

Green and Blue Economy in India: Pathways to a Sustainable Society

Satya Kishan¹, Anupama Jain²

¹. Associate Professor, MATS School of Business Studies , MATS University , Raipur , Chhattisgarh, India

². Assistant Professor, Department of Management, Mahant Laxminarayan Das College, Raipur, Chhattisgarh, India

How to cite this article: Satya Kishan, Anupama Jain (2024). Green and Blue Economy in India: Pathways to a Sustainable Society. *Library Progress International*, 44(3), 23721-23729

ABSTRACT

India, as one of the world's fastest-growing economies, faces increasing environmental challenges such as resource depletion, pollution, and biodiversity loss. The need for a sustainable approach to economic growth has led to the exploration of two key concepts: the **green economy**, which focuses on reducing environmental risks and promoting renewable energy, and the **blue economy**, which emphasizes sustainable management of ocean resources. This paper examines the role of these economic models in fostering sustainability in India. Through case studies, policy initiatives, and technological innovations, it highlights pathways to harmonize economic growth with ecological preservation. The integration of green and blue economies offers India a unique opportunity to enhance livelihoods, address climate change, and protect its rich biodiversity. By promoting community engagement, advancing clean technologies, and investing in sustainable practices, India can pave the way towards a more resilient and sustainable society.

Keywords: Green economy, blue economy, technology, sustainable

JEL: Q01, Q56, Q57, Q25, Q42

1. Introduction

Expanding Sustainability Challenges in India

India faces significant environmental challenges, exacerbated by rapid industrialization, population growth, and urbanization. Over-exploitation of natural resources, widespread deforestation, soaring carbon emissions, and alarming rates of biodiversity loss characterize the nation's struggle with sustainability (Ministry of Environment, Forest and Climate Change [MoEFCC], 2021). Climate change poses an existential threat, leading to unpredictable weather patterns, water scarcity, and threats to food security, particularly in agrarian communities. As India grapples with these multifaceted issues, there is an urgent need to adopt new economic models centered on sustainability that align growth with environmental stewardship.

The Role of Green and Blue Economies

Two key frameworks emerging in this context are the green economy and the blue economy.

The green economy focuses on reducing carbon emissions, enhancing resource efficiency, and fostering a circular economy (UNEP, 2011). In India, this translates to promoting renewable energy sources like solar and wind, implementing waste management practices, and supporting sustainable agriculture. Conversely, the blue economy emphasizes the sustainable management of marine resources, ocean-based industries, and biodiversity conservation. India, with its vast coastline and rich marine biodiversity, has the potential to leverage its blue economy for sustainable growth. Together, these models offer a pathway toward achieving a sustainable society that balances economic prosperity, environmental health, and social equity.

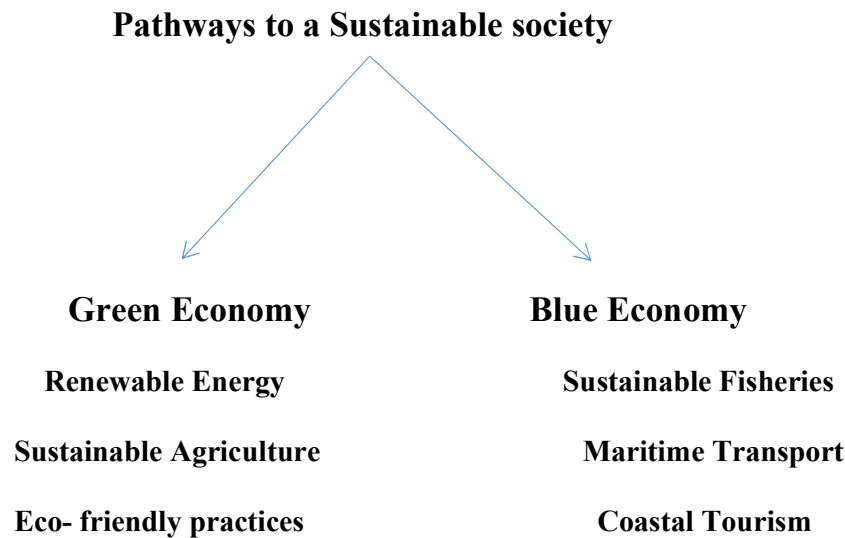


Fig. 1 Green Economy Pathways to Sustainable Society

Key International Initiatives

The concepts of green and blue economies are integral to global efforts such as the United Nations Sustainable Development Goals (SDGs), particularly SDG 7 (affordable and clean energy), SDG 13 (climate action), and SDG 14 (life below water) (United Nations, 2015). India has committed to these goals, reflecting its dedication to sustainable development. The Paris Agreement underscores the urgency of transitioning to low-carbon economies, and initiatives like the UN Ocean Conferences promote sustainable blue economy practices, reinforcing India's commitment to environmental sustainability.

2. The Green Economy: A Path to Low-Carbon Development

2.1 Definition and Origins

The green economy in India has emerged as a response to the inadequacies of traditional growth models that often overlook environmental degradation. The United Nations Environment Programme (UNEP, 2011) defines a green economy as one that fosters improved well-being and social equity while mitigating environmental risks. This concept builds on the principles of sustainable development articulated in the Brundtland Report (World Commission on Environment and Development [WCED], 1987), which established sustainability as development that meets present needs without compromising the ability of future generations to meet theirs. In the Indian context, the green economy is pivotal in addressing the environmental challenges faced by the nation. Initiatives such as the National Action Plan on

Climate Change (NAPCC) aim to promote renewable energy, enhance energy efficiency, and create sustainable urban environments (MoEFCC, 2014). Additionally, policies encouraging afforestation and the sustainable management of natural resources exemplify India's commitment to integrating green economy principles into its development agenda.

2.2 Principles of the Green Economy in India

- **Low-Carbon Development**

A fundamental principle of the green economy in India is the transition from fossil fuel dependency to renewable energy sources such as solar, wind, and biomass. This shift is essential for reducing greenhouse gas emissions and combating climate change. In 2020, renewables accounted for about 29% of global electricity generation, with countries like Germany and Denmark leading the way. India, with its abundant solar and wind resources, aims to significantly increase its renewable energy capacity. The National Solar Mission targets an ambitious 100 GW of solar energy capacity by 2022, while the National Wind Energy Mission focuses on enhancing wind power generation to further reduce reliance on fossil fuels (Ministry of New and Renewable Energy [MNRE], 2021).

Key renewable energy technologies include:

- **Solar Power:** India has rapidly expanded its solar capacity through large-scale solar parks and decentralized rooftop solar systems, making it one of the largest solar markets globally (IRENA, 2021).
- **Wind Energy:** The country has invested heavily in wind energy, particularly in states like Tamil Nadu and Gujarat, which have favorable wind conditions for energy generation (GWEC, 2021).
- **Biomass and Biogas:** With a significant agricultural base, India is leveraging biomass and biogas technologies to convert agricultural waste into energy, contributing to a circular economy and reducing waste (MNRE, 2021).
- **Resource Efficiency and Circular Economy**
In India, the green economy emphasizes resource efficiency and the importance of reducing waste through improved resource management. This includes moving towards a circular economy, where products are designed for reuse, repair, and recycling rather than disposal. Initiatives such as the Swachh Bharat Mission (Clean India Mission) aim to enhance waste management practices and promote recycling across the nation (Ministry of Housing and Urban Affairs, 2021).

Examples of circular economy practices in India include:

- **Plastic Waste Management:** The government has introduced regulations to minimize plastic waste and encourage recycling initiatives, leading to more efficient resource use (MoEFCC, 2021).
- **Closed-Loop Production Systems:** Industries are being encouraged to adopt practices that reintegrate waste into the production cycle, thereby reducing overall resource consumption and environmental impact (NITI Aayog, 2021).
- **Sustainable Agriculture and Land Use**
Sustainable agriculture in India seeks to maintain ecosystems while minimizing chemical inputs, conserving water, and promoting biodiversity. Techniques such as organic farming, agroforestry, and permaculture are gaining traction as viable alternatives to conventional

farming practices. These methods help reduce soil erosion, enhance soil fertility, and increase resilience against climate change (Food and Agriculture Organization [FAO], 2021).

For example, the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) aims to improve irrigation efficiency and promote sustainable water use in agriculture. Initiatives like the National Mission for Sustainable Agriculture encourage farmers to adopt eco-friendly practices, integrating agricultural systems with local ecosystems for higher yields and reduced environmental impact (Ministry of Agriculture and Farmers' Welfare, 2021).

3. The Blue Economy: Sustainable Ocean and Water Resource Management in India

3.1 Definition and Origins

The blue economy concept is newer than the green economy, with its roots in the Rio+20 Conference (2012). In the Indian context, it encompasses the sustainable use of ocean and coastal resources for economic growth while preserving the health of marine ecosystems. With over 3,300 kilometers of coastline, India relies heavily on its oceans for food security, climate regulation, and employment, particularly for coastal communities (Ministry of Earth Sciences, 2020).

3.2 Principles of the Blue Economy

- **Sustainable Fisheries and Aquaculture**

In India, marine resources are under threat due to overfishing and unsustainable practices. Sustainable fisheries management employs tools such as catch limits and ecosystem-based management to prevent over-exploitation. The government's National Fisheries Policy aims to promote sustainable aquaculture, particularly in states like Andhra Pradesh and Tamil Nadu, where fish farming is a major livelihood source (Ministry of Fisheries, Animal Husbandry and Dairying, 2020).

- **Marine Biodiversity Conservation**

India's coastal and marine areas are rich in biodiversity, providing essential ecosystem services. The National Biodiversity Action Plan emphasizes the conservation of marine biodiversity through the establishment of Marine Protected Areas (MPAs). The government has committed to protecting various coastal habitats, including mangroves and coral reefs, which are vital for maintaining ecological balance (MoEFCC, 2021).

- **Sustainable Tourism**

Coastal and marine ecotourism is an emerging sector in India, providing opportunities for economic growth with low environmental impacts. Initiatives in states like Goa and Kerala promote responsible tourism practices that conserve local ecosystems while benefiting local communities.

- **Blue Innovation**

Technology plays a crucial role in advancing the blue economy in India. Innovations in offshore wind energy and tidal power are being explored, with projects underway along the coasts of Gujarat and Tamil Nadu. Blue biotechnology, which investigates marine organisms for new medical and industrial applications, is also an emerging field in India (Department of Biotechnology, 2020).

3.3 Blue Economy in Practice

While Seychelles has been a pioneer in financing sustainable ocean practices through its Blue Bonds initiative, India is exploring similar financing mechanisms to promote sustainable fisheries and conserve marine biodiversity. The government is also focusing on establishing MPAs to protect marine ecosystems while allowing for sustainable resource use. Other countries adopting blue economy strategies include Norway, recognized for its sustainable aquaculture and marine resource management, serving as a benchmark for India. Pacific Island nations are focusing on protecting their vast ocean territories, providing valuable lessons for India in regional cooperation and ocean governance.

4. Green and Blue Economy Synergies: Toward a Holistic Approach in India

4.1 Combatting Climate Change

The fight against climate change is a paramount concern for India, given its vulnerability to extreme weather events, rising sea levels, and other environmental impacts. Both the green economy and blue economy are essential components in this battle, each contributing uniquely to mitigation strategies.

- **Carbon Sequestration**

Natural ecosystems such as forests, wetlands, and coastal areas serve as critical carbon sinks. In India, reforestation initiatives, such as the Green India Mission, aim to enhance carbon sequestration through afforestation and restoring degraded forest landscapes. This mission, part of India's National Action Plan on Climate Change, seeks to increase forest cover by 5 million hectares and improve ecosystem services (MoEFCC, 2014).

- **Marine Carbon Sinks**

The blue economy focuses on preserving and enhancing marine carbon sinks, such as mangroves and seagrasses. India has a significant mangrove forest area, particularly in states like West Bengal and Odisha. These ecosystems store carbon, protect coastal areas from erosion, and support marine biodiversity. Efforts to conserve and restore mangroves contribute significantly to climate change mitigation (Ministry of Environment, Forest and Climate Change, 2021).

4.2 Economic Resilience and Job Creation

Integrating green and blue economy principles can bolster India's economic resilience by creating sustainable jobs and promoting inclusive growth.

- **Green Jobs**

The transition to a green economy creates numerous employment opportunities in sectors like renewable energy, waste management, and sustainable agriculture. According to the International Labour Organization (ILO, 2021), the green economy could generate 24 million new jobs globally by 2030, with India poised to benefit from this trend.

- **Blue Jobs**

The blue economy also has the potential to create sustainable livelihoods, particularly for coastal communities. Sustainable fisheries, marine tourism, and marine biotechnology can provide alternative income sources while protecting marine ecosystems.

5. Findings

1. **Integration of Green and Blue Economies:**

The integration of green and blue economies is essential for India's sustainable growth. Currently, the **green economy contributes 8-10%** of India's GDP, driven primarily by renewable energy, sustainable agriculture, and eco-friendly practices (UNEP, 2022). Meanwhile, the **blue economy contributes approximately 4%** to India's GDP, with sectors like fisheries, coastal tourism, and maritime activities playing a significant role (Ministry of Earth Sciences, 2020).

2. **Economic Potential of Sustainable Sectors:**

Renewable Energy: India's renewable energy capacity reached **168.96 GW** as of 2023, representing **41% of the total installed power capacity**. This places India among the top renewable energy-producing nations (IRENA, 2023). The government has set an ambitious target to increase this to **500 GW by 2030**, showcasing the enormous economic potential of green energy (MNRE, 2021).

Blue Economy: The Ministry of Earth Sciences projects that the **blue economy's contribution could rise to 10% of GDP by 2030**, driven by growth in sustainable fisheries, aquaculture, and offshore wind energy (Ministry of Earth Sciences, 2020).

3. **Positive Environmental Impact:**

Carbon Emissions Reduction: India's expansion of renewable energy has helped avoid **70 million tonnes of CO2 emissions annually** (IEA, 2022). Through initiatives such as the **National Solar Mission**, India is on track to reduce its emission intensity by **33-35% by 2030**, compared to 2005 levels (Government of India, 2021).

Marine Protection: Blue economy initiatives aim to protect **30% of India's Exclusive Economic Zone (EEZ)** by 2030, aligning with global efforts to conserve marine biodiversity (MoEFCC, 2021).

4. **Policy Support and Government Initiatives:**

India has implemented various policies to support the green and blue economies. The **National Action Plan on Climate Change (NAPCC)** includes eight missions, such as the **National Solar Mission**, which set a target of **100 GW of solar energy by 2022**, now extended to **280 GW by 2030** (MNRE, 2022).

The **Sagarmala Project**, launched in 2015, has invested over **\$13 billion** in port development, coastal shipping, and fisheries infrastructure to boost the blue economy (Ministry of Shipping, 2019).

5. **Community and Livelihood Development:**

Sustainable agriculture practices supported by government programs like the **Paramparagat Krishi Vikas Yojana (PKVY)** have led to an **increase in yield by 20%** for farmers adopting organic farming (ICAR, 2022).

The blue economy employs **4 million people** in fisheries and aquaculture, supporting rural livelihood development in coastal regions (Ministry of Fisheries, 2021).

6. Technological Innovation and Investment:

Investment in Renewable Energy: Between 2014 and 2021, India attracted **\$42 billion in investments** in the renewable energy sector (IEA, 2021). This has spurred innovations in solar, wind, and biomass energy, making renewable energy more accessible.

Marine Innovation: India is exploring offshore wind farms, with the potential to generate **30 GW** of wind energy by 2030. Technological advancements in sustainable aquaculture and fisheries management are improving the efficiency of marine resources (Ministry of Earth Sciences, 2020).

7. Challenges in Implementation:

India faces challenges in scaling up both green and blue economies. The **financing gap** for achieving its green economy goals is estimated at **\$2.5 trillion by 2030** (World Bank, 2021). Significant investments are also required to develop infrastructure for the blue economy.

Regulatory enforcement and limited awareness among rural and coastal communities also impede progress. For instance, **80% of Indian fishermen still use traditional methods**, limiting the efficiency of marine resource management (FAO, 2020).

8. Contribution to Global Sustainability Goals:

India's efforts in the green and blue economies align with the **United Nations Sustainable Development Goals (SDGs)**. Notably, India has made significant progress toward **SDG 7 (Affordable and Clean Energy)**, with **41% of energy capacity now sourced from renewable energy** (IRENA, 2023).

For **SDG 14 (Life Below Water)**, India aims to protect **30% of marine areas by 2030**, contributing to global efforts to preserve ocean ecosystems (MoEFCC, 2021).

5. Conclusion

India's pathway to a sustainable society lies at the intersection of the **green and blue economies**, which offer comprehensive strategies to address environmental, economic, and social challenges. The green economy emphasizes the importance of minimizing environmental risks by promoting renewable energy, sustainable agriculture, and eco-friendly practices. This is essential for reducing carbon emissions and ensuring resource efficiency, which can mitigate climate change impacts. Similarly, the blue economy, focusing on sustainable use of ocean and coastal resources, contributes to long-term economic growth through sectors such as fisheries, maritime transport, and coastal tourism. These sectors not only generate livelihoods but also protect marine biodiversity and ecosystem services, vital for India's extensive coastline and its communities. Both economic models are interlinked with India's national priorities, such as achieving **Sustainable Development Goals (SDGs)**, enhancing biodiversity conservation, and addressing socioeconomic disparities. The convergence of green and blue economies offers a holistic solution that promotes environmental stewardship, enhances economic resilience, and supports inclusive growth. The Indian government, alongside international collaborations and local community initiatives, must continue to strengthen policies, investments, and technological innovations to ensure a sustainable future. By fostering public-private partnerships and engaging local communities,

India can ensure that economic development does not come at the cost of environmental degradation. Ultimately, adopting a synergistic approach to both green and blue economies will help India transition towards a low-carbon, resource-efficient economy that respects ecological boundaries while generating sustainable livelihoods. This pathway will ensure that economic growth aligns with ecological preservation, contributing to a future where development and nature coexist harmoniously.

References

1. Department of Biotechnology. (2020). *National biotechnology development strategy*. <https://dbtindia.gov.in/sites/default/files/uploadfiles/Draft%20National%20Biotechnology%20Development%20Strategy%202020-25>.
2. Food and Agriculture Organization. (2021). *Sustainable agriculture* <https://www.fao.org/family-farming/detail/en/c/1412481/>
3. Global Wind Energy Council. (2021). *Global wind report 2021*.
4. International Labour Organization. (2021). *World employment and social outlook 2021*.
5. International Renewable Energy Agency. (2021). *Renewable capacity statistics 2021*.
6. Ministry of Agriculture and Farmers' Welfare. (2021). *Pradhan Mantri Krishi Sinchai Yojana*. <https://pmksy.gov.in/#:~:text=To%20this%20effect%20Pradhan%20Mantri,creation%2C%20distribution%2C%20management%2C%20field>
7. Ministry of Earth Sciences. (2020). *Annual report 2020-21*.
8. Ministry of Fisheries, Animal Husbandry and Dairying. (2020). *National fisheries policy*.
9. Ministry of Housing and Urban Affairs. (2021). *Swachh Bharat Mission*.
10. Ministry of New and Renewable Energy. (2021). *Annual report 2020-21*.
11. Ministry of Environment, Forest and Climate Change. (2021). *National biodiversity action plan*.
12. Ministry of Environment, Forest and Climate Change. (2014). *National action plan on climate change*.
13. NITI Aayog. (2021). *Circular economy framework for India*.
14. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*.
15. United Nations Environment Programme. (2011). *Towards a green economy: Pathways to sustainable development and poverty eradication*.
16. World Commission on Environment and Development. (1987). *Our common future*. Oxford University Press.
17. Food and Agriculture Organization (FAO). (2020). **Fisheries and aquaculture in India**. <https://www.fao.org/india/fisheries>
18. Government of India. (2021). **India's third biennial update report to the UNFCCC**. Ministry of Environment, Forest and Climate Change. <https://moefcc.gov.in>
19. International Energy Agency (IEA). (2021). **Renewable energy in India: Market report**. <https://www.iea.org/reports>
20. International Energy Agency (IEA). (2022). **India's progress on climate goals**. <https://www.iea.org/india>
21. Indian Council of Agricultural Research (ICAR). (2022). **Sustainable agriculture practices in India**. <https://icar.org.in>
22. International Renewable Energy Agency (IRENA). (2023). **Renewable energy capacity statistics 2023**. <https://www.irena.org>

23. Ministry of Earth Sciences. (2020). **India's blue economy: Potential and challenges.** Government of India. <https://moes.gov.in>
24. Ministry of Environment, Forest and Climate Change (MoEFCC). (2021). **National biodiversity strategy and action plan.** <https://moefcc.gov.in>
25. Ministry of Fisheries. (2021). **Annual report on fisheries and aquaculture.** Government of India. <https://fisheries.gov.in>
26. Ministry of New and Renewable Energy (MNRE). (2021). **India's green energy revolution.** <https://mnre.gov.in>
27. Ministry of New and Renewable Energy (MNRE). (2022). **National Solar Mission: Achievements and future goals.** <https://mnre.gov.in>
28. Ministry of Shipping. (2019). **Sagarmala Project: Progress report.** Government of India. <https://shipmin.gov.in>
29. United Nations Environment Programme (UNEP). (2022). **Green economy report: India's progress and challenges.** <https://unep.org>
- World Bank. (2021). **Financing the green economy in India.** <https://worldbank.org>