

Financial Inclusion and Environmental Sustainability: A Multisectoral Review of Evidence, Interlinkages, and Policy Implications

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Abstract

Financial inclusion and environmental sustainability have traditionally been examined as separate dimensions of economic and development policy. Financial inclusion emphasizes access to affordable and appropriate financial services, particularly for populations excluded from formal financial systems, whereas environmental sustainability focuses on reducing ecological degradation, conserving natural resources, and promoting low-carbon and climate-resilient development. Increasingly, however, evidence suggests that these two agendas are interconnected. Access to formal savings, credit, insurance, digital payments, and investment products can influence household and enterprise decisions concerning energy consumption, agricultural practices, resource efficiency, clean technologies, and climate adaptation. At the same time, environmental risks can affect financial inclusion by reducing incomes, damaging productive assets, increasing household vulnerability, and limiting access to formal financial services. This review examines the relationship between financial inclusion and environmental sustainability through evidence from agriculture, energy, small and medium-sized enterprises, rural development, households, and financial markets. It identifies several pathways through which inclusive finance can contribute to sustainable development, including financing renewable energy, supporting climate-smart agriculture, enabling green entrepreneurship, improving resilience, and facilitating investment in resource-efficient technologies. However, financial inclusion does not automatically produce environmental benefits. Expanded access to finance may also increase consumption, fossil-fuel use, resource extraction, and environmentally harmful investment when sustainability considerations are absent. The review therefore emphasizes the importance of green financial inclusion, digital financial infrastructure, environmental risk assessment, financial literacy, inclusive climate finance, and supportive regulatory frameworks. A coordinated approach integrating financial inclusion with environmental and climate policy can contribute to more equitable, resilient, and sustainable development.

Keywords: Financial inclusion; Environmental sustainability; Green finance; Sustainable development; Digital finance; Climate finance.

1. Introduction

Financial inclusion has emerged as a major component of contemporary development policy because access to appropriate financial services can improve the economic opportunities and resilience of individuals, households, farmers, and enterprises. Financial inclusion generally encompasses access to and effective use of formal financial services, including savings accounts, credit, insurance, payment systems, pensions, and investment products. Its significance extends beyond simple access to banking institutions because meaningful inclusion requires that financial products be affordable, accessible, reliable, and appropriate to the needs of different socioeconomic groups [1]. The expansion of mobile banking, digital payments, fintech platforms, microfinance, and simplified account-opening procedures has substantially altered the possibilities for extending financial

services to previously underserved populations. Environmental sustainability represents another central dimension of contemporary development. Rapid economic expansion, resource-intensive production, fossil-fuel dependence, deforestation, biodiversity loss, pollution, and climate change have increased pressure on ecosystems and natural resources. Sustainable development consequently requires economic activities to be compatible with the long-term capacity of ecological systems while also ensuring social and economic wellbeing. Financial systems play a critical role in this transition because investment decisions determine which technologies, industries, infrastructure, and production systems receive capital [2]. The relationship between financial inclusion and environmental sustainability is therefore increasingly important.

Finance can provide households and businesses with resources to invest in solar energy, energy-efficient equipment, sustainable agricultural technologies, waste management, water conservation, and climate-resilient infrastructure. Access to insurance can reduce the economic consequences of climate-related shocks, while savings and credit can enable vulnerable households to recover from floods, droughts, crop failures, and other environmental disturbances. Digital financial services can further reduce transaction costs and facilitate the delivery of climate-related payments, agricultural insurance, social protection, and environmental incentives. Nevertheless, the relationship is not inherently positive. Expanded financial access can stimulate consumption and investment without regard to environmental consequences [3]. Credit may finance environmentally harmful activities, increase fossil-fuel consumption, or accelerate resource extraction. Greater purchasing power may increase demand for energy-intensive goods and services. Consequently, the environmental outcome of financial inclusion depends on the structure of financial systems, the purposes for which finance is used, environmental regulation, financial literacy, and the availability of sustainable investment opportunities.

The concept of green financial inclusion has emerged from this intersection. It refers broadly to the integration of environmental sustainability into inclusive financial systems so that disadvantaged populations and small enterprises can access financial products that support environmentally sustainable activities. Such an approach seeks to ensure that the transition toward a low-carbon and climate-resilient economy does not exclude low-income households, rural communities, small farmers, women, and micro and small enterprises. This review examines the relationship between financial inclusion and environmental sustainability from a multisectoral perspective [4]. It considers evidence from agriculture, energy, households, rural economies, small and medium-sized enterprises, digital finance, and financial markets. The review also considers the conditions under which financial inclusion produces positive environmental outcomes and identifies risks associated with environmentally unsustainable financial expansion.

2. Conceptual Linkages between Financial Inclusion and Environmental Sustainability

Financial inclusion and environmental sustainability intersect through several economic and social mechanisms. The first is the allocation of financial resources. Banks, microfinance institutions, digital lenders, investors, and other financial intermediaries determine which economic activities receive capital. When financial institutions incorporate environmental criteria into lending and investment decisions, financial inclusion can contribute to environmentally sustainable production and consumption. The second mechanism is household resilience. Poor and financially excluded households are frequently more vulnerable to environmental shocks because they have limited savings, restricted access to insurance, and few alternative sources of finance [5].

A climate-related disaster can therefore result in asset depletion, indebtedness, food insecurity, and loss of livelihoods. Access to savings, credit, insurance, and emergency financial transfers can improve the capacity of households to absorb and recover from environmental shocks.

The third mechanism involves technological adoption. Many environmentally beneficial technologies require initial investment. Solar irrigation, efficient machinery, clean cooking systems, improved seeds, water-saving technologies, electric mobility, and energy-efficient appliances may reduce environmental pressures over time but remain inaccessible to households or enterprises without appropriate financing. Inclusive financial systems can reduce this investment barrier. A fourth mechanism is entrepreneurship. Micro and small enterprises are important sources of employment and income but often face substantial financing constraints. Access to finance can allow entrepreneurs to adopt cleaner technologies, improve resource efficiency, develop recycling enterprises, establish renewable-energy businesses, and create other green economic activities. Finally, financial inclusion can contribute to environmental governance by improving the transparency and delivery of sustainability-related financial resources. Digital payment systems can facilitate targeted climate subsidies, carbon-related payments, agricultural insurance settlements, and environmental incentive programmes.

3. Financial Inclusion and Sustainable Agriculture

Agriculture provides one of the clearest examples of the interaction between finance and environmental sustainability. Smallholder farmers frequently face constraints in accessing formal credit, insurance, savings, and payment systems. These constraints can limit their ability to adopt sustainable agricultural practices requiring upfront investment. Financial access can facilitate the adoption of conservation agriculture, precision farming, efficient irrigation, integrated nutrient management, agroforestry, renewable-energy technologies, improved storage systems, and climate-resilient crop varieties. Agricultural credit can provide farmers with the capital required to acquire technologies that reduce water consumption, soil degradation, chemical inputs, and post-harvest losses. Agricultural insurance is particularly important in the context of climate change. Droughts, floods, extreme temperatures, pests, and irregular rainfall can generate substantial income losses. Insurance can reduce the need for farmers to sell productive assets or rely on high-cost informal borrowing after environmental shocks [6]. When combined with credit and savings, insurance can strengthen long-term resilience. However, agricultural finance can also produce negative environmental effects. Credit directed toward intensive cultivation, excessive fertilizer application, groundwater extraction, land clearing, or environmentally damaging production can increase ecological pressure. Financial inclusion should therefore be accompanied by environmental standards and incentives for sustainable agricultural investment.

4. Financial Inclusion and Renewable Energy

Energy access and environmental sustainability are closely connected. Many low-income households in developing economies experience energy poverty while simultaneously facing the environmental and health consequences of dependence on traditional fuels. Financial exclusion can prevent households from purchasing solar systems, efficient appliances, clean cooking technologies, or other sustainable energy solutions. Inclusive financial products can reduce these barriers. Microcredit, pay-as-you-go systems, consumer financing, leasing, and digital payment mechanisms can allow households to obtain renewable-energy technologies without bearing the full upfront cost. For rural communities without reliable electricity grids, decentralized solar systems can provide lighting, communication, refrigeration, and productive energy services. Financial inclusion can therefore contribute simultaneously to poverty reduction, energy access, and environmental sustainability [7]. Nevertheless, renewable-energy finance needs to consider affordability and repayment capacity. Financial products that impose excessive costs on low-income consumers can generate indebtedness rather than sustainable development.

5. Digital Financial Inclusion and Environmental Sustainability

Digital financial inclusion has transformed the relationship between finance and sustainability. Mobile money, digital wallets, electronic payments, online banking, and fintech platforms can reach populations located far from conventional financial institutions. Digital services reduce transaction costs and can facilitate the rapid transfer of resources to rural and vulnerable populations. Digital finance can also support environmental objectives. Digital agricultural payments can improve the delivery of climate-related subsidies and insurance. Electronic transactions may reduce the need for physical travel and paper-based processes. Digital platforms can facilitate financing for renewable energy, sustainable transport, circular-economy enterprises, and other green activities. However, the environmental implications of digital finance should not be assumed to be universally positive. Digital infrastructure requires energy and material resources, while data centres, electronic devices, and telecommunications equipment generate environmental footprints [8]. The rapid expansion of digital consumption can also contribute to electronic waste. Consequently, the sustainability of digital financial inclusion depends on the broader environmental performance of digital infrastructure.

Table 1: Multisectoral pathways linking financial inclusion with environmental sustainability

Sector/Domain	Financial Inclusion Mechanism	Potential Environmental Contribution	Possible Environmental Risk	Key Policy Direction
Agriculture	Agricultural credit, savings, crop insurance, digital payments	Supports climate-smart agriculture, efficient irrigation, soil conservation, renewable-energy technologies, and sustainable inputs	Credit may finance excessive fertilizer use, groundwater extraction, land degradation, or intensive production	Promote green agricultural credit, climate insurance, and sustainability-linked lending
Renewable Energy	Microfinance, consumer credit, leasing, pay-as-you-go financing	Improves access to solar energy, clean cooking technologies, energy-efficient appliances, and decentralized energy systems	Unsuitable repayment structures may increase household indebtedness; disposal of energy equipment may generate waste	Develop affordable renewable-energy finance and consumer-protection mechanisms
Rural Development	Mobile banking, savings accounts, remittances, microcredit, insurance	Strengthens resilience to climate shocks and facilitates investment in sustainable livelihoods	Increased purchasing power may stimulate environmentally intensive consumption	Integrate rural financial inclusion with climate-resilience programmes
Households	Savings, consumer credit, insurance, digital financial services	Enables investment in efficient housing, clean energy, sustainable transport, and climate adaptation	Greater financial capacity may increase consumption and household energy demand	Promote green consumer finance and environmental financial literacy
Small and Medium-Sized Enterprises	Business loans, credit guarantees, fintech lending, working capital	Enables investment in energy efficiency, waste reduction, recycling, cleaner production, and sustainable technologies	Conventional loans may support polluting production and resource-intensive expansion	Establish dedicated green SME financing and technical assistance
Digital Finance	Mobile money, digital wallets, online banking, electronic payments	Reduces transaction costs and facilitates climate payments, insurance, subsidies, and green-finance access	Data centres, electronic devices, energy use, and electronic waste create environmental costs	Develop low-carbon digital infrastructure and responsible e-waste management
Climate Resilience	Insurance, emergency credit, savings, social transfers	Helps households and enterprises recover from floods, droughts, storms, and other climate-related shocks	High premiums or poorly designed products may exclude vulnerable populations	Expand affordable climate insurance and risk-based financial products
Green Entrepreneurship	Microfinance, venture finance, green loans, investment products	Supports recycling, renewable energy, sustainable agriculture, eco-tourism, and circular-economy businesses	Green enterprises may remain financially inaccessible to low-income entrepreneurs	Provide concessional finance, guarantees, and capacity-building
Women and Marginalized Groups	Women-focused banking, savings groups, microfinance, digital accounts	Strengthens participation in sustainable livelihoods and household environmental decision-making	Financial products may reproduce existing inequalities if access remains limited	Adopt gender-responsive and socially inclusive green-finance policies
Financial Markets	Green bonds, sustainability-linked loans, ESG investment, climate finance	Directs capital toward renewable energy, sustainable infrastructure, and low-carbon technologies	Greenwashing and inadequate environmental verification may misallocate capital	Strengthen disclosure, environmental standards, monitoring, and accountability

6. Financial Inclusion, Households, and Consumption

At the household level, access to finance can increase economic security and provide greater flexibility in managing income and expenditure. Savings accounts allow households to accumulate resources, while credit can finance education, housing, health services, productive assets, and business activities. Insurance can protect households against major shocks. These benefits can indirectly support environmental sustainability when financial resources are invested in efficient housing, renewable energy, clean transport, sustainable food systems, or environmentally responsible enterprises. However, increased purchasing power may also generate higher consumption of energy-intensive products and services. This dual relationship indicates that financial inclusion should not be evaluated solely according to the number of accounts opened or volume of credit distributed. The quality and purpose of financial inclusion are equally important [9]. Financial inclusion that expands access to environmentally harmful consumption may increase ecological pressures, whereas financial inclusion linked to sustainable investment can generate environmental benefits.

7. Financial Inclusion and Small and Medium-Sized Enterprises

Small and medium-sized enterprises are important contributors to employment, income generation, innovation, and local economic development. Yet they frequently experience restricted access to formal credit because of limited collateral, inadequate financial records, high perceived risk, and information asymmetries.

Improved financial access can enable SMEs to invest in energy-efficient equipment, renewable energy, waste reduction, water conservation, sustainable packaging, recycling, and cleaner production systems. Green credit programmes can further encourage SMEs to adopt environmentally responsible technologies.

Financial institutions should therefore develop products suited to the scale and characteristics of small businesses [10]. Simplified green-loan applications, credit guarantees, concessional financing, technical assistance, and sustainability-linked lending can help overcome financial and informational barriers.

8. Financial Inclusion and Climate Resilience

Climate change increasingly affects households, agricultural producers, enterprises, and local economies through extreme weather events, changing rainfall patterns, rising temperatures, sea-level rise, and other environmental changes. Financial inclusion can improve adaptive capacity by providing access to savings, insurance, credit, remittances, and emergency transfers. Climate-resilient financial inclusion is particularly important for low-income populations because they often have limited capacity to absorb shocks. A financially resilient household can maintain consumption, rebuild productive assets, and continue investing in education and livelihoods after an environmental disaster.

Microinsurance and index-based agricultural insurance have particular potential in this context. However, affordability, trust, product design, basis risk, and financial literacy remain important challenges. Insurance products must be adapted to local environmental risks and household circumstances.

9. The Risk of Unsustainable Financial Inclusion

Financial inclusion should not automatically be interpreted as environmentally beneficial. Expanded access to credit may stimulate investment in polluting industries, fossil-fuel consumption, intensive resource extraction, or unsustainable urban expansion. Similarly, increased household purchasing power can increase demand for environmentally intensive products. This possibility demonstrates that financial inclusion and environmental sustainability may sometimes operate in tension [11]. The appropriate objective is therefore not simply more finance but better and more sustainable finance. Financial institutions should incorporate environmental risk assessment into lending decisions. Environmental, social, and governance considerations, climate-risk disclosure, sector-specific environmental standards, and sustainability-linked financial products can help direct financial resources toward environmentally responsible activities.

10. Gender, Social Inclusion, and Environmental Sustainability

Financial inclusion has important implications for gender and social equity. Women, rural populations, informal workers, and marginalized communities frequently experience greater barriers to formal financial services. Improving their financial access can strengthen economic agency and resilience. Women's access to financial resources may support investments in household energy, water management, sustainable agriculture, and small-scale green enterprises. However, gender-sensitive financial inclusion requires more than opening accounts. Financial literacy, digital skills, identification systems, affordable products, and social norms affecting financial decision-making must also be considered. Similarly, environmentally sustainable finance should avoid creating new forms of exclusion [12]. Green technologies and financial products should be accessible to low-income populations rather than becoming services available only to wealthier households and enterprises.

11. Financial Literacy as a Connecting Mechanism

Financial literacy represents an important but sometimes overlooked link between financial inclusion and environmental sustainability. Individuals may have access to credit or savings but lack sufficient knowledge to evaluate financial products, investment risks, repayment obligations, or sustainability considerations.

Green financial literacy can help households and enterprises understand the economic and environmental benefits of energy efficiency, renewable energy, sustainable production, and climate-resilient investments.

Financial institutions, governments, universities, and civil-society organizations can contribute to this process through targeted education programmes. Digital financial literacy is equally important. As financial services increasingly migrate to mobile and online platforms, users need the skills to recognize fraud, compare financial products, manage digital accounts, and make informed decisions.

12. Policy Implications

The evidence reviewed suggests that financial inclusion and environmental sustainability should be integrated into broader development policy rather than treated as isolated objectives. Governments can establish regulatory frameworks encouraging banks and other financial institutions to allocate capital toward environmentally sustainable activities while maintaining access for underserved groups. Green credit lines, concessional loans, credit guarantees, blended finance, climate insurance, and sustainability-linked financial products can help connect inclusive finance with environmental objectives. Public financial institutions can play a catalytic role by reducing the risks associated with investments in emerging green sectors. Digital infrastructure should also be expanded responsibly. Rural broadband, mobile connectivity, digital identification, interoperable payment systems, and consumer protection can improve access while supporting the delivery of climate and agricultural finance. Policy should further promote environmental standards for financial institutions. Climate-risk assessment and disclosure can help financial institutions identify potential losses arising from environmental degradation and climate change. At the same time, regulations should prevent sustainability requirements from unintentionally excluding small enterprises and low-income borrowers.

13. Research Gaps and Future Directions

Although the relationship between financial inclusion and environmental sustainability has attracted increasing attention, several research gaps remain. First, much of the existing literature examines either financial inclusion or environmental outcomes separately. More integrated empirical studies are needed to identify causal pathways between the two. Second, the effects of digital financial inclusion require greater investigation. Digital finance may reduce some environmental costs while creating new energy and electronic-waste challenges. Future studies should evaluate its complete environmental footprint. Third, greater attention should be given to distributional effects. Aggregate improvements in environmental sustainability may conceal unequal outcomes among income groups, genders, rural and urban populations, and different occupational groups. Fourth, future research should distinguish between different forms of financial inclusion. Credit, insurance, savings, payments, and investment may have different environmental consequences. Measuring financial inclusion solely through account ownership is therefore insufficient.

Finally, longitudinal and multisectoral research is needed to establish whether financial inclusion produces sustained environmental benefits over time. Combining household surveys, financial data, environmental indicators, satellite observations, and administrative datasets could provide a more comprehensive understanding of these relationships.

14. Conclusion

Financial inclusion and environmental sustainability are increasingly interconnected components of inclusive development. Access to appropriate financial services can improve the ability of households, farmers, enterprises, and communities to invest in sustainable technologies, manage environmental risks, recover from climate shocks, and participate in emerging green economies. Financial inclusion can support renewable energy, climate-smart agriculture, resource efficiency, sustainable entrepreneurship, and household resilience. However, financial inclusion alone does not guarantee environmental sustainability. Expanded access to credit and financial services can also increase consumption, resource use, fossil-fuel dependence, and environmentally harmful investment when sustainability considerations are absent. The central policy challenge is therefore to move from conventional financial inclusion toward green and sustainable financial inclusion. A successful approach requires coordination among financial institutions, governments, technology providers, environmental agencies, agricultural organizations, and communities. Green financial products must remain affordable and accessible to underserved populations, while environmental policies must ensure that the transition toward sustainability does not create new forms of financial exclusion. Integrating financial inclusion with climate finance, environmental regulation, financial literacy, digital infrastructure, and sustainable investment can create a development pathway in which economic opportunity and environmental protection reinforce one another. Such an integrated approach is essential for achieving equitable, resilient, and environmentally sustainable development.

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