Food and Agriculture Organization of the United Nations

A GLOBAL LANDSCAPE STUDY

Green finance as a critical lever for delivering sustainable agrifood systems

INCLUSIVE RURAL FINANCE

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AUTHORS:
Prasun Kumar Das
Asia Pacific Rural and Agricultural Credit Association

Azeta Cungu
Food and Agriculture Organization of the United Nations

Food and Agriculture Organization of the United Nations
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Contents

TABLES

FIGURES

BOXES

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Abbreviationss

AATIF	Africa Agriculture and Trade Investment Fund
ABC	Agricultural Bank of China
ADB	Asian Development Bank
ADBC	Agricultural Development Bank of China
ADF	African Development Fund
AF	Adaptation Fund
AfDB	African Development Bank
AFI	Alliance for Financial Inclusion
AFRACA	African Rural and Agricultural Credit Association
AI	artificial intelligence
APRACA	Asia-Pacific Rural and Agricultural Credit Association
ASAP	Adaptation for Smallholder Agriculture Programme
ASEAN	Association of Southeast Asian Nations
BDS	business development services
BGK	Bank Gospodarstwa Krajowego
BIS	Bank for International Settlements
BMZ	German Federal Ministry for Economic Cooperation and Development
CABFIN	Improving Capacity Building in Rural Finance Partnership
CAP	Common Agricultural Policy
CFP	Climate Finance Partnership
CIF	Climate Investment Funds
COP	Conference of Parties to the UN Framework Convention on Climate Change
CPI	Climate Policy Initiative
CSA	climate-smart agriculture
CSLP	Climate-Smart Lending Platform
CSO	civil society organization
DBSA	Development Bank of South Africa
DFIs	development finance institutions
DLT	distributed ledger technology
EAFRD	European Agricultural Fund for Rural Development
EBF	European Banking Federation
EBID	ECOWAS Bank for Investment and Development
EBRD	European Bank for Reconstruction and Development
ECOWAS	Economic Community of West African States
ELI	environmental liability insurance
EP	Equator Principles
ESG	environmental, social and governance
ESI	Energy Savings Insurance
EU	European Union

FAO	Food and Agriculture Organization of the United Nations
FDI	foreign direct investment
FI	financial institution
FIRA	Trust Funds for Rural Development (Mexico)
FO	farmer organization
FPO	farmer producer organization
FSB	Financial Stability Board
FSF	Financial Stability Forum
FSP	financial service provider
GAF	Henan Green Agriculture Fund Project (China)
GAFSP	Global Agriculture and Food Security Programme
GAP	Good Agricultural Practices
GBP	Green Bond Principles
GCA	Global Commission on Adaptation
GCF	Green Climate Fund
GEA	Greening the Economy with Agriculture Initiative
GEF	Global Environment Facility
GFCF	Green Finance Catalyzing Facility
GGFI	Global Green Finance Index
GFSG	G20 Green Finance Study Group
GGGI	Global Green Growth Institute
GHG	greenhouse gas
GIB	green investment bank
GIZ	German International Cooperation Agency
GKP	Global Knowledge Partnership
GPA	Green Performance Agenda
GRET	Green and renewable energy technologies
GRI	Global Reporting Initiative
GSSB	Global Sustainability Standards Board
ICMA	International Capital Market Association
ICT	information and communication technologies
IDB	Inter-American Development Bank
IDFC	International Development Finance Club
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFIs	International financial institutions
INDCs	Intended nationally determined contributions
IoT	internet of things
IPCC	Intergovernmental Panel on Climate Change
IPO	initial public offering

KPI	key performance indicator
LCR	low-carbon climate resilience
LDCs	least developed countries
MDBs	multilateral development banks
MDGs	Millennium Development Goals
MFIs	microfinance institutions
MSMEs	micro-, small- and medium-sized enterprises
NDA	National Designated Authorities
NDB	National Development Bank
NDCs	nationally determined contributions
NEFCO	Nordic Environment Finance Corporation
NGFS	Network of Central Banks and Supervisors for Greening the Financial System
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
OeEB	Development Bank of Austria
OJK	Indonesia Financial Services Authority
PPCR	Pilot Program for Climate Resilience
PPP-IAD	Public-Private Partnership for Integrated Agriculture Development
PPP	public-private partnership
PRI	Principles for Responsible Investment
PSI	Principles for Sustainable Insurance
PwC	Pricewaterhouse Coopers Consultants
RAAF	Regional Agency for Agriculture and Food
RCF	revolving credit facility
RETs	renewable energy technologies
RLU	Royal Lestari Utama (Indonesia)
RSCIs	rural savings and credit institutions
SAARC	South Asian Association for Regional Cooperation
SAFIN	Smallholder and Agri-SME Finance and Investment Network
SBFN	Sustainable Banking and Finance Network
SBN	Sustainable Banking Network
SDGs	Sustainable Development Goals
SLWRMP	Sustainable Land and Water Resource Management Project
SMAs	small- and medium-sized agribusinesses
SMEs	small and medium enterprises
SOP	standard operating procedure
SPVs	Special purpose vehicles
TFCD	Task Force on Climate-related Financial Disclosures
TFCR	Task Force on Climate-related Financial Risks
TLFF	Tropical Landscape Finance Facility
ToC	theory of change

UNCDF	United Nations Capital Development Fund
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP FI	United Nations Environment Programme Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VC	venture capital
VSS	voluntary sustainability standards
WBCSD	World Business Council for Sustainable Development
WEF	World Economic Forum
WFP	World Food Programme
YUIF	Yield Uganda Investment Fund

Executive summary

Green finance: a critical trigger for achieving the United Nations Sustainable Development Goals (SDGs)

Green finance is a critical trigger for this lever in order to meet the globally committed investments in achieving the SDGs, and it is one of the most important levers for promoting sustainable and climate-resilient food systems. Providing environmental benefits through social governance is a function that high-potential, green financial services can play. "Business as usual" will not be able to solve the current world challenges, such as the financial crisis, global warming, and the COVID-19 pandemic, and sustainable business practices must be adopted as a solution. In recent years, green finance has shown its ability to change the focus from shareholder profit creation (economic) to the generation of stakeholder value (economic, environmental and social). Although green finance taxonomies are taking centre stage, demand for green finance continues to grow and challenges the supply side's preparedness, resulting in a slowdown in sustainable financing practices in the Global South. Development finance institutions, multinational banks, and other industry leaders are well-supported by governments around the world through international cooperation in driving global green financing initiatives.

Green investment windows in the agrifood system

Biodiversity loss and the release of over a third of the world's greenhouse gas emissions are the result of agrifood systems as a whole. Despite feeding billions, most of the food production system has contributed to global warming, posing a serious danger to food security and sustainability around the world. In order for the agrifood business to successfully cut emissions, adapt to changing weather patterns, and survive the constraints placed on food security by population increase, it is imperative that sustainable farming techniques be implemented. All sources of investment in agriculture and its value chains are unquestionably more generous today than they were in the past. Yet a critical step remains: determining the appropriate scale of long-term investments in agriculture and food systems to meet the increased demand for reducing agricultural ecosystem hazards as a result of climate change. An excellent opportunity has presented itself for financial service providers to go into the agrifood system's green assets, which are in line with sustainability and concern for the climate.

Overview of the present study

As the need for food grows, so does the need for sustainable farming, livestock and fisheries. Green finance creates a conundrum: how can this be reconciled? Any financial and policy plan that supports the development and widespread acceptance of novel solutions must centre on smallholders and agricultural entrepreneurs in particular. *Green finance in the agrifood system: a landscape study* documents various perspectives on the definition of green finance as well as trends, driving factors, the ecosystem, instruments, and innovations that can help elicit ongoing initiatives, mechanisms for their application, and significant issues that can help build global narratives about the extension of green finance to the agrifood industry. There needs to be quick focus from development leaders and policymakers alike to the significance of developing an inclusive

approach to green finance services for the agrifood sector. Stakeholders considering investments to green the agrifood sector will find a summary of the important results, recommendations and possible future steps in this report.

Main findings

A green finance taxonomy that is widely acknowledged could help reduce the prevalence of greenwashing in the agrifood business. More detail is needed to better understand the extent to which nature-friendly investments might attract the private sector, and hence boost leverage ratios for governments that have voluntarily made NDCs (nationally determined contributions). In general, current green finance trends favour the development of the clean energy industry, whereas smallholder agriculture has not had the same success. Policy and regulatory frameworks are regarded as the primary drivers of the green finance industry, but innovation incubators, networks and associations, research and consulting services, and international cooperation are the important accelerators to increase the demand for investments in green development. There are numerous technologies that have the potential to play a significant part in the life cycle of green development, but they are fragmented in their approach. Success in gaining access to funds from pooled funds depends on innovative financial models and green-specific instruments. Because of its wider applicability, fintech and digital technology-based delivery solutions offer a lot of promise to support environmentally friendly and sustainable financing. It is possible to compare food and agriculture investments across countries and enterprises by using sustainability indexes that are based on trustworthy scientific evidence and contain relevant data. In order to scale up green financing designs for the agrifood sector, public-private partnerships (PPPs) are critical. Investing and building the capacity of financial service providers can be accelerated through the use of networks, multistakeholder collaborations, and cooperative efforts (technical, commercial, and financial).

Key recommendations

Policymakers at all levels must work together to ensure that the agrifood sector can benefit from green financing, which may help to promote sustainable growth and generate value from the environment. In order to alleviate the existing pressure on short- and medium-term results, as well as to successfully transition to green finance, there is a growing demand for longer-term policy development. For this transition to be successful there needs to be policy coherence across the various economic, environmental, and sectoral initiatives. Diverse public and private sector actors (including relevant government departments) must be involved in the implementation of green finance policies and approaches rather than just environmental agencies, business units, and financial institutions on their own. In order to assess the bankability of green loans and other agrifood sector financial services, financial institutions will benefit from scaling up their involvement and providing hand-holding. Creating a green finance fund and issuing green bonds at the national level could help the agrifood sector get the cash it needs to thrive. Extending the scope of regional and global collaboration would help countries/territories that have benefited from green financing in the agrifood industry exchange knowledge.

What next?

A multiplier effect in greening the agrifood sector can be enhanced by the global community taking specific initiatives to implement appropriate financial mechanisms and regulatory measures that will help accelerate progress toward the SDGs, in particular: in order to attract financial service providers to the agrifood and forestry sectors, it is necessary to: (a) create a taxonomy of green finance that is inclusive and representative, (b) increase fiscal incentives to leverage green finance, (c) facilitate innovations in financing mechanisms by using investment vehicles that support green finance in agriculture, and (d) bridge the demand-supply gap in green finance by working with the industry. High-level cooperation, knowledge management, and education will make these efforts practicable.

1. Introduction

As part of a significant international effort to promote holistic development, the United Nations General Assembly established 17 SDGs on 25 September 2015. Investment in both public and private sectors is required to meet the wide range of economic, social, and environmental goals under this agenda. UNCTAD estimates that poor nations alone require USD 2.5 trillion annually to support the achievement of the 17 SDGs and associated goals. In order to achieve the goals, investments are being made in areas such as infrastructure, climate change mitigation, agriculture, health, telecommunications, and ecosystems and biodiversity. Investment growth is currently not making a meaningful dent in the expected finance shortages to meet these goals, according to published reports. There was an unprecedented COVID-19 pandemic and its disastrous effects on the global economy when "the next decade of action" (2020–2030) to drive for the fulfilment of the SDGs began. When this worldwide calamity occurred it effectively interrupted the efforts of focused fundraising and investment promotion initiatives to support the increasing demand for wideranging climate action and to channel the resources towards accomplishing SDGs. The ability of developing and transitioning economies to channel targeted investments into the agricultural sector (and its subsectors) relevant to their respective national priorities aligned with the SDGs depends on the availability of adequate financial services and innovative instruments. Sustainable development finance has evolved over time, and this section of the report provides a brief overview of the scope of green finance taxonomy in defining regulatory and policy frameworks to promote this type of finance. Specifically, this section focuses on the integration of environmental, social, and governance (ESG) criteria into financing decisions.

1.1 Investments in sustainable development

Natural resource processing and productive diversification has increased with the help of SDG investments, ensuring a more inclusive growth model and sustainable development. The majority of such investments are geared toward ESG or SDG-related topics or industries, such as clean energy, clean technology, and sustainable agriculture and food security. It has been estimated that the amount of money being invested in sustainable development has reached between USD 1.2 and USD 1.3 trillion (UNCTAD, 2020). However, the COVID19 pandemic has shown that putting money into SDGs like building healthy food and farming systems is more important than ever. In the wake of the health crisis and economic shock, many countries are rethinking their investment goals and

strategies and seeking for methods to reinvent themselves as attractive investment destinations. Foreign direct investment (FDI) in eight SDG areas (for which data were available) amounted to an annual average of USD 134 billion in 138 developing countries, including 45 least developed countries (LDCs), between 2015 and 2019, an 18 percent increase over the period 2010–2014. It should be noted that the FDI in food and agriculture projects were marginally increased (1 percent) during the period 2015–2019 (USD 22.3 billion), as compared with 2010–2014 (USD 22.1 billion).

1.1.1 Development narratives and sustainable finance

The SDGs, the Paris Agreement on Climate Change, and the Financing for Development framework all emphasize the importance of expanding access to financial services (a new global framework for financing sustainable development to support the 2030 Agenda). Development countries are expected to confront an annual investment gap of around USD 2.5 trillion as a result of a projected USD 5–7 trillion in global investments to implement the SDGs (United Nations, 2015). It's vital to note that these accords have three main differences from previous development cooperation, particularly the Millennium Development Goals (MDGs). It's expected that private sector participation in international cooperation, such as trade agreements, investment frameworks, and subsidy programmes, will play a role in funding all of these programmes. The emphasis on universal application of these programmes implies that all countries must adapt their approaches in light of the global public good as a whole (Osborn, Cutter and Ullah, 2015).

1.1.2 The evolution of sustainable finance: key landmarks

Discussions about the need for new models of socioeconomic development in order to achieve the SDGs have begun to underline the crucial role that finance can and should play. Even if most of the money and investments in development projects are still going toward "business as usual", sustainable finance has emerged as the most important source of funding for climate-friendly development programmes. As a result of the dire repercussions of global warming, the creation of green and sustainable financial instruments is now at the top of the development priority list. A lot of good work is being done in this critical field of financial services, and some of the most notable landmarks of the evolution of sustainable finance – which is often headed by multilateral/bilateral organizations – can be found in Box 1.1.

BOX 1.1: Landmarks in the evolution of sustainable finance

The sequence of events below highlights the development of sustainable finance and how this has been mainstreamed by the development sector:

- An increase in interest in financial services as a means of achieving social and environmental goals was spurred in 2000 by the implementation of the United Nations Millennium Development Goals (MDGs). This increased interest led to the development of environmental and social risk management frameworks adopted by financial institutions as a minimum standard for proper due diligence and monitoring to support responsible risk taking (and states). For the first time, capital markets were used to raise financing for climate-related projects when the European Investment Bank issued a green bond in 2007 and the World Bank released a green bond in 2008. The green bond model is now being used to raise financing for all 17 SDGs;
- The Financial Stability Board (FSB) was founded in April 2009 as the successor to the

(cont.)

Financial Stability Forum;

- (FSF). Financial firms must disclose climate risk information in order to manage and price climate risks appropriately and, if desired, to take lending, investment, or insurance underwriting decisions based on their view of transition scenarios;
- The Asia Pacific Index and other indices have made it easier for investors to sift through the data and make informed decisions. The SDG investment gap in emerging and low-income countries is a major focus of the Financing for Development process;
- The Paris Agreement on Climate Change was signed in December 2015 as a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low-carbon future;
- In October of 2016, GRI unveiled its first set of international sustainability reporting guidelines. More than 250 companies have adopted the guidelines produced by the Global Sustainability Standards Board (GSSB) to report on their sustainability performance (including, for example, climate change challenges); at the One Planet Summit in Paris on 12 December 2017, participating central banks and supervisors from around the world gathered to discuss best practices and contribute to the formulation of financial sector policies on environmental and climate risk management; and
- The Joint SDG Fund was established to support the development of financing strategies required for scaled up SDG investments (UN Joint SDG Fund, 2022a). SDG Invest, an initiative of the Joint SDG Fund, is the UN platform to host and support ambitious proposals that aim to mobilize much needed resources for the achievement of the SDGs at scale (SDG Invest, 2022).

Note: There may be many more relevant initiatives operating at various levels which have not been included due to limits on the information available in the public domain.
Source: Authors' own elaboration.

1.1.3 Sustainable finance in the agriculture and food sector

Sustainable finance and its application to the agriculture and food sector is no different in terms of its assessment criteria for investment but differs based on *application* (public subsidies,[1] diverse food chain stakeholders, etc.), *geographical location* (approaches differ for rural and agricultural areas as compared with urban areas due to e.g. different carbon footprints levels) and *available natural resources* (irrigation, grasslands, forests, mountains). The terms generally used to denote sustainable finance in the agrifood system are *"finance for climate-smart food systems"*, *"finance for the green agrifood economy*", "*finance for sustainable agriculture practices*", *"finance for greening food value chains"*, *"climate finance"* and *"green finance"*.[2] The objectives of these financing mechanisms are to reduce climate footprints while taking care of market-based economic return.

[1] Public subsidies in the agrifood sector are different to those in other sectors, as they involve both front-end and back-end subsidies. For example, subsidizing fertilizer price is a front-end subsidy, whereas supporting exports is a back-end subsidy.

[2] Investments through *climate finance* instruments are considered to be an important source of "*green finance*". which has demonstrated its ability to unlock additional public and private capital from a variety of sources including domestic national budgets, the private sector, bilateral and multilateral actors, development finance institutions and institutional investors.

1.2 Sustainable finance and integration of environmental, social and governance criteria

Sustainable finance refers to the process of considering the impact of ESG[3] criteria during investment decisions for long-term investments in economic activities and projects. It is common for investors to consider ESG issues when assessing the sustainability of high-impact projects ranging from renewable energy to climate change to the agrifood sector or health and safety. Due to the inclusion of non-traditional data elements critical to values, ESG data is commonly referred to as "non-accounting" information. Integration of ESG factors into the business risk management process has the potential to enhance sustainabilityrelated risk management and decisionmaking, reduce cost impact, and boost stakeholder confidence. Financial institutions (FIs) can minimize risk to their portfolios, boost value generation, and support receivers as they move to more sustainable business models by integrating ESG evaluations into their lending, investment, and underwriting operations. This also helps to strengthen the global economy.

1.3 Green finance: an instrument to promote sustainable development

In the context of green finance, the term refers to a range of financial instruments that are used to fund sustainable development, climate action, and policies that aim to promote low-carbon, sustainable, and equitable pathways. Sustainable financial goods and services that are both financially viable and environmentally beneficial are supported by green finance. Investing with a green economic development lens requires a wide range of specialized financial goods and services, all of which can be grouped under the umbrella term of "green finance", a subset of the broader term "sustainable finance". Debt and equity are the most commonly used financial tools in green financing. Green finance has two basic objectives: (a) to lower the perception of risk, and (b) to internalize environmental externalities.

1.4 Understanding taxonomies in sustainable and green finance

There are many organizations/agencies and publications that use the terms "green finance" and "climate finance" interchangeably, so a precise definition is needed at the beginning of this study. There are a number of industries where the terminology used to explain sustainable finance and its subsets is crucial. Global debates on taxonomy and climate change mitigation and adaptation have taken place in recent years, but they remain a work in progress.

1.4.1 Scope of taxonomies in defining common policy frameworks in sustainable finance

According to those in attendance at a 2021 global workshop on green finance for agriculture and food systems, the taxonomy addresses the need for greater clarity in the categorization of various investment types and can potentially improve market clarity, give financial institutions confidence and assurance, as well as to make it easier to track sustainable finance flow measurement. An inclusive approach to building taxonomies for sustainable finance markets may help achieve development goals, although the veracity of one taxonomy across geographies is still being challenged as there are both commonalities and variances in the scope of taxonomies. We believe that commonalities in defining what taxonomy is about can be used to create comparable

[3] *Environmental* considerations might include climate change mitigation and adaptation, as well as the environment more broadly, for instance the preservation of biodiversity, pollution prevention and the circular economy. *Social* considerations could refer to issues of inequality, inclusiveness, labour relations, investment in human capital and communities, and human rights issues. The *governance* of public and private institutions – including management structures, employee relations etc. – plays a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process.

frameworks that ease international investment yet reflecting the unique circumstances of each country, subregion, and region that exist. The World Bank Group, the European Union, and the Association of Southeast Asian Nations, as well as countries like Japan, China, and the Netherlands, have all developed formal definitions of sustainable finance and taxonomies that classify it in greater detail. According to the World Bank's 2020 taxonomy guide (World Bank, 2020b), a unified vocabulary for discussing climate resilience and supporting decisions related to climate risk in financing, lending, and investment operations has been developed. There are various features of green financing that are unique to this landscape research report, and they are geared toward the food and agriculture industry. However, the study is not intended to comment on the taxonomies used by various organizations and institutions; rather, the aim is to present several points of view and follow the nested idea of sustainable finance and its subsets as described in Box 1.2.

Box 1.2: Terminologies and definitions

Sustainable finance: ESG (Environmental, social, and governance) aspects are taken into account when making investment decisions in the financial sector, leading to increasing long-term investments in sustainable economic activities and projects (European Commission, 2020a, 2020b). Climate change mitigation and adaptation are two specific examples of environmental factors, but there are many others, such as biodiversity preservation, pollution avoidance, and circular economics, as well. The concept of sustainable finance is significantly broader than the concept of green finance, as sustainable finance focuses on holistic ecological preservation that may span delete while all economic activities.

Green finance: "green finance" is a subset of sustainable finance and refers to financing initiatives that have environmental advantages in the broader context of environmentally sustainable development (UNEP, 2016). the financing of green investments in environmental goods and services (such as water management, landscape preservation and biodiversity conservation, and renewable energy), the financing of the implementation of public policies aimed at greening the environment, and the components of the financial system that deal specifically with green initiatives are all examples of what the German Development Institute (Berensmann and Lindenberg, 2016) call "green finance".

Climate finance: there is no universally accepted definition of "climate finance", which is a subset of green finance. According to the United Nations Framework Convention on Climate Change's (UNFCCC) 2016 Biennial Assessment and Overview of Climate Finance Flows (UNFCCC, 2016), the term refers to financial resources dedicated to adapting and mitigating climate change globally, aiming at reducing emissions of greenhouse gases (GHG), decreasing vulnerability, and increasing resilience of human and ecological systems to negative impacts of climate change.

Climate finance to agriculture: the typical smallholder farm finance strategy does not work for climate-smart agriculture (CSA). The term "climate finance to agriculture" refers to large-scale funding of CSA using a combination of grant, commercial, and quasi-commercial financing vehicles. For instance, the conservation financing provided by Crédit Suisse encourages a wide range of environmentally friendly farming practices.

Green finance to agriculture: different definitions of "green finance to agriculture"[4] are used which are, however, centred around the basic idea of green finance (as defined above) applied to the agriculture and food sector. For the purposes of this paper, "green finance for agriculture" means all types of finance directed to the agrifood sector with the objective of achieving greater

(cont.)

[4] FAO's policy paper on "greening the economy with agriculture" (GEA) referred to ensuring the right to adequate food, as well as food and nutrition security – in terms of food availability, access, stability and utilization – and contributing to the quality of rural livelihoods, while efficiently managing natural resources and improving resilience and equity throughout the food supply chain, taking into account countries' individual circumstances (FAO, 2011).

resource efficiency (water, soil and natural resources), environmental sustainability with a climate-smart approach, and enhance the quality and safety of agrifood produce. This definition will go beyond "climate finance to agriculture".

Inclusive green finance: member institutions of the Alliance for Financial Inclusion (AFI) are already developing and implementing new "inclusive green finance" policy areas, laws and national plans to help alleviate or build resilience against the widespread effects of climate change (AFI, 2020). Government financial inclusion programmes and other financial sector strategies should incorporate climate change concerns through coordination with national authorities or institutions.

Greenwashing: is the process of conveying a false impression or providing misleading information about products and services to deceive consumers into believing that they are environment-friendly. It is the practice of trying to make people believe that an organization/agency/institution is doing more to adopt a sustainable approach than it really is, often for public relations reasons or to receive tax benefits/incentives.

Note: The definition of terminologies referred above are the most common and available in the public domain. We understand that some organizations/agencies have also designed their own contextual definitions, which are not covered here.
Source: Authors' own elaboration.

1.4.2 Taxonomy regulations to promote sustainable finance

It is essential to invest in sustainable initiatives and activities in order to accomplish the goals of the 2030 Agenda. As a result of the current COVID-19 pandemic, the urgency of making economies, businesses, society and especially health systems more robust to climate and environmental shocks and dangers has been reaffirmed. As previously mentioned, this can only be accomplished with the help of a common language and a clear meaning of the term "sustainable".

EU Taxonomy (European Commission, 2020c) for Sustainability Activities is a classification system for green economic activity that transforms the the European Union's climatic and environmental goals into criteria for specific economic activities for investment. At least one of the the European Union's climatic and environmental goals must be met, but the activities must also not impair any of these goals or fulfil basic social safeguards in order to be considered "green" or "environmentally sustainable".

This is a critical factor in the implementation of the European Green Deal and the scaling up of sustainable investment. Investors, businesses, and politicians can use the EU Taxonomy's appropriate criteria to determine whether economic activities are environmentally sustainable. This regulation is also expected to create security for investors, protect private investors, help companies to plan the transition, mitigate market fragmentation and eventually help shift investments where they are most needed.

They announced their commitment for building a taxonomy of sustainable finance at the seventh conference of the finance ministers and central bank governors from ASEAN nations on 30 March 2021. Similarly to the European Union Taxonomy, the ASEAN Taxonomy will serve as ASEAN's common language for sustainable finance and take into account both worldwide aims and specific needs of ASEAN member countries, such as Singapore, Malaysia, and Indonesia. Regional taxonomy regulations are uncommon outside of the EU and ASEAN. Regional taxonomies, on the other hand, may become indispensable in the future to deal with contradictions between various taxonomies and enhance ambition.

2. Definition, trends drivers

It is difficult to draw a distinction between “green finance” and “sustainable finance”, given the overlap of many of their respective goals. On top of all that, there’s no agreed-upon definition of what constitutes “green financing”. Green finance is strongly tied with ideas like “climate finance” and “sustainable finance”, which have a similar meaning. Contrary to popular belief, despite the fact that these phrases are frequently used interchangeably, the focus of this research is on how they are all intertwined. Climate finance is one component of green finance, the latter being broader and including other environmental objectives. Similarly, sustainable finance encompasses environmental and social governance as well as financial modelling, making it wider than green finance. For example, according to Corfee-Morlot, *et al.* (2012), and the European Commission’s High-Level Expert Group on Sustainable Finance (HLEGSF), the lack of a common definition for “green finance” is frequently mentioned in institutional investor surveys when asked about the most significant challenges in making green investments. Green finance is defined here as an umbrella word referring to investments that give environmental advantages in a wider framework of ecologically sustainable development processes, in light of those differing viewpoints previously indicated. In order to promote these new financial services, this part largely examines definitions, the driving forces behind global green finance, and popular financial products.

2.1 Global efforts to define green finance

For sustainable finance, there are many different stakeholders who have an impact on how green financing is defined. Some of these definitions have a broader scope, while others are more specific and transparent. As an example, the European Commission (2017) produced a detailed report on the worldwide efforts to define the “green” aspect of green finance; likewise, according to the German Development Institute (Berensmann and Lindenberg, 2016), green finance comprises three major aspects related to purpose, major areas for consideration, and entities to be financed. Table 2.1 analyses and summarizes additional pertinent concepts from publicly available literature:

TABLE 2.1: Definition of green finance

	Researchers/organizations	Detailed definition
1.	Höhne *et al.*, from International Development Finance Club (2012)	"Green finance" is a broad term that can refer to financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy. The term includes but is not limited to climate finance. It also refers to a wider range of other environmental objectives, for example industrial pollution control, water and sanitation, or biodiversity protection.
2	PricewaterhouseCoopers Consultants (2013)	For the banking sector, "green finance" is defined as financial products and services – under the consideration of environmental factors throughout the lending decisionmaking, ex post monitoring and risk management processes – provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries and businesses.
3	Development Asia (Initiative of Asian Development Bank)[5]	In simple terms, "green finance" involves engaging traditional capital markets in creating and distributing a range of financial products and services that deliver both investable returns and environmentally positive outcomes.
4	European Banking Federation (EBF)	"Green finance" includes, but is not limited to: (a) environmental aspects (pollution, greenhouse gas emissions, biodiversity, water or air quality issues) and (b) climate change-related aspects (energy efficiency, renewable energies, prevention and mitigation of climate change-connected severe events).
5	G20 Green Finance Study Group (2016)	"Green finance" can be understood as the financing of investments that provide environmental benefits in the broader context of environmentally sustainable development. These l benefits include reductions in air, water and land pollution, reductions in GHG emissions, improved energy efficiency while utilizing existing natural resources, and mitigation of and adaptation to climate change and their co-benefits.
6	Agirman and Osman (2019)	The term "green finance" has come into existence to complement sustainable development by taking care of economic benefits along with environmental benefits. Generally, it can be defined as extending financial services and carrying out all kinds of financial activities considering the affirmative benefits towards the environment.

Source: Authors' own elaboration.

There may be many more definitions produced by other authors and institutions around the world. It is clear that while the definitions in Table 2.1 differ in their emphasis, they generally share some or all of the following common elements:

a) focus on the use of investment to enhance the environmental benefits or lower the climatic footprint;
b) concern for managing and factoring in environmental risks faced by the financial industry and society as a whole;
c) understanding risks associated with physical, transitional (including stranded assets), and liability factors including the policies and infrastructure required to make green finance work;
d) role of the stakeholders in the public and private sector to leverage capital for green economic recovery; and
e) broader view of sustainable development and/or economic growth in which financial institutions play a key role.

[5] See: Development Asia, 2018.

2.2 Trends in green finance

To aid quick growth, there is a large demand for green investments but a limited supply. Additionally, new financial products like green bonds and green loans have emerged, which are now widely regarded as useful tools for directing resources toward initiatives aimed at mitigating climate change as well as adapting to it and building resilience. There has been a 34 percent increase in the amount of sustainable or green investments held by members of the Global Sustainable Investment Alliance 2018, a network of sustainable investment organizations that monitors these trends in five areas from the United States to Australia. In certain regions, these cash flows account for more than half of the tracked assets under management. Green finance and investments intrigue the development community because of their "greenness". Because there isn't a universally accepted definition of what constitutes "green finance", some investments may be more environmentally friendly than others. There are some investors/asset managers that exclusively support activities that do not contribute to pollution, while others value efficiency or even adherence to a rigid set of social policies. A study by 350.org (a campaign to limit funding for fossil fuel corporations) found that in addition to broader initiatives for green investment, funding is increasingly being divested from fossil fuels (350.org, 2022). Additionally, the equity markets for environmentally friendly investments have seen increased trade in recent years. For 2018, Bloomberg Intelligence (2019) recorded a record USD 41.6 billion in the value of green or ESG funds traded or exchanged.

2.2.1 Estimated global demand for green finance

It is a well-accepted fact that green financing assists the achievement of environment-friendly results over the long term, which provides a fair idea that the demand for these investments needs to be continuing and follow the nationally determined contributions (NDCs). It is estimated that the total volume of required green investments (covering the water, agriculture, telecommunications, energy, transport, buildings, industrial and forestry sectors) to comply with the strategies of the 2030 Agenda range annually between USD 5–7 trillion, of which USD 4 trillion corresponds to developing countries alone (UNDP, 2018). As per the estimates of UNCTAD (2014) in its *World Investment Report 2014*, states are far from achieving these figures, despite continuous global efforts and engagements. Table 2.2 below details the estimated annualized investments and the gaps thereto for selected sectors of economic activities which demand immediate attention.

TABLE 2.2: Investment needs in selected SDG sectors in developing countries, 2015–2030

Sector	Description of activities	Estimated investment required Annualized in USD billion (constant price)	Investment gaps Annualized in USD billion (constant price)
Food security and agriculture	Investment in agriculture, research, rural development, safety nets, etc.	480	260
Climate change mitigation	Investment in relevant infrastructure, renewable energy generation, research and deployment of climate-friendly technologies, etc.	550–850	380–680
Climate change adaptation	Investment to cope with impact of climate change in agriculture, infrastructure, water management, coastal zones, etc.	80–120	60–100
Ecosystem services/ biodiversity preservation	Investment in conservation and safeguarding ecosystems, marine resources management, sustainable forestry etc.	70–210	Not available

Source: UNCTAD. 2014. *World investment report 2014*. Geneva, Switzerland. https://unctad.org/system/files/official-document/wir2014_en.pdf

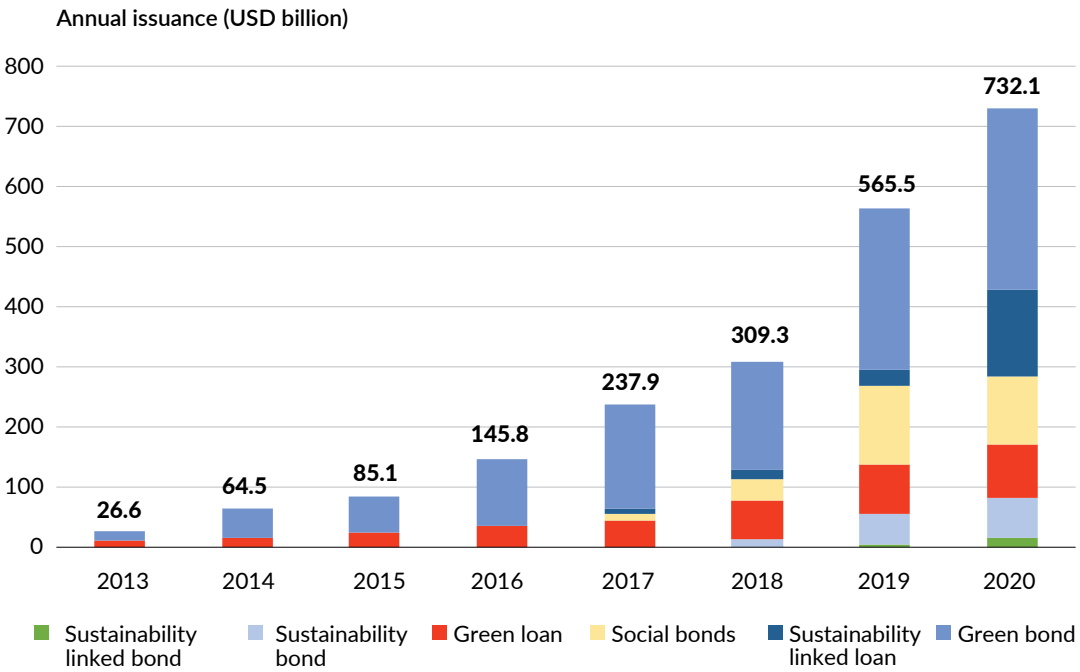
It can be noted from the gaps estimated that investments in agriculture, climate change (mitigation and adaptation) and ecosystem services provide huge potential to extend green and climate finance.

2.2.2 Supply of green finance

In terms of structure, ownership, operations, and strategic importance, green financing providers are extremely different. There are two major financial instruments used by these companies: debt and equity (specific riskmitigation and risk-enhancement instruments are less frequent). In order to evaluate the development of existing green money flows, financial institutions, international agencies and regulatory bodies have established their own methods for delivering, monitoring and reporting on green finance. This adds to the limits of not being able to obtain authentic data from popular sources. In addition, it was found that many agencies utilize their own analytics to analyse the flows, which are predominantly private sector investments. Using data from the banking industry, the Climate Policy team at the International Finance Corporation (IFC) has devised a new way to evaluate and track green finance, in order to better understand the current state of green lending and make recommendations on how different approaches to measuring green finance can be better aligned (IFC, 2018). Two widely used green finance products were thoroughly examined in a 2018 IFC document, which examined their global situation in great detail: investment in (a) equities and (b) debt.

a) **Issuance of debt instruments.** Despite the COVID-19 pandemic, the global issuance of sustainable debt hit a new high in 2020, exceeding USD 732 billion, according to BloombergNEF (2021). This represents a 29 percent increase over the year before. Sustainability and social bonds grew at an incredible rate, while green bond volumes increased by 13 percent to a record USD 305 billion in the first quarter. Figure 2.1 shows that there was no notable growth in green and sustainability-related loans during the 2019–2020 period.

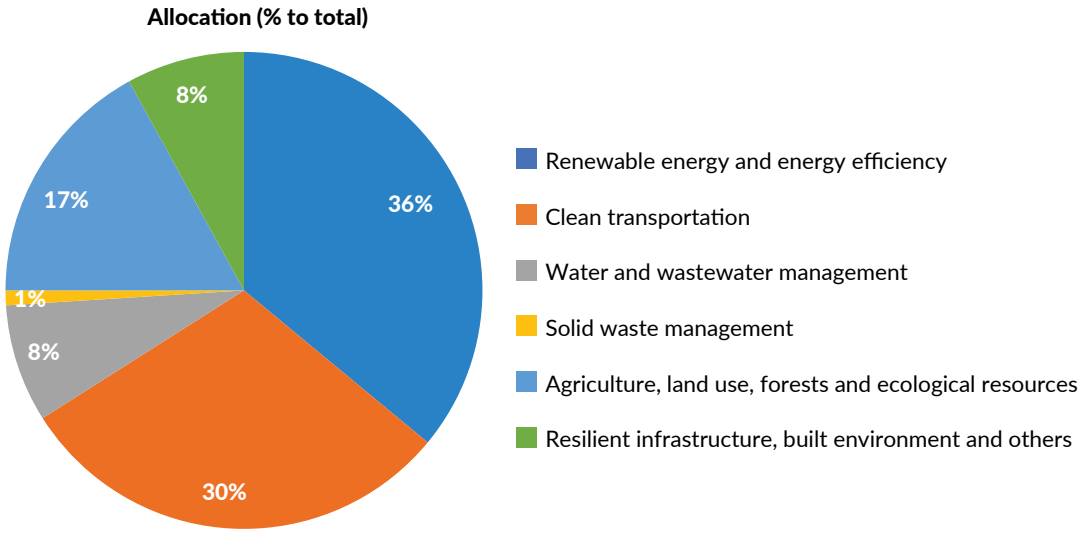
FIGURE 2.1: Annual global issuance of sustainable debt, 2013–2020



Source: BloombergNEF. 2021. Sustainable debt issuance exceeds $730 billion in 2020. 25 February 2021. New York, USA. [Cited 24 November 2022]. https://www.bloomberg.com/professional/blog/sustainable-debtissuance-exceeds-730-billion-in-2020

In light of these data, green bonds, which are used to raise money for green projects and other environmentally-friendly endeavours, are becoming increasingly important in green finance. As a result, green bonds have a direct impact on initiatives ranging from renewable energy to clean transportation to forest management to water management to land use. More green bonds were issued at the end of 2020 than at the end of 2019, and Climate Bonds Initiative, a not-for-profit group, predicted that in 2021, issuance might reach as high as USD 450 billion if the market continues to grow at its current pace (CBI, 2021). The World Bank is the most significant institutional investment in this field. Green bonds issued by the World Bank totaled approximately USD 13 billion as of 30 June 2019 (World Bank, 2019). Only 17 percent of the World Bank's overall commitments went to agriculture and forestry, while 36 percent went to renewable energy and energy efficiency bonds, which are more popular with investors (Figure 2.2).

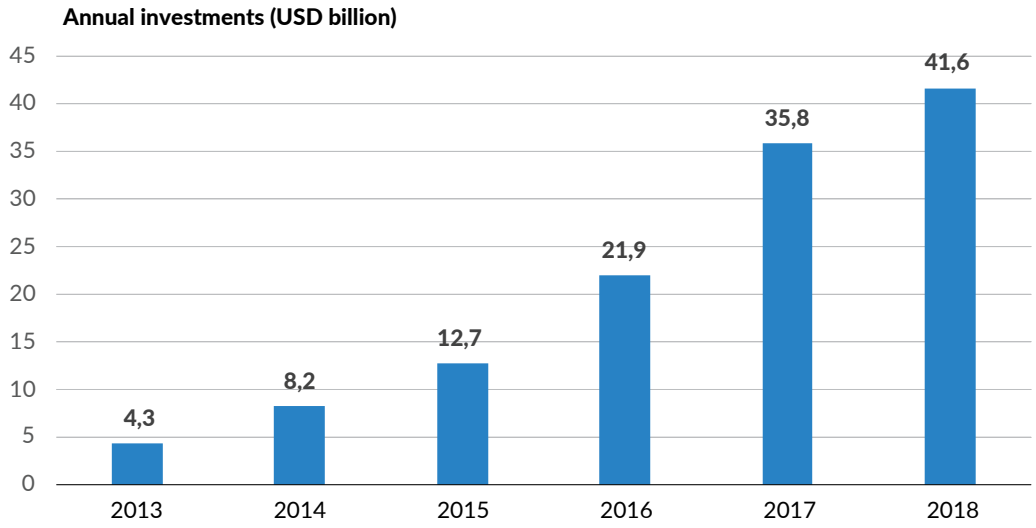
FIGURE 2.2: Sectoral allocation of green bonds by the World Bank



Source: World Bank. 2019. *Green Bank impact report 2019*. Washington, DC. http://pubdocs.worldbank.org en/790081576615720375/IBRD-Green-Bond-Impact-Report-FY-2019.pdf

b) **Investments in equity instruments.** Marketing green equity to clients for off-taking and changing the way institutional investors engage with green equity investments is a major responsibility for institutional investors. In addition, banks are taking part in green/sustainable capital mobilization efforts through various programmes. Figure 2.3 below illustrates how the green finance equity investment market has grown in recent years.

FIGURE 2.3: Green finance equity investment market



Source: Bloomberg Intelligence. 2019. Green finance is now $31 trillion and growing. 7 June 2019. New York, USA. [Cited 24 November 2022]. https://www.bloomberg.com/graphics/2019-green-finance

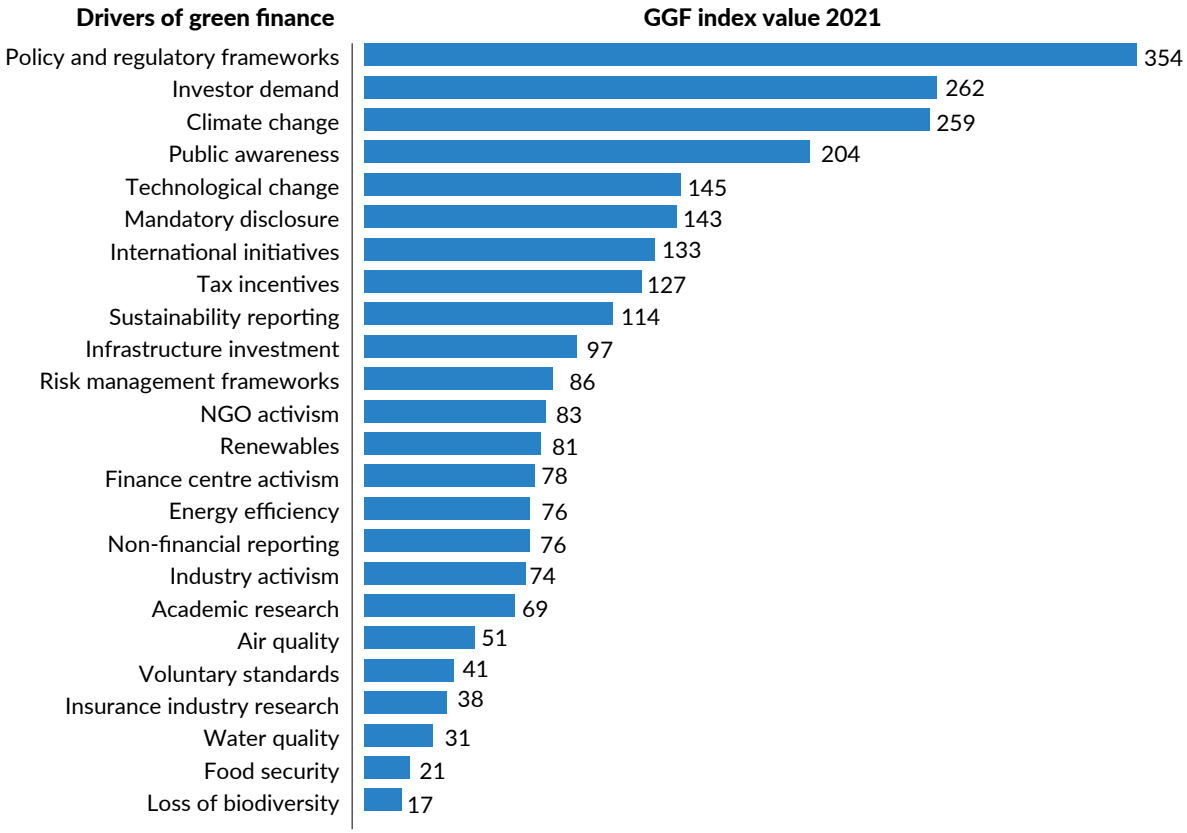
2.3 Drivers of green finance

Policymakers, executives and investors throughout the world are increasingly willing to accept green finance as a crucial driver of growth in a global economy as the world shifts to a new development paradigm that puts the environment and people at the centre of interventions. ESG analytics and reporting, among other green finance components, are becoming more popular, and this boosts investor trust in green finance development globally.

2.3.1 Policy and regulation as drivers

An important role for regulators in green finance's progress is to help the financial sector expand green finance and gradually move toward an eco-friendly financial system architecture (CISL and UNEP FI, 2014). In addition to green prudential regulations, there are numerous more instances of green policies and regulations that central banks are pursuing. This year's 7th Global Green Finance Index (GGFI) reported that policy and regulatory frameworks continue to be identified as the leading driver in developing green finance, underlining the reliance of green finance on stable and robust policy frameworks, which require government and regulatory action from both parties (GGFI, 2021). As a result, food security and the loss of biodiversity continue to rank low as drivers of green investment (Figure 2.4).

FIGURE 2.4: Drivers of green finance



Source: GGFI. 2021. GGFI 4 Key Drivers of Green Finance. In: *The Global Green Finance Index – GGFI 4 explore the data*. London, Z/Yen. [Cited 22 November 2022]. https://www.longfinance.net/programmes/financial-centrefutures/global-green-finance-index/ggfi4-explore-data/ggfi-4-key-drivers-green-finance

2.3.2 Market mechanism

The key to implementing green investments is adapting to the ever-changing market. The market mechanism for green financing has a lot of promise because of the growing demand for environmentally and socially responsible investments. Investors of all ages, including millennials, may play an important role in reshaping the financial landscape. Growing evidence and recognition that "value investments" offer additional returns when linked with mechanisms to absorb environmental and social externalities to create financial incentives for the active players is driving the growth in demand for green capital. If the generated service or product does not meet the needs of the market or the price is not competitive, there is always a risk. As a result, businesses may suffer losses. In order to speed up the transition to low-carbon corporate business practices, institutional investors are increasingly exercising their power and influence. Capital markets must incorporate environmental costs and risks in order to achieve the 2030 Agenda for Sustainable Development's SDGs, otherwise none of the efforts toward sustainability will make a difference.

2.3.3 Other important drivers

- ***Public financing incentives***. A combination of traditional and innovative approaches can be used by the government to link green projects with financial resources by improving their access to capital, facilitating risk reduction and sharing, building up the capacity of market participants, as well as influencing broader market practices and conditions. The more time

a company has had with a bank, the more likely it is that it will use green investing tactics. However, a company's efforts in environmental innovation may be stifled by the presence of many credit relationships. Firms that are financially limited or heavily indebted are more likely to meet challenges.

- ***Consumers and stakeholder behavior***. Consumers are more aware and worried than ever before about the environmental impact of the things they buy. Investors, shareholders and non-governmental organizations are all pressuring firms to invest in environmentally friendly technologies. However, recipient companies are frequently reluctant to do so because of the additional costs and dangers involved.
- ***Investor preferences***. Investors are concerned about environmental damage, and companies need to address this issue in the process of increasing environmental performance. Investors today appear to be forced to make a decision between "conventional" (strictly financial) investments and "sustainable" investments. There are particular dangers associated with funding green ventures, and as a result, investors increasingly require investment security that is at least based on indicators. There is currently a lack of significant involvement by scientists in the development of indicator-based methods for incorporating sustainability values.
- ***Organizational culture***. Entrepreneurs are motivated to do better for the environment by their own personal ideals and characteristics. Internal and vertical integration of sustainability activities within a company and between departments, strategies, and divisions is necessary to boost an organization's chances of becoming more sustainable.

3. Ecosystem, instruments and innovations

In the wake of the COVID-19 pandemic, green finance has become a hot topic in the global development community, and investors have taken notice. Green finance's unique characteristics, along with policy and regulatory assistance, are helping to direct capital flows in the direction of reaching the SDGs by 2030. Green finance investment products are attractive because they outperform traditional investments over time (WEF, 2020). They are also more resilient, with better control over volatility when things become rough. The rising popularity of green funds can be attributed to recent market gains, which are clearly evident. Due to greater risk management, the global architecture for green financing is resilient. There is a brief overview of worldwide developments in the green finance ecosystem – and the instruments and innovations related to it – in this chapter of the report.

3.1 The green finance ecosystem

As the effects of climate change continue to impact agriculture and other sectors of the economy, the need for relevant government departments and financial institutions to understand and adopt more sustainable practices becomes ever more pressing. The UN Inter-Agency Task Force on Financing for Development and other agencies tracking the development of green finance have indicated that transitioning to green growth pathways will require significant finance and investment in developing countries, and more importantly, a major shift and scaling up in the way both the public and private sectors invest. This calls for a clear understanding of the sustainable and green finance ecosystem – as it is worth noting here that the focus of green investments/finance by public and private sector differs based on national priorities6 and business considerations respectively – and reflects the importance of the green finance continuum and its ecosystem.

[6] National governments generally fulfil their NDC commitments from budgetary allocations. It was observed that the energy, agriculture and SME sectors receive the lion's share of these allocations in most of the developing countries, which however need various levels of tracking to measure the impacts. On the other hand, private enterprises' investments are generally focused around the high-return energy and transportation sectors, which also support national growth.

3.1.1 Actors in the green finance ecosystem

The global green finance infrastructure is ever-changing, as multilateral, bilateral, and regional efforts and channels all contribute to the flow of funds. For green finance programmes to succeed, all ecosystem players, as well as their capacities and quality of engagement, are required. There must be significant policy backing and political will in order to implement an integrated funding structure for green finance. Listed in Table 3.1 are the important players and their roles in promoting green finance.

TABLE 3.1: Stakeholders in green finance and their roles

Stakeholders	Roles
National and local governments	• Generally involved in the development of green infrastructure and seek to develop a green project pipeline and obtain funding through debt issuance in capital markets; • Government provides subsidies, tax incentives and other policy instruments to promote green investments from both private and public entities; • Government, in partnership with other public entities (such as multilateral/bilateral development finance institutions) or the private sector, may share the risks that can arise from green infrastructure project development.
Central banks and financial regulators	• Play a key role in allocating resources to sustainable investments and discourage activities that may harm the environment; • Directly influence investment decisions and the creation and allocation of credit through monetary as well as microprudential and macroprudential policies; • Facilitate expansion of green finance through instruments such as disclosure requirements, interest rate setting and variation of reserve or capital requirements according to environmental impact of the projects.
Development financial institutions (multilateral, bilateral and national)	• Mandated to support developing countries achieve their NDCs through innovative and high impact financial instruments (blended finance and credit enhancement mechanisms); • Provide long-term lending for infrastructure development in order to reduce risk exposures and enhance market incentives for investors to mobilize private capital; • Subscribe to private placements or act as the anchor investors in debt issuance and initial public offerings (IPOs) to help the companies seeking funding to build investor confidence and catalyse investments.
Commercial banks and other financial institutions	• Key source of funding, given their market expertise at a regional and country level. Function as aggregators of green projects and refinancing in the green bond market, or may be able to develop green securitizations; • Provide indirect capital market access for small and medium enterprises (SMEs) through alternate routes; • Green banks and dedicated green divisions contribute to accelerating private sector participation in green projects.
Specialized financing facilities/funds	• These finance facilities employ innovative approaches to generate bankable project pipelines through technical support and access to funding; • These funds are also a source of financing support to project under public-private partnerships; • International specialized funds focused on green bonds focused on investing in emerging markets.

(cont.)

Green investment banks (OECD, 2017b)[7]	• Able to overcome the barriers of private investments and leverage the impact of available public resources; • Green investment bank (GIB) and GIB-like entities support extending green finance to domestic low-carbon, climate-resilient infrastructure, water and waste management; • GIBs are exclusively focused on green investment and face fewer competing agendas.
Institutional investors	• Able to provide financing at scale due to high levels of liquidity in the system; • Pension funds, insurance companies, sovereign wealth funds, hedge funds, mutual funds support promoting green finance; • Create market liquidity and enable primary lenders to free up capital and make space for new green investments; • Play a critical role in scaling up domestic currency financing through direct lending or equity investment in large, long-term green projects.

Source: Authors' own elaboration.

3.1.2 Multistakeholder engagement approach in green finance

The success of green finance cannot be credited to the industry alone. The governmental sector, development finance institutions (bilateral and multilateral), development cooperation providers, and civil society organizations (CSOs) all play important roles in attracting private sector investment to green financing projects (Table 3.2). The development process will not be successful if any of the actors in this continuum do not participate. An effective transition to the 2030 Agenda will include partnerships of this type.

TABLE 3.2: Stakeholder engagement approaches

Roles	Public sector institutions	Development finance institutions	Development cooperation providers	Private sector	Civil society organizations
What they contribute	Address finance gaps for longer-term investments Enable policy prescriptions Allow public research institutions to support the development agenda Provide local administrative support	Bring both long and short-term funds Introduce new financial instruments Long gestation period Provide grants for pilots	Facilitate fundraising Global knowledge Efficient programme management Legitimacy and authority Local connections Institutional sustainability	Bring funds Innovation and technology, standards and business practices, know-how and expertise, efficiency Economic sustainability Local contacts in value chains	Ground contacts, local context and expertise Implementation capacity Convening, bargaining, facilitating power Legitimacy and credibility Whistleblowers to climate wrong doing

(cont.)

[7] According to the OECD, national and subnational governments have established 13 public green investment banks (GIBs) and GIB-like entities(a) at the national level in Australia, Japan, Malaysia, Switzerland and the United Kingdom of Great Britain and Northern Ireland; (b) the state level in California, Connecticut, Hawaii, New Jersey, New York and Rhode Island in the United States, (c) the county level in Montgomery County, Maryland, United States of America and (d) the city level in Masdar, United Arab Emirates (OECD, 2015).

Roles	Public sector institutions	Development finance institutions	Development cooperation providers	Private sector	Civil society organizations
What they gain	Public support and confidence Exploration of new ideas for investments Coordination with multiple organizations	Increased investments in low-income countries Improved country portfolios Manage risks through diverse portfolio	Increased private investment, especially in low-income countries Influencing development outcomes of business practices Enhanced leverage, in line with public policy Soft and hard skills used to make official development assistance (ODA) more effective	Cost-sharing with other actors in supply chain Risk and reputation sharing Legitimacy to help the project process Support increasing development impact Long-term market development and increased customer base and brand establishment Greater competitiveness Increased market share	Local influence Higher development impact in focused areas New sources of financing

Source: Authors' own elaboration.

Building a multistakeholder partnership is a journey, and partnership leaders continue to improve, refine and contextualize their approach over time. There are many successful examples where multistakeholder partnerships have excelled in implementing green development projects in infrastructure, clean energy, irrigation and agricultural development. The World Economic Forum's (2016) Public–Private Partnerships for Integrated Agriculture Development (PPP-IAD) project implemented in India is a perfect example (Box 3.1), demonstrating that multistakeholder partnerships can lead to the development of grassroots institutions and support all round development of farming community.

BOX 3.1: Multistakeholder partnership for green finance in India

PPP-IAD, a joint effort between the World Economic Forum (WEF) and more than 60 organizations and almost half a million farmers in Maharashtra state in India, generated more than USD 50 million in investments. Over the course of three years, this intervention grew from ten value chain initiatives to 33 and saw an increase in investment from USD 10 million to USD 50 million (2012–2015). Access to markets, water resource management, electrical availability, and a heavy reliance on government aid were all major issues the enterprise had to deal with. Local commercial banks provided major support for the development of market-driven business models that finally led to the foundation of commodity-based farmer producer organizations (FPOs). Through new initiatives and expanded relationships with corporations, farmers, and government agencies, the project hoped to reach 2.5 million farmers by 2020 as part of its goal.

Source: WEF. 2016. *New Vision for Agriculture Transformation Leaders Workshop 2015. Summary Report*. Cologny, Switzerland. http://www.eaglesoncassava.com/wp-content/uploads/2016/03/WEF_NVA_TLW15_Report.pdf

3.1.3 Nexus of the public and private sectors in green finance

Green growth can only be achieved if all sectors of society work together to generate new skills, unlock innovation, achieve more sustainable resource management, and create new ideas and paths for how economies are grown and communities interact. Public–private partnerships have proven to be an effective means of mobilizing resources, skills, and innovative leadership needed to achieve green growth objectives. The sustenance of the green finance ecosystem greatly depends on the businesses strategies and investment instruments[8] being used by the private sector and the entities under public–private partnerships (PPPs), which also includes special purpose vehicles (SPVs). Funding from public sources, such as grants and subsidies, is crucial for green business growth since it allows for previously unfunded innovations and capacity building. According to Habte-Selassié, the Yield Uganda Investment Fund is an example of IFAD's efforts to bring together the public and private sectors to promote agricultural growth, as demonstrated by the Yield Uganda Investment Fund (Box 3.2).

BOX 3.2: IFAD's Yield Uganda Investment Fund (YUIF)

Small and medium-sized agribusinesses (SMAs) in Uganda can benefit from long-term financing through the Yield Uganda Investing Fund (YUIF), an innovative IFAD "impact investment" project that brings together public and private investors and service providers. In order for YUIF to invest in a company, it looks at the company's potential for both financial and social gains. Therefore, YUIF has a dual obligation: (a) to ensure that its investments generate financial returns for its investors, and (b) to make sure that those most in need benefit from the investments. ESG factors are taken into consideration while investing in agribusiness-focused development services. Other important factors for the fund's performance include the investors' willingness to take risks, the fund manager's position in the local community, and the availability of technical help and cooperation among investors and financiers.

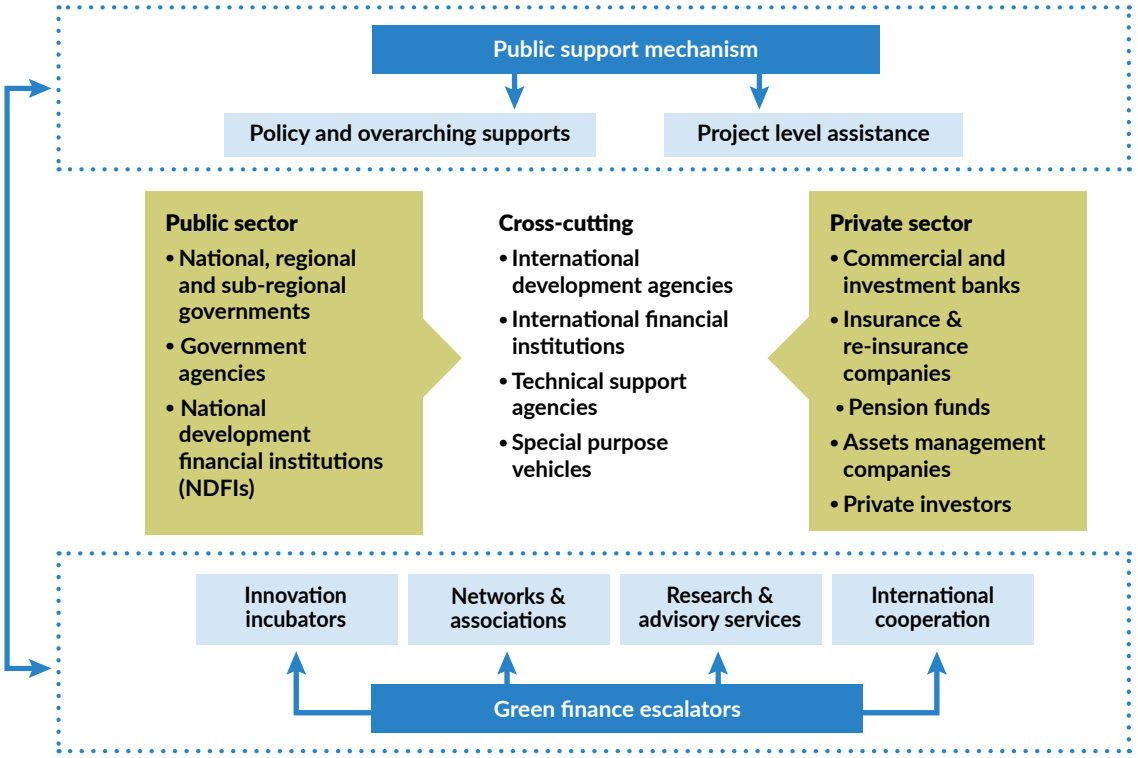
Source: Habte-Selassie, D. 2019. Uganda Yield Fund: early lessons from IFAD's first private sector investment fund. IFAD Blogs, 20 May 2019. Rome. [Cited 14 March 2022]. https://www.ifad.org/en/web/latest/blog/asset/41168206

3.1.4 Escalators in the green finance ecosystem

To promote the flow of financing to green growth in a sustainable manner, the green finance ecosystem includes public, private, and cross-sectoral sectors. In order to be successful, these endeavours require public support mechanisms, such as macrolevel enabling policies and project-level support. Accelerators for generating new ideas and eventual investment demand for green initiatives include the development of stakeholder capacity and investment readiness through research and consulting services, networks and associations, innovation incubators, etc. Figure 3.1 provides a visual representation of the green finance ecosystems and their interactions.

[8] Grants, subsidies, equity, debt finance, guarantees and other innovative instruments.

FIGURE 3.1: Green finance ecosystem



Source: Authors' own elaboration.

However, until green financing escalators are operational in the ecosystem, the public support mechanism serves both at the policy and project level. Among the four main escalators are (a) innovation incubators, (b) networks and associations, and (c) research and consulting services. These escalators have the potential to play a significant role in the life cycle of green development, but their methodologies are currently fragmented and disjointed.

3.2 Green finance instruments

Green finance is not just the financing of a single product or activity, rather an entire financial system which must use different instruments to finance a range of activities with the single goal of promoting a green economic transformation. The predominant financial instruments in green finance are debt,[9] equity,[10] credit enhancers,[11] and risk transfer.[12] Investing in debt and equity funds is the most common method of financing green projects. The reason for this is that they allow projects and cash flow to be combined into a single investment. Multiple initiatives can be

[9] Debt financing instruments are used for borrowing a fixed sum from a lending institution, which is then paid back with interest based on agreed terms and conditions.

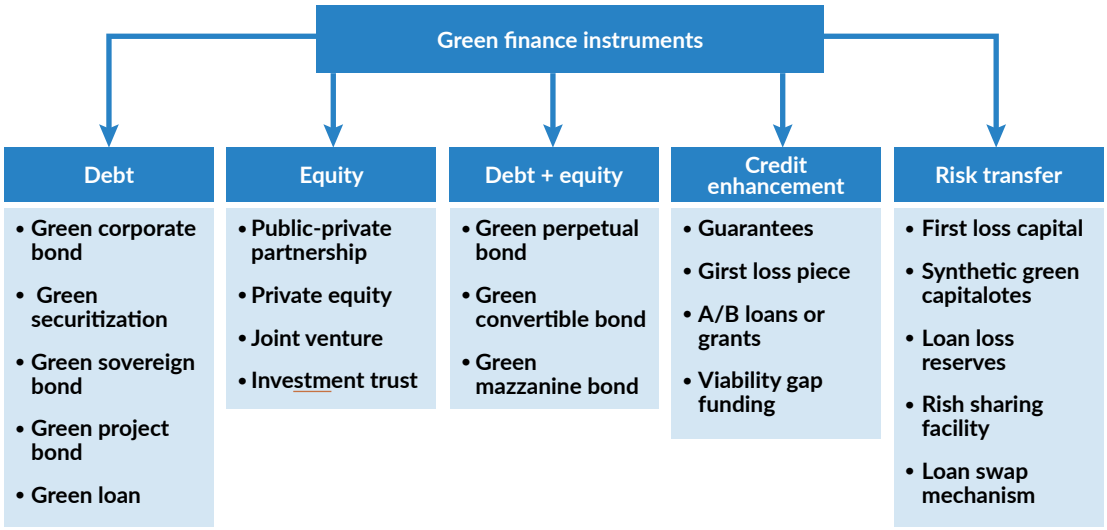
[10] Equity financing is the sale of a percentage of the business to an investor in exchange for capital inflow by the investor, i.e. investing capital in a company's stock in return for an ownership interest. This is often used in the early stages of developing a project or company.

[11] Credit enhancers are an instrument which provide confidence to financial institutions to extend debt (both medium- and long-term) and risk mitigations tools. For example, credit guarantees, insurance etc.

[12] Risk transfer is the process of shifting the burden of financial loss or responsibility for risk financing to another party. Examples would be through insurance, reinsurance, legislation or other means.

brought together under one umbrella, including land use, forestry, and agriculture. Loan/credit guarantees from public finance organizations are frequently used by investors to mitigate risk. Figure 3.2 below and Annex 1 provide an overview of common green finance vehicles.

FIGURE 3.2: Green finance instruments



Source: Authors' own elaboration.

3.2.1 Instruments to unlock private capital

All throughout the world, green finance is advancing at a rapid pace. To meet climate change and environmental goals, more green/sustainable financial instruments (bonds, loans, etc.) are appearing on the market, indicating that private investors are interested in these products, although the market still needs to grow substantially. It is possible to find numerous examples of multilateral development finance institutions (DFIs) and international financial institutions (IFIs) initiating procedures to unlock private capital through the use of public funds in green initiatives. Governments can use the Green Finance Catalyzing Facility (GFCF), a proposal established by the Asian Development Bank (ADB), to unlock private and commercial financing for green projects (Box 3.3).

BOX 3.3: The Asian Development Bank's Green Finance Catalyzing Facility (GFCF) approach

The Green Finance Catalyzing Facility (GFCF) has been conceptualized to create a national or regional green finance vehicle which will: (i) directly catalyse a pool of bankable green infrastructure projects in a specific country, through (ii) assisting projects in creating both financially bankable as well as environmentally sustainable models, with timebound green targets, by utilizing (iii) concessional sovereign and development finance to mitigate risks, linked to (iv) clear conditionalities for both, achieving green indicators and crowding in a blend of private sector finance at the project level, as well as (v) accessing private sector finance at the pooled GFCF vehicle level itself, while (vi) strengthening the country's green growth policies and leveraging structures, allowing a gradual reduction in national-level fiscal burdens from external

(cont.)

debt. In contrast to common green finance approaches, the GFCF uniquely aims to incentivize aggressive green outcomes in projects, including those that can be retrofitted, through addressing the vacuum of bankability, hence linking the channeling of finance with both financial and environmental sustainability.

Source: ADB. 2018. 2018. *Catalyzing Green Finance: A concept for leveraging blended finance for green development*.Manila.http://dx.doi.org/10.22617/TCS178941

Established in 2010 by the UNFCCC, the Green Climate Fund (GCF) is one of the specialized institutions for stimulating private funding through public investments, offering an array of financing instruments, including loans, equity, guarantees, and grants, to design tailored solutions that address specific investment barriers. Until February 2020, the GCF approved USD 5.42 billion in funding and potentially raise an additional USD 13.9 billion in co-financing during that time period (GCF, 2020). In order to maximize the impact of limited public resources, GIBs have been established by a number of national and subnational governments. GIBs channel private investment, including that from institutional investors, into greening activities through the use of novel transaction structures, risk reduction approaches, transaction enabling techniques, and local and market experience.

3.2.2 Innovative green finance products

"Green" products like green bonds, green credit, green insurance, and blended finance have arisen in the financial markets over the past few years. This is driven by international accords, which have led to an increased focus on green finance and are considered essential drivers of green growth and sustainability. New developments in financial instruments, such as blended finance, which has attracted both public and private sector investors, have led to an increase in green impact financing. Blended financing allows investors to access a wider range of private sector funding through a variety of channels with varying levels of risk, hence reducing the cost of capital for investors. It has revealed that Sharia-compliant Islamic green bonds, or "green *sukuk*", have arisen as high potential and market-driven fixed-income bonds that are increasing at a quicker rate in Islamic countries, and have now been extended to many countries in the Near East, Africa and Asia (Box 3.4).

BOX 3.4: The global market for "green *sukuk*"

Across markets in the Near East, Africa and Southeast Asia, there is growing demand for "green *sukuk*" – bonds that adhere to the principles of Islamic law (Sharia). Green *sukuk* have the potential to channel the USD 2 trillion Islamic finance market towards the funding of green and sustainable investment projects. The global *sukuk* market grew at a pace of around USD 100 billion of issuance in 2019, with an annual growth rate of around 18 percent. Within this market, green *sukuk* surpassed USD 4 billion of issuance in 2019.

Source: Giordano, J. 2020. The development of the global [italics]sukuk[italics] market from an indexing perspective. *Standard and Poor*, 5 February 2020. New York, USA. [Cited 14 March 2022]. https://www.spglobal.com/spdji/en/education/article/the-development-of-the-global-sukuk-market-from-an-indexing-perspective

3.2.3 Green insurance products

As a key "shock absorber" for financial losses in decreasing real risks to assets, in health and safety, and as a large investment in the real economy, the insurance business is actively pursuing

a substantial role in sustainable development. In particular, the insurance business is responding to sustainable development concerns related to natural disasters, financial inclusion, and the insurance and investment demands of the green economy. According to the United Nations' Principles for Sustainable Insurance (PSI), an industry-wide framework for risk reduction, innovative solution development, improved business performance, and contribution to environmental, social, and economic sustainability has been developed (UNEP, 2012). Green insurance products are investments that are long-term and reduce the danger of financial loss. From agriculture solutions to home reconstruction, these products are fast appearing all over the world. Sustainable behaviours and catastrophe preparedness are both promoted by a wide range of existing green insurance products. For the most part, there are wide variations in the underwriting and investment methods from country to country and company to company green insurance can be divided into four categories: (a) renewable energy, (b) green building insurance, (c) green car insurance, and (d) green agriculture insurance. Providing green financial services necessitates the use of green insurance products, which serve multiple purposes: combating climate change, fostering risky technical advancements, safeguarding investors' money, and promoting risk-averse behaviour.

3.2.4 Green microfinance

Green microfinance refers broadly to the operational practice of microfinance institutions (MFIs) supporting the principles of environmental sustainability while delivering service to low-income clientele. While green microfinance is often associated with microloans for clean energy solutions,[13] MFIs have the option of implementing a broad spectrum of green strategies, ranging from "do no harm" policies to "positive environmental impact" initiatives at the portfolio and institutional levels. In fact, four different types of strategies, or essential practices, in green microfinance can be distinguished: (a) managing internal environmental risk, (b) managing external environmental risk, (c) fostering green opportunities and (d) adopting a formal environmental strategy. VIRL Financial Services of Zimbabwe is one of the many MFIs in Africa promoting green microfinance in the agriculture and rural energy sector to support the global agenda of achieving a climate-resilient society (Box 3.5).

BOX 3.5: Green microfinance by VIRL Financial Services

Founded in February 2010, VIRL Financial Services is a Zimbabwean microfinance institution. It is VIRL's mission to help financially excluded and vulnerable women and young people start and grow successful enterprises that create jobs while also reducing rural-to-urban migration. Approximately 25 000 families were receiving loans from VIRL as of December 2019. The loan portfolio stood at approximately USD 19.2 million at that time. Among its borrowers, women and young people account for 55 percent of all balances. In 2013, VIRL sought to collaborate with Hivos' Green Performance programme to develop green products. The Green Performance Agenda and the green microfinance strategy were introduced to the MFI (GPA). The first GPA intervention offered suggestions and a course of action for moving in a more environmentally friendly direction. A number of agricultural production-improving tools, such as solar irrigation pumps, hand-driven ploughs and cultivators, and ecostoves, have been developed by VIRL since then as the company continues to investigate and develop new loan products.

Source: MIX (Microfinance Information Exchange) & e-MFP (European Microfinance Platform). 2015. *Assessing green microfinance*. Washington, DC. https://www.e-mfp.eu/sites/default/files/resources/2016/01/Assessing%20Green%20Microfinance%20-%20Qualitative%20and%20quantitative%20indicators%20for%20measuring%20environmental%20performance.pdf and VIRL. 2020. VIRL Financial Services. [Cited 18 March 2022]. Harare. https://virlmicrofinance.co.zw

[13] For example, solar home systems, solar chargers, improved cooking stoves, etc.

3.3 Innovations in green finance

As a result, innovative green finance models are based on non-traditional approaches to the use of solidarity, public-private partnerships, and catalytic mechanisms that (a) support fundraising by tapping into new funding sources; or (b) deliver financial solutions to development issues on the ground. Enterprise and investment banking services, bond underwriting, and equity, asset management, and consultancy are all now offered by financial institutions. Digital technology-driven improvements in regulations and delivery models are also reshaping the landscape of green finance in addition to product advances.

3.3.1 Innovations in green finance delivery and best practices

By adopting cues from best practices, tailored instruments, and creative business models that were tailored to fit local need, the current form of green finance has evolved into what it is today. We learned how to balance instruments to the capacity of both demand and supply from these inventions and good practices. Providing environmental advantages, increasing revenue generating possibilities, and improving capital structure by providing efficient sources of financing and equity are the primary motivators for these financial instrument innovations aimed at extending green finance. The multistakeholder partnership of the China-led Belt and Road Initiative's International Green Development Coalition[14] and the development of new delivery mechanisms by establishing a national-level Green Fund in South Africa (Box 3.6) are both examples of global best practices being used to catalyse the transition supporting the achievement of the SDGs.

BOX 3.6: The Green Fund of South Africa

As a part of South Africa's green economic transition, the country has established the Green Fund. Department of Environmental Affairs (DEA) funds are administered by the Development Bank of Southern Africa (DBSA). An innovative, high-impact green strategy is the focus of a three-year programme (economic, environmental and social). South Africa's transition to a green economy will be aided by the Green Fund's ability to provide catalytic funding for project commencement and development, policy and research creation, and capacity-building efforts. (a) Promoting innovative and high-impact green programmes and projects; (b) reinforcing sustainable development objectives; (c) building an evidence base for the expansion of the green economy; and (d) attracting additional resources to support South Africa's green economy development are some of the goals of the fund.

Source: South African Department of Forestry, Fisheries and the Environment. 2022. Green Fund. In: *Projects and Programmes*. Pretoria. [Cited 18 March 2022]. https://www.dffe.gov.za/projectsprogrammes/greenfund

As defined by the Global Green Growth Institute (2016), innovative financial mechanisms are a novel structure or combination of traditional financial instruments that leverages greater investment from multiple investors (private and public) by lowering the cost of capital through measures that mitigate one or more investment risks. They must meet the following three requirements for novel financial methods:

a) *Blended instruments*. Diverse risk-reducing tools, such as grants, guarantees, and insurance policies, are typically combined in new financial structures to create a diversified capital

[14] The Belt and Road Initiative is a China-led effort to promote economic development and interregional connectivity in over 115 countries, and is arguably the largest single investment in infrastructure in generations. This undertaking will involve trillions of dollars of investments, largely in transportation, energy and telecommunications infrastructure, industrial capacity and technical capacity building (UNEP, 2022).

structure. In a classic example of a public-private debt fund, the Africa Agriculture and Trade Investment Fund (AATIF) managed by Deutsche Bank aims to make sustainable investments in Africa's agricultural sector. Investors from the public and private sectors contribute to the fund's capital structure in various tranches with various characteristics of size, riskreturn profiles, and maturities (AATIF, 2022). The SDG Invest platform[15] designed a specialized structured blended finance vehicle through its Build Malawi window aimed at mobilizing USD 35 million. The money will be invested patiently. As a result of this guidance, businesses will be able to better their growth and effect on the SDGs while reducing the risks that come along with it.

b) *Risk reduction*. Guarantees and insurances, as well as innovative financial arrangements, are aimed to decrease investment risk. An agricultural development bank of second tier in Mexico, the Trust Funds for Rural Development, *Fideicomisos Instituidos en Relación con la Agricultura* (FIRA), provides government-funded guarantee schemes to support renewable energy and biofuels initiatives as well as efforts to improve energy efficiency and maintain commercial forestry and irrigation systems in the country.

c) *Leverage achieved*. By unlocking extra finance from both public and private sources, innovative financial systems achieve leverage. The Rajasthan Agricultural Competitiveness Project in India is a classic example of innovations around unlocking private finance, with a main component relating to climate-resilient agriculture (World Bank, 2012).

3.3.2 Innovations in policies as enablers

Many of the best practices for seamless development finance interventions have been developed as a result of policies and regulations. The majority of the time, these policies promote ecosystem investment in order to assist in establishing the required governance frameworks or to embrace a development strategy that takes into account both economic growth and environmental concerns. A "green macroprudential policy framework" adopted by the Central Bank of Brazil is an example of a green banking policy tool that supports sustainable finance (Box 3.7).

BOX 3.7: Green prudential policy

Defining and reducing systemic financial risks to the macroeconomy as a result of climate change is the goal of green macroprudential policy. Green macroprudential tools include climate stress-testing of the banking system, varying capital requirements depending on the bank's proportion of green portfolio, and limits on loan exposure and financial ratios. Green macroprudential instruments, central banks and regulators can use these tools to influence the lending activity of banks by pushing them to participate in greener projects. As far as macroprudential instruments go, the Basel Accords are unquestionably the most effective.[16] The goal of green microprudential policy is to encourage financial institutions to include environmental and social safeguards into their policies and operations. For example, banks may disclose climaterelated financial risks, create and apply risk management policies based on the environment or society, or set different reserve requirements.

Source: Park, H. & Kim, J.D. 2020. Transition towards green banking: role of financial regulators and financial institutions. *Asian Journal of Sustainability and Social Responsibility*, 5(5): https://ajssr.springeropen.com/articles/10.1186/s41180-020-00034-3

[15] SDG Invest is the UN platform to host and support ambitious proposals that aim to mobilize much needed resources for the achievement of the SDGs at scale. Further details see: UN Joint SDG Fund, 2022b.

[16] The Basel Accords are a series of three sequential banking regulation agreements (Basel I, II, and III) set by the Basel Committee on Bank Supervision (BCBS). The Committee provides recommendations on banking and financial regulations, specifically concerning capital risk, market risk and operational risk (see BIS, 2022).

Financial vehicles, processes, and fiscal incentives are being used by the United Nations Environment Program (UNEP) to facilitate green investment and financing. Fiscal measures can assist in overcoming this financial gap by directing development toward a more sustainable path by generating incentives. Governments may encourage green growth and sustainable global value chains by reforming subsidies and implementing creative tax incentives.[17] Fiscal reforms may be used by policymakers to better encourage private sector investment in agriculture and forest conservation and restoration. Sustainable transitions are less expensive for the entire economy when implemented with innovative and improved fiscal policy, and private sector investors are more willing to fund these transitions on their own dime. As part of an overarching development paradigm, both of the above effects are critical to minimizing the public funding gap for the SDGs.

3.3.3 Innovations in building partnerships

Innovation, broad-based alliances and joint actions are becoming increasingly important in green finance business models. Several global (public and private) agency efforts have been put in place to work together as development partners in order to ensure the attainment of the SDGs. Building innovative relationships with governments, charitable institutions, firms and investors; communities; civil society; and academics could help transform this momentum for market change. As a result of these forward-thinking collaborations, new products and tools are being developed to aid in green growth and the proper adaption to climate change. Green financial sector regulation, capacity building in financial institutions, and the introduction of innovative financing concepts are all part of the partnership's goals in some cases. It also works to develop weather and agricultural insurance solutions, among other things. The following is a brief summary of some of the most notable global advances in green finance partnerships (Box 3.8).

3.3.4 Technology-enabled innovations

Green financial services will be shaped in the future by two important factors: technology and sustainability. Innovative green technology (greentech), financial technologies (fintech), and agricultural technologies are progressively influencing the landscape of green finance (agritech). In contrast to green energy, green buildings and green transportation, fintech is taking the lead in bringing greentech to the last-mile recipients. Climate-smart agriculture relies on the more environmentally friendly form of agritech to cut down on greenhouse gas emissions. By synchronizing their operations to meet sustainability concerns, these three technology advances work together to create value for investors, customers and society. Listed in Table 3.3 are brief descriptions of various technological advancements from each of the three categories to help you better understand their applicability.

BOX 3.8: Green finance global partnership innovations

Numerous new collaboration models have been developed by the global players to mainstream the change towards green economies. The following is a quick description of a few of these models.

- **United Nations Environment Programme Finance Initiative** (UNEP FI) is a unique collaboration between UNEP and the global financial industry to get private money flowing into green projects. The effort is supported by approximately 300 members of the UNEP FI

[17] Improved management of soil, water and forests, and restoration of degraded land and seascapes. *(cont.)*

network – banks, insurance companies and investors – and over 100 supporting institutions. UNEP FI's mission is to help financial institutions improve their ability to deal with environmental risks.

- **Climate Finance Partnership** (CFP), in its partnership to speed up capital flow into climate-related initiatives in emerging nations, reached agreement on the fundamental terms and structure of their flagship blended finance investment vehicle. France, Germany, the Hewlett and Grantham Foundations, and BlackRock are all participants in the CFP, which demonstrates the distinctiveness and diversity of the relationship between public and private sectors to address climate risks.
- **Global Knowledge Partnership** (GKP) was established under the aegis of the United Nations, involving with some of the world's largest organizations, in July 2019, and is made up of: (a) the Green Industry Platform and (b) the Green Finance Platform (UNEP, 2019b). These platforms provide the financial and private sectors with the latest research, data, guidance and tools from leading experts and institutions to help green their operations.
- **Global partnerships and initiatives on inclusive green finance by AFI** supported financial institutions and investors to join hands in extending inclusive and green finance. There are some classic examples of partnerships providing credits and technical advises/assistance to the private sector entities extending green finance (AFI, 2022).
- **Tropical Forest Alliance (TFA)** is a global partnership of over 120 businesses, governments and CSOs which committed to reducing tropical deforestation related to key global commodities by 2020, starting with soy, beef, palm oil, and paper and pulp. TFA2020 makes the case for sustainable supply chains as an essential aspect of achieving development and growth objectives.

Source: Authors' own elaboration.

TABLE 3.3: Technology-enabled innovation

Technology	Brief description and role in promoting green finance	Problems addressed	Challenges and issues faced	Examples
1. Greentech (green technology)	Refers to the use of environment-friendly technology in production processes or supply chains which contributes to both poverty reduction and sustainable agricultural development.	This technology supports clean energy production, which involves the use of alternative fuels and technologies that are less detrimental to the environment than fossil fuels. The goal of greentech is to protect the environment, repair damage done to the environment in the past, and conserve the Earth's natural resources. Greentech has also become a burgeoning industry that has attracted enormous amounts of investment capital.	Often policies are giving conflicting signals, hindering the uptake of green technologies. For example, some policies are encouraging overexploitation of natural resources without considering the environmental spillover impacts.	A study conducted to examine the diffusion of green and renewable energy technologies (GRET) to support cassava processing in Nigeria and maize in Kenya (UNIDO, 2014). The report reveals that the GRET industry in the two countries is young and growing. Solar and biomass are among the biggest GRET markets, with solar photovoltaics based on foreign technology and biomass mostly based on domestic technology and knowhow.

(cont.)

2. Fintech (financial technology)	Financial technology is a term to describe new and innovative technological solutions that aim to improve and automate the delivery and use of financial services. This expanding landscape includes distributed ledger technology (DLT) or blockchain, artificial intelligence (AI) and the Internet of things (IoT). Fintechs are well placed to meet the changing demands of diverse customers in the green finance ecosystem.	This implies an ecosystem of technologies which is expected to annually connect an average of 125 billion devices worldwide by 2030 (PwC, 2017). It also addresses the advancement of green finance which remains underleveraged in unlocking new sources of finance. Fintech has an impact along the whole value chain of financial services, covering customer-to-customer (c2c), business-to-customer (b2c) and business-to-business (b2b) services. There are three key enablers that will affect the role of fintech in green finance: collection of authentic data,government support and policy, and guidelines, rules and regulations from regulators.	Fintech also create new risks and unintended consequences, including for the environment, which can limit their potential to scale green finance	The Ant Financial Services group (formerly known as Alipay), a China-based leading fintech company, launched a large-scale pilot to engage with consumers in shaping their behavior in ways aligned with green finance at scale. The "Ant Forest" encourages Ant's users to reduce their carbon footprint through a threepronged approach (Nassiry, 2018): (a) providing individualized carbon savings data to people's smartphones, (b) connecting their virtual identity and status to their earnings of "green energy" for reduced carbon emissions, and (c) providing carbon offset rewards through a physical tree planting programme.
3. Agritech (agricultural technology)	The coupling of agricultural technology with food science and technology (foodtech) points to innovation in the food development process, from farm to plate. Smart agricultural technology18 is an exceptionally important determinant of farming's contribution to green development.	This collective industry seeks to leverage technology to create efficiencies that benefit farmers, the environment and consumers. Some agritech supports resource conservation (reduced tillage techniques to control soil erosion) and precision agriculture which are the drivers of a decision support system for transformation to a green and sustainable society.	All the new nature-positive agritech technologies require a high level of knowledge and appropriate management which is difficult to achieve with the present level of infrastructure available in developing nations.	BeGreen is a Brazil based organic vegetable producing urban startup established to provide solutions for inefficient water systems and the high levels of chemicals used in vegetables by using an aquaponic technology. They use collected rainwater for irrigation and vegetable waste to replace inorganic fertilizers and reduce the emission of CO_2 (IDB, 2019). BeGreen also use other forms of agritech such as sensor technologies to monitor and optimize different production factors to produce fresh food in a sustainable and efficient manner.

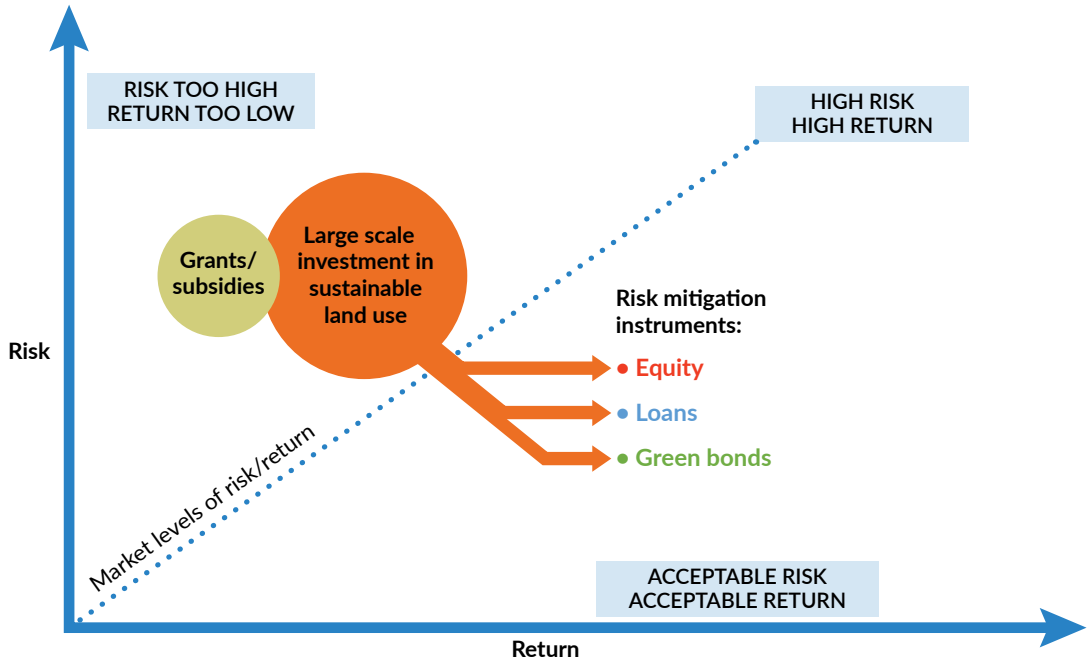
[18] As per the resolution on "Agricultural technology for sustainable development" adopted by the 74th UN General Assembly, 19 December 2019, which recognized "that agricultural technologies have improved the productivity of agriculture and enhanced the sustainability and resilience of food production systems at the local level". (UNGA, 2019, p. 3).

3.3.5 Innovative risk-proofing mechanics

The willingness of investors and financial intermediaries to give money for green investments is closely linked to a comparable advancement in risk management. Investors' decisions are heavily influenced by both perceived and real risks, and many impact investors continue to focus on areas they perceive to be less hazardous (e.g. transport, energy, waste etc.). With risk mitigation instruments, potential capital investments can be unlocked. With regards to bi- and multilateral donor organizations and national governments providing grants and subsidies, Girling and Bauch (2017) found that they often cover investments in land uses where risks are relatively high and returns are low (Figure 3.3). As long as the latter are still limited, but the dangers are much lower, green bonds are a feasible option. While risk remains low to moderate, rewards rise, and additional financial instruments such as loans and equities are introduced.

The financial sector is working to rethink its strategy and monetize the risks associated with the new approach of climatepositive investments in order to effectively manage and safeguard against the possible repercussions of climate catastrophes. Financial institutions will have to adapt their risk management systems to incorporate environmental, social, and governance (ESG) factors. Energy Savings Insurance (ESI), a hybrid risk mitigation tool, was established by the Inter-American Development Bank (IDB) to assist small and medium-sized enterprises (SMEs) in the region.

FIGURE 3.3: Risk and return matrix in green finance



Source: Adapted from Girling, A. & Bauch, S. 2017. *Incentives to save the forest: Financial instruments to drive sustainable land use.* Oxford, UK, Global Canopy. https://www.tropenbos.org/file.php/2326/smallholder%20risk%20management%20strategies%20-%20draft%20clean.pdf

Box 3.9: The Energy Savings Insurance (ESI) of the Inter-American Development Bank (IDB)

The Energy Savings Insurance (ESI) of the Inter-American Development Bank (IDB) programme aims to encourage small and medium-sized businesses (SMEs) in Latin America to invest in energy efficiency and distributed generation. Its goal is to provide a new approach to ensuring energy efficiency, which reduces project risk and boosts confidence among investors. In collaboration with the National Development Banks, the IDB helps to create the ESI programme (NDBs). The components of the ESI model are as follows: an energy savings insurance plan, verification of the energy savings, and project finance The Clean Technology Fund and the Danish Energy Agency are providing financial support for the IDB's ESI instrument pilot in Mexico, which aims to attract USD 25 million in investment over six years for 190 energy efficiency projects in the agro-industry sector.

Source: Global Innovation Lab for Climate Finance. 2020. Energy saving insurance. In: *Global Innovation Lab for Climate Finance: Ideas*. San Francisco, USA. [Cited 14 March 2022]. https://www.climatefinancelab.org/project/insurance-for-energy-savings

In summary, there is a need for developing capacities among both smallholders/SMEs and investors/financial institutions for a better distinction between the perceived and real risks of green and sustainable investments in agriculture.

4. Green finance to the agrifood sector: an inclusive approach

Food and nutrition security around the world will be severely affected by even the most minor changes in agricultural practices. From the foundation of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 through the 26th Conference of the Parties (COP26) in Glasgow, Scotland, in November 2020, agriculture became a distinct agenda item in climate change discussions. The most important responsibility of global climate action committees and groups is to ensure food security while working for a safe and stable climate. Even after the 1997 Kyoto Protocol, which contained a promise to "promote sustainable agriculture in light of climate change considerations", agricultural and food systems have always taken a backseat in climaterelated debates (United Nations, 1998, p. 3). Agriculture and land use discussions in the UNFCCC have been fast-tracked during the past decade, with emphasis on both adaptation needs and mitigation possibilities in the sector. Additionally, there has been a broad understanding that the agrifood sector needs to address green financing beyond climate-smart agriculture. Traditional green financing, such as solar irrigation pumps or compressed natural gas-based agri-machinery, may be included to broaden the scope, but adoption of these technologies is needed to make them more widely applicable It is here that climate finance for agriculture is examined, covering the demand and supply components as well as funding structures, tools and implications. Consideration of the complexity and inclusion of green financing in the agrifood industry is examined in the larger context.

4.1 Climate finance to the agrifood sector

Global food and nutrition security will be severely impacted by even the tiniest shift in the agriculture sector's climate-sensitive activities. As a result of this success, agriculture became a distinct topic of debate at the 26th Conference of the Parties (COP26), which was held in Glasgow in November 2020. The conference revealed that the most important job of global climate action committees and

groups is to ensure food security while also aiming for a safe and stable environment. Agricultural and food systems have unfortunately traditionally been overlooked in climate negotiations, even after the 1997 Kyoto Protocol pledged to "promote sustainable agriculture in light of climate change considerations" (United Nations, 1998, p. 3). The United Nations Framework Convention on Climate Change (UNFCCC) accelerated discussions on agriculture and land use throughout the past decade, focusing on both adaptation needs and mitigation potential in the sector, and adding green investment mechanisms and vehicles. In addition to climate-smart agriculture, discussions at various levels and in various forums have also suggested a general recognition of the immediate need to explore green financing for the agrifood sector. For a larger view, this might encompass some operations under traditional green finance, such as solar irrigation pumps or compressed natural gas-based agri-machines, but acceptance for these is higher. Agricultural climate finance demand and supply aspects are discussed in this part, as well as the funding strategies that can be used to promote sustainable farming. The complexities and inclusion of green financing for the agrifood industry are examined from the perspective of the broad picture.

4.1.1 Defining climate finance

Climate finance, which is a subset of green finance, is an important tool for combating and adapting to the negative consequences and impacts of climate change. It turns out that no organization has defined climate finance specifically but that several provide definitions of climate mitigation and adaptation financing (Aldana *et al*, 2014). Without a universally agreed-upon definition of climate finance, the International Development Finance Club and the multilateral development banks (MDBs) came up with the IDFC-MDB Climate Finance Common Principles, a set of guidelines for how climate mitigation and adaptation funds should be defined. These principles are:

(a) increasingly mobilize finance for climate action;
(b) support country-led climate-related policies;
(c) catalyse investments and mobilize private capital;
(d) recognize the importance of adaptation and resilience, especially in the most vulnerable countries;
(e) support the transition from fossil fuels to renewables financing; and
(f) internal transformation of the institution.

In this landscape study, the term "climate finance" refers to the financial resources devoted to adapting and mitigating climate change in the agriculture and food sector with special reference to the developing nations.

4.1.2 Global climate finance ecosystem

The climate finance ecosystem has been growing rapidly and one of the main indicators for this expansion is the number of players, which vary greatly in function and nature. Regarding financing players, it is important to mention the multilateral players, which control the bulk of the climate finance resources. Trust funds formed by intergovernmental mechanisms to fund projects to mitigate and adapt to climate change hazards are another key actor in this industry. For climate-related multilateral funding, the GEF, Climate Investment Funds, Adaptation Fund, Green Climate Fund and SDG Invest should be mentioned. Each one of these funds is briefly described in Box 4.1.

BOX 4.1: Multilateral climate finance funds

The Global Environmental Facility (GEF). Founded in 1991 as a pilot project by the World Bank, the GEF is one of the oldest multilateral trust funds. It was the Rio Summit in 1992 that gave birth to the Global Environment Facility (GEF), which was tasked with assisting developing countries in achieving the aspirations spelled out in the key international environmental treaties. GEF is jointly managed by the World Bank, the United Nations Development Program and United Nations Environmental Program.

Climate Investment Fund (CIF). Since its founding in 2008, the CIF has been made up of two funds: the Clean Technology Fund and Strategic Climate Fund. The Clean Technology Fund intends to assist developing countries in their transition by providing financial support for low-carbon technology projects. Projects in sustainable transportation, renewable energy, and energy efficiency are typically supported by this fund. Climate resilience, renewable energy scaling, and forestry management are all supported by the Strategic Climate Fund, which is aimed at developing countries.

The Adaptation Fund (AF). The AF is a UNFCCC financial instrument created as part of the Kyoto Protocol to fund climate change adaptation projects, particularly in developing countries that are particularly vulnerable to their effects. It became well-known that the AF made it easier to get access to its funding schemes, simplified and accelerated the process, and reduced intermediaries.

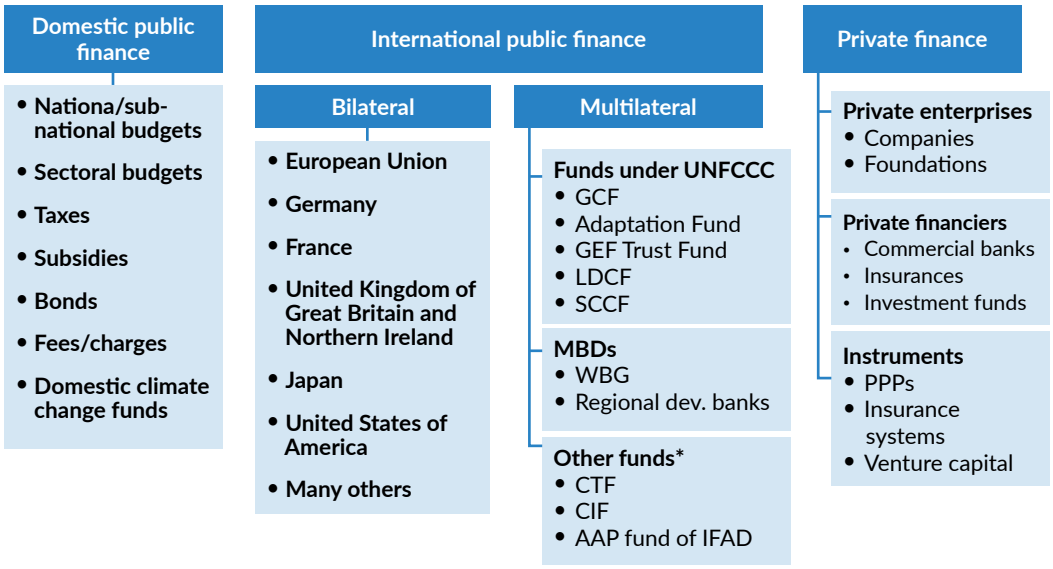
The Green Climate Fund (GCF). The GCF is also a financial instrument under the UNFCCC, but it was created in the context of the Paris Agreement, intended to assist developing countries in developing projects to mitigate and adapt to the effects of climate change. An interesting feature of the GCF is that it also provides technical assistance to developing countries, especially for the development of their institutional capabilities, so they may be better prepared to access the GCF funding schemes.

SDG Invest. SDG Invest is committed to co-creating a pipeline of solutions to finance the SDGs. It is a facility to finance blended finance schemes as catalysers of private investments on different areas, including agriculture and food security, natural ecosystems and climate actions, and the blue economy.

Source: Authors' own elaboration

MDBs play a critical role in the fight against climate change that extends far beyond merely serving as a conduit for money. As receivers, countries and implementing agencies are also "donors" because a portion of the monies raised globally is often transferred to CSOs, which are the players administering the programmes. Below is a comprehensive global climate finance architecture (Figure 4.1).

FIGURE 4.1: Global climate finance architecture



**There might be other funds for which data not available
*Few other countries also extend funds through bilateral agreements
Source: Author's own elaboration.

4.1.3 Demand and supply of climate finance

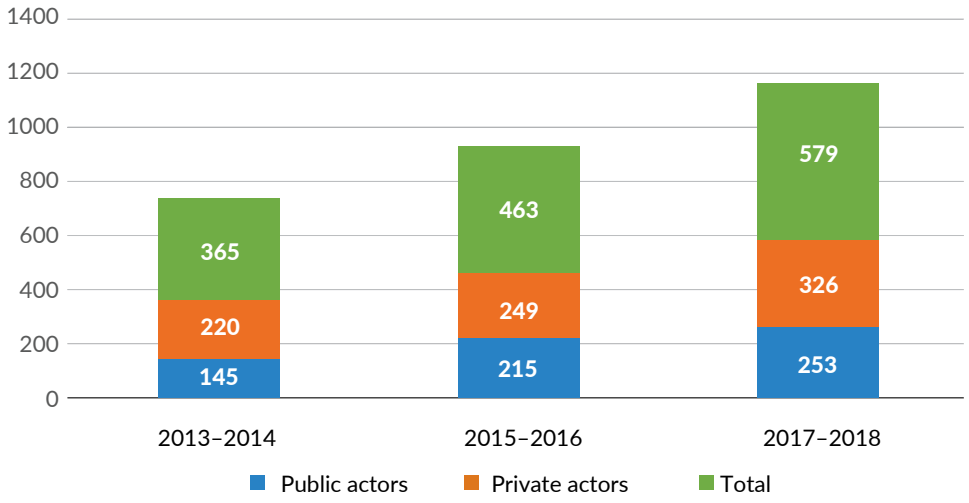
a) **Demand for climate finance.** The voluntarily proposed national action plans through the NDCs to achieve the 2030 Agenda are a positive step, but put together, even if fully implemented, they seem to be insufficient to cater to the need of investments to halt the expected severe disruptions and economic damages due to climate changes (OECD, 2017a). The estimated annual investment required is USD 6.9 trillion for the next 15 years to build climate-related infrastructure[19] for *mitigation* of climate challenges. Additionally, there is a substantial investment in adapting the economy to make it more efficient in the coming few years. Some nations estimated their financial needs for adaptation, which ranged from USD 100 million to over USD 200 billion over the entire planned nationally determined contributions (INDC) period and between USD 10 million and USD 3 billion per year (United Nations, 2015). There is currently no scientific or political consensus on the current and projected costs of mitigation and adaptation on a global scale. However, some countries presented predicted adaptation costs for various mitigation scenarios, clearly illustrating that the need for adaptation varies on mitigation ambition.

b) **Supply of climate finance.** The study released by Climate Policy Initiate (CPI) contains information on climate finance supply, which accounts for a significant portion of green finance (2019). For the first time, annual climate finance in 2017 and 2018 exceeded USD 500 billion. Over the two-year period 2017–2018, annual flows increased by USD 116 billion (25 percent) to USD 579 billion, on average. Almost all sorts of investor funding has increased

[19] This covers only transport, water and sanitation, and energy supply and use. On top of this, an annual additional capital cost of USD 3 trillion is required to support robust low emission economic growth.

steadily, as evidenced by the increase (public and private actors).[20] It can be observed that out of the tracked climate finance, *mitigation financing* accounted for 93 percent of total flows in 2017–2018, while *adaptation finance* made up another 5 percent of flows.

FIGURE 4.2: Breakdown of global climate finance flows, 2013–2018 (two-year average, billion USD)



Source: CPI. 2019. *Global landscape of climate finance 2019*. San Francisco, USA. https://climatepolicyinitiative.org/wp-content/uploads/2019/11/2019-Global-Landscape-of-Climate-Finance.pdf

Since 2017–2018, state actors (44 percent) have contributed less to financing green projects than private actors (56 percent; Figure 4.2). The preceding data reveals that the leverage ratio between public and private financing is less than 2. When it comes to climate-related investments, this percentage is lower than predicted, which raises the question of whether public funds are effective in attracting private funds.

4.1.4 Flow of climate finance to the agriculture and allied sector

To strike a balance between food security and climate change, international development agencies are increasingly developing road maps for the adoption of CSA, which is seen as an integrated method to efficiently manage soil and crop health, landscapes, livestock, forests, and fisheries. There are three main goals of climatesmart agriculture, all of which must be met simultaneously: (a) increased productivity for better food to improve nutrition security and raise incomes; (b) increased resilience by reducing vulnerability to climaterelated risks and shocks; and (c) decreased emissions per calorie or kilo of food produced, avoided through agricultural deforestation and the discovery and implementation of methods to absorb carbon from the atmosphere. Finance for CSA may also play a catalytic role in helping agriculture become a part of the climate solution and help transform the sector to ensure equitable and sustainable growth and meet the SDGs. The implementation of climate-resilient technologies and practices, the use of drought-tolerant seeds, the development of irrigation systems and sustainable land management strategies, as well as early warning systems are all being funded. Cobenefits such as food security, improved nutrition, carbon sequestration, and gender equality as well as sustainable growth and youth employment are commonly included in agricultural projects.

[20] The surge in growth was driven particularly by renewable energy capacity additions in China, the USA and India, as well as increased public commitments to land use and energy efficiency.

During 2017–2018, a total of USD 11 billion was invested in agriculture, forestry, land use, and natural resources management, an increase of 275 percent over the 2015–2016 average. Water and wastewater management, agriculture and land use, and disaster risk management collectively accounted for 78 percent of total adaption finance, or USD 23 billion annually, between 2017 and 2018, in the three sectors. It was revealed in a new analysis by CPI and IFAD that the global sum of climate finance for agriculture, forested land use, and aquaculture in 2017 and 2018 was only 3 percent of the total amount raised globally during the same period (CPI and IFAD, 2020). In 2018, FAO (2018a) conducted a review of the GCF portfolio of 77 projects (approved between November 2015 and February 2018) and found that 21 projects (valued at USD 1 557), 31 projects (valued at USD 4 536) with some agriculture components, and 25 projects (valued at USD 6 515) were purely non-agricultural projects. Agriculture and land use contributed 26 percent of global climate finance flows, or USD 122 billion, from 2000 to 2018, according to a more recent FAO analysis (Buto *et al.*, 2021). Agriculture and land use sector bifurcation followed the pattern of global flows and rises in adaptation financing, with a large spike seen in 2010 due to an increased contribution to environmental policies.

4.1.5 Potential avenues and pathways to improve climate finance to agriculture

New and better-targeted sources of climate finance are crucial to increasing the agriculture sector's resilience and sustainability, according to the global development community at the beginning of the millennium. This might lead to positive climate outcomes for farmers and value chain actors. Three prospective approaches and eight potential pathways (Table 4.1) have been identified by the FAO Investment Action Group (2016) as having the potential to boost extra climate-smart investments in agriculture. Financial service companies and all stakeholders in agricultural value chains could benefit from the paths.

TABLE 4.1: Promising avenues and potential pathways to finance CSA

	Promising avenues	Potential pathways
1.	**Designing innovative** mechanisms to leverage ad ditional sources of capital, from both public and private sources, that can be directed towards climate-smart investments in the agriculture sector	**a) Developing public private partnerships** to leverage the resources, expertise and capacities of stakeholders
		b) Designing and piloting innovative investment vehicles that can help attract additional capital by diversifying and managing the risk return profile of each investor
		c) Bundling a wide range of financial instruments to increase effectiveness and provide more holistic and comprehensive solutions
2.	**Identifying entry points** for directing climate finance into agriculture and for linking financial institutions to smallholders and agricultural SMEs	**a) Developing and/or improving enabling environment for agrifinance.** This includes appropriate policy and regulatory frameworks that are key to mobilizing finance for farmers, facilitating agri-infrastructure development and accelerating investments
		b) Develop and/or strengthen their risk management mechanisms. This includes the establishment of credit rating agencies, promotion of guarantees, insurance, value chain finance, warehouse receipts and advisory services using big data
		c) Supporting financial institutions to optimize transaction costs. This could include the use of branchless banking, mobile financial services and the latest fintech to increase reach at a lower cost

	Promising avenues	Potential pathways
3.	**Providing technical assistance** to increase investments in agriculture. Climate finance could play a key role in helping strengthen the capacities of the main stakeholders involved in realizing climate-smart investments, namely lenders and borrowers	**a) Lenders:** • Developing adequate institutional agricultural finance capacities • Developing the capacity of agricultural finance staff • Developing customized agricultural financial products and services.
		b) Borrowers: • Developing capacity and skills of farmers and SMEs with regards to: • On-farm climate-smart practices and technologies • Risk management • Accessing finance

Source: Adapted from FAO. 2016. Making Climate Finance Work in Agriculture. Rome. http://www.fao.org/fileadmin/user_upload/gacsa/AF/SC/GACSA_IAG_-_Climate_Finance_Note.pdf

The GCF sectoral guide identifies three investment pathways for the fund to support transformational change in agriculture (UNFCCC, 2021):

(a) *Promoting resilient agriculture*. This is important for the 2.4 billion people on 19 million km^2 of agricultural land in the Global South threatened by climate hazards. Key activities in this area include improving seeds, crop varieties and breeds; diversifying crops, aquaculture and livestock; and developing sustainable practices and technologies, while synergies with mitigation benefits are also important.

(b) *Facilitating climate-informed advisory and risk management services*. This will include general climate advisory and in particular early warning systems; effective delivery mechanisms that facilitate personal relationships and multiway communication at low cost; addressing gaps in extension programmes affecting women, youth, smallholders and vulnerable groups; and financial literacy training and index insurance.

(c) *Reconfiguring food systems*. Key activities including changing how food is stored, transported, sold and consumed; restructuring supply chains, food retail, marketing and procurement; reducing food loss and waste; encouraging consumers to demand safer, healthier and more environmentally sustainable diets; and building supply chain resilience.

The above three investment pathways create a matrix of agricultural activities when combined with the four drivers of paradigm shifts: (a) transformational planning and programming; (b) catalysing climate innovation; (c) mobilizing finance at scale; and (d) coalitions and knowledge to scale up success.

4.1.6 Innovations in climate finance to agriculture

The successful and efficient use of financial resources for climate-smart agriculture and the technologies it employs is dependent on innovation. According to a UNFCCC (2020) assessment, several innovative approaches to climate technology obtain funding for priority programmes and policy. The two main novel mechanisms that assist countries in (re)funding technological investments are green and climate bonds. Adaptation possibilities for these have only just recently been examined. As a result of these new techniques, the technological scaling up process is also expected to be more evenly distributed between the government (push) and the private sector (pull). Stakeholder engagement (co-design) can help countries better align their climate plans with

their sustainable development goals and strategies, (b) private sector participation is essential for accelerating the deployment of climate technologies, and (c) international institutions, including multilateral institutions (such as UNFCCC), can help countries better align their climate plans with their sustainable development goals and strategies. Climate-smart agriculture (CSA) activities by smallholder farmers in West African countries are a classic example of a blended finance fund that invests in these practices (Global Innovation Lab for Climate Finance, 2020; Box 4.2).

BOX 4.2: The West African Initiative for Climate-Smart Agriculture

With this initiative, the Economic Community of West African States Commission aims to improve the food security and income of 90 000 smallholder households in the project areas in West African countries by practicing climate-smart agriculture on 185 000 ha of farmland, decreasing annual CO_2 emissions by 2 million metric tonnes. The ECOWAS Bank for Investment and Development (EBID) is in charge of managing 80 percent of this USD 80 million fund, while the Regional Agency for Agriculture and Food (RAAF) is in charge of managing the other 20 percent. (RAAF). Directly to agribusinesses or on-lends to local financial institutions, the financing facility provides equity, loans, and guarantees under USD 1 million at reduced rates. CSA-linked investment products can be developed by financial intermediaries thanks to a technical capability. In addition, the farm's technological infrastructure aids farmers in adopting CSA methods. After conducting a trial in six ECOWAS Member States, the fund expects to expand its involvement in all 15 Member States if the pilot is a success.

Source: Global Innovation Lab for Climate Finance. 2020. *The West African Initiative for Climate Smart Agriculture*.San Francisco, USA. [Cited 22 November 2022]. https://www.climatefinancelab.org/project/africaclimate-smart-agriculture

Climate-smart agriculture financing can be accessed through new digital platforms. To help smallholder farmers in Africa become more resilient to climate change by providing them with timely and fair payouts in the event of extreme weather events, the Global Innovation Lab for Climate Finance has developed Blockchain Climate Risk Crop Insurance (Global Innovation Lab for Climate Finance, 2019). CSLP is an innovative digital platform that was developed to encourage farmers to embrace climate-smart farming methods and respond to the long-term threat of climate change (Partnership for Forests, 2020). In order to help financial institutions work with smallholder farmers and help them become more resilient to climate change, it has developed cutting-edge technologies.

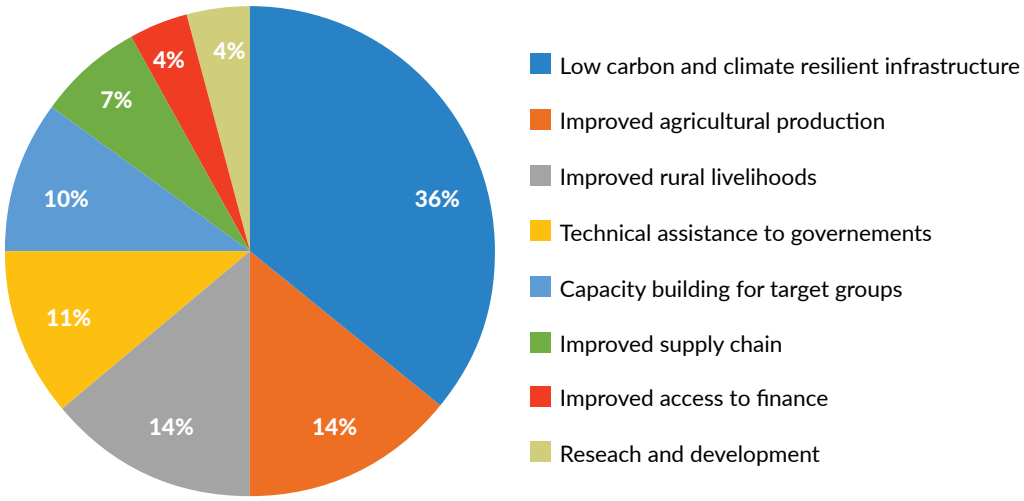
4.2 Climate finance to smallholder agriculture

CPI and IFAD, 2020, revealed that only USD 8.1 billion of the total tracked climate funding for agriculture, forestry, and land use (USD 20 billion) reached small-scale farmers and value chain players serving them, which is 40 percent of the total funds pledged across the three sectors. Small-scale farmers benefit from an additional USD 1.72 billion in climate financing through renewable energy generation, sustainable rural transportation, and water management. Nearly USD 10 billion in climate financing is dedicated to small-scale agriculture, which is just about 1.7 percent of the total climate money tracked. This is only a small proportion of the needs of smallscale agriculture actors.

Climate adaptation projects received almost half (49 percent) of the climate finance flows to small-scale agriculture, while projects tackling the objectives of both mitigation and adaptation received 29 percent of the total funding flows. However, mitigation-only projects were targeted

by 21 percent of the finance. The skewed flow of finance towards adaptation is aligned with the increased vulnerability of small-scale agricultural actors to climate change. Out of the climate finance to small-scale agriculture, 36 percent was used to support the creation of climate-resilient infrastructure[21] to reduce emissions, followed by investments to improve agricultural production at farm level (14 percent) and improvement of livelihoods of rural communities in general (also 14 percent). These are followed by the provision of technical assistance to governments (11 percent) and capacity building for target groups received 10 percent share of the total funding (Figure 4.3).

FIGURE 4.3: Flow of climate finance to small-scale agriculture



Source: CPI & IFAD. 2020. *Examining the climate finance gap for small-scale agriculture*. San Francisco, USA and Rome. https://www.ifad.org/en/web/knowledge/publication/asset/42157635

4.3 Green finance to the agrifood system: the big picture

It is projected that existing farming techniques will result in GHG emissions, an increase in the competition for natural resources, and an increase in land degradation as a result of growing food demand. In light of these findings, it is clear that greening agrifood industries and regulating demand for food are essential for achieving both the 2030 Agenda and the United Nations Paris Climate Agreement (FAO, 2018b; UNEP, 2019a). In order to achieve a worldwide broad picture of sustainability in agrifood systems, researchers (Willett *et al*., 2019) have shown that working on both the consumption and production ends of the food system simultaneously is necessary (sustainable food production). Supply-side changes include a large-scale move away from conventional agriculture toward agricultural practices that encourage biodiversity and a greater reliance on plant-based foodstuff production. It is important to keep in mind that green and sustainable financing for the agriculture and food sector is a nested notion and should not be viewed as a separate entity. It should be linked to the critical challenges of unmet demands in developing mitigation infrastructure, the need for clean energy, and improved macro and microclimatic health, which could potentially support the desired shift and augmented demand and supply of finance, and improve efficiency and wider access[22] to catch up with the clarion call. In this direction, the

[21] Climate-resilient infrastructure includes building irrigation systems in drought drought-affected regions or protection of climateexposed farm buildings.

[22] While the number of people who lack access to financial services is falling, a significant share of adult population still lack basic financial services. Greater financial inclusion promises more inclusive growth and development and the broader ambit of green finance is potentially able to explore this opportunity.

global community may consider the following issues which need to be a part of the wider agenda about the performance and development of green financial system to support agriculture and food sector, in particular:

a) building resilience in agriculture is critical for stakeholders, as minor changes in accessing inputs (in this case finance) can have far reaching impacts;
b) improving the basic performance, integrity and reach of the financial system, particularly to smallholders and agri-SMEs;
c) integrating and regulating informal financial service providers and linking them with the agriculture and food sector;
d) developing markets and institutions to provide long-term finance to infrastructure supporting greening of agriculture;
e) optimizing policies and incentive structures to attract long-term finance which however need to be effective and not overgenerous; and
f) using public finance effectively to leverage private investment in agricultural infrastructure.

4.3.1 Potential of green finance to support building resilience

Accelerated investments in sustainable agriculture have the potential to improve agrifood system efficiency and equity, as well as their resilience to shocks like the COVID-19 pandemic and other environmental changes (FAO, 2021b). As a result of these obstacles, financial service providers face a double burden (double burden) when it comes to agricultural development finance and green finance, respectively. Countries are expected to accomplish multiple SDGs and support green finance endeavours with targeted investment, acceptable financial tools, innovation, knowledge, and increased capacities. According to this report's previous sections of focus on the traditional green and climate finance sector, they are heavily focused on clean energy and mitigation infrastructure while overlooking the critical areas of managing natural resources and building community-level adaptation capacity through small farms. It is no surprise that a growing number of people throughout the world are interested in debunking the mystery of green financing for agriculture and food systems. In this direction, the SAFIN Network23 kicked off a high-level review and discussions on the initiatives and knowledge resources of SAFIN partners on "Green Finance for Agriculture and Food Systems" which clearly indicated that many of the related areas need more cohesive and concrete global actions to fill in the main gaps related to the lack of a common definition of green finance products and services related to green finance for agriculture and food systems.

4.3.2 Narrowing the focus on investing in agriculture would widen the impact

In the process of estimating the amount of money needed to meet the increased need for long-term investments in agriculture and food systems in order to mitigate or adapt to the consequences of climate change on agricultural ecosystems, it appeared that something had gone wrong or was missing. There is an estimated annual need for climate change adaptation in the world of at least USD 105 billion, according to a research by the Food and Agriculture Organization (FAO), IFAD, and the World Food Program (FAO, IFAD and WFP, 2015). Sustainable food systems and land use require an annual investment of USD 300–350 billion to meet the 2030 Agenda, according to the Food and Land Use Coalition (2019). Climate change funding support surpassed half a trillion

[23] Unpublished report of SAFIN Network, May 2021.

dollars in 2017 and 2018, yet only USD 10 billion of this reached smallholder farmers annually, according to a report by CPI and IFAD (2020). Investing in agriculture and food has previously shown to be a powerful engine for economic growth in developing countries, with spillover effects on a variety of other industries. International activity in this area is commendable, since the GEF has invested USD 17 billion in grants and raised an additional USD 88 billion in finance for sustainable development. The GCF24 and the Addis Ababa Action Agenda are also helping the global financial system to invest in the right places (FAO, 2018c).

4.3.3 Global call for greening the agricultural ecosystem

This urgent need for investment in greening the agricultural ecosystem has been recognized by the global development community, which believes that smallholders should have access to adequate financial services that could help them become more resilient to climate change and other environmental threats. Green finance, which combines new and innovative financial instruments with enabling policy measures and delivery mechanisms, is seen as the answer to the difficulties and challenges raised by the global and national agencies. For the sake of addressing regional economic imbalances, food security, and poverty alleviation, governments are widely acknowledged to need to step in and provide appropriate finance ecosystems for green company development. Governments can help create incentives for more sustainable investing by, for example, pricing externalities, demanding more meaningful disclosure by companies on social and environmental issues, and clarifying fiduciary duty and asset-owner preferences (e.g. through incorporating sustainability preferences into required investor profiles). Credit ratings and regulatory frameworks can both be used to encourage long-term investing by supporting and promoting attempts to establish longer-term indexes.

4.4 Opportunities for green finance to the agrifood sector

From farmland and sustainable forestry to the adoption of green and smart agricultural technologies and the improvement of yields for smallholders, there are numerous green investment options. As a critical change agent in the sustainability agenda, green and sustainable finance is seen as essential to aiding the shift toward more sustainable and climate-resilient food systems. Therefore, partnering with governments and international financial institutions and asset managers and corporations will help refocus and leverage capital flows towards creative investments in long-term food system sustainability is essential. However, forecasting investment and funding needs in the agriculture industry is a difficulty. Therefore, partnering with governments, international financial institutions, asset managers and corporations is essential as it will help refocus and leverage capital flows towards creative investments in long-term food system sustainability. As a result of the MDGs, we know that a comprehensive approach to food, livelihoods, and natural resource management is necessary, and that investments should be made to benefit a wide range of stakeholders. Specially crafted financial products may be the most important drivers of green finance adoption in the agrifood sector. Financial instruments available under the Common Agricultural Policy (CAP) have substantial potential to contribute to the accomplishment of the European Green Deal's aims, particularly the EU farm-to-fork and biodiversity initiatives, according to the European Commission's evaluation (2020).

[24] A fund established within the framework of the UNFCCC as an operating entity of the financial mechanism for developing countries.

4.4.1 Supply of green finance: conservative vs. aggressive

Green finance products and services to the agrifood sector will have to be put into the demand-side perspective, as well as specific vulnerabilities linked to climate change impacts; and thereby collecting demand-side data is the critical first step to understanding individual coping strategies and their needs. Financial actors have started taking a growing interest in food and agriculture and agrifood enterprises (value chain actors) are becoming increasingly involved in financial activities, which has amplified the ambit of supply of finance. Climate risk mitigation in the agrifood sector requires long-term investments to make the desired changes in the key areas of the agrifood production system,[25] and almost all banks perceive the risks attached to these investments to be too high and loan tenors too big. This leads to the agricultural sector seeking to transition to sustainability with access to limited banking finance, leaving small farmers in particular clearly underserved. Nonetheless, some banks have responded to this call and demonstrated that extending financing support to sustainable agriculture can be both safe and lucrative. The Rabobank model (Batini, 2019) showcases the bank's process of blending sustainable green agriculture with lending support and business models for agriculture sector (Box 4.3).

BOX 4.3: The Rabobank model of financing for the agrifood sector

Cooperative Rabobank U.A. – a Dutch multinational banking and financial services company – is the second-largest bank in the Netherlands in terms of total assets, as well as a global leader in food and agriculture financing. It offers sustainability-oriented banking across all major food chains and is currently active in 40 countries with 389 foreign places of business. The bank is active in five areas of agrifood finance and research activities: (1) *Wholesale Banking*, serving large corporates, commodity traders, private equity firms and financial institutions; (2) *Trade and Commodity Finance*, supporting Rabobank's largest international clients: for example, 17 of the top 20 global dairy farms are clients; (3) *Rabo Research Food and Agribusiness*, providing the bank's clients with tailored research and news on the latest market developments; (4) *Rabo Loss and Waste Hub*, helping the bank's clients turn food waste/loss into revenue; and (5) *"Kickstart"* Initiatives (e. g. Kickstart Stability, Kickstart Nutrition, Kickstart Food Programme, etc.) helping accelerate the transition to a sustainable food supply, often partnering with private businesses, civil society organizations and international governmental organizations like FAO, UNEP etc., with which it has launched a USD 1 billion fund (*AgriFund3*) dedicated to accelerating forest conservation and sustainable agriculture.[26]

Source: Rabobank. 2018. *Annual report 2018*. Utrecht, Kingdom of the Netherlands. https://www.rabobank.com/en/images/annualreport-2018.pdf

4.4.2 Demand for green finance: mitigation and adaptation

There is an increasing demand for funding green infrastructure (green warehouses and cold chains) with an emphasis on climate change mitigation because these facilities have the potential to create a better market for agricultural products worldwide. When farmers had access to all-weather roads

[25] Key areas are: irrigation, replanting, soil quality, forest and ecosystem protection/nature inclusive agriculture, new farm equipment and/or training and capacity building.

[26] Rabobank recently joined the World Business Council for Sustainable Development (WBCSD) as part of its Banking for Food strategy. The aim of this membership is to step up its efforts to enable farmers to produce more efficiently and more sustainably and to strengthen food value chains. Rabobank will take up the chair of the Climate-Smart Agriculture Finance Working Group to contribute to its ambition statement to make 50 percent more food available and reduce agricultural and land-use greenhouse gas emissions from commercial agriculture by 50 percent by 2030.

in Ethiopia, the frequency of poverty reduced by 6.7 percent, a research found (Dercon *et al*., 2009). Climate-smart agricultural methods have been proven to boost agricultural productivity and resilience, according to a World Bank report (2011). Disaster preparedness and resilient and diversified farming systems work hand in hand, according to the paper, especially countries most susceptible to climate variability and change. As an example, Vietnam is working to better manage its water resources in order to better adjust its farming and aquaculture regimes to rising flood risk and salinity levels. On the other side, development agencies and agriculture firms are supporting – albeit less vigorously – strategies for climate change adaptation. To achieve its main objective of "reimagining global agriculture and food systems", Olam International, for example, places sustainability at the centre of its business strategy (Olam International, 2018). A consortium of banks has provided the company with a USD 1.3 billion sustainability-linked revolving credit facility (RCF) to help the company meet its finance needs (Box 4.4).

BOX 4.4: Olam's sustainability-linked loan

Thousands of customers in 66 countries depend on Olam for their food and agricultural supply needs. A three-year, USD 500 million revolving credit facility (RCF) for Olam International was secured by the company in May of last year, and it is expected to grow to USD 1.35 billion by June of next year. Loans from a group of 15 banks are tied to Olam meeting sustainability goals as part of its sustainability-linked credit facility. Three main objectives: thriving communities; prosperous farmers; and the re-creation of the living planet. Olam has promised to meet 50 various environmental, social, and governance requirements. It is possible to lower interest rates by 10–15 basis points if these goals are met. Additionally, ING Bank serves as the facility's sustainability coordinator, while BNP Paribas serves as its agent. In September 2020, a third loan of USD 250 million was agreed upon.

Source: Olam International. 2018. Olam International secures Asia's first sustainability-linked club loan facility of US$500.0 million. 26 March 2018. Singapore. [Cited 14 March 2022]. https://www.olamgroup.com/news/all-news/press-release/asias-first-sustainability-linked-club-loan-facility-us500million.html

Overall, the potential demand for green finance both for mitigation and adaption is high, keeping in view the new business opportunities which however are not being fully explored due to: (a) the non-availability of qualified and meaningful data and insights for evidence-based policy interventions, (b) the slow pace of adaptation to climate and natural hazards, which involves changes in agricultural management practices, (c) good agricultural practices affected by the range of uncontrollable factors (policy environment, natural endowments etc.), (d) non-diversified household income negatively impacting risks due to increased climate variability and (e) low levels of awareness about green finance products and instruments.

5. Green finance instruments, good practices and challenges

People around the world will be affected by climate-related risks disproportionately because of their vulnerability to climate change and other threats. Agricultural productivity can be reduced and economic growth harmed by long-term changes in weather patterns that raise the risk of flooding or wildfires. New developments in financial products, most notably social impact contracts, development impact bonds, and blended financing, have given the financial industry a key role in addressing global sustainability concerns and achieving sustainability obligations. It is time to move on from experimenting and into actual practice. Green financing for agriculture and food can be made a reality by documenting and disseminating the finest practices from around the world. As a result, the transfer is not as simple as it first appears. Selected case studies driven by financial sector actors and investors illustrate some of the innovative financial instruments utilized in the greening of the agrifood sector. In addition, a brief description of the difficulties is given.

5.1 Instruments for green finance to the agrifood sector

Greening the agriculture and food sector requires investment in various forms, and many financial products/instruments, innovative supply chain partnerships and investment vehicles are already being developed to support this transition. Using resources from the European Agricultural Fund for Rural Development (EAFRD), the Bank Gospodarstwa Krajowego (BGK)[27] from Poland designed financial instruments, including loans, guarantees and other financial schemes, which provided better financing opportunities to farmers and the agrifood sector, such as low interest rates and favourable lending conditions (European Commission, 2020a). The EU's CAP proposals will include instruments that can be used to finance stand-alone working capital, investments, capital rebates and provide combinations with grants and interest rate subsidies. As part of the European Green

[27] The BGK is a national promotional bank in Poland supporting agricultural development in the country.

Deal, they can play a vital role in promoting green and cost-saving investments, for example "architypes" described by the Taskforce include (a) blended funds, (b) fintech solutions, (c) supply chain partnerships, (d) sustainability-linked debt (e) nature-linked insurance (f) market solutions, and (g) pay for ecosystem services (e) in order to accelerate this transformation (Blended Finance Taskforce, 2020). (a) Activities that directly impact agricultural production and (b) activities and services that facilitate the transition to green agriculture can be categorized as green finance demand in the agrifood industry. Different types of financing tools and solutions are available (hybrid, blended, etc.). Green bonds, green loans, sustainability-linked loans, green assets finance, green insurance, and so on are all readily available products that keep some basic characteristics. Table 5.1 below provides an overview of some of the product's most notable features.

TABLE 5.1 Potential financial products for green finance to the agrifood sector

	Green finance products	Important features
1.	Green bonds	These bonds are created to fund projects that have positive environmental and/or climate benefits, which may include land and water use, agricultural production systems, etc.
2.	Green loans for sustainable farming	These are loans that can be used to fund a range of environmentally sustainable farming with reduced GHG emissions. These loans may be structured as bilateral loans or syndicated loans (blended).
3.	Sustainability-linked loans	The attractiveness of sustainability-linked loans is their linkage between pricing and a borrower's ESG performance. These loans are structured to offer a pricing discount when a borrower meets or outperforms its ESG targets.
4.	Green asset finance	This type of finance is a subset of asset financing (mitigation infrastructure, etc.) that supports sustainable agricultural and forestry development.
5.	Green insurance	Green insurance includes a large spectrum of insurance products which are either related to climate risk insurance (in agriculture), or a bundled package that includes credit to promote energy-efficient investments, or macrolevel insurance among regions or states that seek to pool risk against large-scale catastrophic events (such as hurricanes, earthquake, tsunami etc.).
6.	Other allied financial products • Blue finance • Landscape finance • Livelihoods finance • Green credit cards	These are financial products offered to consumers and businesses that either provide environmental benefits or reduce negative environmental impacts. Examples include financing for fisheries, landscapes, livelihoods, green agricultural machinery loans, energy efficient mortgages, green credit cards, and ecosavings deposits.

Source: Authors' own elaboration.

5.2 Global best practices for green finance to the agrifood sector

Food and nutrition security, employment, climate change, and environmental sustainability are at the heart of the global debate on investment in the agrifood sector to realize the 2030 Agenda's ambitions. As a result of the different financial needs of smallholder farmers, who produce two-thirds of the world's food, global investment still falls short, necessitating coordinated action and efforts from all stakeholders to help promote green finance in agriculture.

5.2.1 Public sector-led good practices

Government, non-traditional partners, official development aid (ODA) and official climate finance, and new forms of financing could be utilized to bridge the current deficit in public resources and unlock private financing. Recent years have seen an increase in global growth, and this trend is projected to continue. It is imperative that some of the resources generated by this growth be reinvested to ensure the long-term viability of both the economy and society. As a result, it is unlikely that LDCs and other poor and vulnerable countries will be able to collect and distribute extra resources for this. In order to fund sustainable and green development, ODA and green finance instruments (mainly climate finance) to agriculture are becoming increasingly important. The Sustainable Land and Water Resource Management Project (SLWRMP) was funded by the public sector, specifically by the African Development Bank (AfDB; Box 5.1) and co-financed by the CIF in an effort to assist the Mozambican government in dealing with the country's volatile weather patterns (CIF, 2019).[28]

BOX 5.1: The Sustainable Land and Water Resource Management Project (SLWRMP) in Mozambique

The main objective of the SLWRMP was to reduce poverty through increased agricultural productivity, as a result of improved water and land management practices and linked with investment from the Pilot Program for Climate Resilience (PPCR) through promotion of adaptation activities. The project was implemented during 2012–2019 and provided enhanced irrigation infrastructure and market infrastructure for processing units, promoted farm diversification, and increased production and food security. It also aimed to strengthen the capacity of communities to address the interlinked challenges of the adverse impacts of climate change, rural poverty, food insecurity and land degradation. The project was implemented in five drought-affected districts of the Gaza province of Mozambique. The total cost of the project was estimated at USD 21.5 million, comprising USD 4.9 million from the African Development Fund (ADF), USD 15.9 million from the CIF and USD 0.5 million from the Government of Mozambique, benefitting 54 000 smallholders of whom 54 percent were female farmers.

Source: CIF. 2019. *Investing in climate: resilient livelihoods*. Maputo, African Development Bank. https://climateinvestmentfunds.org/cif_enc/sites/cif_enc/files/knowledge-documents/afdb_booklet_slwrmp_v17_web.pdf

A small amount of private capital has been allocated to greening agricultural financing, in spite of the obvious advantages and the positive momentum it has generated. For the SDGs to be achieved, there needs to be a large rise in sustainable and green investments from current levels, according to several research. To cope with these two main difficulties, investment must first be refocused toward new innovative products and services aimed at finding solutions to meet the SDGs, as well as identifying areas of funding deficits to meet both the SDGs and the individual targets that comprise them. Data on private sector capital investments in the agrifood sector are limited, and there is no comprehensive information on the involvement of large international investors in available in the public domain, which poses challenges[29] in assessing the presence of international private investors along the full value chain in agriculture. There is a growing belief

[28] The Climate Investment Funds (CIF) is one of the world's largest and most ambitious climate finance mechanisms. Founded in 2008, it represents one of the first global efforts to invest in a dedicated climate finance vehicle. It is an intergovernmental fund accredited by the multilateral development banks.

[29] Considering cross country movements of food items, especially in the contract farming and processing, due to the lack of consistent methods of data collection.

that public–private partnerships (PPPs), which bring together business and government as well as non-profits and civil society groups to promote the agricultural and food sector's growth, is the best way to address these issues. For instance, in the Indonesian sustainable finance market, the supply of green finance for agriculture is minimal in comparison with the enormous demand for cheaper, long-term financing. The lack of particular and targeted instruments in the pipeline of bankable green projects is evident in this example. Green bonds are being used to encourage sustainable landscape development in Indonesia through the Tropical Landscape Finance Facility (TLFF), which was launched in 2018. As part of the USD 95 million corporate sustainability bond issued by TLFF, the facility collaborates with local communities on issues such as reforestation, wildlife conservation, and renewable energy development (Box 5.2).

BOX 5.2: Tropical Landscape Finance Facility (TLFF) in Indonesia

TLFF is a partnership between UNEP, World Agroforestry Centre, ADM Capital and BNP Paribas. Its objective is to utilize private finance for public good, stimulate green growth and create jobs by supporting projects in sustainable agriculture and the renewable energy sector. It is an innovative financing mechanism to unlock private finance to support mitigation and adaptation activities, demonstrating a feasible model of sustainable production and climate-resilient employment for local communities within the amalgamated framework of conservation and high-value investment landscape that seeks to contribute substantial environmental and social dividends alongside risk-shared financial returns. The TLFF is impactdriven and announced its first sustainability bond in February 2018, a USD 95 million world-first corporate sustainability bond to fund PT Royal Lestari Utama (RLU), an Indonesian joint venture between France's Michelin (49 percent) and Indonesia's Barito Pacific Group (51 percent), for a natural rubber plantation in degraded land in two provinces in Indonesia. The proceeds of the issuance were put towards a 15-year loan facility to RLU. The partial credit guarantee on the transaction is provided by the United States Agency for International Development (USAID). TLFF financing models could be applied and scaled at national level to unlock finance from investors for achieving NDC targets.

Source: TLFF. 2018. *Annual report*. Jakarta. https://www.tlffindonesia.org/wpcontent/uploads/2020/09/RLU-ESG-Annual-Report-2018-March-Summary.pdf

5.2.2 Public development bank-led best practices

The major actors driving the development of green finance include public and private sector development banks, institutional investors and IFIs, as well as central banks and financial regulators (Berensmann and Lindenberg, 2016). Agricultural development banks are often supported by government subsidy programmes aimed at offsetting the transaction costs and risks of doing business in the sector. A recent study on green agricultural credit for smallholders in Peru (Box 5.3) reported that the goals and needs of financial institutions and smallholder farmers must be brought into alignment to drive the transition to sustainability using generic agricultural credit as an instrument (Pinzon, 2019). Peru's GHG emissions are primarily attributed to land use change, primarily caused by agricultural expansion into native Amazon forest, necessitating urgent reorientation of the agricultural sector towards sustainability[30] to meet the country's climate target of reducing its GHG emissions by 30 percent by 2030.

[30] According to the Peruvian Central Bank, agriculture as a sector has maintained a relatively stable 5 percent of GDP. Between 2008 and 2017, Peruvian agricultural GDP has grown by 32 percent while total GDP has grown by 48 percent.

BOX 5.3: Green agricultural credit for smallholders in Peru

As of 2017, banking companies in Peru reportedly supply 68 percent of the agricultural credit, representing only 2.8 percent of their total lending portfolio. On the other hand, Rural savings and credit institutions (RSCIs) had only 1 percent of the total agricultural credit, representing 8.5 percent of their loan portfolio. Lending to small agricultural producers by the FIs is in two streams: working capital and investment, which are being bundled into a single package in most cases. The majority of the FIs identify critical gaps in making progress towards using agricultural credit as a vehicle to promote sustainable land use and get involved in lending for coffee and cacao under agroforestry. Some of them consider green agricultural credit as a strategic pillar of growth. The FIs are facing challenges due to the lack of adequate risk mitigation instruments, such as agricultural insurance and guarantees. In addition, agricultural extension services and the provision of technical assistance to ensure that borrower-farmers are able to implement the technological improvements are missing. The FIs also expressed the importance of building capacity at the farmer level to ensure the credit is used adequately and increase the chances of success for the farms in adaptation of climate-related risks.

Source: Pinzon, A. 2019. *Redefining finance for agriculture: green agricultural credit for smallholders in Peru.* Oxford,UK. Global Canopy. https://globalcanopy.org/wp-content/uploads/2020/12/UFF-project-Redefiningfinance-for-agriculture.pdf

The agrifood sector receives green financing from commercial banks and development finance institutions in a number of nations. Agricultural Bank of China (ABC), the third largest commercial bank in the world by assets, provides financial solutions to the agri-food industry in China. ABC provides green finance. It has cooperated with the International Finance Corporation (IFC) on an innovative programme to realign the ABC's green-finance portfolio and assist Australia's commitment to the international climate agenda (IFC, 2016). It was ABC, a pioneer in green finance in China, that created a system of green financial products and services encompassing everything from green credit to eco-agriculture to eco-investment banks. ABC now offers a wide range of ecofriendly financial products and services to its clients and projects. USD 14.73 billion was ABC's total green credit balance at the end of 2018. Green Finance Development Plan and necessary ESG standards are being regularly implemented by ABC, which is aiming to become a leading bank for agrifood industry green financing.

5.2.3 Best practices led by international financial institutions and supported by development networks

IFIs[31] are essentially playing three major roles to bring green finance to centre stage in sustainable agrifood sector development: (a) pioneering roles in considering sustainability issues while making funding decisions, (b) building coalitions with the ultimate goal of improving global governance in the financial sector and (c) mobilizing private sector capital for investments that serve sustainability. In addition to supporting immediate investment priorities, IFIs have established credit lines with the aim of supporting local banks to create sustainable lending products as part of their standard offering. For example, the Private Sector Window of the Global Agriculture and Food Security Programme (GAFSP) piloted a project in Honduras (Box 5.4) to support smallholder farmers in accessing finance and improving resilience (GAFSP, 2019).

[31] The IFIs referred to here are two major types of international lenders: (a) multilateral development banks, for example World Bank Group, International Fund for Agricultural Development, Asian Development Bank, African Development Bank, Inter-American Development Bank, European Bank for Reconstruction and Development, European Investment Bank etc. and (b) donor development banks, for example KfW, Austrian Development Bank (OeDB), Nordic Environment Finance Corporation (NEFCO) etc. Apart from the above IFIs, the GCF is another important multilateral instrument used for green finance.

BOX 5.4: Smallholders in honduras weather the effects of climate change

Honduras' agriculture sector employs over 40 percent of the country's workforce, while smallholders make up 70 percent of the country's farming population. It has been hard to get in touch with the small-scale farmers. Only 45 percent of the country's population has a bank account, making it the least financially included country in the area, according to the 2017 Global Findex report. It is difficult for rural residents to obtain credit because of their lack of access to collateral and financial awareness. A lack of bank lending in the smallholder sector means that farmers are left to rely on commercial intermediaries who charge exorbitant interest rates to keep them in debt. IFC and the Cadelga Group, one of Honduras' leading agricultural product and service distributors, have formed a collaboration with the help of the GAFSP's Private Sector Window. Smallholders can get loans for fertilizer, seeds and irrigation technologies through Cadelga's AgroMoney department, which was created as a result of the project's advising services. Smallholder farmers in the Santa Barbara and Comayagua regions have received loans totaling approximately USD 1 million from the AgroMoney pilot, which was begun in March 2019 and rolled out in August 2019. By the year 2021, the project hoped to have reached 4 400 farmers, and it had ambitions to spread throughout Honduras in the years to come. Crop diversification and improved irrigation techniques are also included as part of the loan, which helps farmers in Honduras mitigate the effects of and build a more sustainable distribution network for smallholder farmers.

Source: GAFSP. 2019. Smallholders in Honduras weather the effects of climate change. In: *GAFSP Projects*. [Cited 14 March 2022]. https://www.gafspfund.org/projects/smallholdershonduras-weather-effects-climate-change

IFAD has created the National Designated Authority (NDA) collaboration platform to facilitate policy discussion, climate finance programming, and capacity building for governmental officials who serve as focal points for the GCF, GEF, and AF through their national governments (IFAD, 2022). Many other international and regional networks are working with local financial institutions to promote, implement and deliver green finance policies for the final beneficiaries (farmers, value-chain actors, etc.), such as AFRACA, AFI and APRACA, to name just a few. Local networks of financial institutions are promoting voluntary sustainability standards (VSSs) that could help agricultural producers adopt sustainable practices, which could then be leveraged to decrease investment risks and ultimately allow them to access financial services. Smallholder farmers in developing countries are being supported through a flagship programme, the Adaptation for Smallholder Agriculture Program (ASAP), which aims to redirect climate and environmental financing to smallholder farmers for sustainable development. With the approval of the GCF (2019) and the IFAD, Niger is implementing a collaborative initiative on inclusive green finance for agriculture to adapt to climate changes (Box 5.5).

BOX 5.5: Inclusive green financing for climate-resilient and low-emmission smallholder agriculture in the Niger

Niger's most important economic activity is agriculture, which is being threatened by climate change and generating a rise in competition for dwindling natural resources by farmers and pastoralists. Numerous inherent hazards impact smallholder farming in this country (the most prominent being access to water for crop cultivation and a history of crop failures), discouraging bank investment. Despite the country's significant sensitivity to climate change and its

(cont.)

inadequate adaptive capability in agriculture, green funding in Niger has yet to be simplified. IFAD is providing co-funding for a loan to the Niger government that was approved by the GCF for use in inclusive green financing of agriculture. The lessons learned by IFAD and its partners in the country informed the development of this programme. The project's primary goal is to help rural communities and agricultural groups, including youth and women's organizations, cooperatives, and micro, small, and medium-sized businesses (MSMEs), in the country strengthen and scale their resilience and adaptive capacity. Agricultural and water resource management methods in four major agroecological zones in the country will be the focus of this effort. It will help reduce greenhouse gas (GHG) emissions from agricultural energy use and promote the use of renewable energy sources (RETs). Smallholder farmers, farmer organizations (FOs), cooperatives, and MSMEs are likely to benefit from the project, which aims to expand access to funding for climate-resilient agricultural techniques and practices.

Source: GCF. 2019. SAP012: *Inclusive green financing for climate resilient and low emission smallholder agriculture*. Incheon, South Korea. https://www.greenclimate.fund/sites/default/files/document/fundingsap012-ifad-niger.pdf

In China, the investment in Henan Province's greening agriculture, standards development, and technical innovation has secured a USD 300 million World Bank loan (World Bank, 2020a). With this project, a method for extending green financing to agriculture and related sectors will be developed to give technical and financial support. Green technology adoption is predicted to increase as a result of the project's ability to leverage commercial investments. To help improve agricultural food safety and quality, the project is also developing green financing standards and generating beneficial lessons. Reduced agricultural GHG emissions are a main emphasis of the Henan green finance project, which aims to promote global public goods in terms of knowledge that benefit China and the world society as a whole. Green agriculture investments will be tested through the creation of the Henan Green Agriculture Fund Project (GAF), which will include both equity and merit-based financing criteria. The GAF is expected to provide finance to roughly 60 small businesses in the agricultural industry. Direct and indirect mobilization of public and private money to assist green agriculture investments in specific companies is also advocated as a way for the initiative to maximize its impact.

5.3 Challenges of green financing to the agrifood sector

In order to meet the needs of a growing global population, the agricultural industry is turning to the green finance market to raise the cash needed for mitigation and adaptation to climate change. Agriculture, forestry, and food, on the other hand, account for barely 3 percent of all climate bonds issued, according to the most recent figures. There are many various ways to ''green'' agriculture (agri-horti-livestock-forestry, for example), and it is a problem for agribusiness companies and investors alike to figure out what that means across a variety of production systems. Investors attempting to identify the most critical sustainability issues faced by the downstream actors in agricultural value chains may face difficulties due to these various requirements.

5.3.1 General challenges of green finance to the agrifood sector

Key challenges include: (a) the scope of green financing needs to be defined in order to determine the right policy choices; (b) flow of finance to the sector does not focus on green investment opportunities, resulting in a substantial shortfall in supply of green finance; (c) green finance lacks a comprehensive legal foundation; (d) meeting the needs of upstream primary producers at the level of the farm or the smallholding; and (e) an urgent national coordination mechanism is needed.

5.3.2 Challenges for commercialization of green finance

Although green finance has several advantages for the agri-food industry, commercialization is problematic for a number of obvious and straightforward reasons: (a) traditional agricultural finance is already extremely risky, (b) there is a lack of knowledge on greening agricultural development, (c) there is a lack of tailored financial products to cater to the greening of agriculture and agri-SMEs, and (d) there are inadequate alternative collateral instruments to mitigate agriculture-related risks. Beyond the usual roadblocks (lack of suitable enabling environments, exposure to risks, and high transaction costs), a number of other obstacles limit the availability of green finance in most developing countries: small-scale farming makes it difficult to achieve economies of scale, which in turn makes it difficult for the agricultural sector to accurately assess its financial needs for climate change adaptation and mitigation. Green finance resources are also fragmented, with the majority of them going toward energy-related measures. A large portion of Green Finance's capital has gone to projects that can show a short-term, measurable benefit and a considerable decrease in GHG emissions. There is an increasing recognition among donors and global funds like the GCF of the agrifood sector's susceptibility and contribution to climate change as well as of the need of allocating resources. During the present global pandemic of COVID-19, the agrifood industry has been reiterating this reality by continuing production to feed the food supply chain for billions of people around the world.

5.3.3 Challenges of participation for the private sector

Consumers, investors, and producers, who are among the first to experience the effects of climate change, are driving the global development agenda in the agrifood sector, which is acutely aware of the necessity of sustainability. Despite the wide variety of projections of the agrifood sector's green financing needs, public funding alone will not be adequate to meet the 2030 Agenda's targets. As a result, substantial amounts of private capital are required to match the sums committed by the public sector. Private sector green financing is still heavily focused on climate finance, with a particular focus on sustainable infrastructure, green bonds, and renewable energy, leaving green financing for the agriculture sector to be supported by the public sector. Microeconomic challenges may be to blame, such as difficulties in internalizing environmental externalities, information asymmetry (e.g. between investors and recipients), inadequate analytical capacity of financial institutions (issuers and investors), a lack of generally accepted green definitions, and maturity mismatches, to name only a few (GFSG, 2016).

5.3.4 Science-based data on emissions from the sector

It is difficult to obtain emissions data for each actor in a disaggregated agrifood sector value chain. It is increasingly vital for issuers of green finance products to set science-based targets for emissions from their value chain, as they are regarded the most relevant ESG criteria for the agrifood sector by investors. However, the lack of solid data has made this a major issue. As a result, stakeholders need to adopt regional and global technological standards in order to track certain sustainability indicators, such as soil-captured carbon dioxide (CO^2) or biodiversity protection. An urgent need exists for increased third-party verification based on agreed criteria for GHG emissions monitoring, reporting and reporting by investors and agricultural businesses.

5.3.5 Greenwashing

In order to make significant progress in the greening of the agricultural sector, we must overcome the hurdles posed by greenwashing. For the most part, the term "greenwashing" refers to a variety of marketing and public relations tactics that are used to mislead the public about the true meaning

of “green” and “sustainable” investments. Eco-friendly or “sustainable” undertakings that do not actually meet these standards wind up wasting scarce investment resources, since providers who are “green-minded” are aware of the hazards of greenwashing and need more ability to better understand and evaluate sustainable practices. Asset management firm Schroders conducted an April 2020 poll and found that six out of every ten investors had an issue with greenwashing when investing in green projects (Schroders, 2020). Bottom-up investor education and top-down legislation usually work together to address problems like greenwashing. With the the European Union’s Taxonomy Regulation on sustainable investments, financial institutions should expect more accurate and transparent reporting and less greenwashing in the financial sector. The European Commission (2021) has also planned the introduction of new and specific rules to prevent financial market greenwashing and, as a result, reduce reputational risks for those involved, which could lead to a decline in trust in sustainable financial products and the financial system as a whole.

5.3.6 Impact of COVID-19 on green finance

It was the COVID-19 pandemic that drew attention to the ramifications of our interaction with nature as we cultivate and feed ourselves. Additionally, it exacerbated food-system disparities, disrupting supply networks and lowering millions of people to poverty. In several countries, smallholders in the agrifood sector have had significant financial difficulties as a result of the pandemic. Despite the mitigation measures, the crisis severely interrupted commodities supply networks in the countries most affected. The temporary stoppage of supply chains (forward and backward) and plummeting pricing have had a significant impact on perishable product producers. The agricultural, transportation, medical, and tourism industries were all hit hard and fast by the COVID-19 outbreak. There will be at least as many, if not more, impacts on the value chains of the major sectors as a result of the climate crisis’s low start characteristics, but it will likely take longer to do so. Climate-sensitive industries like agriculture have a unique opportunity to build systems that strengthen their value chain’s resilience to climate-induced disasters while also ensuring that essential commodities and services are available to everyone (UNESCAP, 2020). Financial resources that must be allocated to dealing with emergency problems, such as the rapid stimulation of sustainable and low-carbon commodities and common goods services, will be impacted as well. In the post-COVID-19 setting, climate-related risks in agriculture will have enormous effects on the financial system. All throughout the world there are calls for post-COVID-19 green investments to relaunch growth with the aim of combating climate change as well as protecting biodiversity, which might help to create stronger economies. If not appropriately addressed, climate change risks are seen as possible sources of financial and Sustainable Development Goals risk. As a result of climate change, there are both costs and opportunities, especially in agriculture. Public development banks (agricultural banks), microfinance institutions, regulators, and central bankers must be ready to build the resilience of the global financial system in order to mitigate the effects of climate change on agriculture. As of now, the financial system faces a number of institutional and regulatory challenges, including the absence or limited availability of green lending products, as well as the lack of instruments, tools (like ESG benchmarks and environmental data) and awareness for the decision-making process on agricultural investment policy.

An increasing worldwide population will necessitate new technology and business models for the agrifood sector that do not disrupt the climate balance, yet despite these obstacles, the global society expects significant investment in these areas. SDGs are increasingly being used by investors and agribusinesses to quantify the good benefits they are having, while green finance frameworks that underlie these instruments are increasingly factoring in the SDGs.

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6. Policy and regulatory support to promote green finance in the agrifood sector

Agricultural and food sector policies and regulations are two primary drivers of green finance, which is garnering growing attention from the development community as a critical tool for the transition to sustainability. Policy and regulation gaps exist in many nations, however, which can slow down the change. When it comes to the new economic environment, growing and developing nations are at a crossroads where they must choose between food security and environmentally friendly production methods. National governments are constantly updating and mainstreaming the new policies they have implemented to encourage sustainable production systems and practices in agriculture, forestry and fisheries. As a starting point, this section of the paper argues that green finance policies and their effectiveness should not be viewed in isolation, but rather as part of an overall framework that places the enabling environment for investment and development at its heart. For the total transition to a greener agrifood industry, this part also emphasizes the building of domestic circumstances that allow private sector investments in mitigation (green infrastructure) and adaptation to shift and scale up.

6.1 Green investment policy framework: global engagements

For both industrialized and developing countries, transitioning to a low-carbon, climate-resilient (LCR) economy has immense potential and numerous problems. There are five major parts to a structure: In order to begin, we need to (a) establish goals, aligning policies across and within government, (b) reforming policies to enable investment and strengthen market incentives for low carbon, climate-resilient infrastructure, (c) creating specific financial policies, regulations and instruments that provide transitional support for new green technologies, (d) harnessing resources and building local capacity, and (e) promoting green business and consumer behaviour. The United

Nations Conference on Trade and Development (UNCTAD) Investment Policy Framework for Sustainable Development – which was published in 2015 and has become a crucial instrument for governments throughout the world in building a new generation of investment policies – has also been taken note of by a number of international organizations and NGOs (UNCTAD, 2015). UNCTAD's policy framework highlighted three essential themes of investment plans, programmes and treaties: inclusive growth and sustainable development. These include an investment framework and toolbox for international investment agreements and treaties, detailed recommendations for building national investment policy guidelines, and strategic initiatives to mobilize funds and channel investment into important areas for sustainable development. As a starting point, LCR/ sustainable infrastructure investment can be utilized to realign green investment strategies in the agriculture and food business.

6.2 Policy and regulatory aspects for promoting green finance

Some countries are still in the early stages of implementing policies linked to green financing and other important green rules. In many countries, financial institutions are beginning to incorporate environmental, social, and governance (ESG) issues into their credit risk management, while some of the biggest banks (with a regional/global presence) have actively pushed green initiatives in their lending policies. Both the political and regulatory environment, as well as market inclinations, have supported efforts to mainstream green financing thus far. Climate and environmental obligations can now be based on the NDCs, which have been established as an internationally recognized framework for operational strategies for climate mitigation and adaptation. On the other side, the adoption of green technologies enhances the prospects for green financing to clean energy, the agriculture and food sector, and other infrastructure supported by subsidies to meet the NDC goals. A few commodities, including cotton, rubber, coffee, tea, cacao, and others, have enticed direct investment from private investors in the greening of the agrifood industry. Box 6.1 provides an overview of several worldwide rules, standards, guidelines, cooperation, and initiatives to support green finance.

BOX 6.1: International regulations, guidance and initiatives linked to green finance

Type of regulations	Examples
International regulation on climate-related financial risks	*Basel Standards (Basel III) on capital ratios requirements.* The Basel Committee established the Task Force on Climate-related Financial Risks (TFCR) to undertake work on climate-related financial risks. The TFCR is following a gradual and sequential approach from a banking supervisory perspective, with a current focus on understanding climate risk transmission channels as well as methodologies for measuring and assessing these risks. The Basel Committee is an observer on the Network for Greening the Financial System (NGFS) and allows the two bodies to coordinate and ensure synergies wherever possible (Stiroh, 2020). *Task Force on Climate-related Financial Disclosure (TFCD).* This task force was created in 2015 by the Financial Stability Board (FSB) to develop consistent climate-related financial risk disclosures for use by companies, banks and investors in providing information to stakeholders.

(cont.)

International guidance for responsible investments and standards	*Equator Principles (EP).* The Equator Principles were developed for responsible investment guidance to support the conservation and protection of biodiversity and natural resources, to help mitigating or adapting to climate change, and for the promotion of economic, social and cultural rights and economic inclusion of smallholders. For example, EP III expanded its applicability to project finance advisory services and project finance above USD 10 million. *Green Bond Principles (GBP).* The Green Bond Principles seek to support issuers in financing environmentally sound and sustainable projects that foster a net zero emissions economy and protect the environment. GBP-aligned issuances should provide transparent green credentials alongside an investment opportunity. *UN Global Compact*. The Ten Principles of the UN Global Compact were derived from various declarations and treaties, of which Principle 9 encourages development and the diffusion of environmentally friendly technologies which attract green investments to the agricultural and industrial sectors.
International cooperation to encourage knowledge dissemination and build capacities	*G20 working groups, UNEP Inquiry, UNEP Finance Initiative.* These international cooperation initiatives are aimed to engage with national governments, collaborate effectively, share knowledge, build capacities, drive meaningful, measurable and sustainable action on climate change, and promote a positive investment climate.
Initiatives from financial institutions to promote investments in green projects through networks	*International Development Finance Club (IDFC).* The IDFC is a partnership of development banks whose aim is to complement each other's needs for more efficient global development. The IDFC was founded in 2011 and has a current membership of 26 institutions offering green finance services. *Network for Greening the Financial System (NGFS).* Established in 2017, this network of 83 central banks and financial supervisors aims to accelerate the scaling up of green finance and develop recommendations for central banks' role to mitigate impacts of climate change through financial intervention. *Sustainable Banking and Finance Network (SBFN).* This is a voluntary community of financial sector regulators and banking associations from 43 countries hosted by IFC. SBFN is committed to advancing sustainable finance in line with international good practice.

Source: Authors' own elaboration.

Even when the market drives innovative mechanisms and products to support green and sustainable development, the principles of cooperation and networking are applicable, as they need to depend on many other players and support from a stable and coherent regulatory and policy framework over time to maintain a level of sustainability and continuity of supply. A detailed compilation of global partnership initiatives is provided in Annex 2.

6.3 Macroeconomic policies enabling green and sustainable investments in the agrifood sector

Risk appraisal and pricing of investments in the agrifood business need special consideration, as the level of participation of actors in the value chains is determined by the level of risk. In the lack of adequate macroeconomic policies, the expansion of green finance in general and in

particular is hindered. In order to fill the significant demand gap for green finance products and services, government interventions or injections of concessional funding in the form of subsidies are typically substituted. As a result of this, market change is not projected to go successfully. In addition, the high costs of capital and servicing investments in infrastructure, machinery, etc., due to interest rate sensitivity, have a substantial impact on greening agricultural activities. Priority is given to agricultural output in underdeveloped economies, and food security is favoured over the market mechanism. In order for the agrifood sector as a whole to keep up with the growing demand for green products, all stakeholders must have access to financial and incentive support in the form of technical assistance and capacity building (Table 6.1)

TABLE 6.1: Implications of policies and enablers of green finance

	Broad areas of policy	Macrolevel enablers
1	Risk reduction and promotion of agricultural business	• Investment in research, technology and systems, including work on disaster resistant crops, loss reduction and other risk reduction methods; • Improvements in public infrastructure that could reduce financing risks: flood control, watershed management, agrometeorology for early warning systems; • Enabling regulations on certifications, product differentiation, disease control and monitoring etc.; • Financial instruments to co-invest with private sector investors through matching grants and credit enhancement to provide incentives for adaptation investment; and • Strengthen capacities of individual businesses, business multipliers and banks in assessing their risks and developing adaptation strategies.
2	Risk mitigation instruments and financial modeling	• Ensure and support climate-smart agricultural projects so that they are more bankable and are considered a better credit rating for financial institutions; • Support insurance products such as crop/livestock, weather and farm income insurance; also facilitate initial international risk pooling or access to reinsurance; • Uberization of movable assets through participation by famers in collateral registry for building collaterals; • Support improvement of credit scoring models for rural credit/agri-SME rating systems; • Support establishment of sustainable (both financially and environmentally) agrifood finance guarantee mechanisms to share risks and improve adaptations; and • Public funds and public-private blended finance are important to leverage private funding, including for green finance models.
3	Structured incentives to enterprises and financial institutions	• Establishment of a strong legal and regulatory environment for enforcing contracts that both buyer and seller can trust; • Provide smart subsidies to smallholders in the form of subsidized insurance premiums, new technology adaptation, market facilitations etc.; • Consideration of investments by financial institutions to be a priority for the sector and the recasting of capital requirement norms to adjust the definition of non-performing loan assets; • Fiscal incentives such as availability of low-cost and longer-term funds, tax adjustments etc. need to be promoted; • Specific public funding and/or first loss capital needs to be made available through commercial banking system for green finance projects; and • Investment-friendly guidelines by regulators to promote “green” lending and assessment of ESG risks in bank lending operations.

Source: Authors’ own elaboration.

For green financing in agriculture, macroeconomic policy must support increased investments in green farming practices and agricultural technology adoption, which simultaneously maintain and increase farm productivity and profitability while ensuring the provision of food and ecosystem services on a sustainable basis; reduce negative externalities and gradually lead to positive ones, and rebuild ecological roosting (Box 6.2).

BOX 6.2: Critical areas of green finance and investments for policy influence

There are several critical areas which need immediate macrolevel attention from policymakers to reduce the carbon footprint from agriculture and allied sectors and to bring green finance to centre stage:

- Improved infrastructure for irrigation for water use efficiency, soil-water conservation to restore soil and nutrient erosions by reducing runoff losses;
- Adaptation of technologies for improving water use efficiency by applying minimum tillage and cover crop cultivation techniques;
- Introduction of alternative energies for running agri-machines and post-harvest processing;
- Building infrastructure for capturing weather data, information and communication technologies (ICT), spot markets etc.;
- Investments in technologies to reduce food spoilage and loss by expanding the use of post-harvest storage and processing facilities by the agri-SMEs;
- Building capacities of smallholders to adopt technologies that support usage of naturally and sustainably produced nutrient inputs, diversified crop rotations, farming systems for nutrition, and livestock and crop integration; and
- Raising community awareness to reduce chemical pesticide and herbicide usage by implementing integrated and other environment-friendly biological pest and weed management practices.

Source: Authors' own elaboration.

6.4 Enablers for institutional investors in greening the agrifood sector

A diverse group of institutional investors[32] from different regulatory and management environments do invest in sustainable development activities with a priority of climate-smart activities. Those who have until recently been primarily targeting the clean energy sector and green infrastructure with longer-term repayment periods, have emerged as an important source of green finance to the agrifood sector. As the institutional investors rely on a chain of service providers[33] who play important roles in the investment decision, introducing new asset classes or investment themes like direct investments in the agrifood sector takes time to embed in the decisionmaking process and technical assessment qualities. An FAO study on investment trends in primary agriculture reported that decisions on investments in primary agriculture by private equity investors are the result of careful assessment of potential returns and associated risks including climatic, country, market and regulatory risks (FAO, 2013). In general, the enablers for institutional investors in primary agriculture are: (a) geographic locations, (b) investment approaches, (c) production strategies, (d) marketing strategies and (e) financing strategies. Out of the numerous significant risks of

[32] These are a highly differentiated group, and include public and private pension funds, insurance companies, sovereign wealth funds, angel investors, crowd funding, etc.

[33] Fund trustees, advisors, asset managers, policymakers and regulators etc.

investments in agriculture, ESG risks are common in all types of agricultural activities. IFAD floated an Agri-Business Capital Investment Fund in 2019 which is an independent private investment fund with a dual objective of supporting agribusiness SMEs in building their capital and creating climate-resilient food systems. This fund is specifically tailored to the needs of smallholder farmers and agricultural SMEs and is directed to support farmer organizations (IFAD, 2020).

Various green finance programmes and approaches to attracting private investors are being explored by central banks, financial supervisors, and financial sector policymakers in different countries. Reports from the Intergovernmental Panel on Climate Change (IPCC) stated that a facilitator of last resort for climate financing instruments could assist reduce the systemic risk of stranded assets (Safarzynska and van den Bergh, 2017). So, many central banks and financial regulatory agencies have begun studying the detrimental effects of climate change on their banking and nonbanking financial sectors in order to assess the potential harm to financial stability. There are a growing number of central banks in developing nations that are actively pursuing green central banking policies and expressly incorporating sustainability into their missions (Dikau and RyanCollins, 2017). Adapted from GIZ's global report on the role of national financial institutions in the implementation of NDCs (2018), Table 6.2 illustrates the typical roles played by central banks in monetary policy and by various regulators in formulating policy measures, all of which are dependent on the governance structures of a country, the maturity and depth of its financial system, and its financial supervisory authorities.

TABLE 6.2: Roles and measures of various regulatory bodies

Type of regulators	Instruments and requirements	Policy measures
Central banks regulations (central banks, monetary authorities)	Interest rates Quantitative easing Licensing	Interest rate setting Quantitative easing funds Distribution and control of licenses
Supervision of banks and financial service providers (can be central banks, also dedicated financial conduct authorities)	Capital requirement Reserve requirement Corporate governance Financial reporting and disclosure requirements	Capital requirement settings (Basel accords) Reserve requirements Credit guidance and controls Verification frameworks
Financial regulation (securities commission, financial authorities, line ministries e.g. Treasury or Finance)	Supervision of stock exchanges Corporate governance Financial reporting and disclosure requirements	ESG reporting Climate risk disclosure
Financial supervisory/conduct authorities; stock exchanges including commodity exchange	Supervision of listed companies Supervision of investment Management	Analysis of financial disclosure Compliance with regulations

Source: Adapted from GIZ. 2018. *Global report: the role of national financial institutions in the implementation of NDCs*. Bonn and Eschborn, Germany. https://www.giz.de/en/downloads/giz2019-EN-The-Role-of-National-Financial-Institutions.pdf

7. Key findings, recommendations and next steps

During recent years, the global agrifood system has been under stress due to the negative impacts of external factors like global warming and climate events, which has been further aggravated due to the unprecedented global health emergency of COVID-19. This three-pronged attack has created uncertainties and disrupted the investment climate in the sector, which has a direct bearing on the process of the transition to sustainability. Due to traditionally low yields coupled with higher risks of farming in developing countries, the agrifood sector is unfortunately also not able to attract adequate investments for both mitigation and adaptation, resulting in low levels of capital formation among farming households and depriving them as a climate shock-resilient community. Investors also prefer to invest in the sustainable energy sector over the agrifood sector because of scientific and technological advancements in capital markets. Green bond markets show that only about 3 percent of sustainability-labeled bonds are issued in the agriculture and forestry and land use domains while renewable energy efforts make up 23 percent (CBI, 2018). If one is looking to invest in a field that is heavily reliant on technology and capital investment, it is better to go with the clean energy sector. A transformation in knowledge systems is urgently needed to make it easier to analyse risks and provide sustainability indicators that better inform investment decisions in the food and agriculture industry.

7.1 Main findings of the study

Green finance is considered as a potential vehicle to accomplish the global agenda on sustainable transformation in order to transition to a new economic and financial era. This is one of the greatest opportunities in decades for investors and financial institutions to switch from vanilla to sustainability-focused green asset products. These new financing instruments and structures carry a lower risk of polluting the environment and accelerating climate change. Sustainable agricultural methods are a must if the food sector is to successfully cut emissions, adapt to weather patterns, and withstand the constraints placed on food security by population expansion. Limiting deforestation

and forest degradation at the same time is essential to keep forests from becoming a source of greenhouse gas emissions but rather a safety net.[34] Furthermore, green financing for agrifoods goes beyond typical lending and investment norms because it needs to include the characteristics of inclusive green finance and quantify the impact of ESG in financial appraisals. Measuring progress in green finance is useful as this could gauge the levels of finance being directed towards greening all actors in the agrifood sector and the extent to which green finance is being prioritized by national governments to reach their NDCs.

From this landscape study, some extremely interesting and significant issues have arisen, which require immediate and renewed attention from development leaders and policymakers at all levels. For example, some countries are already making good progress in overall development indices, including in the agrifood sector by addressing climate-related risks through the adoption of green finance models and instruments. This is not the case for the majority of countries, however, which are taking their first steps in the process of transition and need global support for their endeavours. These transition countries' political resolve and economic strength are critical in determining their ability to take use of the financial resources available to them. Table 7.1 provides an overview of the study's findings, along with brief summaries of each.

TABLE 7.1: Key findings on green finance to the agrifood sector

Key findings	Detailed descriptions
A. Taxonomy	
1. Lack of a common definition to demystify green finance and its application to the agrifood-forestry sector	Classification of sustainable economic activity in the agrifood sector and mandatory/voluntary guidelines to differentiate among sustainable finance, green finance, climate finance etc. may serve a tool to address the inconsistencies in definitions and threats of greenwashing.
	There is a need to move from self-prescribed green categories of investments towards standardized definitions and reporting. The potential users of green taxonomies would be banks and financial institutions, regulators and policymakers, investors and issuers.
2. Regional and subregional regulations on green taxonomy are being established, which is a good starting point for universal acceptance	The EU Taxonomy Regulation came into force on 12 July 2020 to achieve the EU's objective of becoming climate-neutral by 2050, with the agriculture sector at the top of its list of 13 technical screening criteria. The ASEAN Taxonomy on Sustainable Finance is following in the footsteps of the EU to serve as ASEAN's common language for sustainable finance and account for both international goals and ASEAN's specific needs.
B. Trends	
3. National-level initiatives to support the NDCs are key to naturepositive investment which needs programme-level technical support though global cooperation	The NDCs are considered as the basis for green investments at the country level and experience across the globe demonstrates the creativity of many countries in seeking to ensure that investment and finance serve to optimally advance sustainable forms of development with special reference to the greening of the agrifood sector. These initiatives are being supported by forward-looking investments and technical cooperation. Strengthened multilateralism and new forms of global cooperation are bringing policy communities together to support programmes and projects addressing the systemic nature of climate change with special reference to the agrifood sector.
	The international community is also building a consensus around necessary reforms to align financial services towards green and climate-positive investments to build resilience in agrifood sector and achieve the SDGs.

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[34] Forests are crucial for sustainable agricultural development because of the role they play in the water and carbon cycles, soil conservation, pest management, the amelioration of local climates and the maintenance of habitats for pollinators.

Key findings	Detailed descriptions
4. Green financing is generally skewed towards the clean energy sector as innovation in science and technology enabled capital markets to support investments. However, the potential of the food-energy nexus is yet to be fully unleashed.	Investments in green development in the last few years have grown more rapidly in the energy sector than in food and agriculture. This trend is also reflected in the rapidly growing green bond markets, where only about 3 percent of sustainabilitylabeled bonds are in the agriculture, forest and land use domains, while better quantified renewable energy initiatives constitute 23 percent.
	It was observed that investment in clean energy technology for the agrifood value chain is not only an attractive financial proposition but also needs to consider the impacts of co-benefits that can take place at different stages of the value chain.
5. Small-scale agriculture is not benefitting from the progress in climate finance to agriculture	Total climate finance targeting small-scale agriculture represents only 1.7 percent of the total climate finance tracked and it covers only a small fraction of the general needs of small-scale agriculture actors. Climate adaptation projects received almost half of climate finance flows to small-scale agriculture, while projects tackling both mitigation and adaptation objectives received more than a quarter of the total fund flows.
6. Low leveraging ratio of public finance to private investment raises the question of efficacy and possible growth deterring effect in the sector	Studies conducted by international agencies found that contributions by public actors are less than those of private actors in extending finance to green and climate-smart projects. However, the leveraging ratio of public finance to private finance is less than two, which is lower than expected as this ratio should ideally go beyond two, raising the question of public finance efficacy in climate-related investments.
C. Drivers and escalators	
7. Policy and regulation are the major drivers in the promotion of green finance. Public and private sector development financial institutions play important roles in promoting green finance.	Policy and regulatory frameworks are considered to be the leading driver in the development of green finance, underlining the reliance of green finance on robust and stable policy frameworks, which require government and regulatory action. Food security and loss of biodiversity are lower in order as drivers of green finance and transformation.
	The major actors driving the development of green finance to the agrifood sector include public and private sector development banks, and institutional investors with active support from the central banks. IFIs play an important role to bringing sustainability issues to centre stage, building coalitions and mobilizing private sector investments in green finance.
8. Identified green finance escalators are expected to be operative to receive effective public support mechanism	Four major escalators in the green finance ecosystem which are poised to play important roles in the life cycle of green deals, but which are currently fragmented and disconnected in their approaches, are: (a) innovation incubators, (b) networks and associations, (c) research and advisory services and (d) international cooperation.
D. Financial instruments	
9. Traditional financing instruments for climatesmart agriculture may be considered as the starting point for green finance to the agrifood–forestry sector.	The financial instruments used for CSA support addressing financing barriers and mitigating risks. Apart from traditional agricultural lending instruments, loan guarantees, proxy credit scores, bundled insurance, digital finance and technical assistance grants etc. are tremendously useful for the promotion of green finance to the agrifood sector. Use of these instruments has not only improved farmers' access to finance, but also helped them manage climate risks, reduce emissions from production, and increase crop yields and consequently income levels.

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Key findings	Detailed descriptions
10. Innovative financial archetypes and tailor-made instruments in green finance are the key to success in accessing capital from the pool funds	Traditional green finance instruments (debt, equity, credit enhancers and risk transfer) are useful, but are however being replaced by hybrid instruments like blended and layered structured finance. These instruments potentially cover several features and bring new financing channels. Adaptation to new archetypes needs to send a clear message to investors about the commitments and intention of policymakers to meeting sustainability goals and accelerating the transition. The growth of innovative financial instruments needs policy support and a system of additional benefits for market participants, both for issuers and for investors.
E. Innovations in delivery mechanism	
11. Fintech and digital solutions potentially promote sustainable and green finance through its broader applicability	Fintech-enabled digital financial marketplaces do have the capacity to transform agrifood sector finance to become more sustainable in terms of sourcing and distributing green investments and further sustainable development. Fintech has the potential to act as a platform to integrate innovative green finance solutions into the broader agricultural ecosystem. Green finance and fintech are relevant considerations for policymakers as they pursue the implementation of the Paris Agreement and achievement of the SDGs.
	Technological Innovations such as blockchain with potential to accelerate the flow of capital to a more sustainable economic technology, as well as financial instruments such as green bonds that meet the risk-return requirements of investors for sustainable investments, will help meet global policy objectives.
12. The green finance framework and workable green finance mechanisms can be employed for the postCOVID-19 global green recovery	To counter the devastating impact of COVID-19, calls are growing for countries to *"build back better"* in an effort to create a more inclusive and sustainable economy that is climate-resilient. To unlock the successful implementation of green finance, developing countries are focusing on creating a dedicated green fund, de-risking investments and credit enhancement, and co-investing with local financial institutions.
F. Risk management	
13. Multifaceted characteristics of ESGrelated risks are a deterrent to scaling up green finance to the agrifood sector.	The complexities of risks emanating from climatic events are widespread and there is a limitation in the adequacy to appropriately assess and prioritize the multifaceted and complex characteristics of ESG-related risks in agriculture-related business. The agrifood sector and financiers must establish or reinforce holistic risk management frameworks. Financial institutions are developing protocols to evaluate the risks in loan portfolios through evaluating plausible linkages between climatic events, risks to sector performance, financial risk to borrowers and associated credit risks. These factors appear to be difficult to quantify but nevertheless can be evaluated qualitatively.
14. Scientifically developed sustainability indices provide benchmarks for upgrading investment decisions and risk management	It is possible to compare food and agriculture investments across countries and enterprises by using sustainability indices that are based on trustworthy scientific findings and are loaded with relevant data. Sustainability-focused corporations and funds will benefit from these indices, which can attract investment and cut the cost of capital, as well as popularize such criteria across all asset classes.

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Key findings	Detailed descriptions
G. Strategies and policies	
15. Targets under NDCs need revisiting to strike a balance in investing between mitigation and adaptation of climatesmart technologies in agriculture	NDCs are at the heart of the SDGs. They are also the most useful starting point for the transition to sustainable finance and creating a green finance strategy or road map that seeks to align with the country's SDG priorities to invest. The consolidated NDC report reveals that most of the countries (parties) are focusing on mitigation while to meet the adaptation targets, they continue to focus on food, nutrition security and food production. However, the investment targets in adaptation are comparatively low and need global dialogue in order to strike a balance between mitigation and adaptation.
16. Lack of progress measuring indicators, key performance indicators (KPIs) and poor commercial outlook require navigational aid at various levels to streamline green finance to the agrifood sector	Catalysing sustainable investment in the food and agriculture sector, at scale, will require a shift in knowledge systems to simplify measurement and produce sustainability indicators that better inform investment decision-making for both public and private actors.
	To adopt suitable KPIs, agrifood companies and financial institutions need widely accepted sustainability metrics and tools. The Global Reporting Initiative (GRI) on disclosure reports can enable development of new financial products and sustainability indices, which can unlock sustainable investments in the food and agriculture sector at scale. A poor commercial outlook, limited financial track record and regulatory uncertainty have made green finance to the agrifood sector appear less attractive to financial institutions.
17. PPPs are paramount in the scaling up of green finance and its architectures.	The public and private sectors are actively investing in green projects as per organizational priorities, business models and commercial considerations - these investments are more prevalent in private sector investment models. The unlocking of private finance in greening agrifood will be possible with strong public and private collaboration, which has emerged as an important tool to mobilize the resources, expertise and innovative leadership needed to achieve sustainable growth. However, there is limited experience globally with collaborative public-private green investment facilities in the agriculture and food sector.
	PPPs in particular tend to have a multiplier effect by leveraging diverse types of expertise, skills, resources (technical and financial) and networks. More importantly, they can help to accommodate the interests of a wide range of actors with different risk appetites, desired investment returns, and social, economic and environmental goals. Knowledge contributions from research agencies, government, corporate and investor communities have proved handy in achieving the objectives of investments.
18. Enabling policy environment with greater coherence provides fresh windows of green investments in agrifood sector.	Developing countries are experiencing hurdles in designing commercially viable and resilient agricultural investment projects which often require patient capital. Lack of policy commitments to long-term investments for greening the agrifood sector (soil health, smart forestry, ecosystem services, circular agro-based industries etc.) has been a major stumbling block as the incentives for these long gestation projects are not explicit enough to attract private investments.
	The agrifood sector is facing challenges driven by climate change, rapid technological innovation and new demands for biofuels and access to information, which call for a high-level investment pipeline to tackle these challenges. These challenges need nature-positive investment policies to leverage private sector participation in transformation projects.

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Key findings	Detailed descriptions
H. Cooperation and collaborations	
19. National, regional and global networks play the role of escalators and have the potential to catalyse sourcing investments, build capacity and engage with policy	Collaborations through networks at different levels are active regionally and globally focusing generally on sustainable and green finance. These networks are primarily led by UN agencies, working closely with public and private actors in agricultural systems and engaging with policymaking entities at the national level.
	These networks could be federated and bring in financial sector actors – insurance, banks and banking associations, central banks, stock markets, etc. – to work in tandem and support the theory of change from conventional finance to green finance in the agrifood sector. These synergies will allow gaps to be identified and filled and will provide opportunities to the networks for extending their service coverage to build the capacities of their members, leveraging their core competence.
20. Multistakeholder partnerships (technical, commercial and financial) are necessary to reduce trade-offs between different land uses and provision of ecosystem services within a landscape.	Partnering with financial service providers and smallholder farmers can help practitioners overcome major obstacles to the implementation of successful finance programmes and maximize the effects of supported activities through customized assistance.
	Value chain operators and other relevant stakeholders will need to form commercial partnerships in order to build a predictable and profitable route to market, providing investors confidence that smallholder economic value can be properly exploited.
	Agricultural finance may need to be de-risked by combining various sources of funding and using customized risk mitigation methods in order to meet investor expectations.

Source: Authors' own elaboration.

7.2 Key recommendations

The green financing architecture for the agrifood sector has grown substantially in recent years, and so have the volumes of funding made available especially for mitigation and, though to a far lesser extent, adaptation. Yet, for many agribusinesses and value chain enterprises, especially those that operate at small-scale, new funding opportunities are unknown or inaccessible. Based on the landscape study, a brief summary of key recommendations on areas of intervention is summarized in Table 7.2 below.

TABLE 7.2: Summary of key recommendations

Broad areas of intervention	Action points	Intended agencies	Key outputs
1. Intensive policy-level engagements	1.1 Coordinated engagement with national/ regional-level governments and policy advocates to support green finance in the agrifood sector	Relevant national government departments/ ministries/ central banks and banking associations	Coordination among relevant stakeholders at the national level, such as ministries, scientific institutions, specialized organizations etc., to define the categories of finance classed as green finance to the agrifood sector
			Advocate and promote green finance to the agriculture sector as a specialized business line and provide enabling policies
			Enforce environmental laws and ensure the adequacy of the legal framework for investors of green credit lines to the agrifood-forestry sector to reduce the incidence of "greenwashing"
	1.2 Establishment of institutional structures to support green finance	National task force on climate change and SDG task force	National-level taskforce and coordination team to monitor progress in green finance to agriculture and allied sectors
			Continuous dialogue among demand and supply side actors on national/regional/global platforms
	1.3 Adoption of policy measures and interventions by financial service providers (FSPs) and their governing bodies	Central banks, concerned ministries, global watchdogs, international development agencies, etc.	Establishment of a framework for green finance to the agrifood sector to provide stakeholders with a national-level roadmap for integration of sustainability into the business models and core strategies of FSPs with sustainable development and responsible investment
			This should be in addition to issuance of uniform rules and regulations for green finance to the agriculture and food sector, providing the FSPs with a reference guidance framework, aligning the incentive system with sustainable finance, and developing the financial sector infrastructure to enable the integration of ESG considerations as well as strengthening the capacity of stakeholders in the financial sector
	1.4 Incentive structures	Financial institutions, development agencies (national and international), central banks	Provide incentives for nature-positive farmers by evaluating their contribution to greening agriculture and consider tax incentives for businesses and projects funded under the green finance category
			Allow longer gestation periods and concessional interest for green agricultural projects using public funds to build mitigation infrastructure
			Charge concessional fees for private sector actors using public infrastructure to implement green agriculture projects

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Broad areas of intervention	Action points	Intended agencies	Key outputs
2. Scaled up engagements at financial institution level	2.1 Central banking and regulatory policies	Central banks, concerned ministries, banking associations	Recommend pathways, policies and frameworks to enable the financial services sector to contribute more efficiently to achieve the NDCs to achieve the SDGs
			Establish self-regulatory organizations in the banking industry to gradually launch a green banking evaluation mechanism to promote green finance
			Guide financial institutions to actively carry out green finance business and better manage environmental risks and disclosures
	2.2 Banking and financial sector policy perspective	Financial institutions, banking associations (national/ regional), central banks	Develop and pilot test tailor-made green finance instruments and services to cater to agricultural value chain actors and support businesses
			Banking institutions need to establish and constantly improve systems and processes for calibrating ESG risk while assessing the bankability of green credit to the agrifood sector
			Incorporate green credit implementation into the scope of internal compliance, and regularly organize and carry out internal auditing on green credit
			Introduce and support green guarantee programmes as credit enhancement tools for banks to take advantage of and leverage
	2.3 Support nonbank financial institutions and MFIs	Investment funds, DFIs, large-sized commercial banks, MFI associations/ regulatory agencies	Institutional investors and non-bank financial institutions need capacity building support to comply with the laid-out policies and processes while providing green finance through online banking, forex platforms, etc.
			MFIs need to be encouraged through technical assistance to develop green finance products and services for their captive clientele in rural and semi-urban areas
	2.4 Facilitating the recognition of green finance instruments for trading by capital markets	Capital market regulatory agencies, stock exchanges, concerned ministries	Promote securitization of green finance and expand the range of participating financial institutions, standardize the selection process of underlying assets
			Facilitate the development of investment pipelines in capital markets through working with stock exchanges and offer technical advisory geared towards green finance to the agrifood-forestry sector
	2.5 Encourage development of instruments for channeling green finance and risk mitigation	Financial institutions, banking associations, central banks	Develop innovative financial mechanisms combining different de-risking instruments – which might include grants, guarantees, and insurance – to achieve a blended capital structure
			Enlarge the scope of financial instrument "green loans for sustainable farming" (for example, green bonds, blue finance, landscape finance, livelihoods finance, green credit cards etc.) to be used to fund a range of environmentally sustainable farming with reduced GHG emissions. These loans may be structured as bilateral loans or syndicated loans as blended instruments
			Innovative green insurance mechanisms, which might include a large spectrum of insurance products either related to climate risk insurance (in agriculture), or a bundled package that includes credit to promote energy-efficient investments, or macrolevel insurance that seek to pool risk against large-scale catastrophic events (such as hurricanes, earthquake, tsunami etc.)

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Broad areas of intervention	Action points	Intended agencies	Key outputs
3. Setting medium- and long-term priorities for green finance to the agrifood sector and revisiting the NDCs	3.1 Establishment of dedicated green finance funds at the national level to promote a sustainable agrifood sector	Investment banks, DFIs, concerned ministries, central banks	These funds will work in tandem with all global green funds and support green investment and finance targeted to transition in the agrifood-forestry sector
			Both private and public sectors (including multinationals) may participate as shareholders of the fund, which may be managed by professional fund managers with active support from all shareholders
			Prioritize investment in projects/programmes to address climate resilience in the agrifood-forestry sector on a merit basis with significant consideration of the impact factor and outreach; the standard operating procedure (SOP) of the fund will ensure consistency in investment
			The fund will leverage investments from bi/multilateral agencies for capacity building alongside encouraging private sector investments in innovations and technological promotion in the agrifood sector; a separate provision for the private sector and innovation windows needs to be established for this fund
	3.2 Floating of green bonds for sourcing long-term funds for nature-positive agricultural development	Development financial institutions (national/ international), investment banks, central banks	Mobilizing liquidity through the issuance of green bonds which can be used as long-term and stable capital for agriculture at a reasonable cost, for which a national guidance on investment criteria needs to be developed
			Green bonds will be considered at par with other long-term bonds in the capital market and periodic monitoring and evaluation system need to be in place
			This dedicated green bond will be able to tap funds from remittances and other angel investors for long-term investments
4. Strengthening of public-private partnerships to innovate and deliver green finance to agriculture	4.1 Increase the scale of funding and diversified channels	Investment banks, development financial institutions, concerned ministries	Encourage different and diversified channels to invest in greening the agrifood sector. For example, allow private capital and foreign capital to set up private green investment funds, implement green projects.
			Favourable fiscal policies on FDI in green agricultural projects need to be encouraged
	4.2 Strengthening support for public-private partnerships	Public sector engaged in environmental protection, private agribusiness companies, financial institutions	Support the introduction of the PPP model in the green financing industry and bundling of environment-friendly technologies in green projects
			Improve relevant rules and regulations on green PPP projects, and encourage national governments to release operational rules based on experience of past PPP projects
			Encourage all kinds of green development funds to support green PPP projects
			To ramp up green finance to agriculture at scale, it will be essential to establish PPPs that bring together donors, governments, climate funds, development and international FIs, civil society, private and institutional investors, and others from the agriculture, climate and financial sectors

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Broad areas of intervention	Action points	Intended agencies	Key outputs
5. Promote regional and international cooperation	5.1 Expand the scope of cooperation at global level	Global development agencies, voluntary associations and UN agencies	Expand the scope of international cooperation in green finance and allow exchange of knowledge from countries which have already achieved success in this regard
			Continue to promote the global consensus on developing green finance under the framework of the G20, promote the application of voluntary principles for green banking and green investment, as well as other best practices on green finance, and improve related capacity building
			Support domestic financial institutions and enterprises to issue green bonds overseas and strengthen financial cooperation
	5.2 Engage with the regional cooperation agencies	Regional/ subregional agencies/ regional development agencies/ associations	Promote regional cooperation on green finance and support green investment of relevant countries (for example, ASEAN, the South Asian Association for Regional Cooperation (SAARC), EU, African Union etc.)
			Leverage the existing south-south technical cooperation facilities for funding and upgrading of knowledge
6. Agri-focused post-COVID-19 green growth push	6.1 The agrifood sector needs to suitably manage ESG issues for business continuity	Investment banks, development sector	There are abundant opportunities to provide the support that enables a green recovery and business continuity. For example, conditional cash transfers to farmer groups for constructing infrastructure to address climate change, renewable energy for food production, processing and storage, and training on sustainable land management practices will trigger the post-COVID-19 recovery
	6.2 Ensure COVID-19 dedicated resources are used to generate evidence for future pandemics/ disasters	Relevant ministries, development finance institutions (national and international)	Country- and global-level assessment tools offer several advantages. They provide valuable indicators to guide policymakers for short-term responses, increase public awareness of the impacts and reveal the vulnerabilities of the interconnectedness of ecosystems and economies

Source: Authors' own elaboration.

7.3 Next steps

While reviewing the global state of affairs in greening the agriculture and food sector, three potential parameters appeared to be most important for adapting green finance to the sector: (i) economic profit for the smallholder producers and the value chain actors active in both upstream and downstream, (ii) environmental stewardship in the green development space and (iii) social responsibility by all the concerned stakeholders. To facilitate rapid advancement in sustainable development, the following concrete actions need to be prioritized to enhance the multiplier effect that green finance to the agrifood sector can potentially have to support the transformation to climate-resilient agricultural systems:

1. ***Establishing an inclusive and representative taxonomy of green finance*** While defining green finance in the agrifood sector, it was extremely difficult to draw lines between sustainable finance, climate finance and green finance to agriculture. Keeping in view the interest of the global community and institutional investors, the time has come to provide an acceptable definition to clearly identify green finance to the agrifood sector. This study proposes that all types of financing and investments targeted to achieve the following objectives could be identified as green finance to the agrifood sector: (a) green inputs and equipment production; (b) reduction and elimination of chemical fertilizer, pesticide and plastic use through good agricultural practices (GAP); (c) investments in technologies and practices that reduce GHG emissions and nutrient runoff; (d) investments in improving energy and water resource use; and (e) investments in reducing food loss and waste.

2. ***Expanding fiscal incentives to contribute to leveraging green finance in the agrifood forestry sector*** Concessional interest and tax breaks for agrifood sector financing and investments need to be widened to include more of the country's farmers. This will aid in bringing in new players in the supply side, which will help them become more competitive and more efficient. It is important for policymakers to exercise caution when structuring concessional interest/ subsidies, as these can put a significant burden on financial institutions and distort the market and competition. There must be a tax exemption for institutional investors that purchase green agricultural bonds. 'Important' Green finance and environmental protection should receive additional support from central banks and authorities. In order to collaborate with private sector financial institutions and give credit guarantees for green loans and credit risk compensation to suppliers of risk guarantees, the government should establish a new firm or fund.

3. ***Innovations in financing mechanisms by using investment vehicles supporting green finance to agriculture*** In order to promote green finance to the agrifood sector, it will be necessary to design innovative financial mechanisms, investment vehicles and financial instruments that can provide more tailored and comprehensive solutions to the specific challenges of greening the sector and can facilitate the SDGs. There is a need to leverage additional capital from public and private sources and channel the resources to smallholders and downstream actors. To understand the benefits, innovative approaches required to be adopted and supported by the regulatory authorities. Financial institutions need to pilot innovative mechanisms so that a wide range of financial approaches can be tested and, if successful, scaling up process can be undertaken.

4. ***Bridging the disconnect of demand and supply in green finance and work with the escalator*** There are a vast number of sectors/subsectors (agriculture, biodiversity, ecosystem, climate, finance, etc.) and parties (government, donors, civil society, financial institutions, private companies and private investors, among others) involved in transitioning agricultural development to the new normal investment arrangements to achieve risk-proofed and climate-resilient systems. It is a herculean task to reach to mutual understanding in this regard due to these actors' diverse interests and approaches. This lack of agreement and disconnection among stakeholders in the agrifood sector has already impacted efforts to address environmental, social and governance challenges in a coordinated and effective manner. It is therefore imperative for all the stakeholders to support the identified escalators for connecting the dots of their

individual efforts: (a) innovation incubators, (b) networks and associations, (c) research and advisory services and (d) international cooperation. This will be a vital and game-changing approach for ensuring that the capacities, energy and resources spent by each party are not wasted, but can maximize the outputs.

5. ***Strengthening the national and global green financing mechanism to provide additional oxygen to agrifood sector*** Underinvestment in greening agriculture and its supply chains is being reported from all corners of the globe, which is negatively impacting on the working approaches of the agrifood system. Keeping in view the investment challenges, there are few national/regional/global funds dedicated to supporting green investments were initiated during the early years of the new millennium. Out of these funds, the GCF, established in 2010, has made tremendous progress in the last decade to help developing countries to enhance their ability to respond to climate change which however is skewed towards clean and renewable energy and is also competing with other climate funds. From this study, it is clear that there is an urgent requirement of national-level dedicated funds which may partner with the regional/global funds to pool information, lesson-learning, capacities for mainstreaming good practices need to reduce the considerable gap in demand and supply of green finance in the agrifood space.

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Annex 1: Financial instruments for extending green finance

TABLE A1 Financial instruments for extending green finance

Financial instruments	Definition and features of the instruments
1. Debt instruments	
Supranational and sovereign green bonds	Proceeds are allocated to nominated projects and assets. Debt securities carry the credit rating of the issuing state. However, an independent rating may be assigned by ratings agencies.
Sub-sovereign green bonds	Proceeds are allocated to nominated projects and assets within the sponsoring region. The credit rating is based on that of the issuing municipality and credit quality of underlying assets.
General obligation green bond	Proceeds are allocated to nominated projects and assets within the sponsoring region. As the green bonds are backed by balance sheet assets, the bond will carry the credit rating of the issuing entity.
Green revenue bond	Proceeds are allocated to nominated projects and assets. As the green bonds are backed at least partially by the issuer's revenue stream, bonds carry the credit rating of the issuing entity.
Green structured finance	Debt securities backed by a pool of underlying assets. Proceeds are allocated only to nominated projects and assets. The credit risk is dependent on the asset risks.
Green securitization Green tranches in asset-backed security (ABS) and mortgage-backed security (MBS) deals	Debt securities backed by a pool of underlying assets. Proceeds are allocated only to nominated projects and assets. Often an independent credit rating is issued by a rating agency, but this is not a requirement. The credit risk is dependent on the asset risks.
Green convertible bond	Proceeds are allocated on nominated projects and assets. The security can be converted into a predetermined amount of the company's common stock. The bond will carry the credit rating of the issuing entity.
Green project bond	Proceeds are allocated on nominated projects and assets. Credit rating is based on the quality of the backing green assets and the returns stream of the underlying project.
Environmental impact bonds/ pay-for-results green bonds	Proceeds allocated to nominated green projects/assets. Part of the project's risk is transferred from the issuer to investors. The payments to investors are conditional to the project achieving an expected outcome after a third-party evaluation has been conducted.
Private placement	Green bond placed directly with the investor/s. Details of the deal such as pricing and maturity may remain confidential, but the issuer is expected to disclose details on the nominated projects and assets to be financed.

(cont.)

Financial instruments	Definition and features of the instruments
Green loans, syndicated loans and credit lines	Provide lending to encourage market development in climate-aligned sectors in line with the Climate Bonds Taxonomy and in compliance with the Green Loan Principles. Interest rates are based on borrower credit scores or an ESG score assigned by an ESG rating agency.
Mezzanine and subordinated debt	Proceeds are allocated to nominated projects and assets. Hybrid capital investments from development banks seeking to support private investment in the senior debt or from investors with a higher risk appetite.
2. Equity instruments	
Islamic finance, including sukuk	Islamic financial certificate in compliance with Sharia law. The certificates give partial ownership in the underlying assets and/or the earnings from those assets.
Public-private partnership	A long-term contract between a public entity and a private party aimed at developing and supporting a public asset or service. The private party takes on significant risk and management responsibility, and remuneration is linked to performance.
Joint venture, partnership	Business agreement between two or more parties that pool their capital, skills and resources to achieve a specific project or business activity.
Private equity, venture capital and unlisted equity funds	Fund allocations to innovative pilot-scale green projects including for qualified green infrastructure. Aid project developers and entrepreneurs to secure a funding stream for green projects. Private equity often incorporates green indicators into the process.
Mezzanine/ subordinated debt and preferred stock (B-shares)	Hybrid financing typically from development banks and international finance institutions supported by subordination of equity tranches. Often, lenders are allowed to convert the loan into subordinate equity shares according to prespecified conditions. Alternatively, shares may be used as loan collateral.
Subsidiary/ project financing vehicles, YieldCos	Use of proceeds to fund a portfolio of (off-balance sheet) green projects. Private or publicly traded vehicle consisting of pools of long-term cash-generating green assets, may have tax advantages.
Investment trusts	Use of proceeds to fund a portfolio of green projects. Publicly traded vehicle consisting of pools of long-term cash-generating green assets, may have tax advantages.
Infrastructure/ property funds	Fund directly investing in nominated infrastructure projects. Funds can have a mixed financing structure by both investing directly in assets and through debt subscription.
3. Debt and equity instruments	
Islamic finance, including sukuk	Islamic financial certificate in compliance with Sharia law. The certificates give partial ownership in the underlying assets and/or the earnings from those assets.
Public-private partnership	A long-term contract between a public entity and a private party aimed at developing and supporting a public asset or service. The private party takes on significant risk and management responsibility, and remuneration is linked to performance.
Joint venture, partnership	Business agreement between two or more parties that pool their capital, skills and resources to achieve a specific project or business activity.
Private equity, venture capital and unlisted equity funds	Fund allocations to innovative pilot-scale green projects, including for qualified green infrastructure. Aid project developers and entrepreneurs to secure a funding stream for green projects. Private equity often incorporates green indicators into the process.
Mezzanine/ subordinated debt and preferred stock (B-shares)	Hybrid financing typically from development banks and international finance institutions supported by subordination of equity tranches. Often, lenders are allowed to convert the loan into subordinate equity shares according to prespecified conditions. Alternatively, shares may be used as loan collateral.

(cont.)

Financial instruments	Definition and features of the instruments
4. Credit enhancement instruments	
Full or partial credit guarantee (PCG)	A credit guarantee or PCG is created to absorb part or all the debt service default risk of an infrastructure project, irrespective of the cause of default. PCGs can be used for any commercial debt instrument (loans, bonds) from a private lender. The existence or proposed implementation of a PCG is indicative of confidence in the product being floated by the guaranteeing entity and can even assist in bringing new lenders to the table.
Partial risk guarantee/ political risk guarantee (PRGs)	PRGs cover private lenders and investors for certain risks of lending to sovereign or subsovereign borrowers. A PRG needs to include private participation in the project. A PRG can cover a number of sovereign or sub-sovereign risks such as currency inconvertibility, repatriation, expropriation, political force majeure such as war, regulatory risk and government payment obligations (such as tariffs).
Partial risk swap guarantees	Partial risk swap guarantees cover investors against the risks arising from currency swaps in cross-border transactions or where the debt service cash flow is in a different currency from the deal cash flows, which would require the issuer to hedge the currency mismatch to provide comfort to investors that payments can be made in the debt currency.
First-loss provisions	First-loss provisions refer to any device designed to protect investors from the loss of capital that is exposed first if there is a financial loss of security. These could be debt, equity or derivatives instruments including mezzanine finance, cash facilities or guarantees. They could also take the form of insurance that insures debt security providers who are liable to pay compensation to the investors, irrespective of the cause of the loss.
Contingent loans	Contingent loans are often used in project finance to backstop the main debt by providing a payment option for specific case scenarios. For instance, if the government fails to obtain quality cash flows, the contingent loan is triggered and investors are paid.
Concessional loan	Concessional loans are loans that are granted on substantially more generous terms compared to market loans, which is achieved through below-the-market interest rates, longer grant periods or a combination of both.
Energy service companies (ESCOs)	ESCOs provide technical and financial services for the implementation of energy efficiency solutions. Under a Guaranteed Saving Scheme, the ESCO guarantees a certain level of energy savings, thus assuming the performance risk. With a Shared Savings Model, higher energy savings determine a lower cost of the energy service. In both schemes, financing can come either from the ESCO or a third party.
Viability gap funding (VGF)	VGF is used specifically in infrastructure to cover for the heavy upfront funding that is required to kick-start projects. An analysis of the viability of a proposed project points out the weak areas that prevent large-scale funding from being obtained. A VGF scheme can be implemented through capital grants, subordinated loans or even interest subsidies to target specific issues that are affecting the viability of the project. A blended finance approach could also be used to reduce project risk.
A/B loans or grants	A/B loans or grants are where a Multilateral Development Bank (MDB) offers the “A” portion of the loan while attracting other lenders to join in a second (or “B”) tranche. The MDB will be the lender-of-record, lead lender and administrative agent in the transaction. This reduces part of the risks of the operations, by also being covered by the “umbrella” of the MDBs that include a preferred creditor status and de jour immunity from taxation.

(cont.)

Financial instruments	Definition and features of the instruments
5. Risk transfer/sharing instruments	
First-loss capital	May provide a risk-buffer for green structures and thereby encourage institutional investors. First-loss capital incorporated into the capital structure usually as a junior equity tranche or as subordinated debt.
Synthetic green capital notes or securitization	Risk management (de-risking) to release loss reserves, with the use of freed capital to fund green projects. Reduce risk weighting of assets, while keeping the assets tied to the banks' balance sheet and the current operations.
Loan loss reserves	Pooled public funds set aside by a financial institution to partially recover loss in their loan portfolio in the event of borrower defaults. If the institution issues green bonds, loan loss reserves can improve the risk profile of the deal by providing additional assurance on the issuer's cash flows.
Risk sharing facility (RSF)/ default swap	These structures support a transaction involving a loss-sharing agreement, where the originator will be reimbursed in the case of a loss of principal on a portfolio of eligible assets (mortgages, consumer or student debt, energy efficiency loans, SME loans, receivables). Originators are mainly banking and financial corporations.

Source: Compiled from CBI. 2019. *ASEAN green financial instruments guide*. London. https://www.climatebonds.net/files/reports/asean_green_fin_istruments_cbi_012019_0.pdf

Annex 2: Global initiatives to promote green and sustainable finance

TABLE A2: Global initiatives to promote green and sustainable finance

Initiatives and best market practices	Salient features of the initiatives
Leading policies and regulatory initiatives	
Equator Principles (EPs)	The Equator Principles, launched in 2003, form a risk management framework adopted by financial institutions, for identifying, assessing and managing environmental and social risk in projects. The EPs are primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making. As of December 2019, there were 101 financial institutions in 38 countries that had officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets.
Financial Stability Board Task Force on Climate-related Financial Disclosures	In December 2015, the Financial Stability Board (FSB) established the Task Force on Climate-related Financial Disclosures (TCFD) to develop voluntary, consistent, climate-related financial disclosures useful in understanding material risks and opportunities related to climate change in an organization's balance-sheet. In 2017, the Task Force published its Final Report setting out its recommendations for helping businesses disclose climate-related financial information.
G20 Sustainable Finance Study Group	The objective of the G20 Sustainable Finance Study Group (SFSG), formerly known as the Green Finance Study Group (GFSG), is to "identify institutional and market barriers to green finance, and based on country experiences, develop options to enhance the ability of the financial system to mobilize private capital for green investment" (GFSG, 2016, p. 7).
Network of Central Banks and Supervisors for Greening the Financial System (NGFS)	During the One Planet Summit in December 2017, eight central banks and supervisors established a Network of Central Banks and Supervisors for Greening the Financial System (NGFS). With its Secretariat being provided by the Banque de France. Since then, the NGFS has grown to 55 Members and 12 Observers, in six continents (as of February 2020). The Network's purpose is to help strengthen the global response required to meet the goals of the Paris Climate Agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development.
United Nations Sustainable Development Goals (SDGs)	The SDGs were launched in 2015 under the 2030 Agenda for Sustainable Development, which was agreed by 193 countries in a UN-led process. The 17 goals address global challenges including those related to poverty, inequality, climate, environmental degradation and prosperity. The financing needed to achieve the SDGs is required from both public and private sectors.
Regulatory initiatives through international cooperation	
ASEAN Capital Markets Forum (ACMF)	In November 2017, the ASEAN Capital Markets Forum (ACMF), which is composed of ten national securities regulators in southeast Asia, issued the ASEAN Green Bond Standards. These were developed based on the Green Bond Principles (GBP) and tailored to meet the needs and commitment of the ASEAN capital markets.

(cont.)

IOSCO Sustainable Finance Network	In October 2018, the International Organization of Securities Commissions (IOSCO) established a Sustainable Finance Network that will serve as a platform for securities regulators to share their experiences and discuss sustainability-related issues as well as developments in the market and across jurisdictions.
Marrakech Pledge	The Marrakech Pledge for Fostering Green Capital Markets in Africa is one of the key continental initiatives launched during the COP22 held in Marrakech in November 2016, to scale up climate finance. It is a commitment by participating African capital markets regulators and exchanges to act collectively in favour of sustainable development by enabling the establishment of green capital markets in Africa.
Sustainable Banking Network (SBN)	SBN is a community of financial sector regulatory agencies and banking associations from emerging markets committed to advancing sustainable finance in line with international good practice. The SBN facilitates the collective learning of members and supports them in policy development and related initiatives to create drivers for sustainable finance in their home countries. The SBN is currently hosted by IFC.
Key National Policy Initiatives	
Bangladesh	In January 2011, Bangladesh Bank (BB) issued the Environmental Risk Management Guidelines for Banks and Financial Institutions in Bangladesh (updated in 2017 with the scope expanded to cover social risk). In addition, in February 2011, BB issued the Policy Guidelines for Green Banking for the scheduled Bangladeshi banks to formulate and adopt broad environmental or green banking policies and strategies.
Brazil	In May 2018, the Central Bank of Brazil published its resolution revising the rules applicable to occupational pension funds' investments and requiring asset managers to take ESG risks into account as part of their decision-making process.
Canada	In April 2018, Canada launched an Expert Panel on Sustainable Finance which consults members of the business community about the opportunities associated with sustainable finance and explores the opportunities and challenges for companies facing voluntary standards for corporate disclosure of the financial risks associated with climate change. In October 2018, the expert panel published its interim report and its final report was published in June 2019.
France	France became the first country to enact legislation requiring asset owners and asset managers to disclose how they manage climate-related risks and, more broadly, incorporate environmental, social and governance parameters into their investment policy. In December 2018, the Institute for Climate Economics (I4CE), a joint initiative established by Caisse des Dépôts and Agence Française de Développement (AFD), published an overview assessing the application of Article 173 by French insurers after two years of implementation.
Germany	The German government created a Sustainable Finance Committee on 6 June 2019. The Committee's purpose is to advise the German government as it drafts and implements a sustainable finance strategy, as well as to pool existing expertise and foster dialogue between the relevant players. This includes consideration of European and international initiatives as well as the German government's ongoing work on the federal investment strategy.
China, Hong Kong SAR	In May 2019, the Hong Kong Monetary Authority (HKMA) announced three sets of measures to promote green finance: (i) the development of a common framework to assess the "greenness baseline" of individual banks, stakeholder engagement on the supervisory role for green and sustainable banking, and setting targets and monitoring banks' progress; (ii) the prioritization by the HKMA, as the manager of the Exchange Fund, of green and ESG investments; and (iii) the establishment of the Centre for Green Finance which will serve as a platform for technical support and experience sharing for the green development of the Hong Kong banking and finance industry.

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Japan	In January 2018, the High-Level Meeting on ESG Finance was set up in Japan for major players in the financial markets to gather under the initiative of the Minister of the Environment. In July 2018, the members of the High-Level Meeting on ESG Finance released their recommendation called "Toward becoming a big power in ESG finance".
Singapore	The Monetary Authority of Singapore (MAS) launched a three-year Green Bond Grant Scheme in June 2017 to cushion the additional costs of green bond issuance. The scheme assists qualifying issuers by covering the costs for obtaining an external review. Qualifying bonds must be at least SGD 200 million or equivalent, issued and listed in Singapore. Additionally, in February 2019, the Authority expanded the scope of its Green Bond Grant Scheme to include social and sustainability bonds and renamed it as the "Sustainable Bond Grant Scheme".
Sweden	A Green Bond Investigation Commission by the Swedish Ministry of Finance was launched in 2016 to analyse and produce examples of project types that could be financed through green bonds, as well as to propose a structure for processes and criteria that identify green projects. The Commission's final report was published in January 2018 and proposed a number of recommendations including the issuance of a sovereign green bond, as well as the promotion of green bonds issued by state-owned enterprises.
Switzerland	The Federal Council in June 2019 set up a working group headed by the State Secretariat for International Finance (SIF), in close cooperation with the Federal Office for the Environment (FOEN), to help determine the framework conditions that will enable the Swiss financial centre to be competitive in the area of sustainable finance.
United Kingdom of Great Britain and Northern Ireland	The United Kingdom Government set up an independent taskforce in September 2017 to look at how the UK could enable a low-carbon transition in its economy and evaluate what systems and structures are required for such a transition. In March 2018, the Green Finance Taskforce released its Accelerating Green Finance report, with recommendations which included the issuance of a sovereign green bond, aligned with the United Kingdom's Clean Growth Strategy and 25-year Environment Plan.
Viet Nam	The State Bank of Vietnam (SBV) issued Decision No.1640/QD-NHNN in August 2018 approving the "Scheme on green bank development in Vietnam". The overall goal of the Scheme is to accelerate the awareness and corporate responsibility of the banking sector about environmental protection, the climate change response, directing credit resources into eco-friendly projects/ programmes, boosting green production, services, as well as clean and renewable energy, in order to contribute to the promotion of green and sustainable growth.
United Nations Initiatives	
International Network of Financial Centres for Sustainability (FC4S)	The FC4S Network, established in September 2017, is a partnership between financial centres and the United Nations Environment Programme (UNEP) with the aim of exchanging experience and taking common action on shared priorities to accelerate the expansion of green and sustainable finance.
Principles for Responsible Banking (PRB)	The Principles were launched during the annual United Nations General Assembly in September 2019 by 130 banks from 49 countries representing more than USD 47 trillion in assets. The Principles provide the banking industry with a single framework that embeds sustainability at the strategic, portfolio and transactional levels and across all business areas.
Principles for Responsible Investment (PRI)	The PRI is a leading proponent of responsible investment. It works to understand the investment implications of ESG factors and to support its international network of investor signatories in incorporating these factors into their investment and ownership decisions.

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Sustainable Stock Exchanges Initiative	The Sustainable Stock Exchanges Initiative, launched in 2009, is a UN Partnership Programme of the UN Conference on Trade and Development (UNCTAD), the UN Global Compact, the UN Environment Programme Finance Initiative (UNEP FI) and the Principles for Responsible Investment (PRI). Its mission is to support the alignment of capital markets with public policy goals (the SDGs) by building capacity of stock exchanges and securities markets regulators to promote responsible investment in sustainable development and advance corporate performance on environmental, social and governance issues.
UNEP FI Sustainable Principles for Insurance Initiative	Launched at the 2012 UN Conference on Sustainable Development, the UNEP FI Principles for Sustainable Insurance (PSI) serve as a global framework for the insurance industry to address environmental, social and governance risks and opportunities. Endorsed by the UN Secretary-General, the Principles have led to the largest collaborative initiative between the UN and the insurance industry, the PSI Initiative.
International Best Market Practices	
The Green Bond Principles (GBP), Social Bond Principles (SBP) and sustainability Bond Guidelines (SBG) – The "Principles"	In October 2019, the Executive Committee of the Principles set up a working group on Climate Transition Finance with the mandate to consider, among other issues, what a climate strategy from an issuer would mean and how the consistency between the strategy and the corporate expenditures could be assessed/evidenced. In January 2020, the Executive Committee established in parallel a working group on sustainability/KPI-linked bonds which will examine these emerging products and potentially propose guidance for issuers.
Climate Bond Initiative	The Climate Bonds Standard seeks to provide common, science-referenced classification of what is "green". The Climate Bonds Standard involves a wide coalition of academic and industry experts preparing open access guidelines for which climate-related investments can be associated with green bonds. The Climate Bonds Taxonomy is a guide to climate aligned assets and projects. It is a tool for issuers, investors, governments and municipalities to help them identify investments that will deliver a low-carbon economy.
Green Loan Principles	The Green Loan Principles were published in March 2018 by the Loan Market Association, supported by the International Capital Market Association (ICMA), with the aim of creating a high-level framework of market standards and guidelines as well as to provide a consistent methodology for use in the wholesale green loan market. The principles constitute voluntary recommended guidelines to be applied to any form of loan instrument that may be categorized as green, including revolving credit facilities. They promote the development of green loans by providing a clear framework of recommendations to be applied by market participants on a deal-by-deal basis
Market authority regulations	
India	The Securities and Exchange Board of India (SEBI) issued the Disclosure Requirements for Issuance and Listing of Green Debt Securities in May, 2017. This follows SEBI's discussion paper Concept paper for issuance of Green Bonds, published in December 2015. Aligned with the Green Bond Principles, the guidelines are applicable to public green debt securities and introduce mandatory disclosure on the use of proceeds, environmental impact and its methodology, process for determining continuing eligibility of projects/assets, etc.
Indonesia	In December 2014, the Indonesia Financial Services Authority, Otoritas Jasa Keuangan (OJK), released the Roadmap for Sustainable Finance in Indonesia, which sets forth the end goal of sustainable finance in Indonesia to be achieved in the medium term (2015–2019) and long term (2015–2024) by the financial services industry and prepares the benchmark for improvements in sustainable finance.
Kenya	The Kenyan Capital Markets Authority released its frameworks for the issuance of listed and unlisted green bonds in February 2019. The launch of the green bond market has been embedded in the legal framework through the publication of a policy guidance note on issuance of green bonds and the approval of amendments to the Nairobi Securities Exchange Listing Rules by the Authority.

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Malaysia	Having launched its Sustainable and Responsible Investment (SRI) Sukuk Framework back in August 2014, Malaysia issued the world's first green sukuk in 2017. The country has implemented the ASEAN Green Bond Standards and the SRI Sukuk Framework (updated in November 2019) via incorporating the requirements into the Guidelines on unlisted Capital Market Products under the Lodge and Launch Framework.
Morocco	The Moroccan Capital Markets Authority, Autorité Marocaine du Marché des Capitaux (AMMC), issued their Green Bonds Guidelines in 2016. In July 2018, with the support of IFC, AMMC published their Green, Social and Sustainability Bond Guidelines, which amended the Guidelines of 2016.
Nigeria	In December 2018, the Securities and Exchange Commission of Nigeria officially launched its Rules on Green Bonds. The initiative follows the country's – and the African continent's – first sovereign green bond issuance in December 2017.
Philippines	On 16 August 2018, the Philippines Securities and Exchange Commission approved the Guidelines on the Issuance of Green Bonds Under the ASEAN Green Bond Standards. These Guidelines set out to adopt the ASEAN Green Bond Standards and provide rules and procedures for the issuance of ASEAN Green Bonds in the Philippines. In April 2019, the regulator also adopted the ASEAN Social and Sustainability Bond Standards.
Thailand	In December 2018, the Securities and Exchange Commission (SEC) of Thailand amended the regulation on debt instruments to include specific disclosure requirements for green bond issuances. Effective as of 31 December 2018, green bond issuers are required to disclose which international green bond standard/ principles the issuance complies with.
United Arab Emirates (UAE)	In January, 2020, the Dubai Financial Services Authority (DFSA), together with a group of leading authorities in the UAE, has published the UAE's first Guiding Principles on Sustainable Finance (the Guiding Principles), which will serve as a catalyst for the implementation of the UAE's sustainability priorities.

Source: Compiled from ICMA. ICMA (International Capital Markets Association). 2020. International policy initiatives. In: *Sustainable Finance*. Zurich, Switzerland. [Cited 18 March 2022]. https://www.icmagroup.org/sustainable-finance/international-policy-initiatives

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Contact:
Rural Institutions, Services and Empowerment
RISE-Team@fao.org
https://www.fao.org/rural-institutions/en/
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