Biophilia Insights, 2023, 1(1), e202311003
Doi: 10.52679/bi.e202311003

Review

Green GDP integrating economic growth with ecological sustainability

Pranav Bhaskar [1,2], and Rashmi Tripathi [3,*]

Citation:
Bhaskar, P., & Tripathi, R. (2023). Green GDP integrating economic growth with ecological sustainability. *Biophilia Insights*, 1 (1), e202311003. https://doi.org/10.52679/bi.e202311003

Received: 12 May 2023
Accepted: 21 June 2023
Published: 30 June 2023

Copyright: © 2023 Pranav Bhaskar, Rashmi Tripathi. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) license (https://creativecommons.org/licenses/by-nc-sa/4.0/).

[1] Integrative Centre for Research & Innovation in Biology, Braj Mohan Jha Science Research & Innovation Foundation, Chandigarh-160014, India.
[2] Department of Pharmacology, School of Medicine, University of Virginia, Charlottesville-22908, Virginia, USA.
[3] Department of Bioscience and Biotechnology, Banasthali Vidyapeeth, Banasthali-304022, Rajasthan, India.
* Correspondence: tripathi.rashmi@gmail.com

Abstract

By integrating economic expansion with ecological sustainability, Green GDP signifies a paradigm change in economic analysis. It acknowledges the necessity of taking into account both conventional economic indicators and how economic activity affects the environment. The succinct summary of Green GDP in this abstract emphasizes its importance and ramifications. To address urgent environmental issues, ecological sustainability must be incorporated into economic appraisal. A comprehensive framework known as "Green GDP" acknowledges the connection between economic growth and the protection of ecosystems and natural resources. Green GDP gives policymakers a more precise grasp of the true costs and benefits of economic activity by considering environmental effects. The implementation of Green GDP will have a significant impact on how decisions and policies are made. It makes it possible to create and put into practice efficient environmental policies, directing resource allocation in the direction of sustainable activities. In addition, Green GDP encourages innovation, environmentally friendly technologies, and the creation of green jobs. Achieving a healthy balance between economic growth and ecological sustainability is difficult, but Green GDP offers a promising way forward. One problem is precisely assessing environmental impacts. To better methodology and data gathering, more study and cooperation are required. Incorporating ecological sustainability along with economic progress, Green GDP represents a substantial improvement in economic assessment. Its adoption can direct decision-makers toward well-informed choices that give equal weight to economic success and environmental protection, creating the foundation for a more sustainable future.

Keywords: Green GDP; Economic stability; Ecological sustainability; Environmental policies; Natural resources; Economic indicators; Environmental protection; Biodiversity conservation; Environmental services

Introduction

The term "Green GDP" refers to a modified definition of Gross Domestic Product (GDP) that takes environmental considerations into account when making economic judgments (System of Environmental Economic Accounting, 2021). The concept of "Green GDP" marks a paradigm shift in how we evaluate economic success because it recognizes the vital role that environmental sustainability plays alongside more conventional indicators of economic growth (Bowen and Fankhauser, 2011; Stjepanović et al., 2019; Aguilar-Rivera, 2021; Brand-Correa et al., 2022). It acknowledges that economic success must take into account the effects on the environment and the long-term well-being of society and cannot be measured exclusively in terms of monetary benefits and material production. In the past, GDP (Gross Domestic Product), which calculates the entire value of goods and services generated inside a nation's boundaries, has been used as the

main indicator of economic growth. The loss of natural resources, environmental damage, and the social costs associated with unsustainable economic practices are not taken into account by this restricted concentration on economic output, though.

Green GDP adopts an extensive approach by including environmental considerations in economic evaluation growth (Bowen and Fankhauser, 2011; Stjepanović et al., 2019). It views the importance of ecosystem services like fresh water, clean air, biodiversity, and carbon sequestration as essential elements of material prosperity. Green GDP offers a more complete and accurate depiction of the real state of an economy by taking into account the costs and benefits of environmental resources and services (Dasgupta, 2021). This new way of thinking acknowledges that a healthy environment is a vital requirement for long-term economic success and human well-being, not just a luxury or an afterthought. It recognizes that ecological sustainability and economic development are inextricably linked since environmental degradation can seriously jeopardize livelihoods, disrupt supply networks, drive up healthcare costs, and threaten economic stability (Bina, 2013). Green GDP supports decision-makers, corporations, and individuals to make well-informed decisions that strike a balance between economic growth and environmental preservation by including environmental sustainability in the analysis of the economy. It encourages the adoption of sustainable practices, sustainable technological innovation, and resource preservation (Buch-Hansen and Carstensen, 2021; Fernandes et al., 2021).

It is crucial to strike a balance between ecological sustainability and economic growth to address the urgent environmental problems that our world is currently facing (Harris et al., 2017). Here are some crucial details emphasizing its significance:

1. Preserving Ecosystem Services:

Ecosystem services, such as clean air, clean water, fertile soil, and climate management, must be preserved if human well-being and economic activity are to continue. The preservation and sustainable use of these services is ensured by striking a balance between economic growth and ecological sustainability, preventing their depletion and degradation.

2. Mitigating Climate Change:

Economic activities contribute to greenhouse gas emissions and climate change, especially those that rely on fossil fuels. We may switch to low-carbon and renewable energy sources, lowering emissions and lessening the effects of climate change, by incorporating ecological sustainability into economic growth strategies.

***3.* Protecting Biodiversity:**

Deforestation, habitat damage, and biodiversity loss are frequent consequences of economic development. Protecting endangered species, safeguarding natural habitats, and sustaining the delicate ecosystem balance that is necessary for our survival are all aspects of striking a balance between ecological sustainability and economic growth.

***4.* Ensuring Resource Efficiency:**

Ecological sustainability promotes waste reduction, resource efficiency, and resource utilization. We can lessen the burden on the environment's resources and reduce pollution by implementing sustainable production and consumption behaviors.

***5.* Enhancing Resilience and Adaptation:**

Extreme weather occurrences, a lack of resources, and ecological degradation are examples of environmental issues that might threaten societal welfare and economic stability. By encouraging adaptive abilities, minimizing vulnerabilities,

and assuring long-term economic viability in the face of environmental uncertainty, balancing economic expansion with ecological sustainability creates resilience.

***6.* Promoting Sustainable Development:**

Without consideration for ecological sustainability, economic growth frequently results in immediate benefits at the expense of long-term effects. The concepts of sustainable development are promoted by balancing ecological sustainability with economic growth, ensuring that present-generation demands are addressed without sacrificing the capacity of future generations to meet their requirements.

***7.* Safeguarding Human Health:**

Unsustainable economic practices that lead to environmental degradation can harm human health. Better public health outcomes result from balancing ecological sustainability with economic growth because it decreases exposure to dangerous substances, improves air and water quality, and helps to reduce pollution.

Addressing urgent environmental concerns requires striking a balance between ecological sustainability and economic prosperity. It acknowledges the inherent worth of the environment, and the interconnectedness of the economy and the environment, and provides a more resilient, just, and sustainable future for both the present and future generations (D'Amato and Korhonen, 2021).

Understanding Green GDP

The Green GDP seeks to provide a more thorough picture of economic performance, by taking into consideration the environmental effects connected to economic activity. It has two objectives. First, it acknowledges the conventional GDP, which gauges the monetary value of products and services generated inside a nation, ignoring the social consequences of unsustainable economic activities as well as the depletion of natural resources and environmental damage (Roach et al., 2019). The Green GDP seeks to fairly represent the costs and advantages of economic activity. The second statistic is that it measures economic success while considering environmental implications. It helps scholars, businesses, and governments comprehend the connection between environmental sustainability and economic growth. Green GDP, which calculates the environmental costs connected with economic activity, emphasizes the trade-offs between economic expansion and ecological preservation.

The Green GDP intends to provide a more complete scenario of economic performance, not to obstruct it, as it exhorts decision-makers to recognize that economic progress shouldn't be made at the expense of the environment, but rather in balance with ecological sustainability. By taking into account environmental issues, Green GDP promotes the adoption of sustainable practices, the efficient use of resources, and the mitigation of negative environmental repercussions (Roach et al., 2019).

Key Principles and Methods Involved in Calculating Green GDP

Calculating green GDP requires the use of core ideas and strategies that consider how economic activity affects the environment (Stjepanović et al., 2019). Although there isn't a single established formula for calculating Green GDP, the following usual principles and methods are used (Xu et al., 2010; Capasso et al., 2019):

1. Environmental Valuation:

One of the cornerstones of calculating Green GDP is assigning monetary values to environmental resources and services. This requires figuring out the economic worth of ecosystem services offered by natural resources, such as carbon sequestration, water filtration, and pollination, as well as the worth of natural resources they give, including forests, water bodies, and air quality. Different valuation approaches, such as market price, replacement cost, and contingency valuation, may be used to determine these values.

2. Natural Resource Depletion:

Green GDP serves as a proxy for the depletion of natural resources brought on by economic activity. Monitoring the extraction and consumption of non-renewable resources, such as fossil fuels and minerals, as well as the rate at which renewable resources, such as forests and fisheries, are used, is required to achieve this. Resource depletion is valued to determine the environmental cost of resource extraction and use.

3. Environmental Damage and Pollution Costs:

Calculating green GDP requires estimating the costs of environmental damage and pollution brought on by economic activity. Part of this approach includes evaluating the harms caused to ecosystems, biodiversity loss, soil erosion, water pollution, air pollution, and greenhouse gas emissions. Understanding the financial impact of environmental damages is aided by the assessment of those damages.

4. Adjustments to Traditional GDP:

To account for environmental considerations, green GDP estimates must be modified from those used for traditional GDP. This may entail either adding the value of environmental resources and services to the GDP or deducting the price of environmental damage and resource depletion from the standard GDP calculation.

5. Environmental Indicators and Accounts:

Green GDP, which uses environmental indicators and accounts, provides a comprehensive view of an economy's environmental performance. Metrics like carbon footprint, water footprint, energy use, waste creation, and pollutant emissions could be among them. Environmental accounts trace the flow of resources, energy, and pollutants throughout an economy, allowing for a more accurate assessment of the environmental effects.

6. Integrated Approaches:

Green GDP frequently makes use of integrated approaches that combine information from the economic, social, and environmental spheres to assess overall sustainability. Examples of these models include the System of Environmental-Economic Accounting (SEEA), which integrates environmental and economic data to provide a comprehensive picture of how the economy and the environment interact.

It is critical to keep in mind that calculating Green GDP is challenging and is a subject of ongoing research and development. Several countries and organizations may adopt variations of these concepts and strategies depending on their particular circumstances and the data that is available to them. The goal is to present more precise and comprehensive measures of economic performance that account for both economic expansion and environmental sustainability (Stjepanović et al., 2019).

Benefits of Adopting Green GDP as a Comprehensive Measure of Economic Growth

The use of Green GDP as a complete indicator of economic development has many potential benefits (Capasso et al., 2019; Stjepanović et al., 2019). Major advantages of considering Green GDP for assessing economic success include the following:

1. Holistic Assessment:

By including both economic growth and environmental sustainability, Green GDP provides a more thorough assessment of economic success. It acknowledges that economic development must take into account the influence on ecosystems,

natural resources, and societal well-being in addition to financial gains and material output.

2. Informed Decision-Making:

Green GDP provides improved information for decision-making to firms, consumers, and politicians. It aids in the identification of trade-offs, risks, and opportunities by measuring the environmental costs and benefits related to economic operations. This information enables wise resource allocation, investment choices, and policy decisions that support sustainable development.

3. Sustainable Development Planning:

Through the incorporation of environmental factors into economic strategy, green GDP helps long-term sustainable development planning. It motivates decision-makers to prioritize ecological preservation and implement policies that support resource efficiency, pollution reduction, and natural resource conservation. This fosters resilience against environmental threats and ensures economic growth that is consistent with environmental restrictions.

4. Environmental Accountability:

Economic activity is held accountable for its effects on the environment through green GDP. By valuing and measuring these effects, it gives a clear indication of the costs imposed on society and the environment. This can encourage companies and sectors to embrace greener technologies, put sustainability policies into place, and lessen their ecological impact, resulting in a more responsible and sustainable approach to economic development.

5. Improved Policy Integration:

Green GDP encourages the inclusion of environmental factors across a range of policy areas. By dismantling silos and increasing cross-sectoral collaboration, it promotes policy coherence. In order to promote a more holistic and sustainable approach to governance, it, for instance, makes it easier to incorporate environmental goals into economic policies, energy strategy, transportation planning, and land-use management.

6. Green Innovation and Technology:

Green GDP can encourage creativity and the creation of eco-friendly technologies. It generates market incentives for the adoption and advancement of clean technologies, renewable energy sources, and sustainable practices by highlighting the environmental effects of economic activities. This promotes technical advancement, encourages green business ventures, and aids in the shift to a low-carbon and resource-efficient economy.

7. Enhanced International Comparability:

Green GDP enables more accurate comparisons of economic performance across national boundaries. When comparing nations with various degrees of environmental sustainability, traditional GDP metrics might be deceptive. In order to evaluate and benchmark economic progress more fairly and to foster global cooperation for the achievement of sustainable development goals, green GDP offers a more reliable base.

Using the Green GDP as a holistic indicator of economic development encourages a more balanced, resilient, and sustainable approach by balancing economic growth with ecological sustainability.

Benefits of Adopting Green GDP as a Comprehensive Measure of Economic Growth

The use of Green GDP as a complete indicator of economic development has many potential benefits (Capasso et al., 2019; Stjepanović et al., 2019). Major advantages of considering Green GDP for assessing economic success include the following:

1. Holistic Assessment:

By including both economic growth and environmental sustainability, Green GDP provides a more thorough assessment of economic success. It acknowledges that economic development must take into account the influence on ecosystems, natural resources, and societal well-being in addition to financial gains and material output.

2. Informed Decision-Making:

Green GDP provides improved information for decision-making to firms, consumers, and politicians. It aids in the identification of trade-offs, risks, and opportunities by measuring the environmental costs and benefits related to economic operations. This information enables wise resource allocation, investment choices, and policy decisions that support sustainable development.

3. Sustainable Development Planning:

Through the incorporation of environmental factors into economic strategy, green GDP helps long-term sustainable development planning. It motivates decision-makers to prioritize ecological preservation and implement policies that support resource efficiency, pollution reduction, and natural resource conservation. This fosters resilience against environmental threats and ensures economic growth that is consistent with environmental restrictions.

4. Environmental Accountability:

Economic activity is held accountable for its effects on the environment through green GDP. By valuing and measuring these effects, it gives a clear indication of the costs imposed on society and the environment. This can encourage companies and sectors to embrace greener technologies, put sustainability policies into place, and lessen their ecological impact, resulting in a more responsible and sustainable approach to economic development.

5. Improved Policy Integration:

Green GDP encourages the inclusion of environmental factors across a range of policy areas. By dismantling silos and increasing cross-sectoral collaboration, it promotes policy coherence. In order to promote a more holistic and sustainable approach to governance, it, for instance, makes it easier to incorporate environmental goals into economic policies, energy strategy, transportation planning, and land-use management.

6. Green Innovation and Technology:

Green GDP can encourage creativity and the creation of eco-friendly technologies. It generates market incentives for the adoption and advancement of clean technologies, renewable energy sources, and sustainable practices by highlighting the environmental effects of economic activities. This promotes technical advancement, encourages green business ventures, and aids in the shift to a low-carbon and resource-efficient economy.

7. Enhanced International Comparability:

Green GDP enables more accurate comparisons of economic performance across national boundaries. When comparing nations with various degrees of environmental sustainability, traditional GDP metrics might be deceptive. In order to evaluate and benchmark economic progress more fairly and to foster global

cooperation for the achievement of sustainable development goals, green GDP offers a more reliable base.

Using the Green GDP as a holistic indicator of economic development encourages a more balanced, resilient, and sustainable approach by balancing economic growth with ecological sustainability.

Synergy of Economic Growth and Ecological Sustainability

The interdependence of a thriving economy and a healthy environment is referred to as the synergy of economic growth and ecological sustainability. It acknowledges that long-term prosperity may be achieved by combining economic growth and ecological protection, rather than seeing them as competing forces. In this synergy, economic growth is pursued in a way that is acceptable to ecological constraints and sustainable development ideals. It entails encouraging resource efficiency, implementing sustainable practices, and reducing harmful environmental effects. The objective is to promote sustainable economic growth that respects and sustains the environmental systems on which it depends by integrating ecological factors into economic decision-making (Aguilar-Rivera, 2021). On the other hand, preserving the long-term viability of economic activity depends on ecological sustainability (Brand-Correa et al., 2022). For economic productivity and human well-being, a healthy environment provides crucial resources including clean air and water, fertile soil, and diversified ecosystems. Environmental degradation poses hazards and vulnerabilities, yet ecological sustainability maintains the availability of natural resources and the stability of ecosystems (Aguilar-Rivera, 2021).

The interplay between ecological sustainability and economic growth encourages a robust and well-balanced approach to development. It acknowledges the connection between good management of the environment and ethical business operations. This synergy aspires to build a future where economic progress and ecological integrity may coexist, benefiting both current and future generations, by fostering sustainable resource management, green innovation, and equitable development (Aguilar-Rivera, 2021). Growing GDP has been frequently emphasized in the classic economic growth perspective as the main measure of development and prosperity. The effects of economic activity on the environment are often given less weight from this perspective. While increased living standards have been one of the many benefits of economic progress, the environment has also been significantly impacted. It is significant to emphasize that the conventional view of economic growth is changing and that the urgency of addressing environmental issues is growing. Environmental factors, such as sustainability objectives, circular economy tenets, and green technologies, are being incorporated into economic policies and practices (Fernandes et al., 2021). The goal is to move away from the current economic growth paradigm and toward one that reduces negative environmental effects, encourages resource efficiency, and supports ecological resilience. It is crucial to incorporate ecological sustainability into economic decision-making processes to build a more robust and sustainable future. Decision-makers can protect natural resources, reduce environmental risks, and encourage resource efficiency by taking into account the environmental effects of economic activity. This integration improves economic viability, lessens vulnerabilities to environmental disasters, and helps secure the long-term availability of resources. Ultimately, attaining sustainable development, addressing environmental issues, and building a more inclusive and resilient world depend on incorporating ecological sustainability into economic decision-making processes (Fernandes et al., 2021).

There are many cases and examples that show how economic expansion and ecological sustainability have been successfully balanced in the past. These instances show that it is feasible to combine environmental preservation with economic growth. Here are some noteworthy examples:

1. Costa Rica's Green Economy:

Alongside the economic expansion, Costa Rica has given priority to ecological sustainability (Granoff et al., 2015: Green Fiscal Policy Network, 2019). The nation has attained a wonderful equilibrium through strategic policies and investments. With more than 50% of its territory protected, Costa Rica's forest cover has dramatically increased. With the bulk of its electricity coming from renewable sources, the nation has also emerged as a global pioneer in renewable energy. While maintaining the nation's great biodiversity, the burgeoning ecotourism sector has helped the economy thrive.

2. Circular Economy in Denmark:

The circular economy, which seeks to reduce waste and increase resource efficiency, has gained support in Denmark (Thorin, 2020). The nation has put innovative practices and policies into place, including eco-design, energy recovery from trash, and recycling. Denmark has achieved high levels of wealth while successfully separating economic expansion from resource usage and trash production.

3. Germany's Energiewende:

The Energiewende, or energy transition, in Germany is a long-term plan to change the nation's energy system to one that is dependent more on renewable energy sources and energy efficiency (World Nuclear Association, 2020). It has resulted in major job growth, technological breakthroughs, and growth in the renewable energy industry. By lowering greenhouse gas emissions while preserving a robust industrial base, Germany has managed to strike a balance between economic growth and environmental sustainability.

4. Bhutan's Gross National Happiness:

Gross National Happiness (GNH), a distinctive development concept adopted by Bhutan, gives equal weight to economic progress, cultural preservation, social well-being, and environmental conservation (Alkire, 2008; 2013). Bhutan has put in place regulations that emphasized sustainable development, safeguarding its pristine environment, and advancing all-around well-being. The nation's dedication to upholding both a high level of forest cover and carbon neutrality serves as an example of how economic progress and ecological sustainability can be successfully combined.

5. Mesoamerican Reef Tourism Initiative:

Including Mexico, Belize, Guatemala, and Honduras, the Mesoamerican Reef is one of the planet's most ecologically diversified marine ecosystems (Ruiz de Gauna et al., 2021). The Mesoamerican Reef Tourism Initiative advocates for eco-friendly travel methods that boost the regional economy while preserving the delicate reef ecology. Stakeholders have effectively balanced economic expansion with the preservation of the reef and marine biodiversity by promoting responsible tourism.

These cases show how economic progress and ecological sustainability can co-exist when proactive regulations are put in place, renewable energy is encouraged, the circular economy is adopted, natural capital is valued, and stakeholders are involved into a strategic sustainability framework (D'Amato and Korhonen, 2021). They serve as models for other nations and regions that want to find a balance between environmental protection and economic growth.

Green GDP in Practice

Different nations and areas have begun to implement Green GDP differently, which combines environmental sustainability with economic growth. While some have made observable strides, others still struggle to successfully include environmental factors in

economic analysis. The acceptance and implementation of Green GDP in a few nations and regions have been analyzed as follows:

1. China:

Since the early 2000s, China has been aggressively researching the idea of a Green GDP (Li and Lang, 2009). The nation understood that environmental deterioration brought on by rapid economic growth needed to be addressed. However, due to data shortages, difficulties in appraising environmental effects, and the predominance of conventional GDP-focused indicators, adopting Green GDP has been difficult. Nevertheless, China has worked to create environmental-economic indicators and green accounting systems to include environmental factors in policy and decision-making procedures (Xu et al., 2010).

2. New Zealand:

The well-being method of economic assessment was pioneered in New Zealand. The nation created the Living Standards Framework, which integrates social and environmental well-being in addition to traditional GDP measurements (Karacaoglu, 2015). Focusing on well-being metrics and including natural capital accounting show New Zealand's dedication to integrating sustainability into economic decision-making.

3. Bhutan:

Bhutan's Gross National Happiness (GNH) strategy, which counts environmental sustainability as one of its cornerstones, has drawn praise. Bhutan's holistic development concept emphasizes the significance of ecological well-being and acknowledges that economic progress should be in harmony with environmental and social goals, even though it is not specifically evaluated through Green GDP (Alkire, 2008; 2013).

4. United Arab Emirates:

The Green Economy Initiative has been put into place in the United Arab Emirates (UAE) to encourage sustainable growth. By making investments in resource efficiency, sustainable infrastructure, and renewable energy, the project aims to establish a transition to a green economy (UAE's Economy, 2021). The UAE is committed to incorporating ecological sustainability into its economic strategies, even though its GDP is not green.

5. European Union:

In order to supplement GDP statistics, the EU has been at the forefront of implementing sustainability metrics, including those that consider social and environmental factors (Bartelmus, 2014). The Beyond GDP program of the EU places a focus on a more thorough evaluation of economic success that incorporates environmental and social indices. To quantify the connections between the economy and the environment, the European Commission has created frameworks like the System of Environmental Economic Accounting (SEEA).

6. Global Efforts:

International organizations like the World Bank and the United Nations have pushed for the adoption of all-encompassing metrics, including Green GDP, to evaluate economic performance (Dzebo and Shawoo, 2023). A framework for incorporating environmental sustainability into international development initiatives is provided by the UN Sustainable Development Goals (SDGs).

Overall, issues with data availability, measurement techniques, and agreement on how to value environmental consequences have complicated the adoption and implementation of Green GDP or comparable metrics. However, nations are realizing more and more that their economic assessments must go beyond the

confines of traditional GDP indicators and take ecological sustainability into account (United Nations Environment Programme, 2022). These initiatives support the global movement toward a broader comprehension of economic development that takes into account the long-term well-being of both people and the environment.

A variety of policy implications and actions are needed to encourage the integration of ecological sustainability into economic plans. Governments can create rules like emissions standards and waste management guidelines that encourage companies to adopt sustainable practices. For eco-friendly efforts, they can also offer financial incentives like tax exemptions and subsidies. Energy-efficient construction and other green infrastructure initiatives foster economic development while minimizing negative environmental effects. Governments have the power to impose requirements for the inclusion of environmental factors in decision-making, ensuring that ecological sustainability is consistently taken into account. Policies that support green investment and sustainable finance direct financial resources toward sustainable endeavors and encourage the disclosure of environmental concerns. Promoting responsible decision-making and consumption habits requires educating the general public, corporations, and legislators about the connections between economic growth and ecological sustainability. Finally, cooperation on a global scale is made possible by agreements like the Paris Agreement and the SDGs, which promote shared norms and goals and a strong commitment to sustainable development (Global Climate & SDG Synergy Conference, 2022). Governments can promote the integration of environmental sustainability into economic policies, resulting in a more sustainable and inclusive future, by putting these policy implications and initiatives into practice.

Future Prospects and Implications

The broad adoption of Green GDP has the potential to drastically alter both the sustainability of the environment and the world's economies. Green GDP can lead to a paradigm shift in how nations calculate and value economic success by adding environmental factors into economic assessments. This change would facilitate the transition to a sustainable and low-carbon economy by enabling a more thorough knowledge of the interdependencies between economic growth and environmental sustainability. Adopting a Green GDP will encourage resource efficiency, stimulate the growth of sustainable businesses and practices, and provide incentives for companies to lessen their environmental impact. In addition to reducing environmental dangers and protecting natural resources, this would also encourage innovation and the creation of green jobs. Additionally, a Green GDP would give decision-makers the data they need to formulate sensible plans for balancing ecological integrity with economic growth. Governments may direct their economies toward sustainable paths, undertake focused interventions, and distribute resources in a way that tackles urgent environmental concerns by valuing and accounting for environmental impacts. The broad adoption of Green GDP would also make it easier to compare performance across nations and advance toward sustainability objectives. In the end, the adoption of Green GDP would represent a global commitment to environmental sustainability and open the door to a more inclusive, resilient, and successful future for both people and the environment.

The goal of economic expansion while maintaining ecological sustainability offers both opportunities and challenges. Balancing immediate economic concerns with long-term environmental concerns is one of the biggest issues. Resource extraction, industrialization, and consumption habits that might have detrimental ecological effects including pollution, habitat destruction, and climate change are frequently necessary for economic growth (D'Amato and Korhonen, 2021). Adopting sustainable manufacturing and consumption methods, utilizing renewable energy sources, and putting in place efficient environmental legislation are all necessary to meet this problem.

The difficulty of measuring and valuing environmental damage is another difficulty. Ecosystem services, biodiversity, and natural resources can all have varying subjective and difficult monetary values (Kubiszewski et al., 2013). Effective decision-making requires the development of reliable approaches and measurements that capture the whole spectrum of ecological impacts. However, there are tremendous advantages to pursuing economic growth while maintaining ecological sustainability. Innovation, job growth, and economic competitiveness can be boosted by the move to a low-carbon economy and sustainable corporate practices. Green technologies, energy efficiency, and renewable energy investments can promote economic growth while minimizing environmental impacts. The rising consumer demand for eco-friendly goods and services opens up new market niches and influences customer preferences.

Additionally, pursuing ecological sustainability can improve risk management and resilience. Societies can defend themselves from environmental threats and guarantee the long-term availability of resources by reducing the effects of climate change, preserving ecosystems, and safeguarding biodiversity. Adopting ecological sustainability can also improve public health, and social well-being, and encourage equitable development.

Conclusion

Green GDP represents a transformative shift in economic assessment, going beyond the narrow confines of traditional GDP to recognize the interdependence between economic growth and environmental sustainability. It provides a more comprehensive and inclusive measure of progress, fostering a paradigm that values both prosperity and the protection of our planet for current and future generations. The purpose of Green GDP is to inspire decision-makers in establishing a balance between economic growth and environmental sustainability. In order to promote long-term economic growth, minimally harm the environment, and safeguard the welfare of current and future generations, it works to promote sustainable development initiatives.

The main tenets and methodology used to calculate Green GDP are intended to offer a thorough and integrated evaluation of economic performance that takes into account both economic expansion and environmental sustainability. Green GDP assists decision-makers and stakeholders in developing policies that support sustainable development by assessing the environmental effects of economic activity. A more informed decision-making process, planning for sustainable growth, environmental accountability, policy integration, green innovation, and improved global comparability are all potential benefits of using the Green GDP as a complete indicator of economic progress. Green GDP encourages a more balanced, resilient, and sustainable approach to economic development by balancing economic growth with ecological sustainability.

The conventional view of economic expansion has had serious negative effects on the environment. Without giving ecological sustainability enough attention, it has prioritized increasing GDP and material prosperity, which has led to resource depletion, pollution, habitat destruction, biodiversity loss, waste generation, and social and environmental injustices. Given these difficulties, there is a rising understanding of the necessity of changing to a more inclusive and sustainable method of economic development that takes into account the long-term welfare of both people and the environment. For long-term economic viability, risk mitigation, ethical resource management, innovation, public health, ecosystem preservation, social equity, and justice, ecological sustainability must be integrated into economic decision-making processes. A more sustainable and resilient future can be created for both the present and future generations by acknowledging the interconnectedness between the economy and the environment.

In various nations and locations, the acceptance and implementation of Green GDP have revealed both advancements and difficulties. While some countries have made progress in including environmental factors in economic assessment, others still struggle with data shortages, complicated valuation issues, and the predominance of conventional GDP-focused metrics. However, there is a framework for encouraging the incorporation

of environmental sustainability into economic decision-making thanks to international efforts and initiatives like the SDGs and the EU's Beyond GDP strategy. Strong data, efficient valuation procedures, and governmental commitments to balance economic growth with environmental preservation are necessary for the adoption and implementation of Green GDP to be successful.

To achieve long-term prosperity and environmental well-being, policy implications and initiatives that support the integration of environmental sustainability into economic plans are essential. Governments can facilitate the necessary changes towards a more sustainable and resilient future by establishing supportive policy frameworks, offering financial incentives, promoting green public procurement, encouraging sustainable finance, encouraging education and awareness, and fostering collaboration.

Global economics and environmental sustainability would undergo radical change as a result of the widespread adoption of Green GDP. Green GDP would encourage the effective use of resources, spur the growth of sustainable enterprises, and motivate companies to lessen their environmental impact by including environmental factors in economic calculations. This would reduce the hazards to the environment, encourage innovation, and produce green jobs. Additionally, Green GDP would give decision-makers vital data to create successful policies that strike a balance between ecological integrity and economic development. It would make it easier to compare countries globally and track how well they are doing in achieving sustainability objectives. But some issues need to be resolved, including how to measure and value environmental damage and strike a balance between immediate economic concerns and long-term environmental concerns. An all-encompassing and integrated strategy is needed to solve the issues and seize the opportunities associated with achieving economic growth while maintaining ecological sustainability. It entails coordinating policies, mobilizing financial resources, encouraging stakeholder cooperation, and promoting knowledge of the advantages of sustainable practices. Societies may attain this harmonious balance between ecological sustainability and economic progress, making everyone's future more robust and prosperous.

Author Contributions: PB and RT conceived of the presented idea for the article, performed the literature search and data analysis; PB wrote the manuscript; RT provided critical feedback and helped to shape the final draft.

Funding: This research received no external funding.

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

References

Aguilar-Rivera, N. (2021). Green gross domestic product (Green GDP) and sustainable development. In: Leal Filho, W., Azul, A.M., Brandli, L., Lange Salvia, A., Özuyar, P.G., Wall, T. (eds) Reduced Inequalities, Encyclopedia of the UN Sustainable Development Goals. Springer, Cham. https://doi.org/10.1007/978-3-319-71060-0_72-1

Alkire, S. (2008). Bhutan's gross national happiness index: methodology and results. OPHI Research in Progress 5a. https://ophi.org.uk/ophi-research-paper-5a/ [Accessed on 11 June 2023]

Alkire, S. (2013). Well-being, happiness and public policy. OPHI Research in Progress 37a. https://ophi.org.uk/ophi-research-in-progress-37a/ [Accessed on 11 June 2023]

Bartelmus, P. (2014). Environmental-economic accounting: progress and digression in the SEEA revisions. Review of Income and Wealth, 60(4): 887-904. https://doi.org/10.1111/roiw.12056

Bina, O. (2013). The green economy and sustainable development: an uneasy balance? Environment and Planning C: Government and Policy, 21: 1023-1047. https://doi.org/10.1068/c1310j

Bowen, A. and Fankhauser, S. (2011). The green growth narrative – paradigm shift or just spin? Global Environmental Change, 21: 1157-1159. https://doi.org/10.1177/1024529420987528

Brand-Correa, L., Brook, A., Büchs, M., Meier, P., Naik, Y. and O'Neill, D. W. (2022). Economics for people and the planet – moving beyond the neoclassical paradigm. Lancet Planet Health, 6(4): e371-e379. https://doi.org/10.1016/S2542-5196(22)00063-8

Buch-Hansen, H. and Carstensen, M. B. (2021). Paradigms and the political economy of ecopolitical projects: green growth and degrowth compared. Competition and Change, 25(3-4): https://doi.org/10.1177/1024529420987528

Capasso, M., Hansen, T., Heiberg, J., Klitkou, A. and Steen, M. (2019). Green growth – a synthesis of scientific findings. Technological Forecasting and Social Change, 146: 390-402. https://doi.org/10.1016/j.techfore.2019.06.013

D'Amato, D. and Korhonen, J. (2021). Integrating the green economy, circular economy and bioeconomy in a strategic sustainability framework. Ecological Economics, 188: 107143. https://doi.org/10.1016/j.ecolecon.2021.107143

Dasgupta, P. (2021). The economics of biodiversity: the Dasgupta review. HM Treasury, London.

Dzebo, A. and Shawoo, Z. (2023). Sustainable development goal interactions through a climate lens: a global analysis. Stockholm Environment Institute, Sweden.

Fernandes, C. I., Veiga, P. M., Ferreira, J. J. M. and Hughes, M. (2021). Green growth versus economic growth: do sustainable technology transfer and innovations lead to an imperfect choice? Business Strategy and the Environment, 30(4): 2021-2037. https://doi.org/10.1002/bse.2730

Global Climate & SDG Synergy Conference (2022). Third global conference on strengthening synergies between the Paris Agreement and the 2030 agenda for sustainable development: building the evidence base for synergistic action in support of raising climate and SDGs ambition. United Nations Department of Economic and Social Affairs and United Nations Climate Change https://sdgs.un.org/sites/default/files/2023-03/the_third_global_conference_report_11.08.2022.pdf [Accessed on 10 June 2023]

Granoff, I., Araya, M., Ulbrich, P., Pickard, S. and Haywood, C. (2015). Bridging Costa Rica's green growth gap: how to support further transformation toward a green economy in Costa Rica. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn and Eschborn, Germany

Green Fiscal Policy Network (2019). Costa Rica – Country Profile. https://greenfiscalpolicy.org/policy_briefs/costa-rica-country-profile/ [Accessed on 11 June 2023]

Harris, J. M., Roach, B. and Codur, A-M. (2017). The economics of global climate change. Global Development and Environment Institute, Tufts University, Somerville, MA, USA.

Karacaoglu, G. (2015). The New Zealand Treasury's Living Standards Framework – exploring a stylised model. https://base.socioeco.org/docs/twp15-12.pdf [Accessed on 11 June 2023]

Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T. and Aylmer, C. (2013). Beyond GDP: measuring and achieving global genuine progress. Ecological Economics, 93: 57-68. https://doi.org/10.1016/j.ecolecon.2013.04.019

Li, V. and Lang, G. (2009). China's "Green GDP" experiment and the struggle for ecological modernisation. Journal of Contemporary Asia, 40(1): 44-62. https://doi.org/10.1080/00472330903270346

Roach, B., Lennox, E. and Codur, A-M. (2019). Macroeconomics and the environment. Global Development and Environment Institute, Tufts University, Somerville, MA, USA.

Ruiz de Gauna, I., Markandya, A., Onofri, L., Greño, F., Warman, J., Arce, N., Navarrete, N., Rivera, M., Kobelkowsky, R., Vargas, M. and Hernández, M. (2021). Economic valuation of the ecosystem services of the Mesoamerican Reef, and the allocation and distribution of these values. https://publications.iadb.org/publications/english/viewer/Economic-Valuation-of-the-Ecosystem-Services-of-the-Mesoamerican-Reef-and-the-Allocation-and-Distribution-of-these-Values.pdf [Accessed on 11 June 2023]

Stjepanović, S., Tomić, D. and Škare, M. (2019). Green GDP: an analysis for developing and developed countries. Economics, XXII(4): 4-17. https://doi.org/10.15240/tul/001/2019-4-001

System of Environmental Economic Accounting (2021). The rise, fall and rethinking of Green GDP. https://seea.un.org/news/rise-fall-and-rethinking-green-gdp [Accessed on 10 June 2023]

Thorin, T. (2020). Circular opportunities in the Danish waste system. https://www.metabolic.nl/projects/circular-opportunities-waste-analysis-of-the-capital-region-of-denmark/ [Accessed on 11 June 2023]

UAE's Economy (2021). Green economy for sustainable development. https://u.ae/en/about-the-uae/economy/green-economy-for-sustainable-development [Accessed on 11 June 2023]

United Nations Environment Programme (2022). Beyond GDP: making nature count in the shift of sustainability. https://www.unep.org/news-and-stories/story/beyond-gdp-making-nature-count-shift-sustainability [Accessed on 10 June 2023]

World Nuclear Association (2020). Germany's Energiewende. https://world-nuclear.org/information-library/energy-and-the-environment/energiewende.aspx [Accessed on 11 June 2023]

Xu, L., Yu, B. and Yue, W. (2010). A method of green GDP accounting based on eco-service and a case study of Wuyishan, China. Procedia Environmental Sciences, 2: 1865-1872. https://doi.org/10.1016/j.proenv.2010.10.198

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of Biophilia Insights and/or the editor(s). Biophilia Insights and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.