CLIMATE FINANCE TOWARDS GREENER AGRICULTURE: A WIN-WIN STRATEGY

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International agreements, like the Paris Agreement, obligate developed countries to financially support developing countries (DCs) in mitigating greenhouse gas (GHG) emissions and adapting to climate change. However, these investments have fallen short, mainly to sustainable agricultural projects, requiring a smart solution. Countries with vast agricultural production and forest reserves, like Brazil and Indonesia, are major contributors to GHG emissions through deforestation. The objective of this study is to assess the role of climate finance in assisting DCs in mitigating GHG emissions and adapting to climate change, particularly in the agricultural sector. The methodology adopted includes a policy-oriented approach, proposing the establishment of the Sustain (Sustainable Financing in Specific Territories for Reforestation, Recovering and Nature) mechanism. We recommend strengthening the management of climate finance to ensure that DCs achieve ambitious goals for reducing GHG and adapting to climate change with a mechanism Sustain. As a first step, the Group of Twenty (G20) should establish the Sustain as a financing modality within the climate fund aimed at addressing issues related to agriculture and land use change. Sustain will serve as an international platform to attract foreign investment for ecosystem preservation and food supply in DCs. Key recommendations for project selection include: prioritizing DCs involved in international trade and committed to sustainable production; supporting projects that promote low-carbon agricultural practices; developing standardized monitoring and reporting procedures for GHG emissions reductions; encouraging the adoption of international agricultural sustainability standards; and ensuring social inclusion and gender equity in the project benefits. The G20 should co-finance these projects by combining its resources with other investments.

Keywords: climate funds; developing countries; greenhouse gas emissions; sustainable practices.

FINANCIAMENTO CLIMÁTICO PARA UMA AGRICULTURA MAIS VERDE: UMA ESTRATÉGIA GANHA-GANHA

Acordos internacionais, como o Acordo de Paris, obrigam os países desenvolvidos a apoiar financeiramente os países em desenvolvimento (PED) na mitigação das emissões de gases de efeito estufa (GEE) e na adaptação às mudanças climáticas. No entanto, esses investimentos

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têm sido insuficientes, especialmente para projetos agrícolas sustentáveis, exigindo uma solução inteligente. Países com vasta produção agrícola e reservas florestais, como Brasil e Indonésia, são grandes contribuintes para as emissões de GEE através do desmatamento. O objetivo deste estudo é avaliar o papel do financiamento climático na assistência aos países em desenvolvimento (DCs) na mitigação das emissões de GEE e na adaptação às mudanças climáticas, particularmente no setor agrícola. A metodologia adotada inclui uma abordagem orientada para políticas, propondo o estabelecimento do mecanismo Sustain. Recomendamos o fortalecimento da gestão do financiamento climático para garantir que os PEDs alcancem metas ambiciosas de redução de GEE e adaptação às mudanças climáticas com um mecanismo Sustain (Financiamento Sustentável para Reflorestamento, Recuperação e Natureza). Como primeiro passo, o Grupo dos Vinte (G20) deve estabelecer o Sustain como uma modalidade de financiamento dentro do fundo climático, visando abordar questões relacionadas à agricultura e uso da terra. O Sustain servirá como uma plataforma internacional para atrair investimentos estrangeiros para preservação de ecossistemas e abastecimento alimentar nos PEDs. Recomendações-chave para a seleção de projetos incluem: priorizar PEDs envolvidos no comércio internacional e comprometidos com a produção sustentável; apoiar projetos que promovam práticas agrícolas de baixo carbono; desenvolver procedimentos de monitoramento e relatórios padronizados para reduções de emissões de GEE; incentivar a adoção de padrões internacionais de sustentabilidade agrícola; e garantir inclusão social e equidade de gênero nos benefícios dos projetos. O G20 deve cofinanciar esses projetos combinando seus recursos com outros investimentos.

Palavras-chave: fundos climáticos; países em desenvolvimento; emissões de gases de efeito estufa; práticas sustentáveis.

FINANCIAMIENTO CLIMÁTICO PARA UNA AGRICULTURA MÁS SOSTENIBLE: UNA ESTRATEGIA GANADORA PARA TODOS

Los acuerdos internacionales, como el Acuerdo de París, obligan a los países desarrollados a apoyar financieramente a los países en desarrollo (PED) en la mitigación de las emisiones de gases de efecto invernadero (GEI) y en la adaptación al cambio climático. Sin embargo, estas inversiones han sido insuficientes, especialmente para proyectos agrícolas sostenibles, requiriendo una solución inteligente. Países con vasta producción agrícola y reservas forestales, como Brasil e Indonesia, son grandes contribuyentes a las emisiones de GEI a través de la deforestación. Recomendamos fortalecer la gestión de las finanzas climáticas para asegurar que los PED alcancen metas ambiciosas de reducción de GEI y adaptación al cambio climático con un mecanismo Sustain (Financiamiento Sostenible para Reforestación, Recuperación y Naturaleza). Como primer paso, el Grupo de los Veinte (G20) debe establecer el Sustain como una modalidad de financiamiento dentro del fondo climático destinado a abordar cuestiones relacionadas con la agricultura y el uso de la tierra. El Sustain servirá como una plataforma internacional para atraer inversión extranjera para la preservación de ecosistemas y el suministro de alimentos en los PED. Las recomendaciones clave para la selección de proyectos incluyen: priorizar a los PED involucrados en el comercio internacional y comprometidos con la producción sostenible; apoyar proyectos que promuevan prácticas agrícolas de bajo carbono; desarrollar procedimientos estandarizados de monitoreo y reporte para reducciones de emisiones de GEI; fomentar la adopción de estándares internacionales de sostenibilidad agrícola; y asegurar la inclusión social y la equidad de género en los beneficios de los proyectos. El G20 debe cofinanciar estos proyectos combinando sus recursos con otras inversiones.

Palabras clave: fondos climáticos; países en desarrollo; emisiones de gases de efecto invernadero; prácticas sostenibles.

JEL: Q18; Q56; Q57; O13.

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1 INTRODUCTION

Current agricultural, pasture, and forest management practices could be made more sustainable by replacing deforestation, intensive monoculture, chemical use, and high irrigation, all of which significantly contribute to greenhouse gas (GHG) emissions. These practices reduce the ability of natural sinks to absorb carbon, resulting in 22% of global GHG emissions being attributed to Land Use, Land-Use Change, and Forestry (LULUCF) (IPCC, 2023). Meanwhile, most of the world's poor and hungry populations reside in rural areas and depend on agriculture for their livelihood. Approximately 1.2 billion people live in extreme poverty, with 900 million residing in rural regions. Of these, around 750 million are engaged in agricultural activities, typically as smallholder family farmers (FAO, 2016).

The agricultural sector plays a dual role in climate change, acting as both a source of GHG emissions and a victim of its effects. Investing in sustainable practices can mitigate negative impacts on the environment and generate long-term economic and social benefits, particularly for small producers. Sustainable agriculture must be seen as part of a solution to tackle global issues such as climate change and global food security, therefore, requires international cooperation for its implementation.

In combating climate change, the Paris Agreement is the main international legal instrument to establish ambitious goals to restrict the increase in global temperature (UNFCCC, 2015), calling for "making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development". This agreement sets clear objectives to reduce GHG emissions and promotes global cooperation through financial instruments such as the Green Climate Fund (GCF) and the Climate Investment Funds (CIF). The GCF is a financial mechanism under the United Nations Framework Convention on Climate Change (UNFCCC) designed to support developing countries (DCs) in their efforts to combat climate change. It provides funding for projects and programs that help reduce emissions and enhance climate resilience (GFC, 2024). The CIF provides funding for climate-related projects in DCs, focusing on clean technologies, renewable energy, and sustainable management of natural resources (CIF, 2024).

The resources granted under the Paris Agreement could have achieved more effective results in terms of improving production processes in agriculture.

The LULUCF emissions have risen in recent years, driven by global demand for food and resource-intensive goods, and the current financial flows for climate change in the LULUCF sector just amount to US$20 billion annually – less than 4% of total climate financing (Díaz-Bonilla et al., 2022). A low value that continues to fall compared to global climate financial flows.[6]

The scarcity of financial and technological resources in DCs severely limits their capacity to implement effective climate mitigation and adaptation strategies, nevertheless, possess competitive advantages for a sustainable economy. Their vast biodiversity and clean energy matrix are valuable assets in promoting the ecological transformation, but are threatened by the extreme weather and other consequences of climate change, making growing seasons less predictable, threatening food security and biomass supply. Ensuring equitable access to climate finance is essential for achieving climate justice and securing food supply. To address these challenges, funds must be managed efficiently to support projects and initiatives that enhance productive capacities for climate mitigation, adaptation to climate-related disasters, and the resilience of agricultural communities. This highlights the necessity for improved fund management, which could be facilitated by the Group of Twenty (G20) countries.

Co-financing climate mitigation and adaptation projects in DCs should be prioritized on the G20 agenda. The G20 represents a significant income level portion of the global economy, holding influence over international policy formulation and controlling a large share of global financial resources. The highest-income G20 countries are the largest importers of agri-food goods. Besides that, some G20 countries, particularly those with economies heavily reliant on agriculture and vulnerable to climate change impacts on food production, such as Brazil, India, Indonesia, South Africa, and Mexico, stand to benefit directly from such initiatives. As importer countries increasingly demand sustainable agricultural trade practices, exemplified by recent policies like the European Union Regulation on Deforestation-Free Supply Chains (EUDR 2023/1115),[7] it is necessary to support DCs in transitioning to more sustainable production methods.

As signatories to the Paris Agreement, G20 countries must collaborate with the private sector and civil society to stimulate financing for climate adaptation and mitigation projects. The aim is to foster the transition to a low-carbon economy while creating sustainable economic and social opportunities for current and future generations. To achieve this goal, climate financing must be enhanced for specific projects for measurable results in reducing emissions in agriculture,

6. Available at: https://www.fao.org/newsroom/detail/fao-report--climate-finance-for-agrifood-systems-in-sharp-downward-trend-despite-their-critical-role-in-reaching-climate-goals/en. Accessed on: Mar. 24, 2024.

7. European Union. Regulation (EU) 2023/1115. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115. Accessed on: Aug. 6, 2024.

transferring technology and knowledge and enabling vulnerable communities to adopt production methods that are more adaptable to climate change. This paper, based on a policy brief sent to T20,[8] proposes a smart mechanism to improve the management of climate finance. We propose the launch of a new credit line for projects financed by climate funds, called Sustains (Sustainable Financing in Specific Territories for Reforestation, Recovery, and Nature). This project improves the allocation of climate fund resources to promote sustainable agriculture in DCs. This proposal is to reduce agricultural emissions and create conditions for these countries to make their production processes more resilient to climate change.

The G20 is increasingly prioritizing climate issues. The creation of the Task Force for the "Global Mobilization against Climate Change" by the Brazilian presidency of the G20 in 2024, alongside the Task Force "Global Alliance Against Hunger and Poverty", underscores the focus on sustainable agricultural practices to ensure global food security. The first Task Force will facilitate high-level dialogues among governments, financial institutions, and international organizations to enhance global macroeconomic and financial alignment in implementing the goals of the Paris Agreement (G20, 2024c). It will engage financial sector stakeholders, such as governments, regulators, banks, and investors, to develop collaborative strategies and voluntary commitments that accelerate resource mobilization for sustainable development and climate action. The target is to restore trust in the international community's ability to address the climate emergency and organize debates to share experiences and identify converging elements for comprehensive economic and sustainable transformation plans (G20, 2024a).

Our Sustain initiative aligns with the Task Force's objectives by addressing the pressing need for more efficient management of climate funds to promote sustainable agricultural practices, ensure food security and reduce GHG emissions, particularly those resulting from deforestation. We think that a specific investment project like Sustain, arises from the recognition that financing agriculture faces challenges not only due to farmers lacking resources but also because investors are uncertain about where to allocate their funds. The proposal is consistent with the solutions to expand initiatives that reward countries for conserving forests and ecosystems, such as biodiversity credit and green bonds.

Initially, we propose a pilot project under the Sustain initiative to be conducted on an experimental basis in the Amazon region, given its critical role in climate regulation and the threats of deforestation and degradation posed by agricultural expansion. The pilot project is important for identifying and refining key aspects of the initiative, allowing for necessary adjustments to enhance its

8. The T20 is a G20 engagement group comprising think tanks and research centers from G20 member countries, guest nations, and other organizations. Available at: https://t20brasil.org/en/about. Accessed on: Aug. 6, 2024.

effectiveness before broader implementation. This paper is structured in several sections, following this introduction. It begins with a detailed analysis of "The role of climate finance in food security and market access issues". The "Diagnosis of low-carbon agriculture in climate finance" section then addresses the main challenges related to the topic. The "Recommendations" section presents practical suggestions to address these challenges, while the "Scenarios of Outcomes" explores the possible impacts and challenges of the proposed actions. Finally, the article presents the main conclusions of the study.

2 THE ROLE OF CLIMATE FINANCE IN FOOD SECURITY AND MARKET ACCESS ISSUES

The most vulnerable and food-insecure populations in the world, particularly those who rely on agriculture, are disproportionately affected by climate shocks and stresses. Recent estimates suggest that, in addition to the three billion people who cannot afford healthy diets, another one billion people could be at risk of being unable to afford such diets if their incomes or purchasing power were reduced by one-third. Most of these individuals live in middle-income countries, with a dependency on the agricultural sector.

In DCs, small and medium-sized producers face the greatest risk of marginalization and exclusion from markets. They often lack access to training, information, farm inputs, and financial support necessary for practicing sustainable agriculture. Additionally, they cannot bear the transaction costs associated with standards and certification. Consequently, remain stuck in low-intensity farming with low yields, limited market access, high food losses and waste, and increased vulnerability to crop failure due to climate change. To ensure inclusivity, it is urgent to review and update current agricultural sustainability frameworks (Halimatussadiah et al., 2022).

Historically, developed countries primarily exported manufactured goods to regions such as Africa, the Caribbean, and the Pacific (ACP). However, there had been an increasing inflow of agri-food to ACP regions, despite having a comparative advantage in agri-food production. Subsidized agri-foods from developed countries, exported to DCs, can undermine local agri-food trade competitiveness, with negative effects on the net welfare of developing and least-developed countries. Although these exports increase consumer access to a variety of affordable agri-food products, reducing food insecurity and transforming food systems in some DCs, it negatively impacts domestic agri-food production and processing (Kareem, 2022).

The agricultural and trade policies of developed countries, such as subsidies and agricultural support, added with stringent market access conditions, namely sanitary and phytosanitary measures (SPS), technical barriers to trade (TBT), and recently environmental requirements with great trade relevance, pose high challenges to DCs exports. These non-tariff measures (NTMs) are recognized as the most stringent in G20 markets (Das et al., 2021). The restrictive nature and prevalence of market access conditions adversely affect employment generation, and income-earning opportunities in DCs, especially for women and youth.

The lack of competitiveness in DCs' agri-food sectors, driven by developed countries' trade policies, hampers production capacity, institutional capabilities, and efforts to mitigate food insecurity. Additionally, agrifood systems have always been exposed to adverse natural hazards, such as droughts, floods, storms, as well as pests and disease (Kareem, 2022).

This situation highlights the critical need to develop resilient agrifood systems that guarantee uninterrupted access to healthy diets for everyone, even in the face of climate disruptions (Cattaneo et al., 2022). Nonetheless, there are deficiencies in science and technology development, along with inadequate financing and investment in food and climate systems, which hinder the progress of these countries.

To ensure sustainability, it is necessary to adopt sustainable production practices and new technologies in all producing regions (Elverdin et al., 2022). Transforming food systems will be costly, but should be affordable (Díaz-Bonilla et al., 2022). The unequal distribution of global resources capable of sustainably increasing food production poses a challenge.

Transforming agriculture and food systems to meet Paris Agreement targets will require considerable financial investment. Estimates range from an additional US$15 billion to US$350 billion per year between 2022 and 2030, depending on the scope of objectives included and baseline assumptions (IFPRI, 2021). Recent international summits, including Conference of the Parties (COP26) and the United Nations Food Systems Summit (UNFSS), have emphasized the need to scale up and reorient financial flows towards sustainable development and the creation of innovative financing mechanisms. Various sources of finance should be explored. Díaz-Bonilla, Swinnen and Vos (2021) identify internal and external sources of food system revenues including international development finance, national government budgets, commercial bank credits, and capital market finance.

Despite the availability of diverse funding sources, the financial gaps for sustainable food system transformation remain. The Standing Committee on Finance (SCF) reports climate finance flows (2017-2018) ranged between US$574 billion and US$775 billion (UNFCCC, 2021), with less than 4 percent allocated to agriculture, forestry, land use, and natural resource management (AFOLU). Comprehensive estimates for the entire food sector are still lacking. Furthermore, there are financial flows to hinder climate change objectives. For example, subsidies for fossil fuels or financial support for deforestation by agribusinesses, represent “bad” uses of funds. Redirecting these towards nature-positive investments could reduce their adverse effects and free up resources for sustainable initiatives (Díaz-Bonilla et al., 2022).

To address these challenges, we recommend how G20 can take leadership in promoting the mobilization of financial resources and incentives for investments in healthy, equitable, inclusive, sustainable and climate-resilient food systems along Sustain project. Smallholders naturally present a high-risk profile, which can deter investors from providing necessary funding. Investors require a safety net to justify placing their funds. Conversely, smallholders need financing options that offer lower interest rates and longer repayment periods. This is essential to support the cultivation of certain crops that entail high initial costs and take a long time to become profitable, such as coffee. In this context, de-risking instruments and innovative financing solutions are crucial to complement the role of the investment hub.

3 DIAGNOSIS OF LOW-CARBON AGRICULTURE IN CLIMATE FINANCE

Recognizing the inequalities in capacities to address and cope with climate change among countries,[9] climate finance is at the heart of UNFCCC diplomacy (Cui et al., 2020). In accordance with the principle of “Common but Differentiated Responsibilities and Respective Capabilities”, the UNFCCC and the Paris Agreement require financial assistance from Parties with greater monetary resources to those less well-off and more vulnerable, i.e. assistance from developed (Annex I) countries to developing and least developed countries (Non-Annex I).

The resources needed for climate change mitigation and adaptation are beyond the capacity of many DCs, making climate plans and actions largely conditional on obtaining the necessary financial support. In this sense, climate finance necessarily involves issues of justice and equity, when richer nations have a responsibility to assist poorer nations in their efforts to reduce GHG emissions, adjust to climate impacts, and recover from losses and damages, given the accumulated historical emissions of developed countries (Chowdhury and Jomo, 2022).

According to the World Economic Forum (WEF, 2024) Global Risks Report 2024, climate change is one of the most pressing issues the world will face in the next two years. Its impacts are expected to intensify over the decade, leading to significant economic losses and hampering nations’ economic growth.

9. Available at: https://unfccc.int/topics/introduction-to-climate-finance. Accessed on: Apr. 10, 2024.

DCs, in particular, face heightened risks due to their greater vulnerability to climate-related disasters.

Although developed countries committed to a joint target of mobilizing US$100 billion per year at the 15th Conference of the Parties (COP15) of the UNFCCC in 2009, a target reiterated in the Paris Agreement by 2025, governments have not reached a consensus on how to ensure adequate financing. This situation has contributed to a series of problems related to the non-achievement of targets, the misallocation of resources and the low quality of financing methods.

A survey by the World Resource Institute (WRI) to assess climate finance considered in its methodology indicators related to the size of the economies of countries and their GHG emissions, and found that more than a dozen developed countries are not contributing their necessary shares to reach the US$100 billion target. The United States, Australia and Canada stand out, three large economies that provided less than half of their share of the financial effort in 2018 (Bos and Thwaites, 2021).

The article by Colenbrander et al. (2021) suggested three metrics to assess each country's fair share of the climate finance target, based on gross national income, cumulative CO2 emissions, and population size. All major developed countries would need to increase their commitments, especially Australia, Canada, and the United States, as they contributed less than 5% of what was considered their fair share in 2017-2018.

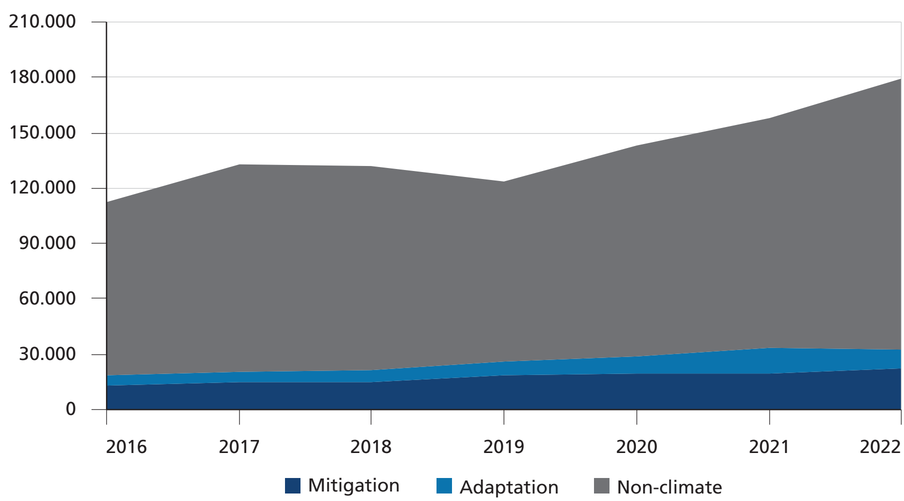
A study by Oxfam highlighted that many developed countries are overestimating their contributions, by as much as 225%. It was estimated that only US$21-24.5 billion is the real value of grants. In short, loans are being reported in financing (about 70% of provisions), adding to the debt crisis in DCs. Furthermore, financed projects often have less of a climate focus than reported, making the net value of climate finance much lower (Carty and Kowalzig, 2022). It is also important to highlight that the amounts disbursed via multilateral climate funds were only US$3.5 billion in 2020, corresponding to approximately 4% of total contributions that year (OECD, 2022).

Although resources allocated to climate finance have increased over the years, this progress is considered far below what is needed, as it is estimated that around US$160 to US$340 billion per year will be needed for adaptation purposes alone by 2030 and US$315 to US$565 billion per year by 2050 (UN, 2022). These perspectives reinforce how the U$100 billion target is highly underestimated and requires updates and greater efforts to achieve them, just as the funds should be prioritized for their systematic capacity and fair approaches with the target countries.

One way to map climate finance more accurately is to use Official Development Assistance (ODA) data. ODA, established by the Organisation for Economic Cooperation and Development (OECD) Development Assistance Committee (DAC), is the main source of development finance because it is specifically targeted at promoting economic and social development in DCs through financing from a range of sources, including developed countries, multilateral agencies and organizations, climate funds, and philanthropic foundations. ODA data allows the use of Rio markers, which indicate whether any financed project seeks to mitigate or adapt to climate change (OECD, 2024).

ODA data reinforces the need to expand climate finance. Considering the period between 2016 and 2022, more than 80% of financed projects did not have climate change mitigation or adaptation objectives. In addition, the highest disbursement value for projects with climate objectives was in 2021, totaling approximately 33.4 billion dollars.

FIGURE 1
Amount financed under ODA
(In US$ 1 million)

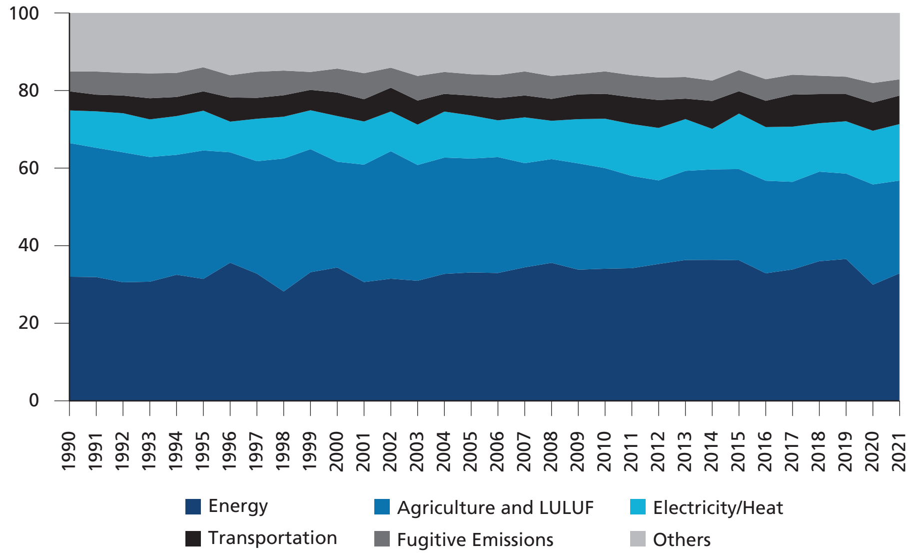


Source: OECD, 2024. Available at: https://stats.oecd.org/Index.aspx?DataSetCode=crs1.
Authors' elaboration.

GHG emissions data by sector for DCs (figure 2) show that the sectors requiring the most emission reduction efforts are Energy, which accounted for 33% of emissions, Agriculture and LULUF with 24%, Electricity/Heat with around 15% and Transportation with 7%.[10]

10. Available at: https://www.climatewatchdata.org/data-explorer/historical-emissions. Accessed on: June 29, 2024.

FIGURE 2
Participation of sectors in GHG emissions in DCs
(In %)

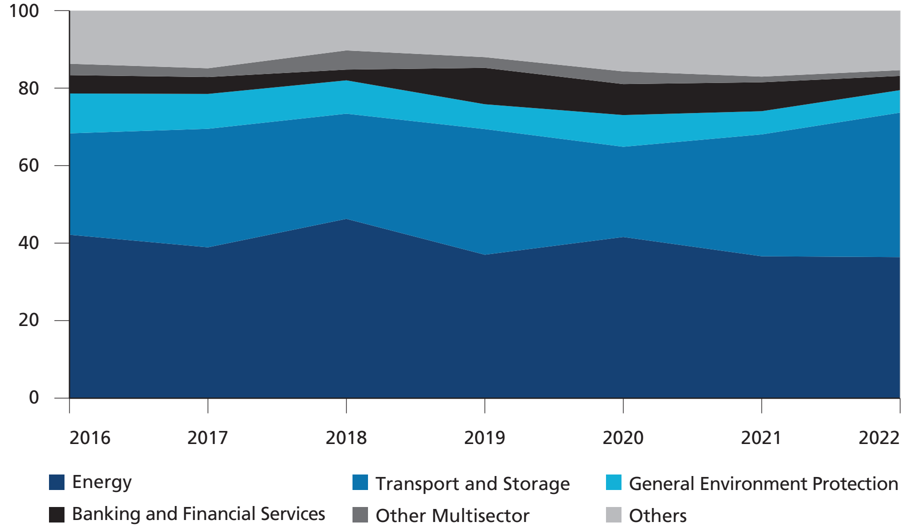


Source: Climate Watch, 2024. Available at: https://www.climatewatchdata.org/data-explorer/historical-emissions.
Authors' elaboration.

Compared to the data on financing for mitigation purposes (figure 3), there is a discrepancy in the priority of sectors when it comes to agriculture and LULUF.

Although the agriculture and land use and land use change sectors are highly strategic for receiving climate finance, both in terms of being able to contribute significantly to reducing emissions and achieving NDCs, agriculture and LULUF received only 1% of the total allocated to mitigation under the ODA in 2022. Furthermore, within this 1%, only 8% was allocated to Food crop production, 4% to Agricultural land resources and 2% to Industrial crops/export crops. Directing mitigation finance for these purposes can directly contribute to environmentally sustainable global food production, the development of low-carbon agricultural technologies, the financial sustainability of the sector and food security in the long term.

FIGURE 3
Percentage of sectors in financing for climate change mitigation



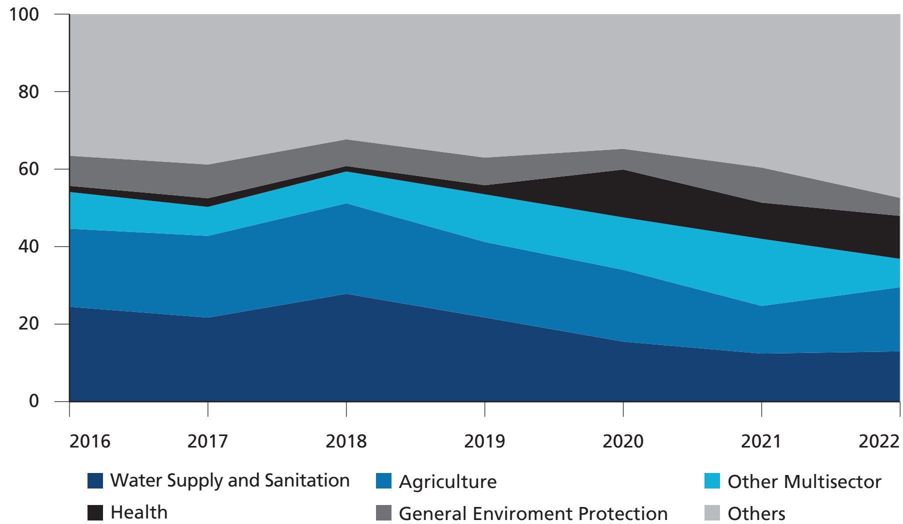
Source: OECD, 2024. Available at: https://stats.oecd.org/Index.aspx?DataSetCode=crs1.
Authors' elaboration.

The agriculture and LULUF sectors are important drivers and victims of climate change. The pressure to expand the agricultural and livestock frontier and the consequent change in land use result in large emissions and loss of carbon absorption capacity. In addition to problems such as changes in rainfall patterns, reduced evapotranspiration, river silting, erosion, loss of biodiversity, and temperature changes, which function as important ecosystem services for agricultural production, are threatened by it.[11] Added to this, there is the occurrence of extreme weather events, such as droughts and floods, which can directly affect the productivity of the agricultural sector, as well as, in many cases, the livelihoods of small producers. This relationship between agriculture and LULUF with climate change also requires urgent adaptation efforts. In the case of adaptation financing, Agriculture played a more relevant role, around 17% of the total financed for adaptation in 2022, sharing space with important sectors such as Water Supply, Health and Environmental Protection.

Although agriculture and LULUF are well positioned in receiving adaptation financing, adaptation financing itself still has a long way to go.

11. Available at: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter07.pdf. Accessed on: June 22, 2024.

FIGURE 4
Percentage of sectors in financing for adaptation to climate change



Source: OECD, 2024. Available at: https://stats.oecd.org/Index.aspx?DataSetCode=crs1.
Authors' elaboration.

The analysis of ODA data allowed us to identify a series of issues related to climate finance. Firstly, the amount of funding for mitigation and adaptation to climate change still occupies a small space in development aid, and the amount mapped based on the Rio markers is far from reaching the annual targets of 100 billion. Secondly, the allocation of the amount financed, especially for mitigation, does not correspond to the main needs of DCs to reduce emissions, such as agriculture and LULUF. Furthermore, there is no balanced allocation between mitigation and adaptation, even though adaptation and resilience measures are more urgent. It is important to highlight that the importance of allocating climate finance to agriculture and LULUF goes beyond reducing emissions; it is also a strategic sector for maintaining the income of most DCs and for global food security.

The development of low-carbon technologies for agriculture can enable access to environmentally demanding markets for countries that have less technical and financial capacity to implement them and, above all, will make the sector more resilient to the impacts of climate change.[12]

12. Available at: https://www.wwf.org.br/natureza_brasileira/areas_prioritarias/amazonia1/ameacas_riscos_amazonia/desmatamento_na_amazonia/. Accessed on: June 22, 2024.

4 RECOMMENDATIONS

As a key stakeholder in managing climate funds and responsible for 76% of the world's GHG emissions (G20, 2024b), the G20 countries must take a leadership role in climate financing decisions. Recognizing that land use change and agriculture are contributors to GHG emissions in DCs, the G20 should align its actions to this sector to support international agreements, like the Paris Agreement. During a G20 panel discussion, soil scientist Rattan Lal, a 2007 Nobel Peace Prize laureate for his work on soil health and sustainable agriculture, emphasized the importance of transformative agricultural practices by stating, "Agriculture doesn't have to be carbon emissions neutral, but negative" and "producers should be compensated for adopting good practices" (G20, 2024d).

According to Lal, science already has the solution to balance agricultural production, environmental conservation and avoid a global collapse: the adoption of practices that protect and restore natural resources, highlighting the urgency to expanding, adopting and developing policies that are pro-nature, pro-farmer and pro-agriculture. This will help tackle challenges, such as environmental degradation and food security (G20, 2024d).

As an initial step, the G20 would establish within the climate fund, a financing modality to Sustain project, aimed at solving problems related to agriculture and land use change. Sustain would be a specific international platform for attracting foreign investment to preserve, conserve, protect, and regenerate ecosystems in DCs, while ensuring food supply.

We recommend that the criteria for selecting funded projects include what follows.

1) It must be a developing country that demonstrates an interest in joining international trade in agricultural products or that already exports these goods, as long as they are committed to sustainable production chains and with the diversification of food sources. Priority will be given to countries that commit to encourage nature-positive production such as by protecting natural systems from new conversions for food production, sustainably managing existing food production systems.

2) Undertake projects that promote low-carbon agricultural practices, including the reduction or recovery of degraded pastures, restore of degraded farmland; implementation and improvement of organic agricultural production systems; adoption of direct planting systems; implementation of crop-livestock-forest integration systems; commercial forest management; forest landscape restoration; adequacy or regularization of rural properties following environmental legislation;

waste management systems from animal and energy production; the use of biological nitrogen fixation and plant growth-promoting microorganisms, bio-inputs and bio-fertilizers production.

3) Develop procedures to monitor, evaluate, measure and report the impacts of proposed agricultural practices, including GHG emissions reductions and resulting environmental benefits. To establish a peer review mechanism where G20 members bear the costs and assess each other's progress and elaborate a standardized reporting framework to track progress towards targets, ensuring transparency and fostering accountability.

4) Identify ways to encourage the adoption of international agricultural sustainability standards and guidelines, like the voluntary sustainability standards (VSS) schemes, ensuring that projects are aligned with globally recognized best practices.

5) To commitment to social inclusion and gender equity, ensuring that the benefits are distributed fairly, with equal opportunities for participation for all parties.

The requirement of countries being exporters or intending to export lies in the fact that, traditionally, G20 countries are the largest importers from DCs, accounting for approximately 80% of their trade (Kareen, 2022). However, recently, exports from DCs, particularly agro-food products, have declined. This decline is partly due to market access conditions in G20 countries, which have affected the agro-food competitiveness of developing nations, food security, and the achievement of sustainable economic growth (Das et al., 2021).

The G20 must play a critical role as a co-financier for projects like these, combining resources from the fund itself (e.g. GFC) with other sources of investment in the context of expanding climate funds. As reported by Tatiana Rosito, coordinator of the Task Force for the Global Mobilization against Climate Change, there is a need to readjust climate finances, and the readjusting should works on three levels. The first relates to the regulation of the international financial system and how it can be capable of generating a movement of public and private financial resources, especially in DCs. The second refers to policies to make resource mobilization possible and the third involves the work not only of multilateral development banks, but also of public, national and regional banks (G20, 2024d). Any strategy to mobilize public and private finance for the transformation of agri-food systems must include reorienting agricultural support that contributes to solving serious environmental, among others, stopping deforestation and displacement of vulnerable communities from their land;

food security, including the reducing food loss and waste, and equity challenges (Martin et al., 2022).

Co-financing can take several forms to promote more sustainable agriculture. It can expand the reach of projects to benefit more people and communities, provide technical expertise and catalyze technologies. Additionally, can support specific projects for regenerative production and the bioeconomy, nutritional diversity through diversified foods, fostering healthy food choices. Furthermore, it should to enhance the success of projects and programs financed by climate funds. This can be achieved, also, through increased private and public spending on agricultural research and development (R&D) and rural infrastructure, payments for ecological services to farmers, or targeted subsidies to the factors of production, boosted global food production, especially of staple crops, reducing hunger and poverty. We propose that the operation of Sustain be organized as follows.

1) Appointment of a commission from the G20 responsible for evaluating the initiative. The commission should determine the number of project beneficiaries and assess the sustainability results over time. It may also propose new requirements for projects, when necessary, to ensure a greater number of beneficiaries and equal access. In a project about the global cooperation framework for sustainable production, Halimatussadiah et al. (2022) propose that a global framework of principles and monitoring indicators be developed collectively through an inclusive process led by the G20. Relevant G20 engagement groups, such as T20, B20, C20, and Y20, can serve as platforms for stakeholder consultations at both national and international levels. These platforms facilitate discussions on key issues like support for small farmers and transparency among various stakeholders.

2) Resources will be directed according to inclusive criteria that take into account the specific needs and vulnerabilities of countries about climate change based on Consensus and Scientific Basis. This will include components such as agroclimatic monitoring, disaster and crisis risk and vulnerability assessments (including pests and diseases), and agricultural damage and loss data.

3) Designation of a bank in each DC, to evaluate the project based on pre-established requirements and grant lines of credit to approved projects. We emphasize the role of national development banks (NDBs) in mobilizing climate finance. Interest rate will be differentiated according to the size of the producer: small and medium producers will have greater credit benefits than large producers. Properties managed by women or traditional communities will have additional benefits.

4) Integrate public and private rural extension companies, subsidized by the G20, to provide consultancy to producers who need technical and human support to develop their projects. Technical assistance from the G20 would strengthen this collaboration, offering, in addition to financial resources, expertise to ensure the effectiveness of rural extension activities. According to Cattaneo et al. (2022), funding for agricultural extension should be accompanied by investments in R&D, as well as services focused on agricultural climate change adaptation strategies and best agronomic practices.

5) Prioritize projects that demonstrate integrated approaches to nature, preserving biodiversity and natural protected areas and recognise nature-based solutions to fight climate change. This includes the adoption of innovative agricultural technologies, such as agricultural bio-inputs to replace synthetic fertilizers and pesticides; and practices that enhance biodiversity and ecosystem services.

6) Inclusive governance and compliance to ensure projects adhere to international environmental and social standards, involving all relevant stakeholders in planning and implementation. This encompasses compliance with global sustainability guidelines, active participation of local communities, the private sector, NGOs, civil society, to support social inclusion, gender equity, and fair distribution of project benefits.

7) Hiring internationally recognized certification companies, designated by the G20. Certification schemes are typically presented as valid mechanisms for valuing more sustainable agri-food systems, allowing for the recognition of productions with less environmental impact. Certification companies to carry out the following activities:

   a) audit the actions proposed in the project and ensure the appropriate use of the credit line;

   b) integrate local knowledge, culture, and innovative technology as value attributes;

   c) grant sustainable labels, recognized on the world market, such as VSS, to producers that comply with sustainable practices;

   d) prepare carbon inventory, based on the assessment and monitoring of GHG emissions associated with producers' activities, based on the IPCC methodology.

In addition to the proposed initiatives, we suggest that the Sustain project implement a green cashback mechanism involving carbon credits to encourage investors to choose the Sustain modality. This mechanism operates as follows: emission reductions resulting from projects are converted into carbon credits, calculated by a certified company, which can then be offset against the annual emissions of the countries investing in Sustain. This approach helps invest countries achieve their Nationally Determined Contributions (NDCs). To support this, a portion of the climate fund should be allocated to developing emissions inventories, ensuring transparency in the credit conversion processes, and verifying compliance with climate regulations through certification systems in the financed countries. The G20 finance leaders, in 2021, recognized carbon pricing as a potential tool to address climate change for the first time in an official communique,[13] taking a tentative step towards promoting the idea and coordinating carbon reduction policies.

We suggest that an experimental Sustain project be launched in the Amazon region given the problems related to deforestation due to the expansion of agriculture and its imposing role in global climate regulation. It is a region that is home to small producers and traditional people, therefore, it has social relevance. It is also a cross-border region, and would benefit more than one country. Furthermore, some bottom-up strategies should be considered, since there is a local bioeconomy already structured in the region and there are possibilities to generate income from nature-based solutions. Improving it could be a good starting point.

Below are other recommendations that could corroborate our proposal.

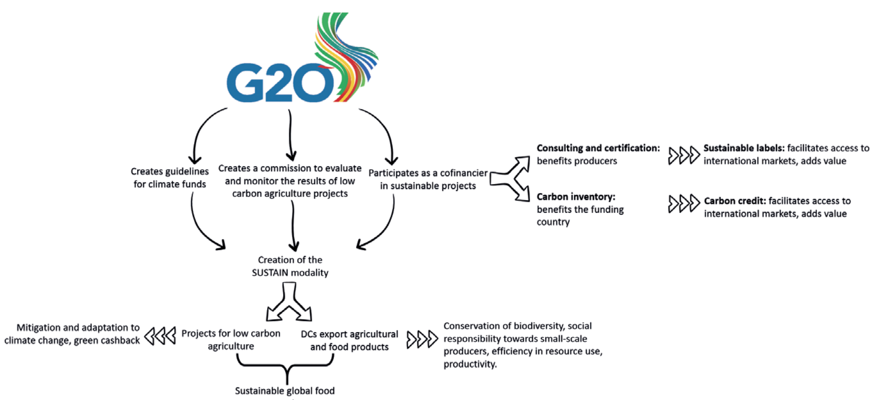
1) Financing Mechanisms:
   a) set ambitious, science-based emission reduction and adaptation targets, considering national circumstances;
   b) increase contributions to existing climate funds like the GCF, leveraging public and private partnerships;
   c) explore new instruments like green bonds, carbon pricing schemes, and blended finance that combine public and private resources;
   d) consider debt relief for Climate Action or swaps for developing nations, conditional on directing funds towards climate projects.
2) Knowledge Sharing and South-South Cooperation:
   a) create platforms for knowledge sharing and technology transfer, facilitating the spread of best practices. Encourage cooperation between G20 members, allowing developing nations to learn from each other's experiences.

13. G20 Rome Leaders' Declaration. Available at: http://www.g20italy.org/wp-content/uploads/2021/10/G20-ROME-LEADERS-DECLARATION.pdf. Accessed on: August 8, 2024.

3) Political Will and Leadership:
    a) appoint high-level champions of the initiative within the G20 to spearhead climate action efforts and maintain momentum;
    b) encourage member nations to align domestic policies with international climate goals;
    c) promote public awareness and education on climate change, fostering public pressure for climate action.
4) Considerations:
    a) navigating the diverse economic realities and political priorities within the G20 is not trivial;
    b) ensuring all members contribute fairly and no country free rides on the efforts;
    c) maintaining transparency in the use of funds and holding members accountable for achieving targets.

The figure below summarizes the Sustain idea.

FIGURE 5
Sustain mechanism



Authors' elaboration.

5 SCENARIO OF OUTCOMES

The Global Risks Report 2024 (WEF, 2024) highlights that, with effects of climate changes, frequent storms, floods, and droughts can damage infrastructure, threaten financial stability, and disrupt supply chains by increasing agricultural production costs and exacerbating global. This is easily observed in Rio Grande do Sul, in Brazil, after an unprecedented extreme. The infrastructure damage and agricultural losses impacted livelihoods and strained government resources for recovery efforts (Debone et al., 2024).

Considering these events, the implementation of the policies proposed in this Policy Brief involves several scenarios and challenges. The first scenario refers to the benefits for countries receiving resources from the fund, such as increased sustainable production in DCs, which consequently increases the supply of sustainable food and agricultural products, meeting the growing demand for these products. Studies indicate that adopting sustainable agricultural practices, such as efficient water use and crop rotation, are strategies for improving agricultural sustainability. Efficient water use ensures optimal utilization of this resource, while crop rotation helps maintain soil health and reduces the reliance on chemical inputs. These practices have improved farmers' resilience to extreme weather events and can increase production. As an example of this discussion, Rattan Lal, who received the Nobel Peace Prize in 2007, in an interview with G20 Brazil, defended agriculture as a solution to climate change. He points out that techniques such as agroforestry and silvopastoral systems not only sequester carbon, but also increase agricultural productivity and ecosystem resilience. These practices involve the integration of trees and shrubs into agricultural landscapes, which can provide shade, improve soil quality, and promote biodiversity.

From a sustainable perspective, the benefits include the conservation of ecosystems, the reduction of GHG emissions, and the improvement of soil environmental quality and biodiversity. Practices such as agroforestry and direct planting can capture carbon in the soil, helping to mitigate climate change (IPCC, 2019). In addition, producers who adopt sustainable practices often obtain international certifications, such as the Rainforest Alliance and Fair Trade, which allow them to enter premium markets and generally guarantee higher prices (Silva and Nonnenberg, 2023). Nevertheless, one challenge with certification schemes is that they are generally developed by importing countries and often do not consider the ability of producers to comply with them, acting as trade barriers (Elverdin et al., 2022; Martins et al., 2022). These schemes are expensive for small producers in DCs, and it is necessary to implement certifications adapted to the agri-food production systems of each specific region.

As successful examples of the relationship between production and sustainability, we can mention Brazil, where the adoption of the Integrated Crop-Livestock-Forestry (ILPF) system has shown relevant results, increasing productivity and promoting environmental conservation simultaneously (Faria and Vasconcelos, 2024) . Another example is the case of African countries, where sustainable agriculture programs supported by international funds have helped small farmers to increase their production and resilience to climate change (AGRA, 2023). These programs include practices such as climate-smart agriculture (CSA) and agroecology, which increase agricultural productivity, enhance resilience to climate change, and reduce GHG emissions. The initiatives of the Inter-American Institute for Cooperation on Agriculture (IICA, 2023) also aim to promote sustainable agricultural development, with a focus on the Americas. The programs include climate action and sustainability, digitalization of agri-food systems, promotion of gender and youth equality, innovation and bioeconomy, and health, food security, and quality. These initiatives aim to transform the agricultural sector into a driver of sustainable, economic, and environmentally responsible development in the region.

The second scenario resulting from the implementation of this Policy Brief concerns the benefits for countries that invest resources in the fund. There is the possibility of fulfilling their international commitments, such as those established in the Paris Agreement, strengthening their position in global climate negotiations. Thus, by financing carbon mitigation projects in other nations, investing countries are not only directed towards the global reduction of GHG emissions, but also strengthening their position in global climate negotiations. Strengthening the international image is an additional benefit, as it demonstrates the commitment of a developed country to reduce the effects of climate change and support the most vulnerable countries. Demonstrating a concrete commitment to reduce climate change and support the least developed countries strengthens the communication as a leader in sustainability, resulting in advantages such as greater influence in international forums and benefits in trade and economic relations.

On the other hand, the challenges that this policy may face are recognized. One of them is the conflict between environmental sustainability and economic growth in the implementation of climate finance policies. Sustainable solutions require substantial upfront investments, especially for low- and middle-income countries that already tend to face greater budget constraints. Furthermore, these solutions may lead to increased operational costs, which may discourage their adoption. Another important point to be discussed is the debate on the climate financial crisis that is taking place around the world.

Some relevant points that support this discussion: the first is the economic slowdown over the last four years, which limits countries' ability to generate revenue and invest in mitigation and adaptation projects. In addition, climate-related systemic risks, such as more frequent and intense natural disasters, have increased, causing damage to infrastructure, production and local economies. These events not only resulted in direct losses, but also increased financial volatility and economic uncertainty, creating an even greater challenge for mobilizing the resources and investments needed to address a climate crisis (WEF, 2024).

Climate disasters require rapid and significant financial responses, diverting resources from prevention and mitigation to recovery and reconstruction. This creates a vicious cycle where a lack of preventive investment leads to higher response costs (UNDRR, 2023). These challenging macroeconomic conditions and increasing systemic risks put financial structures under pressure. Global economic uncertainty and fluctuations in financial markets are reducing the availability of long-term investment needed for sustainable infrastructure projects. In addition, international financial systems, including development banks and multilateral financial institutions, are facing increasing pressure to increase their support, but are also having to deal with limited capital and operational capacity.

Another possible challenge is that the creation of modalities within the fund could become a complex bureaucratic process, hindering efficiency and agility in the allocation of resources. The need to establish public-private partnerships is also a critical point, requiring greater cooperation and coordination between the different sectors. However, blended finance, which refers to the strategic use of public resources to attract private investment in sustainable projects, emerges as a possible solution to overcome some of the challenges related to climate finance, as is done by African countries (AGRA, 2023). It is worth noting that for this approach to be successful, it is necessary to have a favorable regulatory environment, transparent operations and good governance to ensure that the resources are used appropriately. In this sense, the role of the G20 is to direct, develop guidelines and monitor the application of the fund's resources. The G20 can promote harmonization of policies and practices among member countries, ensuring that resources are allocated efficiently and transparently.

Additional challenges arise in DCs, such as the need to comply with environmental regulations, which require certification systems and investments in technology and training. The lack of technical capacity and infrastructure poses obstacles, highlighting the need for technical and financial support to strengthen the capabilities of local institutions. The inclusion of small producers requires specific measures to ensure their participation and access to equitable benefits. These challenges can be mitigated by considering the G20's role in providing consultation to producers, helping to improve technical training in project development.

Defining the direction of the fund's resources is another critical point, requiring a careful approach to ensure that investments are directed to priority areas and in an equitable manner, considering the severity of climate impacts, the adaptive capacity of communities and the potential for significance reduction of GHF emissions, which justifies the choice of the Amazon as a pilot project. Therefore, local communities must be involved in the decision-making process and safeguards must be ensured for traditional communities, promoting a smooth transition to more sustainable and resilient agriculture. These communities not only face the greatest environmental challenges but are also important for the implementation of sustainable solutions, given their connection to local ecosystems.

Effective monitoring of projects is important to ensure that climate fund resources are used efficiently and that implemented policies achieve their intended objectives. This involves constant supervision of all project phases, from planning to implementation and evaluation of Sustain results. Faced with these challenges, measures must be adopted to facilitate the management and centralization of resources and adapt these policies to different countries with diverse cultures and traditions, requiring flexibility and tailored approaches to meet the specific needs of each context.

6 CONCLUSIONS

With global food insecurity rising and the world population expected to grow to 8.5 billion by 2030, agri-food systems face increasing challenges to ensure supply and achieve sustainable development goals. These challenges are compounded by instability in food prices and supply, especially in populous countries, and by the impacts of extreme weather events on major exporters (Elverdin et al., 2022). Unless mitigation and adaptation measures are enacted, the food crisis could intensify, further compromising global food security.

In this context, Sustain presents itself as an initiative that can help countries face these challenges and, at the same time, show their alignment with the goals of the Paris Agreement. The proposal arises from the recognition that the challenges of agricultural financing are not limited to the scarcity of resources among farmers, but also to the uncertainty of investors about where to allocate their funds effectively. The Sustain aims to mobilize financial resources for environmental preservation, promoting low-carbon agricultural practices and strengthening the resilience of rural communities, contributing to the economic and social stability of the region. In this way, it seeks to contribute to the adaptation and mitigation of climate change and to ensure food supply in a sustainable manner. The Amazon, with its biodiversity and role in global climate regulation, is a strategic region for the implementation of this project.

Among the main recommendations of this Policy Brief are the prioritization of resources and efforts for countries committed to sustainable production, support for low-carbon agricultural practices and the development of standardized procedures for monitoring and reporting GHG emission reductions. The adoption of international agricultural sustainability standards, accompanied by a commitment to social inclusion and gender equity in project benefits, is equally important. To this end, international cooperation is important as a way of ensuring that best practices are disseminated and adapted to different regional contexts and so that there is a transfer of technologies and knowledge.

Incorporating innovative financial mechanisms such as green bonds and carbon credits can help attract more investment and strengthen food systems, especially in DCs. The G20 can help provide capacity building, technical assistance and create an enabling regulatory environment in these countries, given that face greater challenges in mobilizing climate finance due to limited institutional capacity. This can help attract investment and expand the reach of climate funds to local beneficiaries.

The pilot project in the Amazon, by addressing sustainability, food security and rural development issues in an integrated manner, can serve as a replicable model for other regions. In addition, the Sustain initiative will set a precedent for the effective management of climate funds on a global scale.

Finally, to ensure the success of the proposed initiatives, challenges must be recognized, such as the bureaucratization of financing processes, the need to establish public-private partnerships, and ensuring that climate funds are used efficiently and transparently. The G20 has the potential to lead this effort by promoting policy harmonization among member countries and ensuring that resources are directed equitably and effectively to priority areas. Including smallholders and traditional communities in decision-making processes, as well as ensuring a fair distribution of benefits, are factors for the long-term success of sustainability and food security initiatives.

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