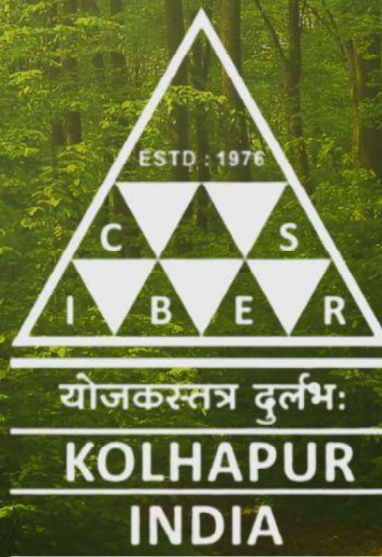




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Sustainable Development through Green Finance

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Mrs. Anushka Satish Chougule

Mr. Dilnaaz Hamid Bagwan

Abstract

The growing urgency of climate change, natural resource depletion, and environmental degradation has positioned environmental sustainability at the forefront of international economic and policy debates. Green finance is seen as a revolutionary instrument that captures environmental factors within financial institutions, channelling flows of capital into environmentally friendly activities like renewable power, clean technologies, sustainable agriculture, and low-carbon infrastructure. This article explores the development, tools, and policy frameworks of green finance and emphasizes its contribution towards sustainable development. Based on qualitative research utilizing secondary data from academic papers, international reports, and market data, the research reviews the world and regional trends with particular emphasis on India.

The findings support a green financial instruments' growth that has been quick and expansive, especially in the rise of green bonds and ESG-linked funds that have become crucial in engaging resources for climate adaptation and mitigation. The growth, though, is hindered by issues of greenwashing, incomparable taxonomies, and impaired accessibility within developing economies. The discussion reiterates that while green finance holds potential for creating innovations, reducing climate risks, and generating employment, it needs more robust regulatory bases, transparency, and global cooperation to achieve its full impacts.

This paper argues that green finance is not just a substitute investment strategy but a required route toward environmental sustainability and fulfilling international commitments like the Paris Agreement and the United Nations Sustainable Development Goals (SDGs). This research adds to increasing literature as it connects theory views with real-world expertise, providing guidance for policymakers, financial institutions, and stakeholders to enhance the embedding of sustainability within the financial landscape.

Keywords: Green finance, ESG investments, Green bonds, Sustainable development, Climate finance, Renewable energy, SDGs.

Introduction

The 21st century is marked by rapid industrialization, urbanization, and economic growth, but these advances have also led to environmental challenges such as air pollution, global warming, and biodiversity loss. The **Paris Agreement (2015)** and **UN Sustainable Development Goals (SDGs)** have reinforced the global consensus that economic growth must align with ecological sustainability.

Green finance refers to financial investments and instruments that support projects with positive environmental impacts, including renewable energy, energy efficiency, waste management, and biodiversity conservation. It represents the fusion of economic development and environmental preservation.

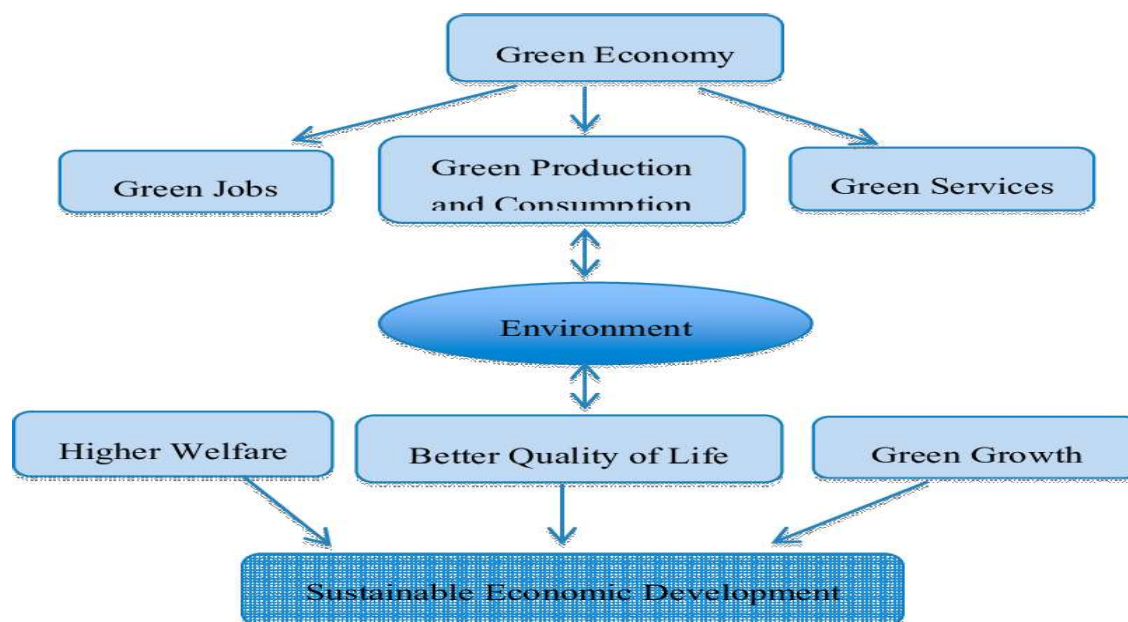
Green finance refers to the allocation of capital and financial resources toward projects, businesses, and policies that deliver environmental benefits while also ensuring economic returns. It includes instruments such as **green bonds, sustainable loans, carbon credits, environmental impact funds, and ESG (Environmental, Social, and Governance) investments**. These instruments aim to finance renewable energy, sustainable agriculture, waste management, energy-efficient infrastructure, and climate adaptation strategies.

By aligning finance with sustainability goals, green finance acts as a **bridge between economic development and environmental protection**, ensuring that growth does not compromise the ecological balance.

Growing global recognition of climate change, environmental deterioration, and scarcity of resources has brought green finance to the centre stage of economic, scholarly, and policy debates. Conventional financial systems have tended to focus on maximization of short-term profits without much consideration for environmental impact. Increasingly, though, the intensifying effects of global warming, loss of biodiversity, and unsustainable consumption have underscored the importance of ensuring financial flows in line with environmental sustainability objectives.

Green finance is a new turn, combining environmental factors in financial decisions to enhance long-term sustainability. Through the channelling of capital to renewable energy, clean technologies, sustainable agriculture, and green infrastructure, green finance seeks to reduce climate risks while building economic resilience. Organizations like the United Nations, World Bank, and governments of countries alike increasingly see green

finance not just as a choice but also as a need to pursue sustainable development and fulfil global obligations like the Paris Agreement and the UN Sustainable Development Goals (SDGs).



Literature Review

IFC (2019) *Green Finance: A Bottom-up Approach to Track Existing Flows*: This publication from the International Finance Corporation highlights efforts to track and measure green finance flows, particularly within private financial institutions. It suggests the feasibility of estimating these flows through a "bottom-up" approach, providing practical methods to assess how financial institutions contribute to sustainable initiatives.

OECD (2020) *Developing Sustainable Finance Markets*: This work from the Organisation for Economic Co-operation and Development focuses on the broader development of sustainable finance markets, offering insights into how environmental considerations can be systematically integrated into financial systems. It provides context for policy-makers and market participants aiming to foster sustainable investment environments.

Fu, Xu, and Zhang (2023) 'Green Finance and Sustainable Development: Evidence from Global Financial Markets': This study examines the relationship between green finance and sustainable development, drawing evidence from global financial markets. The research highlights the measurable impact of green finance initiatives on economic and environmental outcomes, supporting the effectiveness of such practices in promoting sustainability.

Chen et al. (2022) 'Digital Innovation and Sustainable Finance: The Role of Green Fintech': This paper explores the intersection of digital innovation and sustainable finance, specifically highlighting the role of green fintech in promoting environmental objectives within the financial sector. It shows how technology-driven solutions can accelerate the adoption of sustainable financial practices.

Ozili (2022) *Green Finance Research Around the World: A Review of Literature*: This review examines global trends, themes, and gaps in green finance research. It emphasizes challenges, opportunities, and emerging patterns in the field, providing a comprehensive overview for researchers and practitioners interested in sustainable finance development.

Research Gap

Existing studies discuss how green finance works, its benefits, and new technologies, but there is little research on how small and medium enterprises (SMEs) in developing countries use green finance. In particular, it is not well understood how government policies, access to finance, and digital tools together help SMEs adopt sustainable finance. This shows a need for more research on practical ways to implement green finance in different economic settings.

Objectives of the Study

1. To analyse the concept and evolution of green finance in the global and Indian context.
2. To examine the role of green financial instruments in advancing environmental sustainability.
3. To identify challenges and barriers in implementing green finance in developing economies.

Research Methodology

1. Research Design

A. Qualitative Research Design

Purpose: To interpret and understand concepts, policies, frameworks, and practices related to green finance.

Application:

- Analysing sustainability reports of banks and institutions.
- Understanding regulatory frameworks like SEBI's BRSR, EU Taxonomy, and TCFD recommendations.

Justification: Green finance is conceptually complex, involving environmental, financial, and social dimensions, which are better captured through qualitative analysis rather than pure numerical data.

B. Descriptive Research Design

Purpose: To systematically describe the current state of green finance instruments, policy frameworks, and institutional roles.

Application:

- Presenting trends in green bond issuance globally and in India.
- Describing the role of banks, DFIs, and asset managers in promoting sustainable finance.

Justification: Descriptive research enables the study to **present factual information** and compare practices across regions.

C. Exploratory Research Design

Purpose: To explore emerging phenomena and trends in green finance that are not yet widely established.

Application:

- Examining green fintech innovations and block chain-based carbon trading.
- Investigating integration of sustainable finance with SDGs.

Justification: Since green finance is evolving rapidly, exploratory research helps **identify patterns, opportunities, and challenges** that may not yet be fully documented.

Research Approaches

1. **Mixed- Method Research Approach:** That involves both quantitative and qualitative method to gather and analyse data.
 - a) **Quantitative Research Approach:** This involves measuring numerical data related to market growth and performance. The study planned to measure the following specific quantitative data:
 - i) **Growth of Green Bonds in India:** To measure in **INR billions**. Compound Annual Growth Rate (CAGR): To show the exponential growth of green bond issuance over a specific period. Formula: $CAGR = (\text{Beginning Value} / \text{Ending Value})^{1/n} - 1$
 - ii) **ESG Fund Inflows:** Calculating the net flow rate or percentage change: To track investor interest and capital movement into sustainable funds over quarters or years. Formula like $\text{Flow} = \text{Purchase} - \text{Sales}$
 - iii) **Carbon Credit Trading Volumes:** Volume Weighted Average Price (VWAP): To calculate the average price of credits traded over a day, weighted by volume. Formula, $VWAP = \frac{\sum(\text{Price} \times \text{Volume})}{\sum \text{Volume}}$
 - iv) **Thematic Correlation:** Regression Analysis: To explore the relationship between green finance (as a variable) and environmental performance (e.g.CO2 emissions reduction). Formula, $Y = \beta_0 + \beta_1 X + \epsilon$ (Simple Linear Regression)

B) Qualitative Research Approach: This focuses on analysing non-numerical data to gain deeper insights:

Document Analysis: Analysing policy reports, sustainability reports, and guidelines (e.g., SEBI BRSR and EU Taxonomy).

Content Analysis: Extracting thematic patterns from research articles, institutional practices, and case studies.

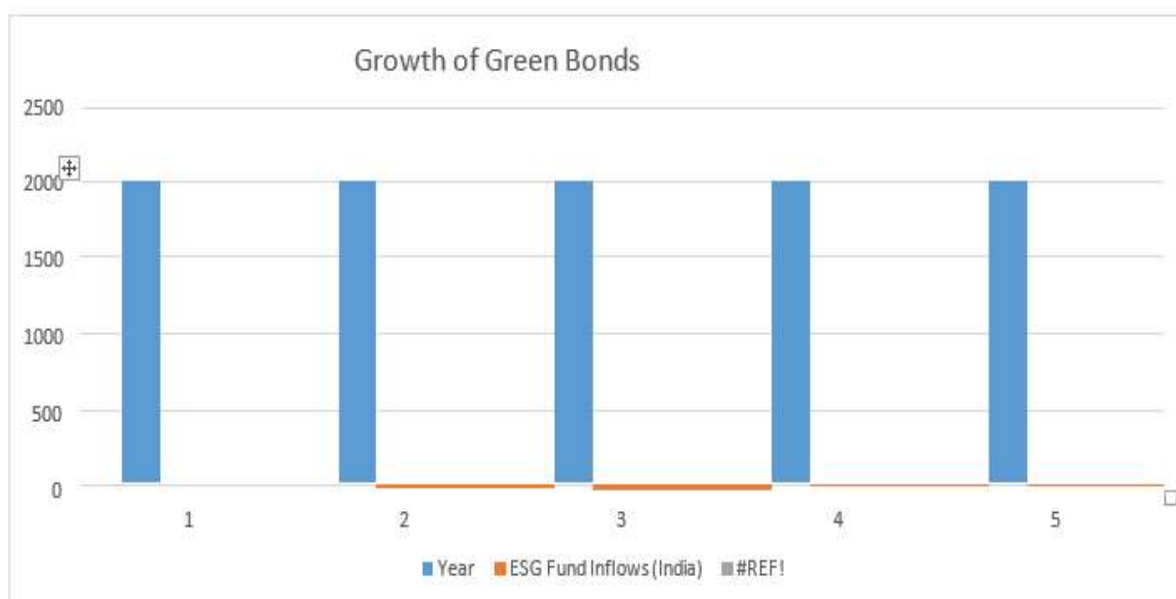
Case Study Analysis: Examining specific high-profile initiatives, such as India's sovereign green bond (2023) or the EU Green Deal implementation.

Data Analysis & Interpretation

Growth of Green Bonds Globally and in India:

Sample Data (USD Billion):

Year	Global Green Bond Issuance	India Green Bond Issuance
2018	167	2
2019	257	5
2020	270	7
2021	500	12
2022	520	15



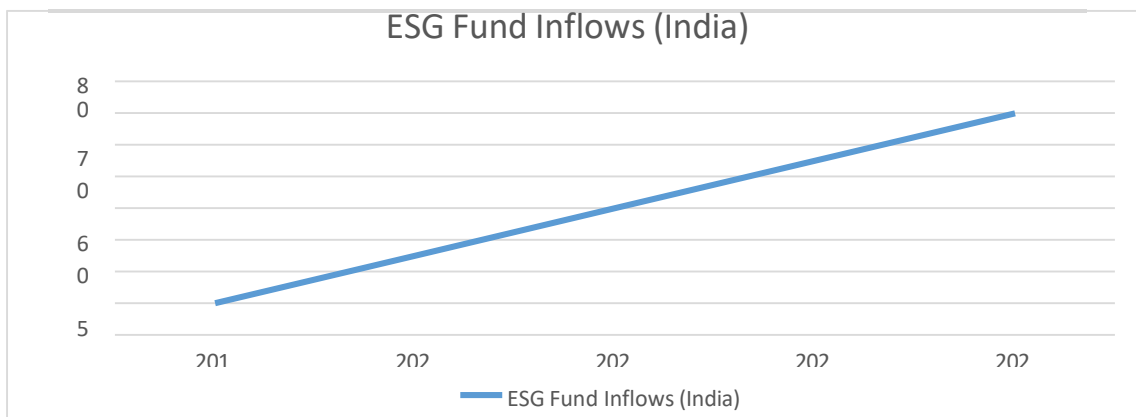
Interpretation:

- The global green bond market has shown exponential growth, more than tripling from 2018 to 2021.
- India's green bond issuance is smaller in volume but shows a steady upward trend, reflecting increasing domestic interest in sustainable financing.

ESG Fund Inflows

- **Sample Data (INR Billion):**

Year	ESG Fund Inflows (India)
2019	10
2020	25
2021	40
2022	55
2023	70



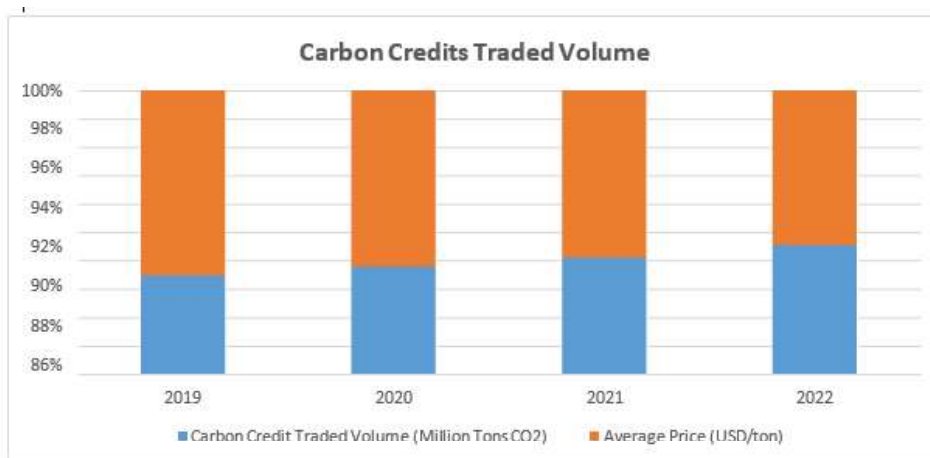
Interpretation:

- ESG fund inflows in India are increasing year-on-year, indicating growing investor confidence in sustainable investment strategies.
- This demonstrates a positive correlation between sustainability performance and financial attractiveness.

Carbon Credit Trading Volumes

Sample Data

Year	Carbon Credit Traded Volume (Million Tons CO ₂)	Average Price (USD/ton)
2019	100	15
2020	120	17
2021	150	20
2022	180	22



Interpretation:

- Both trading volume and average price of carbon credits are increasing, showing a strengthening carbon market.
- This reflects heightened regulatory and market emphasis on carbon reduction and sustainability.

Results

Green finance is a powerful and necessary mechanism for advancing environmental sustainability and meeting international obligations like the Paris Agreement and the UN SDGs. The research supports the notion that the global green finance market is experiencing quick and expansive growth, with instruments like green bonds and ESG-linked funds proving crucial for channelling capital towards climate adaptation and mitigation efforts. This growth is evident in the exponential rise of international green bond issuance, which exceeded USD 500 billion in 2021, and the massive

AUM committed to responsible investment principles. Key results synthesized from the literature highlight several factors:

- **Positive Correlation:** ESG integration is found to have a positive correlation with long-term financial performance.
- **Technological Innovations:** Emerging trends like green fintech and block chain-based carbon trading promise to increase transparency and efficiency, democratizing sustainable investing and improving accountability in carbon markets.
- **Policy Drivers:** Mandatory reporting frameworks, such as the EU's SFDR and India's BRSR, are successfully pushing companies toward greater transparency in sustainability disclosures.
- **Challenges Identified:** Despite these successes, the full impact of green finance is hindered by significant barriers, including the risks of greenwashing, the problem of incomparable taxonomies for classifying 'green' activities, and impaired accessibility for developing economies.

Discussion

The discussion in the paper reiterates the profound potential and emerging necessity of **green finance** while confronting the systemic barriers that challenge its full implementation, particularly in developing economies.

Potential and Necessity:

- **Creating Value:** Green finance is shown to hold immense potential for creating innovations, reducing climate risks, and generating employment.
- **Mitigating Risks:** By channelling capital towards low-carbon infrastructure and clean technologies, it seeks to reduce climate risks while simultaneously building economic resilience.
- **Beyond a Choice:** Organizations worldwide, including the UN and World Bank, increasingly view green finance not just as a choice but as a necessity to pursue sustainable development and fulfil global obligations.

Challenges and Impediments: Despite the rapid growth of instruments like green bonds, the full impact is constrained by significant hurdles. The discussion highlights the critical need to address:

- **Greenwashing:** This issue undermines trust and challenges the integrity of the market.
- **Incomparable Taxonomies:** The lack of standardized definitions and reporting frameworks makes it difficult to compare and verify 'green' investments globally.
- **Impaired Accessibility:** This issue is particularly acute in developing economies, restricting their ability to fully capitalize on green financial flows.

Conclusion

Green finance has emerged as a vital pathway for achieving environmental sustainability. It is no longer seen as a minor or optional investment strategy but as a necessary approach to combine economic growth with ecological preservation. In today's world, where climate change, resource depletion, and environmental degradation are becoming critical concerns, green finance provides solutions by directing capital towards sustainable projects and industries. Investments in renewable energy, energy efficiency, waste management, green bonds, and ESG-based (Environmental, Social, and Governance) practices show that finance can be a strong driver of positive change.

The importance of green finance is also reflected in its global recognition. International frameworks such as the Paris Agreement and the United Nations Sustainable Development Goals (SDGs) emphasize the role of finance in achieving climate action and sustainable development. By mobilizing funds for clean technologies and environmentally responsible businesses, green finance ensures that growth does not come at the cost of the planet. Moreover, it has the ability to generate new employment opportunities, promote innovation, and build resilience against climate risks.

However, despite its fast growth, the full potential of green finance has not yet been realized. The sector still faces many challenges. Weak or inconsistent regulations, lack of standardized reporting, and limited transparency create difficulties in ensuring accountability. The risk of greenwashing—where companies or institutions falsely claim to be environmentally friendly—undermines trust in green financial products. In addition, international cooperation is still fragmented, which slows down the overall effectiveness of green finance on a global scale.

In conclusion, green finance is not just about shifting money into different investments—it is about reshaping the financial system to serve both economic and environmental needs. It provides a bridge between growth and sustainability, proving that the two can go hand in hand if supported with the right policies and practices. With stronger rules, honest practices, and international collaboration, it can become a powerful force to combat climate change and build a sustainable world for future generations.

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