regulation and identifies three application scenarios: leadership departure audits, ecological restoration, and territorial spatial use control.

2. Theoretical Framework of Natural Resource Balance Sheets

2.1 Accounting Elements: Assets, Liabilities, and Net Assets

A corporate balance sheet is a snapshot of financial health at a specific date, adhering to the accounting identity: *Assets = Liabilities + Owner's Equity*. Similarly, a natural resource balance sheet accounts for the stock and changes in natural resources within a specific region, reflecting the government's resource "inventory." We propose the natural resource identity: *Natural Resource Assets = Natural Resource Liabilities + Net Natural Resource Assets*.

2.2 Classification: Hierarchical Segmentation

Based on the *Land Administration Law* and relevant land-use classification guidelines, we categorize natural resources into three levels. The first level includes agricultural land, construction land, water, forest, mineral, and marine resources. The second and third levels further subdivide these categories—for instance, agricultural land includes sub-types such as farmland (e.g., paddy fields, irrigated land, dry land) and orchards, facilitating precise management.

2.3 Physical and Value-Based Metrics

Physical quantities track absolute changes in space and volume, essential for monitoring policy compliance in resource protection. Value-based metrics reflect the economic performance of resource utilization over time, accounting for price fluctuations and compensating for the limitations of physical indicators that overlook economic efficiency.

2.4 Natural Resource Liabilities

Natural resource liabilities represent the obligations incurred by human intervention to protect, maintain, or restore resources to a baseline level. These include:

Over-consumption liabilities: Consumption exceeding natural recovery capacity.

Environmental liabilities: Costs required to mitigate damage caused by resource extraction/utilization.

Ecological liabilities: Losses in ecosystem service functions.

3. The Balance Sheet Reporting System

The proposed four-level reporting system includes:

Master Table: A macro-diagnostic tool assessing overall performance and economic trends.

Sub-tables: Provide internal structural detail for assets and liabilities, enabling diagnostics of specific land-use categories and economic performance.

Extended Tables: Focus on key resources (e.g., farmland, water) to diagnose stocks, flows, and directional changes.

Auxiliary Tables: Support detailed measurements and data interpretation, such as land-use conversion matrices, tailored to specific regional contexts.

4. Application Scenarios

4.1 Natural Resource Asset Audits upon Departure

By bridging the gap between spatial planning policies and auditing requirements, the balance sheet provides a comprehensive metric to evaluate a leader's performance in environmental governance, ecological protection, and sustainable development.

4.2 Ecological Restoration Planning

The balance sheet acts as a diagnostic tool, identifying the types of resources needing repair through physical shifts, evaluating the efficiency of utilization through value-based changes, and calculating the necessary funding for restoration projects.

4.3 Territorial Spatial Functional Structure Adjustment

Traditional land-use planning often lacks an economic dimension. By incorporating assets and liabilities—including underground mineral and mobile water resources—the territorial spatial functional structure table can be upgraded to a comprehensive "balance sheet of territorial space," shifting the view from simple land allocation to a strategic assessment of resource assets and equity.

5. Conclusion and Insights

China’s development driver is shifting from increment-based "land finance" to a dual model of increment and stock. This study demonstrates that introducing balance sheet theory into spatial planning allows for a more comprehensive, dynamic, and equity-oriented approach to resource management. The core contributions include the construction of a hierarchical theoretical framework and the application of this tool in audit, restoration, and planning scenarios. Looking forward, the "three-dimensional, dynamic, and equity-based" perspectives of natural resources should be integrated into the fundamental philosophy of territorial spatial planning to support high-quality, sustainable development.

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