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PATTERNS AND SPECIFIC FEATURES OF CLIMATE FINANCE IN THE WORLD

ABSTRACT

In order to fully comprehend the current status and progress of global climate finance, it is essential to have a clear grasp of the trends and unique characteristics that shape these processes, along with the different factors that influence them. The subject of analysis should be the peculiarities of socio-economic development of developed countries, emerging and developing markets, least developed countries, their economic activities and life in general, and climate policy as a factor of influence on climate change, the formation of systems for preventing, combating, mitigating, and adapting to such changes.

The aim of the study is to examine the trends and distinctive characteristics of climate finance globally, as well as the factors that influence them. The author presents the degree of coverage of the problem of clarifying the patterns and specific features of climate finance in the world. The author analyzes the existing patterns and specific features of climate finance on continents and in countries of different types. The factors that determine both such patterns and specific features are identified.

The article analyzes global and regional patterns of climate finance, focusing on disparities in access, allocation, and institutional support. It examines regions including Europe, Africa, Asia-Pacific, Latin America, North America, the Caribbean, and India. Key findings reveal that developed countries dominate climate finance mobilization, while developing and vulnerable regions face underfunding despite high exposure to climate risks. Factors influencing climate finance include economic development, institutional capacity, political commitment, regulatory frameworks, sectoral readiness, and financial sector involvement. The study highlights the need for improved coordination, equitable distribution, and targeted support to address global climate finance gaps.

Keywords: climate finance, sources of climate finance, areas of climate finance, territorial distribution of climate finance, patterns of global climate finance, specific features of climate finance in the world, factors of climate finance, institutional support for climate

JEL Classification: E22, G21, Q54, Q56

INTRODUCTION

Climate finance is extremely important for solving urgent problems of environmental preservation, ensuring the normal functioning of humanity as a whole, the world's continents, and countries of different types. However, the development of climate finance is accompanied by unstable dynamics, irrational structure, and uneven distribution by territorial, sectoral, and industry characteristics, sources, and forms of provision. This is accompanied by variations in the development of countries with different types and volumes of fossil fuel production and greenhouse gas (GHG) emissions, the impact of adverse climate change factors on specific regions and economic actors, disparities between the supply and demand for climate finance, the progression and structure of climate finance, and the climate policies implemented by governments. It also involves the differentiation of measures and the availability of essential infrastructure to prevent and address climate change. Therefore, in-depth research of its patterns and specific features, as well as the various factors that determine them, is needed to improve climate finance.

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LITERATURE REVIEW

Numerous researchers have studied the problem of identifying patterns and features of global climate finance, as well as the factors that determine them. For example, using the example of Germany, S. Amelang, B. Wehrmann, and J. Wettengel (2019) emphasize the need to improve climate finance by gradually developing the tax system, strengthening measures to encourage private economic agents to reduce environmental pollution and move towards more sustainable production and consumption patterns, and reducing climate damage. K. Obidov (2024), in examining the conceptual foundations and future prospects of green economy development in the Republic of Tajikistan, also highlights the importance of establishing carbon taxation.

M. Carney (2015), focusing on climate change and financial stability, notes that in order to avoid facing the "tragedy of the horizon" - the inability of financial markets to properly assess the long-term impact of climate change - financial institutions around the world should take into account climate and related factors in their policies.

R. Vermeulen, E. Schets, and W. Heeringa (2018) emphasize the significance of stress testing in assessing the financial sector's stability in relation to the transition to a low-carbon economy. E. Green (2024) notes that the growth of "green" financing illustrates a significant shift in support for projects for renewable energy, energy-efficient infrastructure, sustainable water management systems, and carbon reduction initiatives.

K. Castro and G. Burgel (2022) study the green bond market in Brazil as an important element of the investment climate project.

M. Garschagen and D. Doshi (2022), questioning whether adaptation financing from funds reaches the most vulnerable countries, examined the presence of continental initiatives such as the Accelerating Africa's Climate Change Adaptation Program, which seeks to mobilize USD 25 billion by 2025 to enhance innovative and transformative climate adaptation actions. They also investigated the African Climate Finance Alliance, designed to encourage private capital for low-emissions development, GHG reduction, and climate resilience, leveraging key financial institutions in the region to share knowledge, financial instruments for climate risk reduction, disclosures, and climate finance flows, along with the Climate Finance Mechanism. V. Henze (2022) identified a lack of adequate funding and considerable disparities in climate change measures across Africa, noting that most African nations are unable to fulfill their conditional national contribution targets, which represent approximately 85% of the total funding requirements (with the remaining portion allocated to unconditional targets). Additionally, Henze highlighted the uneven distribution of climate finance across various sectors. C. Tancredi (2024) summarized estimates of the price of climate change for Africa against the background of the real state of its GHG emissions, analyzed the continent's share in global climate finance, comparing it with the real need.

R. R. Al-Mashat (2023), highlighting the various challenges related to climate change in Africa, emphasized that the countries of the continent share a collective moral duty to protect the global environment, although not all of them possess the same financial resources or bear equal responsibility for the current state of affairs. A. Fanning and J. Hickel (2023) estimated the damage caused by climate change to the countries of the Global South and the annual compensation payments to the countries of tropical Africa.

Y. Glemarec (2011) studied the functioning of international, bilateral, and national climate funds, the difference in their powers, governance, and structure financing criteria, risk and return targets, and, accordingly, asset allocation strategies; functional and regulatory restrictions in their activities.

AIMS AND OBJECTIVES

Given the importance of climate finance for solving urgent problems of environmental preservation, ensuring the normal functioning of humanity in general, world continents and countries of different types, the goal of the study is to analyze the trends and distinctive characteristics of global climate finance, as well as the factors that influence them. This involves solving the following tasks: analyzing global trends in climate finance; clarifying the patterns of development of global climate finance; identifying territorial, sectoral, price, and time differences in this area; and highlighting specific features of climate finance on continents, in countries of different types, and sectors of national economies.

METHODS

The study used a combination of analytical methods to explore global climate finance. A systematic approach ensured a comprehensive view, while monographic and historical methods allowed for detailed case studies and context over time.

Generalization, comparative, and factor analysis helped identify trends, differences, and key influences. Economic and statistical analysis provided quantitative insight into funding flows, and expert analysis added depth through policy and institutional evaluation. Together, these methods supported a thorough and multidimensional understanding of climate finance.

RESULTS

An evaluation of global climate finance trends reveals a significant gap between the supply and demand for climate finance, along with uneven growth across different regions, sectors, and industries within national economies; different shares of domestic and external climate finance in different countries; problems with its tracking, which prevents a reasonable analysis of its public, private and mixed sources and complicates effective control.

Developed countries account for 84% of international financial commitments, while developing countries, including China, account for only 13%. Moreover, developed countries are significantly ahead of other countries in using private capital for climate finance, which has a decisive impact on achieving economies of scale. At the same time, China has mobilized more domestic climate finance than other countries - 51% of global domestic climate finance. At the same time, investments in developing countries with a high share of carbon-intensive sources in the energy balance and unresolved technological problems to replace traditional fossil fuels with renewable energy sources amounted to less than 1/10 of the USD 2.4 trillion per year needed by these countries for mitigation and adaptation by 2030 (Climate Policy Initiative, 2023).

Despite the fact that most developing countries have declared targets for the transition to sustainable energy sources, only 1/3 of them have identified investment needs. More than 30 developing countries have not yet registered any major international investment projects in renewable energy. In these countries, climate finance is mostly provided as loans, most of which are not concessional (UNCTAD, 2023).

Among the patterns of climate finance in the world, we should highlight the development of a global regulatory policy for climate change prevention and mitigation, mitigation and adaptation to climate change, which should include (EcoBusiness Group, 2021) introduction of global carbon emission standards; focusing on the development of low-carbon industry and substitution by stimulating research and development of green technologies; creation of a Development Fund focused on the green economy; increasing the role of the WB, EBRD and regional development banks in project financing.

The regularities of institutional support for climate finance, implementation of state environmental and climate programs and projects should also include the consideration of the development and implementation of environmentally/climate-responsible budget policy as part of the budget policy for sustainable development to ensure the interconnection of the SDGs and budget policy objectives. The incorporation of environmental and climate objectives into the budget process in foreign countries was initially founded on the principles of the OECD Environmental Budgeting Cooperation Program (OECD, 2023), which provides for the use of such environmentally responsible budget policy tools as environmental taxes and fees, "green" non-tax expenditures, contributions to state off-budget environmental funds, environmental insurance as an additional type of non-tax budget revenues, "green" government bonds, and "green" budget loans. The program, based on an interdisciplinary approach, brings together experts in budgeting, environment, taxation, and other areas, which makes it possible to identify the following blocks of the green budgeting concept: framework and strategic basis; methods and tools of green budgeting; accountability and transparency; and budget management. At the same time, green budgeting has been implemented mainly at the central government level. According to the 2020 OECD report (OECD, 2020), green budgeting at the central government level was applied only in Denmark, Canada, Ireland, Italy, Finland, France, Luxembourg, Netherlands, Mexico, Norway, Sweden, United Kingdom, and the United States, while in Austria and Colombia it was applied at the level of central and local governments. In the majority of OECD countries, green budgeting tools such as pricing (used by 22 out of 24 countries), GHG assessments, environmental impact evaluations (18 out of 24), and sovereign green bonds (18 out of 24) are commonly employed. Newer instruments include integrating green elements into medium-term budgets (8 out of 24), incorporating green perspectives in expenditures (6 out of 24), and setting carbon budgets for specific sectors of the economy (5 out of 24) (OECD, 2023). Currently, carbon taxes are applied in more than 50 countries, reaching EUR 80-100 in some of them. The IMF intends to promote an increase in the average carbon tax per 1 ton of emissions CO₂ among its members from USD 2 to USD 75 by 2030 (Obidov, 2025).

In Germany, the government's Climate Protection Plan 2050 envisages the gradual development of the tax system, strengthening measures to encourage private entities to reduce environmental pollution and move towards more sustainable production and consumption patterns, and reducing climate damage (Amelang, Wehrmann, Wettengel, 2019).

Denmark has introduced taxes that discourage economic processes that cause/could cause environmental damage in various industries: for the use of excess heat by industrial enterprises, for carbon emissions by enterprises in certain industries, for the disposal of business waste and household waste. In addition, a system of compensation payments from the state budget has been established to promote the development of green technologies.

Trading in emission quotas is also a regular feature of GHG. For example, the EU expected to receive about EUR 10 billion from emissions trading in 2020-2030 and use it to finance green projects.

Among the patterns is the identification of common priorities for climate finance. The G20 countries signed declarations on sustainable agriculture and food systems, climate action (17 countries), climate change (16), a global commitment to renewable energy and energy efficiency (13), a coalition for a successful multi-level partnership on climate change (11), on climate, aid, recovery and peace (8), gender-responsive just transition and climate action partnerships (8), climate, nature and people (7), leaders on a global framework for climate finance (5) (COP28, 2023).

One of the trends observed is that, while funding for climate change adaptation and mitigation measures that could potentially save lives remains scarce, substantial financial resources continue to be directed towards activities that harm health and support fossil fuel-based economies. As a result, 84% of the countries studied had negative carbon prices (explicit net fossil fuel subsidies) in 2022, totaling a record USD 1.4 trillion. These subsidy amounts are often comparable to the total health budgets of some countries. Furthermore, although global clean energy investments grew by 10% in 2023, surpassing fossil fuel investments by 73%, significant regional disparities remain. In emerging and developing markets outside of China, clean energy investment is 38% lower than fossil fuel spending, with these countries accounting for only 17.4% of global clean energy spending. Additionally, investments in energy efficiency and end-use, which are essential for a just transition, fell by 1.3% in 2023 (Lancet, 2024).

Another trend in this area is the growing focus on the implementation of the set by climate goals financial regulators around the world. For example, central banks are increasingly recognizing the problem of climate change as a factor in implementing their monetary policy and ensuring financial stability in the country, as such changes have a significant impact on economic growth, inflation, and financial stability. As a result, central banks are modifying their traditional operations to incorporate climate change considerations in the formulation and execution of monetary policy, forecasting the near term, preventing financial instability (by reassessing the level of potential GDP, interest rates in view of climate change; taking into account climate risks directly related to financial risks and identifying them in modelling macroeconomic indicators; in-depth research on the evolution of monetary policy (including its objectives, time horizon, and flexibility) in the face of climate change; and improving communication policy), thus influencing the national financial sector accordingly.

The following areas are seen as ways to enhance the contribution of the Central Bank to climate change mitigation (Eco-Business Group, 2021), redistribution of their balance sheets between sectors of the economy in favour of assets in the low-carbon economy; use of "green-supportive" and "brown-punitive" factors in the capital requirements of the CB; consideration of the possibility of creating a global "carbon" bank; activating the CB's position in revaluing low-carbon economy collateral and assets as part of the collateral valuation system and ESG criteria and setting a higher market price compared to assets of carbon-intensive businesses; calibrating quantitative easing programs (if necessary) in favour of purchasing low-carbon assets.

To avoid facing the "tragedy of the horizon" - the failure of financial markets to properly assess the long-term impact of climate change (Carney, 2015) - financial institutions in a growing number of countries are beginning to take climate and related factors into account in their policies. The transmission channels for their transmission to the economy and the financial sector are two-way, forming a feedback loop. Given the high density of the interconnection between the functioning of the financial sector and climate change, the Central Bank and a growing number of regulators integrate climate risks into financial stability monitoring and supervision, conduct stress testing; study their impact on the financial sector through various transmission channels, using the following approaches (NGFS, 2019) (Table 1).

Table 1. Analysis of the specific climate risks to which CBs and insurance companies are exposed by considering the impact of these risks on their balance sheets, profitability, capital, and business model. (Source: compiled by the author based on [Banque de France, 2020; Bank of England, 2020; Danmarks nationalbank, 2020; De Nederlandsche bank, 2020; Vermeulen, 2019].)

CENTRAL BANK	Actions taken
National Bank of Denmark	study of the impact on the financial system of physical climate risks: sea level rises due to temperature rise, as well as transition risks; stress testing of CBs for their resilience to transition risks
Central Bank of the Netherlands	Stress testing the financial system for exposure to risks associated with the transition to carbon-neutral energy; release of a special review of best practices used by the country's financial institutions to assess and address these risks
Bank of France	Assessment of resilience to climate risks (credit, market, sovereign) of CBs and ICs
Bank of England	conducting stress tests on the exposure of the CB and IC to climate risks; preparing a report on climate-related financial disclosures, which presents the approach used to manage climate risks and improve their understanding

The patterns also highlight actions taken by various financial institutions to manage climate risks. For instance, in 2023, the IFC conducted a study on climate change management within financial institutions to assess their capacity and readiness to handle climate risks and opportunities, as well as the main challenges they encounter in aligning with the goals of the Paris Agreement. The survey involved 177 clients from financial institutions in 73 emerging and developing countries, who were asked to self-assess their readiness in four areas: strategy and governance, risk, finance, and reporting and disclosure. The findings revealed widespread awareness of climate risks, but progress is hindered by insufficient data for decision-making, a lack of appropriate regulation, and limited funding. Around one-third of respondents prioritized the development of climate finance, yet despite growing interest in expanding green portfolios, they face several challenges, such as low client demand for climate finance instruments, limited long-term financing availability, and a narrow selection of climate finance products. Only about one-third of respondents had implemented at least three of the eleven recommendations from the Task Force on Climate-related Financial Disclosures. This study is crucial for identifying priority areas where additional support from development finance institutions can make the most significant impact (IFC, 2023).

A global trend in climate finance is the growing emphasis on climate risk management at the international level. In 2022, the G7 and the V20 group of vulnerable states launched the Global Climate Risk Shield initiative at COP27 to address the call from the most vulnerable countries to improve their response to losses and damages caused by climate change. In 2023, France contributed EUR 20 million in grants to the Global Climate Risk Shield, while Germany, Canada, Denmark, the United States, and Ireland together provided EUR 190 million. This initiative aims to enhance financial protection for populations in vulnerable countries against climate disaster risks, promote the development and implementation of social protection and insurance solutions for local communities, businesses, and households to ensure fast and reliable financing in the aftermath of natural disasters, such as post-disaster recovery systems, and strengthen community resilience to support economic and social development. Bangladesh, Costa Rica, Fiji, Ghana, Pakistan, the Philippines, and Senegal will be the first nations to benefit from the Global Shield. Development institutions are also regularly involved in climate finance. For example, the German Development Bank KfW helps poorer countries transform their socioeconomic systems so that they do not affect the climate and use the potential that arises as a result; works with instruments such as funds for green companies or insurance against indirect losses from extreme weather due to climate change; issues green bonds to mobilize private capital in the amount of EUR 2 billion to EUR 2.5 billion per year, making it one of the largest issuers in the world (KfW, 2024). In 2020, the bank integrated climate impacts and risks into the analysis at an early stage of each project.

The Spanish development institution Instituto de Credito Oficial (ICO) emphasizes in its declaration on the issue of green bonds that certain activities are excluded as eligible for financing due to their environmental impact: nuclear power, fossil fuel energy, carbon emissions, and oil and gas production (ICO, 2021). The funds raised are allocated within one year after issuance. The ICO provides investors with annual reports on the distribution of green bond proceeds until all funds have been allocated. These reports will include the total amount allocated by project category and region, the proportion of new financing and refinancing through green bonds, the total amount of undistributed proceeds, and the environmental impact of the projects being carried out.

In 2023, the Asian Development Bank (ADB) allocated a record amount of climate finance - almost USD 10 billion - to support developing country members in reducing emissions of GHG and adapting to the effects of global warming. Mitigation was allocated USD 5.5 billion and adaptation USD 4.3 billion, which is more than 46% higher than the amount of such financing in 2022. Also, 73% of ADB's projects in 2023 included mitigation or adaptation measures, including climate-resilient infrastructure, green buildings, energy efficiency, and early warning systems. As the climate bank for the Asia-Pacific region, ADB assists developing countries in defossilizing (reducing the use of fossil fuels) economies and climate transition (The Asian Development Bank, 2023).

The First Bank of Abu Dhabi promises AED 500 billion (USD 136 billion) in green financing by 2030, which illustrates a significant shift to support renewable energy projects, energy-efficient infrastructure, sustainable water management systems, and carbon reduction initiatives (Green, 2024).

Additionally, National Development Banks (NDBs) can serve as organizers or managers of climate finance funds. For example, in the Netherlands, FMO is collaborating with the Netherlands Development Organization (SNV), the World Wildlife Fund (WWF-NL), and Climate Fund Managers (CFM) to manage the Netherlands Climate and Development Fund (DFCD). This fund aims to invest in climate-resilient water systems and freshwater ecosystems, forestry, climate-smart agriculture, and ecosystem restoration. An interesting institutional solution is the creation of a specialized climate bank by developed market economies. Climate First Bank, a community bank in Florida established in 2021, offers personal and commercial banking services with a focus on environmental sustainability, providing households and businesses with specialized green loan options for purchasing solar energy sources, modernizing buildings, charging electric vehicles, and purchasing certified carbon offsets. In 2022, the bank increased its assets by 127%, total deposits by 167%, and capital by USD 34.8 million (Climate First Bank, 2023), and joined the Net Zero Banking Alliance (NZBA), 140 of the world's leading banks with USD 47 trillion in assets committed to financing actions aimed at transitioning to zero emissions GHG by 2050, whose framework, guidelines and collaborative learning opportunities help banks develop, set and achieve robust, science-based net zero targets.

In 2013, the New York State-funded NY Green Bank, the largest green bank in the United States, dedicated to filling financing gaps in the clean energy and sustainable infrastructure markets. The bank has invested USD 1 billion in seed capital and has raised more than USD 2 billion in loans to grow the state's green economy; mobilizes private investment in underserved sectors; made more than 100 investments to support projects in building decarbonization, clean energy, energy storage, transportation, and sustainable infrastructure; and plays a unique role in New York State's transition to a green economy, as defined by the state's Climate Leadership and Public Protection Act. The law puts the state on the path to economy-wide carbon neutrality, committing to reduce GHG emissions by 85% by 2050 and create a 100% clean electricity grid by 2040. According to the strategy, in the period 2020-2025, the bank will invest USD 100 million in clean transportation and decarbonization of buildings, USD 150 million in green affordable housing, and USD 200 million in energy conservation (NY Green Bank, 2023). In 2023, the bank had a loan portfolio in which solar energy accounted for 48% (USD 957 million).

The first green bank in the Caribbean, is implementing a public-private partnership initiative aimed at overcoming financial challenges, climate change adaptation constraints and mitigation in the Caribbean region; provides financial and technical assistance to prepare financing proposals for projects and programs with high potential to help the countries of the basin achieve their NDC goals and a climate-resilient, low-emission future. Blue-Green Investment Corporation.

In 2021, Canada committed to doubling its international climate finance from USD 2.65 billion (2015-2021) to USD 5.3 billion (2021-2026). To enhance its support for developing countries in their transition to low-carbon, climate-resilient, nature-friendly, and inclusive sustainable development, Canada announced several key initiatives: increasing the share of grant funding to 40%, up from 30% previously; dedicating at least 40% of funding to climate change adaptation projects; and allocating at least 20% of funds to projects that utilize natural climate solutions and deliver additional benefits for biodiversity (Government of Canada, 2024).

The German government has made climate protection one of the priorities of the current legislative period. The country has increased public funds for international climate finance by more than a third, to EUR 5.3 billion in 2021, about half of which is aimed at helping countries adapt to climate change. By 2025, Germany intends to increase public funds in international climate finance to EUR 6 billion a year and mobilize additional private funds, as well as increase its contribution to biodiversity protection to EUR 1.5 billion.

France's contribution is a key part of the broader efforts aimed at preventing, reducing, and addressing loss and damage related to the impacts of climate change, covering a wide range of measures from mitigation and adaptation to disaster risk reduction, humanitarian support, and sustainable reconstruction. France is a leading contributor to climate adaptation financing in developing countries, having mobilized EUR 2.2 billion in 2021. Additionally, France supports the UN's call for the widespread implementation of early warning systems and has committed to doubling its contribution to the Climate Risk Early Warning Systems Initiative starting in 2023. In total, France mobilized EUR 6.1 billion of climate finance for developing countries in 2021, including the EUR 2.2 billion allocated for adaptation (France Diplomacy, 2022), EUR 7.6 billion in 2022 (EUR 2.6 billion for adaptation, and EUR 7 billion in 2023, EUR 2.8 billion for adaptation, ranking second among EU countries, and its share of open climate finance in 2023 was 31%).

Investments in climate action in Brazil are projected by the World Bank to reach 1.2% of GDP per year from 2022 to 2050, with a lower estimate of 0.8% for the 2022-2030 period (World Bank, 2023). As of February 2021, green securities worth USD 9 billion had been issued, with 27% of these investments directed toward the agro-industrial sector (Castro, Burgel, 2022). In 2021, the Brazilian Development Bank, which has issued such securities on international capital markets, introduced the Sustainable Development Bond Concept framework. This initiative facilitates the issuance of green, social, and sustainable bonds both in Brazil and internationally. Brazil is employing an innovative approach to climate finance by encouraging companies to adopt and implement greenhouse gas emission reduction plans to minimize their carbon footprint and engage with carbon markets. The country's largest bank, Banco do Brasil, offers its clients services that combine financing and access to carbon markets through a one-stop shop. This includes a USD 400 million sustainability-related credit line for companies aiming to reduce their carbon footprint and the establishment of a USD 98 million pilot Climate Mutual Fund to attract private capital for increased sustainability financing. Additionally, the Central Bank is enhancing its capacity to support companies in adopting environmental impact reduction plans and accessing high-quality carbon markets through technical assistance (World Bank, 2023).

In Chile, the sources of climate finance are:

- budget financing (fiscal instruments (program to promote renewable energy in the corporate sector through tax incentives (Market Research Reports, 2017), tax deductions for property owners when they use solar panels, tax preferences for small (up to 10 kW) power plants in households that transfer surplus energy produced by energy to the general grid renewable (Center for Public Impact, 2016), subsidies (investment program to support research on renewable energy technologies (subsidies of up to 40% of the cost of work);
- emission allowance trading system (under development, work is underway to improve the carbon tax);
- financing from the Inter-American Development Bank, the largest donor in Latin America, along with the WB and KfW, is one of the most active donors of climate projects in Chile (in 2019 its subsidiary signed the world's first agreement with the Chilean government on monetization of emission reductions GHG (reduced emissions are estimated to receive a certain financial equivalent), which will provide Chile with significant economic benefits by accelerating energy decarbonization and reducing the time to fulfill its obligations under the Paris Agreement); international climate funds, UNDP, and foreign governments.

The regional peculiarities of institutional support for climate finance are as follows:

in Europe:

- a significant difference in the cost of green and conventional financing, which makes green financing more accessible and cheaper;
- the functioning of the Global Alliance/Consortium for Green Action, which adapts local NGOs and funds various projects, including those related to water;
- implementation of the European Green Deal in the EU;

in Africa:

- continental initiatives such as the Accelerating Africa's Climate Change Adaptation Program, which aims to mobilize USD 25 billion by 2025 to scale up innovative and transformative climate adaptation actions (Garschagen, Doshi, 2022), are notable examples. Additionally, the African Climate Change Finance Alliance works to stimulate private capital for low-emissions development, greenhouse gas reduction, and climate resilience. It leverages key financial institutions in the region to share knowledge, financial instruments for climate risk reduction, and facilitate climate finance flows. Furthermore, the Mechanism for Insufficient Climate Finance addresses the challenge that most African countries are unable to meet their conditional nationally determined contribution targets, which account for approximately 85% of their total financing needs (with the remaining portion being unconditional targets). In Africa, 32 out of 54 countries link financial conditionality to climate adaptation commitments, and 37 link it to mitigation commitments, with most countries seeking partial support. The costs associated with the conditional components vary widely across countries, ranging from USD 35 billion in Zambia to USD 59 million in São Tomé and Príncipe (Henze, 2022);
- a tiny share of global green bond issuance (in 2021, this share was only 0.26%, which is the lowest among all regions of the world (McKinsey, 2021);

- debt-for-climate-change mitigation projects, based on bilateral or trilateral swap agreements, are becoming an important tool. Trilateral swap agreements are typically formed between public creditors and private institutions that have committed to greening their finances or are seeking to invest in green finance, such as swaps for carbon credits. These agreements are supported by the Paris Club, with China serving as the largest bilateral creditor. Through these mechanisms, countries can reduce their debt in exchange for funding projects that contribute to climate change mitigation, such as carbon credit initiatives;

in the Asia-Pacific region:

- measures within the framework of nationally defined NDCs to mobilize adequate climate financial services by governments through the identification of innovative and alternative sources of financing, including private sector involvement;
- Identify gaps, develop and provide targeted advisory and technical assistance to CBs and NDBs in the region to enhance their capacity to formulate policies and guidelines that encourage investment in mitigation and adaptation projects;
- providing clear green standards by the state to mobilize additional investment and private financing; developing a green finance taxonomy that serves as a key reference point for green economic activities, promoting green investments, and preventing greenwashing (Republic of Korea);

in Latin America:

- the world's first agreement on monetization of emission reductions GHG (reduced emissions are assessed to obtain a certain financial equivalent), which provides significant economic benefits by accelerating energy decarbonization and reducing the time to fulfill obligations under the Paris Agreement (Chile);
- issuing "green" securities in domestic and international capital markets; offering clients services that combine financing and support for carbon market access through a "single window"; and establishing a Climate Mutual Fund (Brazil).

Along with the above, there is also a steady trend of uneven climate finance for mitigation and adaptation across economic sectors. More than 2/5 of capital flows go to climate projects in the energy and transportation sectors (44% in 2022). At the same time, industry, which ranks second in terms of CO₂ emissions, and agriculture attracted less than 4% of total mitigation funding. And despite the fact that new technologies, low-carbon infrastructure, hydrogen as a fuel, and energy storage are beginning to attract private financing due to gradual reductions in production costs, increased consumption, and political support, funding for this sector is growing very slowly. Projects on sustainable land management (agriculture, forestry, and other land use), the most important sector with significant vulnerability and significant adaptation needs, received only USD 7 billion or 1% of all adaptation funding) (Climate Policy Initiative, 2023).

The cost of combating climate change also differs for different segments of the population and regions of the world. For example, the richest 1% of people account for more than 15% of total GHG emissions, while the poorest 50% account for only 7%. At the same time, the poorest countries and people in all countries face the greatest threat of the climate crisis, facing the highest economic costs and losses, as well as the risk to their survival (Figure 1) (United Nations Population Fund, 2024).

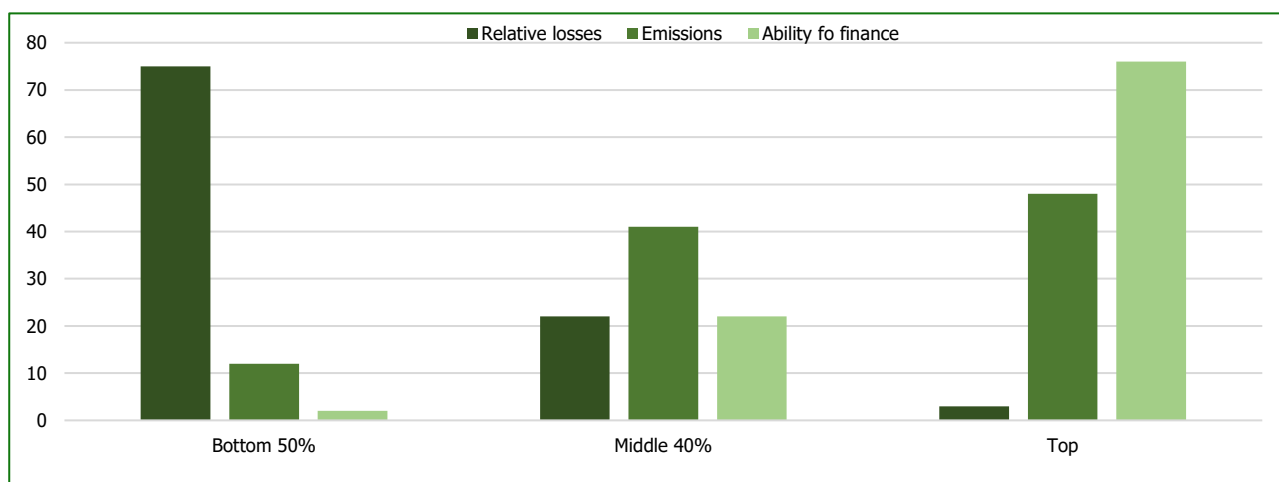


Figure 1. Differences between countries in the share of climate change-related economic losses, emissions, and ability to finance recovery. (Source: United Nations Population Fund, 2024)

According to UN estimates, climate change costs Africa up to 5% of its GDP, as the continent with 54 countries loses that much as a result of global warming. At the same time, Africa produces significantly fewer emissions than the industrialized world, but receives only 1% of global climate finance annually, which is a drop in the bucket out of the USD 1.3 trillion needed, and thus the epidemic of underinvestment hinders Africa's potential to promote climate solutions (Tancredi, 2024).

Despite contributing less than 8% of global emissions, Africa faces numerous climate change-related challenges, including severe water shortages, rising sea levels, and climate-related diseases. Yet, the continent receives less than 5.5% of global climate finance. Countries share a moral responsibility to protect the world's environment, as outlined by the principle of "common but differentiated responsibilities and respective capabilities" established at the Earth Summit in 1992. However, not all countries have the same financial resources or responsibilities for the current situation (Al-Mashat, 2023). Africa proves that climate finance for the continent is unfair and insufficient. From 2016 to 2019, it accounted for only 3% of global climate finance flows, i.e. USD 18.3 billion (United Nations Economic Commission for Africa, 2022), despite various initiatives aimed at supporting climate change adaptation and mitigation.

Madagascar is the third most vulnerable country to climate change globally. Despite having one of the smallest carbon footprints contributing to global warming, farmers are struggling to adapt. Climate change is having a devastating impact on the island (Feedback Madagascar, 2024). Rising temperatures, droughts, cyclones, landslides, deforestation, flooding, and crop devastation are some of the challenges faced. These include increased pests and diseases, such as locust infestations, unpredictable seasons that leave farmers uncertain about when and what to plant, and disruptions in supply chains, markets, and communications, leading to higher prices for basic foodstuffs. These factors contribute to increased poverty and food insecurity.

The damage caused by climate change to the countries of the Global South is estimated at hundreds of USD billions, and according to researchers at the University of (UK), the countries of the Global North have to pay the countries of the Global South about USD 170 trillion by 2050 (7% of global GDP), USD 6 trillion annually. At the same time, annual compensation payments to the countries of tropical Africa, which make up the majority of the LDCs, should amount to USD 1.4 trillion (23% of the total), or 111% of their regional GDP. This is USD 1160 per person annually.

India is the sixth most climate-vulnerable country, according to the 2021 Global Climate Risk Index, and is at the crossroads of climate catastrophe. The regions that are already economically disadvantaged - coastal and mountainous communities where poverty and environmental vulnerability intersect - are the most affected. According to the WB, India's GDP could decline by 3-10% annually due to the growing impact of climate change by the end of the century. According to McKinsey (McKinsey, 2020), floods in India account for 10% of global economic losses from natural disasters, and the recovery process is often slow and inadequate. Coastal regions, where many of the poorest people live, are particularly vulnerable to both sea level rise and storm surges. This creates a need for a climate insurance market, as it provides an important buffer to ensure that when a disaster strikes, recovery efforts are not delayed by a lack of funding. In coastal regions, a climate insurance market could be a lifesaver, not only ensuring that recovery funds are disbursed quickly but also making it more transparent. ICs can cooperate with local authorities to ensure that reconstruction funds are used appropriately and that communities receive the assistance they need. As climate-related disasters become more frequent and severe, the need for a climate insurance market is more urgent than ever. Such a system will not only provide timely support to those affected by climate change but will also encourage more sustainable business practices and infrastructure projects.

Studies show that early financial intervention can have 3.5 times the impact of delayed payments. With a climate insurance market, insurers could provide funds immediately after a natural disaster, providing communities with the resources they need to recover quickly (Siddiqui, 2024).

Information about financing opportunities is one of the factors of green growth. SMEs that are aware of national financial support options are 65% more likely to adopt or expand sustainable practices. The EC study, which examines the key factors that can influence the level of utilization of financial opportunities, concludes that the availability of information on financing opportunities contributes to green growth, and SMEs that use their own funds are more likely to adopt a green business strategy than those that use green loans or EU financing. This was independent of the level of information received, as businesses were reluctant to use green loans or EU financing due to administrative complexity. Providing financing and disseminating information about financial support can promote the adoption of sustainable practices in business, but the success of such a strategy depends on the type of financing, as grants and loans are less conducive to the transition to green business than self-financing. While public-private partnerships would be an effective model for attracting financial support, the adoption of sustainable practices by SMEs varies within and across EU countries (Green Transformation of Ukraine, 2022).

At the same time, different countries have different capacities to implement climate policy measures, and national peculiarities may affect the overall ability of the economy to adapt to changes. For example, the annual flow of climate finance in low- and middle-income countries does not exceed USD 425 billion. This amount needs to be increased at least fourfold by 2030, and more than 80% should be provided by the private sector (Report News Agency, 2024).

Given the different needs and commitments, the priorities of individual countries in strengthening institutional capacity to access climate finance vary, as such capacity should be assessed based on: understanding of national needs, priorities and strategies; ability to obtain up-to-date information on climate finance sources for strategic decision-making; understanding of the domestic situation in the country (climate finance institutions, stakeholders) and ability to use coordination mechanisms.

However, the development and implementation of environmentally/climatically responsible budget policies in individual countries are characterized by three different approaches, in which budget policy objectives are linked to the SDGs, national priorities for socio-economic development (in New Zealand, as part of the public welfare budget policy), or are separated into an independent environmentally/climatically responsible budget policy with the formation and implementation of the country's green/climate budget. In particular, France presented a methodology for forming a green budget in 2019, and in 2020 was the first in the world to publish it as an annex to the 2021 Finance Law. At the same time, green budget revenues were based on environmental taxes, including taxes on energy, waste, transport, and natural resources, which cause price increases and affect the behaviour of economic agents. Environmental expenditures were classified according to the EU methodology (Sylvie et al., 2019) (climate change, climate change adaptation and disaster prevention, sustainable water management, transition to a "full cycle" economy, waste and prevention of technological risks, pollution prevention, biodiversity conservation, and protection of agricultural and forest areas) with a 5-point scale depending on the level of environmental impact and environmental behaviour of economic agents. This allows for the calculation of the share of state budget expenditures that have a positive, negative, or neutral impact on the environment and climate.

In addition, the approach to green/climate budgeting in individual countries, according to OECD recommendations, is determined by the national public finance management system, which has its own specific features. An analysis of the application of green budgeting methods and tools in OECD countries shows that they are being developed differently and implemented in the budget process. For example, the labeling of the green budget, review of tax expenditures that negatively affect the environment and climate, and environmental analysis of the costs and benefits of green budgeting are at an average level of application.

Along with international/bilateral climate funds, some developing countries are also trying to establish national climate funds to tap their own innovative sources of climate finance by combining existing national funds and financial programs with similar objectives but different governance and oversight bodies into one organizational structure, or by combining these resources with additional international and national resources for specific sectors and projects, ensuring their integrated. However, given these different goals and objectives, national climate funds differ significantly in terms of their mandates, governance structure, and funding criteria (Glemarec, 2011).

Although the main objective for most institutional investors is to maximize risk-adjusted returns on investments, given the structural differences between them, they differ in terms of risk and return targets and, accordingly, the asset allocation strategies they follow. When making a decision on climate investments, in addition to the level of risk, institutional investors should take into account such functional and regulatory constraints in their activities as the legal framework and the nature of obligations, which are the most important constraints for pension funds and life funds (Glemarec, 2011).

The EU's approach to climate finance in developing countries involves providing grant funding directly to the poorest and most vulnerable nations, while also using it to mobilize private investment by combining grants with loans and direct investments from both public and private sources, including bilateral and multilateral development banks. In 2023, the financing needs of developing countries for climate change adaptation were 10-18 times greater than international public finance flows, marking an increase of more than 50% compared to previous estimates. The Adaptation Gap Report 2023 outlines seven ways to boost funding, including through domestic spending, international sources, and private sector investments. Additional strategies involve remittances, targeting financing for SMEs, and reforming the global financial architecture. The new Loss and Damage Fund also requires innovative financing mechanisms to secure the necessary investments (The United Nations Environment Programme, 2023).

DISCUSSION

The regularities of climate finance globally include: the development of a global regulatory policy for preventing and combating climate change, as well as for climate change mitigation and adaptation; the incorporation of environmentally/climate-responsible budget policies as part of sustainable development budget policies, ensuring alignment with SDGs and budget objectives; trading in greenhouse gas (GHG) emission quotas; identification of common priorities for climate finance; and the limitation of climate finance resources.

However, the implementation of the global regulatory policy for climate change prevention and mitigation, mitigation and adaptation to climate change is accompanied by numerous shortcomings, problems, and unresolved issues.

Despite the identification of common priorities for climate finance, it is largely driven by the interests of donor countries, which to some extent offset the real needs of recipients.

Despite the declaration by governments, IFIs, major banks, and other financial sector participants of the need to reduce/terminate fossil fuel financing, this problem remains unresolved.

Not all economic agents take due responsibility for the formation of such a global policy, and green budgeting has been introduced mainly at the level of the central government. An analysis of the use of green budgeting methods and tools in OECD countries shows that they are not well developed and implemented in the budget process. The introduction of taxes has not been widely used to discourage economic processes that cause/could cause environmental damage in various industries. The issue of trading in emission quotas has not been properly addressed either GHG. The development of financial institutions' management of climate risks is hindered by insufficient data for decision-making, inadequate regulation, lack of funding, low or insufficient customer demand for climate finance instruments, and limited availability of long-term financing and climate finance product options.

Instead, the specific features of climate finance on the continents and in individual countries are: the introduction of the EUR open Green Deal in the EU; a significant difference in the cost of green and conventional financing, which makes green financing more accessible and cheaper; limited issuance of green bonds; the government setting clear green standards to mobilize additional investment and private financing; agreements on monetizing emission reductions GHG; issuance of green securities in the domestic and international capital; and markets differences in the price of climate change mitigation for different segments of the population and regions of the world.

Although the main objective for most institutional investors is to maximize risk-adjusted returns on investments, given the structural differences between them, they differ in terms of risk and return targets and, accordingly, in the asset allocation strategies they follow. The practice of issuing green bonds and pricing carbon units also needs to be improved. Effective measures are also required to reduce the disparity in the cost of climate change mitigation across different continents, countries, and population groups.

The study suggests that the systemic shortcomings in climate finance in developing countries stem from the fact that, despite their declared goals to transition to sustainable energy sources, only 1/3 of them have identified investment needs, and dozens of countries of this type have not registered any major international energy investment projects in renewable energy.

Therefore, to solve problems, eliminate shortcomings, and unresolved issues of climate finance, it is necessary to clearly take into account the status quo in this area, and promptly develop reasonable and effective measures to correct the current situation in the global climate finance market.

CONCLUSIONS

An assessment of global trends in climate finance shows insufficiency (a significant gap between the supply and demand for climate finance) and inconsistency of its growth in different regions of the world, sectors and industries of national economies; different shares of domestic and external climate finance in different countries; problems with its accounting and tracking, which prevents a reasonable analysis of its public, private and mixed sources and complicates effective control.

The regularities of climate finance in the world are as follows: a steady trend of uneven climate financing of economic sectors for mitigation and adaptation; of development global regulatory policy; application of environmentally/climate-responsible budget policy; trading in emission quotas GHG; limited climate finance; consideration of climate goals by

financial regulators; development of climate risk management at the national and international levels; participation of development institutions in climate finance and specialized organizations.

However, "green" / climate budgeting should be introduced not only at the level of central but also local authorities, and greater extent to taxes should be used to discourage economic processes that cause/are likely to cause environmental damage in various sectors. They should expand the use of the GHG emissions pricing mechanism. The practice should be expanded by applying taxes that discourage economic processes that cause/capable of causing environmental damage in various sectors.

The specific features of climate finance in the world are due to its territorial, sectoral, price, and time differences. These features include:

- introduction of "green exchange rates";
- significant difference in the cost of "green" and conventional financing;
- limited issuance of "green" bonds; provision of clear "green" standards by the state;
- monetization of GHG emission reductions; issuance of "green" securities in the domestic and international capital;
- markets different prices of climate change mitigation for different segments of the population and regions of the world;
- different opportunities for implementing climate policy measures;
- different priorities of individual countries in strengthening institutional capacity to access climate finance.

As climate disasters become more frequent and severe, the need for a climate insurance market is more urgent than ever. Complete and timely is also needed information on opportunities climate finance.

Thus, given the importance of ensuring sustainable climate finance, the existing problems, shortcomings, and unresolved issues in this area, and the logical incompleteness of scientific research on this issue, further comprehensive research is needed.

ADDITIONAL INFORMATION

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CONFLICT OF INTEREST

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ЗАКОНОМІРНОСТІ Й СПЕЦИФІЧНІ ОСОБЛИВОСТІ КЛІМАТИЧНОГО ФІНАНСУВАННЯ У СВІТІ

Для достеменного з'ясування стану й розвитку світового кліматичного фінансування слід мати чітке уявлення про закономірності й специфічні особливості, що супроводжують ці процеси, а також різноманітні чинники, які їх зумовлюють. При цьому предметом аналізу мають бути особливості соціально-економічного розвитку розвинених країн; країн із ринками, що формуються й що розвиваються; найменш розвинених країн, їхньої господарської діяльності й життєдіяльності загалом і кліматична політика як чинників впливу на кліматичні зміни, формування систем запобігання, боротьби, мітигації й адаптації до таких змін.

Метою дослідження є виявлення закономірностей і специфічних особливостей кліматичного фінансування у світі та чинників, що їх зумовлюють.

Авторка представила ступінь висвітлення проблематики з'ясування закономірностей і специфічних особливостей кліматичного фінансування у світі. Проаналізувала наявні закономірності й специфічні особливості кліматичного фінансування на континентах і в країнах різного типу. Виявила чинники, що зумовлюють і такі закономірності, і специфічні особливості. У статті проаналізовано глобальні та регіональні моделі кліматичного фінансування з акцентом на нерівності в доступі, розподілі та інституційній підтримці. Досліджено такі регіони, як Європа, Африка, Азійсько-Тихоокеанський регіон, Латинська Америка, Північна Америка, Карибський басейн та Індія. Основні висновки показують, що розвинені країни домінують у мобілізації кліматичного фінансування, водночас регіони, що розвиваються, та вразливі регіони стикаються з недостатнім фінансуванням, незважаючи на високу схильність до кліматичних ризиків. Фактори, що впливають на кліматичне фінансування, включають економічний розвиток, інституційну спроможність, політичну прихильність, нормативно-правову базу, готовність секторів і залучення фінансового сектора. Дослідження підкреслює необхідність покращення координації, справедливого розподілу та цільової підтримки для подолання глобальних прогалів у кліматичному фінансуванні.

Ключові слова: кліматичні фінанси, джерела кліматичного фінансування, напрями кліматичного фінансування, територіальний розподіл кліматичних фінансів, закономірності глобального кліматичного фінансування, особливості кліматичного фінансування у світі, фактори кліматичного фінансування, інституційне забезпечення клімату

JEL Класифікація: E22, G21, Q54, Q56