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Editors

Dr. Neeta Baglari

Mrs. R. Sheela

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Dr. Tania Sur Roy

GLOBAL PERSPECTIVES ON MULTIDISCIPLINARY RESEARCH & DEVELOPMENT

Dr. Neeta Baglari

Assistant Professor, Department of Education
Cotton University, Guwahati

Mrs.R.Sheela

Associate Professor
Department of Management Studies
Arunachala College of Engineering for Women, Manavilai, Kanyakumari

Dr.Thahira KK

Assistant Professor
Department of Economics
Arignar Anna Govt Arts & Science College, Pondicherry

Dr.Tania Sur Roy

Assistant Professor
Department of Education
Don Bosco University, Assam



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Phone: +91 6384730258

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Green Economics: Reimagining Growth in the Age of Climate Change

Dr.B.R.Kumar

Professor & Director, Dept of MBA
Andhra Loyola College, Vijayawada

Abstract

As the climate crisis intensifies, traditional economic models rooted in perpetual growth and resource exploitation are increasingly under scrutiny. This chapter explores the paradigm of green economics, which seeks to harmonize economic development with ecological sustainability and social equity. Emphasizing a systemic shift from GDP-centric metrics to well-being and environmental health, green economics calls for rethinking investment priorities, consumption patterns, and regulatory frameworks. It examines global initiatives, policy innovations, and alternative models such as circular economy, degrowth, and regenerative finance. Drawing from international case studies and recent climate agreements, the chapter underscores the urgency of embedding environmental limits into economic planning. It concludes with policy recommendations for fostering inclusive, sustainable, and resilient economies in an era of planetary constraints.

Keywords: Green Economics, Climate Change, Sustainable Development, Circular Economy, Degrowth, Environmental Policy, Regenerative Finance, Ecological Limits, Green Innovation, Economic Resilience

Introduction

For decades, global economic systems have been predicated on the principle of exponential growth, often measured by metrics such as Gross Domestic Product (GDP). While these models have enabled industrialization and technological advancement, they have also contributed to significant environmental degradation, biodiversity loss, and climate change. The Anthropocene epoch—characterized by human impact on the planet—calls for a reimagining of what economic prosperity truly means. Green economics challenges the status quo by arguing that an economy must function within ecological boundaries and prioritize long-term planetary health over short-term profit maximization. It advocates a shift from a consumption-driven model to one that values sustainability, equity, and ecological resilience.

1. Core Principles of Green Economics

Green economics is underpinned by several foundational principles:

A. Ecological Sustainability

At the heart of green economics lies the understanding that the economy operates within the constraints of the natural environment. This principle emphasizes that continuous economic growth on a planet with finite resources is unsustainable. Green economics advocates for economic activities that maintain the regenerative and absorptive capacities of ecosystems. It calls for respecting ecological limits by reducing carbon emissions, conserving biodiversity, and protecting vital natural resources like water, forests, and soils.

B. Intergenerational Equity

Green economics champions fairness not only among current populations but also between generations. This principle asserts that today's economic decisions should not deplete resources or create environmental burdens that compromise the ability of future generations to meet their own needs. By focusing on long-term sustainability rather than short-term gains, intergenerational equity encourages investment in renewable energy, sustainable agriculture, and climate adaptation strategies to ensure a livable planet for all.

C. Inclusion and Justice

Sustainability must go hand in hand with social equity. This principle promotes the equitable distribution of environmental benefits and economic opportunities. It addresses structural inequalities by advocating for marginalized communities—especially those disproportionately affected by environmental degradation and climate change. Policies inspired by green economics aim to ensure fair access to clean air, water, land, education, and employment, thus fostering a just transition to a greener economy.

D. Systems Thinking

Green economics adopts a holistic approach to problem-solving by recognizing the complex interdependence between ecological, social, and economic systems. Rather than viewing these domains in isolation, systems thinking emphasizes the ripple effects that economic activities can have across ecosystems and communities. This perspective helps in designing integrated policies that account for feedback loops, unintended consequences, and synergies between sectors—such as linking transport planning with air quality and health outcomes.

E. Holistic Measurement

Traditional economic measures like GDP fail to capture the true costs of environmental degradation and social inequality. Green economics calls for alternative metrics that reflect well-being, sustainability, and quality of life. Tools such as the Genuine Progress Indicator (GPI) adjust economic output by including environmental and social factors, while Gross National Happiness (GNH) focuses on psychological well-being and cultural preservation. The ecological footprint metric assesses whether consumption patterns exceed Earth's biocapacity. Together, these indicators guide more responsible and meaningful policymaking.

These principles aim to foster a well-being economy that balances economic development with human and planetary health.

2. Reassessing Economic Metrics: Beyond GDP

Traditional economic success is largely gauged by GDP, which fails to account for environmental degradation, social inequality, or resource depletion. In response, green economists have advocated for alternative metrics:

- **Ecological Footprint:** Measures the environmental impact of consumption patterns.

- **Genuine Progress Indicator (GPI):** Adjusts GDP by considering social and environmental costs.
- **Human Development Index (HDI) and Happy Planet Index (HPI):** Blend economic, health, and well-being indicators.
- **Carbon Intensity of Growth:** Evaluates emissions per unit of economic output.

These indicators offer a more comprehensive view of societal progress, urging policymakers to prioritize well-being and sustainability over raw output.

3. The Circular Economy and Resource Efficiency

A central tenet of green economics is the transition from a linear "take-make-dispose" economy to a circular economy, where waste is minimized, and materials are reused and recycled. Key aspects include:

i. Design for Longevity

This principle focuses on creating products that are built to last, with durability and adaptability in mind. Unlike the traditional "planned obsolescence" model that encourages frequent replacement, longevity-driven design emphasizes repairability, modularity, and reuse. Products such as furniture, electronics, and clothing are made using robust materials and straightforward construction, allowing users to maintain, upgrade, or refurbish them easily. This reduces the frequency of replacement, lowers demand for virgin resources, and minimizes landfill waste. Brands like Fairphone and Patagonia are pioneering this approach by offering repair kits, spare parts, and lifetime guarantees.

ii. Closed-Loop Systems

In a circular economy, waste is not seen as an end product but as a valuable resource. Closed-loop systems refer to industrial and economic processes where outputs (waste or by-products) are reintroduced into the production cycle. For example, food waste can be converted into biogas or compost, while plastic bottles can be recycled into new containers or textiles. These systems aim to emulate natural cycles, where nothing is wasted, and materials continuously circulate. Implementation of such systems requires innovations in material science, logistics, and cross-sector collaboration between industries.

iii. Extended Producer Responsibility (EPR)

EPR is a regulatory and ethical approach that places the onus on producers to manage their products throughout the entire life cycle, especially at the post-consumer stage. This includes take-back programs, recycling, safe disposal, and even redesigning products for easier recyclability. By internalizing environmental costs, EPR incentivizes manufacturers to minimize waste, reduce hazardous materials, and design more sustainable products. Countries like Germany, Japan, and Canada have implemented robust EPR policies, particularly in sectors such as electronics, packaging, and automotive industries.

iv. Green Supply Chains

Green supply chains seek to reduce the environmental and social impact of goods and services throughout the entire supply chain—from raw material sourcing to end-of-life disposal. This involves selecting sustainable materials, optimizing energy and water use, minimizing transportation emissions, and ensuring ethical labor practices. Technologies like blockchain and AI are increasingly used for supply chain transparency, enabling companies to track carbon footprints and compliance with environmental standards. By adopting green logistics, reverse logistics (return and reuse), and supplier collaboration, businesses can enhance both sustainability and operational efficiency.

Countries like the Netherlands and Sweden are pioneering circular economy strategies, demonstrating that resource efficiency can coexist with economic competitiveness.

4. Degrowth and Post-Growth Thinking

Degrowth theory challenges the assumption that continuous economic growth is compatible with environmental limits. It advocates for:

- **Reduced consumption:** Especially in affluent countries, where overconsumption drives ecological overshoot.
- **Work-time reduction:** Promoting shorter workweeks for better quality of life and lower resource use.
- **Localization:** Supporting local economies and reducing dependence on globalized supply chains.
- **Public investment in care and community services:** Shifting value from material goods to social well-being.

While politically sensitive, degrowth aligns with IPCC warnings that avoiding climate catastrophe requires transformative change in consumption and production models.

5. Green Innovation and Sustainable Technologies

Technological advancement plays a dual role in green economics. While innovation has historically driven environmental degradation, it can also catalyze sustainability through:

- **Renewable energy:** Solar, wind, hydro, and geothermal as replacements for fossil fuels.
- **Green infrastructure:** Eco-friendly buildings, efficient public transport, and urban greening.
- **Eco-industrial parks:** Clusters of industries sharing resources and minimizing waste.
- **Digital tools for sustainability:** AI, blockchain, and IoT used for smart energy grids and precision agriculture.

However, green economics cautions against over-reliance on technology as a silver bullet, stressing the need for behavioral and structural change.

6. Policy Instruments and Governance Frameworks

Governments and international bodies play a pivotal role in steering economies toward green pathways. Effective tools include:

- **Carbon pricing:** Taxes or cap-and-trade schemes to internalize the environmental cost of emissions.
- **Green subsidies:** Support for renewable energy, organic farming, and sustainable transportation.
- **Regulatory standards:** Mandates on energy efficiency, emissions, and environmental disclosures.
- **Public procurement:** Government-led demand for sustainable goods and services.

Global agreements like the Paris Climate Accord and the European Green Deal represent critical steps toward aligning economic governance with climate goals.

7. Case Studies: Green Economics in Practice

Several countries and cities offer instructive examples:

- **Bhutan:** Measures success using Gross National Happiness, integrating environmental conservation into national development.
- **Costa Rica:** Runs on over 95% renewable energy and has reversed deforestation through progressive policies.
- **Germany:** Its "Energiewende" (energy transition) policy emphasizes decentralized, citizen-owned renewable energy.
- **Amsterdam:** Implements the "Doughnut Economics" model to balance social and ecological thresholds.

These case studies demonstrate the feasibility of green economic strategies at both national and municipal levels.

8. Challenges and Criticisms

Despite its promise, green economics faces several challenges:

8.1. Political Resistance

One of the most formidable barriers to green economic transformation is political resistance, often fueled by vested interests in fossil fuels, traditional manufacturing, and heavy industry sectors. These industries wield significant economic and political influence and may lobby against environmental regulations that threaten profits. Political leaders in resource-rich countries may delay green reforms to protect jobs or revenues derived from extractive

sectors. Additionally, short-term electoral cycles often discourage long-term environmental planning. As a result, despite public support for climate action, policies remain fragmented or watered down under industrial pressure.

8.2. Equity Dilemmas

Climate action, if not equitably designed, can unintentionally deepen social and economic inequalities. For instance, carbon taxes can disproportionately impact low-income households, which spend a larger share of their income on energy and basic goods. Similarly, job transitions from fossil fuels to green sectors may leave behind communities reliant on traditional industries. In the Global South, access to green technologies and funding is often limited, placing them at a disadvantage despite contributing less to historical emissions. Green economics advocates for just transitions, where vulnerable groups are supported through retraining programs, subsidies, and inclusive policymaking.

8.3. Greenwashing

Greenwashing occurs when companies or governments falsely portray themselves as environmentally responsible without making substantial changes to their practices. This can involve misleading marketing, exaggerating sustainability claims, or hiding damaging operations behind eco-friendly slogans. For example, an oil company might promote its investment in renewables while continuing to expand fossil fuel extraction. Greenwashing erodes public trust, misleads consumers, and undermines genuine efforts toward sustainability. Addressing it requires transparent standards, third-party audits, and stricter regulations on environmental claims.

8.4. Global Coordination

Climate change is a global issue, but responses remain nationally fragmented, creating challenges in coordination. Wealthier nations often have more resources to invest in green transitions, while developing countries may lack the capacity or be reluctant to limit growth. This imbalance can result in “carbon leakage”, where industries relocate to countries with looser environmental standards, undercutting global progress. Moreover, the lack of a universal enforcement mechanism for climate agreements like the Paris Accord complicates accountability. Effective global coordination demands equitable climate finance, technology sharing, and a stronger multilateral governance framework to ensure fair and collective action.

Addressing these barriers requires transparent governance, public engagement, and international solidarity.

Conclusion

Green economics offers a compelling framework for aligning human prosperity with planetary boundaries. It demands a fundamental rethink of what growth means, encouraging a transition toward resilience, regeneration, and redistribution. While the road ahead is fraught with political and institutional obstacles, the climate crisis provides both the urgency and the

opportunity to reimagine economic systems. By embedding ecological principles into the heart of policymaking and investing in inclusive, low-carbon futures, green economics can help societies thrive in balance with the Earth.

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