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ECONOMIC MECHANISMS FOR INTEGRATING ECOSYSTEM SERVICES INTO SUSTAINABLE DEVELOPMENT STRATEGIES AND NATIONAL ACCOUNTING SYSTEMS

The growing recognition of nature's finite capacity to sustain economic activity has catalyzed a paradigm shift towards integrating ecosystem services into both national accounting frameworks and sustainable development strategies. Traditional economic indicators, such as *gross domestic product*, have long failed to account for the degradation of natural capital, treating the depletion of resources as income rather than a loss of assets. Consequently, the development and application of economic mechanisms – such as payments for ecosystem services, green taxation, and natural capital accounting – have emerged as essential tools to internalize environmental externalities and reveal the true economic contribution of ecosystems. By adopting frameworks like the *System of Environmental-Economic Accounting* (SEEA), nations can move beyond conventional metrics to measure the trade-offs between economic growth and ecological health, thereby embedding the value of biodiversity and ecosystem services directly into policy-making, fiscal planning, and long-term sustainability strategies. Natural resource accounting is traditionally represented in the System of National Accounts (SNA), quantifying the value of natural resources for the national economy and its growth potential. Natural resource accounting serves a purely economic function and is considered from the perspective of natural capital and its growth as a factor of production.

The relevance of sustainable environmental management issues requires distinguishing between natural capital, economic assets, and environmental assets. The category "asset" has various manifestations in the System of National Accounts (SNA), the System of Environmental-Economic Accounting (SEEA), the Automated System of National Accounts (ASNA), and others. In its most general definition, an "asset" is the ability of an object, as a combination of tangible and intangible assets, to generate income for its owner (an individual or legal entity). Currently, the System of National Accounts classifies assets only as those used in economic activity and/or are subject to property rights. Their defining characteristic is profitability. Environmental assets are not reflected in national wealth. In essence, environmental assets are similar to intangible assets. Intangible assets are identifiable non-monetary assets that have no physical form and are separate from other assets [1].

The modern economic model, dominant for much of the 20th century, is based on a paradigm that views natural resources as an inexhaustible and free source of raw materials and a sink for waste. This has led to the systematic depletion of natural capital – the foundation of long-term human well-being.

Ecosystem services (ES), such as water purification by forests, crop pollination, climate regulation, and flood and erosion protection, have fundamental economic value, yet remain "invisible" in traditional decision-making systems and national statistics.

Integrating ES into sustainable development strategies and national accounting systems is a critical step in the transition to an inclusive green economy. This integration aims to correct market failures, when the true value of natural assets is not reflected in prices, and institutional failures, when political decisions are made without regard for environmental consequences [2].

The purpose of this article is to analyze key economic mechanisms that make the value of nature visible to policymakers, businesses, and society, ensuring its conservation and sustainable use as an integral part of economic development.

Integrating ecosystem services requires a multi-level approach, combining valuation methods, policy instruments, and institutional reforms. The key economic mechanisms can be divided into three interrelated blocks.

Assessment and quantification of ecosystem services. The first and fundamental step is the valuation of natural capital in physical and monetary units. This includes [3].

Biophysical assessment – ecosystem mapping, quantitative measurement of service flows (e.g., tons of CO_2, m^3 of filtered water) [2].

Economic valuation – methods such as replacement cost analysis (the cost of building a water treatment plant instead of a forest filter), hedonic pricing (the impact of proximity to a park on property values), or contingent valuation (surveys on willingness to pay for landscape conservation) are used. The results of such valuations allow us to compare the benefits of ecosystem conservation with the income from alternative land uses (e.g., clearing forests for cropland).

Policy instruments and market mechanisms – the data obtained are used to implement mechanisms that adjust market signals and influence behavior [2].

Payments for ecosystem services (PES) – direct, voluntary transactions in which ES providers (e.g., farmers who use conservation farming

methods to keep a river clean) receive compensation from their recipients (a municipality, a water utility, or a private company).

Review environmentally harmful subsidies (e.g., for fossil fuels or intensive agriculture) and redirect financial support to practices that enhance natural capital.

Pollution/resource use taxes and charges – establishing prices for emissions or water abstraction that reflect environmental damage, creating incentives to reduce negative impacts.

Environmentally oriented public procurement and green budgets. Incorporating environmental criteria into the procurement of goods and services, as well as into public expenditure planning.

Reform of systems of national accounts and corporate reporting. To achieve long-term change, it is necessary to modify key systems for measuring economic activity.

The united nations system of Environmental-Economic Accounting (SEEA) is an international standard that allows for the accounting of natural capital stocks (forests, water, soil) and ecosystem service flows in parallel with traditional GDP. SEEA provides macroeconomic indicators such as adjusted net national income, which takes into account the depletion of natural resources [3–4].

Natural capital in corporate reporting, the implementation of standards (such as TNFD – Taskforce on nature-related financial disclosures) obliges companies to assess and disclose their dependencies on and impacts on nature, which is necessary for managing the financial risks associated with biodiversity loss [5]. Integrating ecosystem services into economic planning and accounting is not a technical task, but a strategic imperative for ensuring sustainable development. Economic mechanisms, from direct valuation of nature to the introduction of PES payments and the reform of national accounting systems, create the necessary foundation for informed decision-making. They translate the language of ecology into the language of economics, understandable to finance ministries, investors, and business leaders [5]. The success of this integration depends on political will, interagency cooperation (between environmental and economic ministries), capacity development, and the active participation of all stakeholders, including local communities. Only by making the value of nature visible and incorporating it into the foundation of economic analysis can we create a system in which environmental protection and socio-economic development cease to be perceived as conflicting goals, but become mutually reinforcing components of a single path to prosperity within planetary boundaries [4].

The dominant economic paradigm, viewing nature as a free and inexhaustible resource, has led to a critical depletion of natural capital,

threatening the long-term well-being of humanity. Ecosystem services, despite their fundamental economic value, remain "invisible" in traditional decision-making systems and national statistics, leading to systemic market and institutional failures. Integrating this value into sustainable development strategies and national accounting systems is not a technical improvement, but a strategic imperative for the transition to an inclusive green economy [5].

This process requires a comprehensive, multi-level approach based on three interrelated sets of economic mechanisms. First, valuation and quantification create an evidence base by translating biophysical service flows into monetary metrics. Second, policy instruments and market mechanisms, such as payments for ecosystem services (PES), subsidy reform, and green taxes, use this data to adjust market signals. Third, reform of accounting systems, including the implementation of the United Nations System of Environmental-Economic Accounting (SEEA) and the TNFD, anchors changes at the macro- and micro-level, making natural capital visible to decision-makers [6].

Thus, the success of integration depends not only on methodology but also on political will, interagency coordination, capacity development, and the engagement of all stakeholders. The analyzed economic mechanisms translate the language of ecology into the language of economics, creating a basis for decision-making where environmental protection and socioeconomic development become mutually reinforcing goals. Only by integrating the value of nature into the core of economic analysis can society build a sustainable system of prosperity within planetary boundaries.

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