

# CLIMATE CHANGE: INTERNATIONAL AID FOR DEVELOPMENT OF ADAPTATION IN THE GLOBAL SOUTH

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## Abstract

*This article explores the novel role of international aid for development of adaptation to climate change impacts and disaster risk reduction in the global South, and particularly, in climate vulnerable least developed and small islands states. Development aid is regarded as an instrument, both for enhancing their domestic resilience against disasters, safety of livelihoods and infrastructure, and for compliance with the norms and provisions of the climate change international regime with its Paris agreement. The research innovation is in tracking the new features and trends in multilateral assistance to development of adaptation systems in the recipients, and in analysis of changes in approaches and stronger positions of developing countries in climate diplomacy and multilateral North-South negotiations on adaptation development cooperation. Our focus is on identifying the climate specifics and core drivers in design of multilateral adaptation aid in comparison with the global development cooperation in general. The system of adaptive governance is approached from the polycentric perspective, which is characterized by a diversity of actors involved and broadening interactions between them. This study concludes that adaptation development aid could be more effective when climate finance is packaged together with transfer of technology and competences. Research is based on mixed methods and multidisciplinary approaches to aggregate findings from analysis of risks and climate impacts on society, results of international climate negotiations, UNFCCC documents, national reporting and case-studies on disaster risk reduction.*

**Keywords:** adaptation to climate change, disaster risk reduction, international development aid, North-South climate diplomacy, polycentric governance, new collective quantified goal, multilateral fund for loss and damage

## I. Introduction

Most climate change impacts and risks for society are attributed to a combination of drivers - both to destructive effects of disasters as a result of growing global climate variability, and to failures in human adaptation to disaster risks through response actions worldwide, which are not sufficient enough to address challenges posed by hazards [1][2]. Although the disaster risk reduction and adaptation to climate change impacts are among the top priorities on the global risks agenda, and multiple measures to enhance the resilience of society are undertaken at national and international levels, the trend towards escalating disaster damage is increasing as climate variability intensifies. According to the recent data of the World Economic Forum, in 2025 the annual loss and damage

costs of climate attributed disasters are expected to reach USD 145 billion, while by 2050 they are projected to increase between USD 1.7 - 3.1 trillion.

Global climate change affects all countries around the world in highly heterogeneous ways, depending on nation's geography and level of development [3]. The question about which states are best prepared for adverse climate impacts is among the top issues within the current international discourse. The countries of the global South, and particularly climate vulnerable least developed and small islands states, are disproportionately at risk as their resilience to adverse hazards impacts faces a challenge. It is explained by a set of factors, including their geographical exposure, climate vulnerability, socio-economic and institutional context, limited domestic capacity and resources for adaptation and disaster response to emergencies.

Climate hazards like floods, sea-level rise, storm surges, wildfires and other extreme events might have particularly serious consequences for lives, livelihoods and infrastructure in the global South [4]. They stress infrastructure, causing damage to buildings and destruction of transport systems, telecommunications, power grids and result in costly replacements and repairs; livelihoods are affected and population might be displaced. Socio-economic and institutional issues, high poverty rates and limited financial resources hinder their ability to implement climate resilience measures like protective infrastructure upgrades, disaster preparedness, early warning, emergency response and post-disaster recovery. As a result, they bear significant consequences, with some estimates suggesting that countries of the global South, and especially least developed among them, could encounter a 12-13 percent annual increase in infrastructure costs in the near future. Adaptation costs grow simultaneously with response actions, including building protective seawalls, relocation of infrastructure and livelihoods, constructions upgrades to make them disaster-prone: it requires additional investments and technical capacities. Today, the developing countries experience significant adaptation gaps, while their adaptation needs are about a dozen times higher than their actual capacity to deal with climate risks.

Addressing climate vulnerabilities requires stronger international development cooperation, financial and technical assistance, and the implementation of sustainability strategies that prioritize climate resilience and disaster risk reduction. Multilateral framework for climate aid, incorporating mitigation and adaptation, has been under active formation during the last two decades, and since recently, particularly dynamic has been its segment on development assistance for the global South in adaptation to adverse climate change impacts and related hazards. While official development assistance (ODA) traditionally is among the key forms of international cooperation between developed and developing countries, the climate aid, and especially adaptation support, is a new and important strand, and it clearly reflects the climate specifics, the new factors defining its design, and peculiarities of contemporary North-South climate diplomacy.

The developing states had acquired stronger roles and stance in climate international cooperation and in dynamic international climate regime under the United Nations Convention on Climate Change (UNFCCC), including its provisions and norms on multilateral assistance. Today, active discourse within the international community is underway on selection of effective aid instruments, which could promote fast-track and easier access to transfers of multilateral climate funding, technology, and competences between donors and recipients. Adaptation aid functions through partnerships between donor and recipient countries, and it prioritizes the support for reduction of climate vulnerability, especially in case of disaster emergencies, along with consolidation of sustainability pathways and improvement of living standards.

The main *goal* of this study focuses on understanding and mapping the roles and limitations of international climate aid as a tool for enhancing resilience against climate hazards and adaptation capacity of its recipients in the global South. The study is aimed at analysis of (1) new features and trends of international aid to development of adaptation systems, (2) 'climate' specifics within the recently dynamic North-South development cooperation and main drivers shaping its design, and (3) how and to what extent the emerging multilateral framework of adaptation aid fits into the global climate change international regime under the UNFCCC.

## II. Methods

The research results are based on application of a mixed methods approach, which combines qualitative analysis and case-studies. They allow to explore the major attitudes and perceptions about the role of international climate adaptation aid, its possible instruments and limits in consolidating the resilience and safety of climate vulnerable developing countries and their infrastructure against adverse climate consequences and disaster risks.

*Qualitative* methods are used to define the scope of the emerging international system of development cooperation in climate change and North-South adaptation aid, as well as to explore major trends and features of its architecture; evidence from recent results in multilateral coordination of adaptation aid transfers between the donors and recipients derives from extensive qualitative assessments. Research is based on analysis of documents of the UNFCCC annual conferences of the parties, their regular national communications and reporting. Transcribes of the official approaches of participants allow tracking their diversity within the North-South climate dialogue. The results show that selection of a particular aid instrument, technology, or finance product appears to be in the core of international climate negotiations and bargaining between donors and beneficiaries. It is supplemented and verified by analysis of international assessments recently undertaken in this field by the prominent international agencies.

*Interdisciplinary* approaches are applied. They are involved to combine the results of social and natural sciences in order to identify and assess possible adaptation governance options and instruments for effective problem-solving in enhancing resilience and safety of livelihoods and infrastructure against disasters. Set of selected options depends on observed climate change impacts and risks of related hazards for particular groups of countries depending on their natural vulnerability and geographical exposure. Assessment of local socio-economic, institutional factors and response capacities are equally important within such analytical exercise. Multidisciplinary methods allowed to reconfirm that results and variations in the structure of adaptation aid are highly context-dependent. They also helped in our inquiry about possible means for transfer of adaptation technology and competences, about their structure and limitations. Multidisciplinary approach enables to conclude that climate finance aid packaged together with transfer of technology and competences is among effective tools for problem-solving.

*Attribution* analysis, including assessment of drivers and factors in shaping the design of international development aid for climate adaptation in the global South, contributes to identifying its role in domestic adaptation capacity building and in implementation of national obligations under the UNFCCC climate regime. We distinguish between group of factors defined by natural, geographical, climate specifics of the recipients, and a set of drivers rooted into their socio-economic contexts: it allows identifying the results and effectiveness of particular aid instruments for enhancing resilience, domestic capacities in climate vulnerable least developed states. It shows that the latter group of factors is crucial particularly in disaster risk reduction and enhancing safety of critical infrastructure.

*Case studies* focus on disaster risk reduction in climate vulnerable developing coastal and small islands states in the South-East Asia with the emphasis on floods and sea level rise and related risks response to enhance safety, resilience and adaptation of livelihoods and infrastructure. Possible multilateral adaptation governance instruments for problem-solving are explored on the example of the recently established multilateral Fund on responding to loss and damage from climate disasters.

This study represents the next consequent step in our broader research exploring the major features and trends in global climate change, innovations in adaptive governance, implementation and effectiveness of the international climate change regime and challenges in domestic performance by its parties, groups of states and their different actors. We consider that the instrument of international climate development aid promotes for adaptation problems-solving

both within domestic and international contexts, although a number of serious problems and gaps associated with its application exists. Research methods applied and results gained are planned to be tested and verified within our current research project on assessment of *polycentric governance* of global climate risks and sustainable development.

### III. Results

The following research results contribute to exploring the role of international aid for development of adaptation to adverse climate change impacts and for disaster risk reduction in climate vulnerable least developed countries and small islands states, and to meeting their national obligations under the UNFCCC. They reveal new features and trends in multilateral assistance to development of adaptation systems in the global South through focusing on climate specifics and drivers in design of adaptation aid as an important component of international development cooperation.

Today, we observe a number of novel features and trends in formation of the *global framework for climate aid*, and particularly, in its dynamic segment of international support for development of domestic adaptation systems in the least developed and small islands states of the global South. The growing role of adaptation aid instruments is perceived as an input into building resilience of their livelihoods and infrastructure facing adverse climate consequences and into disaster risk reduction; in a broader sense it contributes to meeting the key goals of climate ODA and sustainability. Adaptation aid is also becoming an important attribute for success in national implementation and compliance with the norms of the UNFCCC international climate regime by the developing parties; *climate aid regime is heavily nested into the provisions of the latter*. We conclude that currently the role of aid in the North-South climate negotiations and in climate development cooperation is consolidating. Recently, in the context of global adaptation gaps and insufficient international transfers to meet the adaptation needs of climate vulnerable states, the aid up-scaling is pledged, i.e. the tripling by 2035 up to USD 300 billion of annual climate development assistance to most vulnerable countries of the global South with more ambitious general goal of getting up to USD 1.3 trillion.

Our analysis indicates shifts not only in *quantitative* parameters of international support, but *qualitative* as well. Recent innovations in the architecture of adaptation development aid are observed, and to a high extent they reflect the specifics of climate development cooperation. Its design is characterized by changes in: 1) structure and sources of international aid; 2) institutional frameworks for resilience capacity building; 3) broader range of sources and actors sources involved; 4) consolidation of their networks and interactions; 5) diversity of donor-recipient linkages and partnerships, 6) finance products and technology transfers packaged together; 7) instruments and tools for enhancing easier and fast-track access to international aid; 8) means for concessional and preferential support for climate vulnerable beneficiaries. Research results show that from now on a wider range of sources and channels for international aid would be mobilized to secure the targeted increase in global climate finance flows to vulnerable states and their local communities. In contrast to earlier preferential emphasis on public sources for climate ODA, multiple public and private flows would be combined, and consequently public and private donors - be involved. Such new diversity is coupled with broadening contributions from international climate funds and development banks, and bilateral assistance. Not only developed countries listed in Annex II, UNFCCC with their special responsibility and commitment to international climate aid, but also rapidly developing economies are promoted to be partners in this global mission: South-South adaptation development cooperation is a novelty. We conclude that such newly emerging design is based on *polycentric approaches*, and it might effectively contribute to solving the key challenges for adaptation development aid - both for consolidation the domestic capacity of recipients in building resilience against adverse climate consequences and for implementation of their international climate obligations.

There is growing variety in the *structure* and *instruments* of climate adaptation aid. Selection of a particular tool is increasingly based on promoting faster and easier direct access of recipients to adaptation funding and technologies. Today, there are several types of adaptation finance instruments available to least developed countries. The major include multilateral/bilateral public grants, concessional sovereign loans, debt coverage, concessional and non-concessional blended bonds, climate finance from international institutions; but each has different consequences for the society and citizens of a recipient. This set also reflects the differences in the parties' positions within North-South climate diplomacy; selection of a particular aid instrument, or finance product is a part of negotiations and donor-beneficiary bargaining. Grants are mostly favored by recipients because they allow generating maximum public benefits for the society and do not require the financial return; usually they are small and short-term and might not be highly effective for creating disaster proof infrastructure, or stable institutional settings. On the contrary, the climate transfers from international finance institutions, or financial markets in the form of non-concessional loans/bonds envisage full repayment by the beneficiary to be generated through accumulated domestic revenues, charges, taxes, and often results in a burden for the citizens, financial debt, or crisis in a recipient. Choice of instruments is highly dependent on the local context, i.e. the specifics of climate vulnerability of a possible beneficiary and its local socio-economic potential. Recent establishing of the multilateral Fund for Responding to Loss and Damage (FRLD) is an interesting case to analyze international practices which intend to select instruments promoting faster and easier access to adaptation aid; our findings are presented for discussion in the following sections.

Analysis indicates at changes in *North-South climate diplomacy* interactions with a drive towards a stronger new role of the developing countries - as a result of their pressures and bargaining in a course of multilateral climate negotiations during the last two decades. The major outcome is not only in introduction of the higher targets for adaptation development aid to climate vulnerable developing states. The other part of their success is in further refining the design of international adaptation aid regime based on the UNFCCC norms, which define the leading role of the developed states and their commitment for assistance to the global South. Recently, the prominent efforts have been undertaken to balance the conflicting approaches of the parties in climate negotiations, and breakthrough results were adopted to provide further institutionalization of the new North-South *climate deal* within the international climate aid framework. The key among them include: (1) increase in annual donor-recipient flows of adaptation finance fixed by the New Collective Quantitative Goal with increase in climate finance; (2) combination of transfers of finance, technology, and competences for capacity-building via establishing the special support program for implementation of National Adaptation Plans (NAP) by 2030; (3) variety of novel instruments and conditions promoting access of recipients to funding and technologies; (4) stronger emphasis on enhancing allocations to support local institutions and locales in their adaptation action; (5) demand-led capacity building, technologies and know-how transfers; application of multi-year programmatic approaches defined by recipient's specifics and context. However, some issues of climate negotiations still remain open, and particularly the North-South climate *responsibility, compensation and justice* with its direct links to climate disasters *loss and damage* reduction; it remains on the agenda of adaptation aid, and its possible beneficiaries intend to use it further as an argument in climate negotiations.

We conclude that *climate finance, technology transfer* and *capacity building* packaged together are the key cornerstones in international climate development aid to the global South. Initially, the currently emerging system of adaptation development aid was associated mainly with mobilization of multilateral climate finance, and was strongly promoted by the developing countries. Later it was expanded to incorporate international support for transfer of technology and competences to cover the adaptation needs, which are usually articulated now in national adaptation plans. The evidence from case studies clearly indicates that to be effective the adaptation development cooperation is to be based on coordination and packaging the financial assistance with transfer of technology, competences, institutional support for adaptation capacity

building. As a single instrument the finance transfers might not be able to fully solve the complexity of adaptation development problems in the recipients. Research shows that adaptation development finance allocated for technology transfers increased during 2018-2022 by two-fold; technology aid is concentrated in such climate sensitive sectors as water, agriculture, and coastal zones. Important trend is the growing flows of technology and competences for wider involvement of vulnerable regions in international climate data exchange to overcome the existing gaps in global networks of disasters early warning and climate forecasting. We consider that application of such triangle-package of international aid might be particularly challenging for enhancing resilience of livelihoods and safety of infrastructure in climate vulnerable least developed states and for consolidating their future sustainability pathways.

## IV. Discussion

### I. Adaptation aid: State-of-the-art

Multilateral framework for climate aid has been under formation in close interaction with development of the UNFCCC international regime. Especially dynamic progress has been noted during the last decade - after the global goal to annually mobilize USD 100 billion for climate support of the developing countries, including their mitigation and adaptation efforts, was agreed. This target was finally enacted until 2025, and during this period the coordination of international aid for adaptation to adverse impacts of climate change had been underway. It is based on the finance mechanism of the UNFCCC, art.11 with its norms to assist the developing country-parties to establish their domestic adaptation systems. The OECD industrialized countries and economies in transition from Annex I, UNFCCC are encouraged to take part in climate assistance and international development cooperation. Also, the twenty four developed states listed in its Annex II<sup>1</sup> are designated with a stronger mission – to provide financial and technological support to address the climate change impacts: they are obliged to mobilize resources both for mitigation and adaptation, and to contribute to covering the climate costs in the developing countries to reduce their climate vulnerability.

During this period, the global climate finance mechanism combined the three major multilateral *specialized funds*, including the *Special Climate Change Fund (SCCF)*, administered by the Global Environmental Facility, the *Least Developed Countries Fund (LDCF)*, and the *Adaptation Fund (AF)*. This system aggregating finance mostly from the governments, was actively used to channel the mobilized funding to developing countries. Recently it was enlarged to include the new multilateral *Fund for Responding to Loss and Damage* established in 2023 to assist climate vulnerable least developed states in averting, minimizing, and addressing damage and risks. International climate funding is also secured through *multilateral development banks*, and it targets particularly the low-income nations, small island states, and indigenous communities. The third source is the *bilateral* state-by-state transfers. According to some estimates the structure of sources for climate aid in 2022 looked as follows: the leading roles were shared almost in equal proportion by the multilateral development banks (44%) and bilateral development cooperation channels (43%); multilateral climate funds accounted for about 3% in total climate aid, with the rest mobilized from other international sources. Despite relatively modest contributions from climate funds in comparison with other sources, their role is important as they aim at promoting direct access to climate aid and tend to scrupulously take into account the local contexts of those recipients who are in urgent need in case of climate emergencies.

Recent international assessments indicate that currently there is a significant global adaptation gap, and it has acquired quite grotesque dimensions in the global South. They unanimously confirm that climate adaptation remains ‘underfinanced and unprepared’. There is a

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<sup>1</sup> Annex I parties include the developed and economies in transition (EITs) states; Annex II parties are a subset of Annex I parties, specifically the OECD states (excluding the EITs), who are required to provide financial and technological support for mitigation and adaptation in the countries of to the global South.

discrepancy between climate finance flows and needs for climate adaptation in climate vulnerable least developed states. According to the UNEP Adaptation Gap Report the adaptation finance gap ranges from about USD 215 billion to USD 387 billion annually [5] depending on the sources of data and assessment methods applied. Today annual adaptation finance flows to recipients appear to be about 8-14 times lower than their adaptation needs. This data is aggregated and verified from two different sources – from national climate reporting of the parties to the international climate regime, and from global adaptation costs modeling. International assessments consider that currently the developed countries fall short to their earlier commitment on funding support for adaptation actions, and it is among the reasons for adaptation gaps and slow progress on the issue. For example, gradually increasing international public adaptation finance flows to developing countries in 2022 accounted for about USD 28 billion [1]. We believe that such state-of-the-art and adaptation failures are attributed also to certain gaps in knowledge about how to effectively perform the available adaptation options, and how to prioritize among implementation instruments in order to reduce disaster risks and enhance the resilience in the climate vulnerable states.

Today, impressive shifts in dynamics and structure of global adaptation aid are noted, and they signal at significant innovations in the international climate aid regime. In 2024, the multilateral climate finance deal was sealed via setting a *tripled finance* goal to protect livelihoods, infrastructure and lives against climate disasters in the vulnerable least developed countries and small island states. The new climate finance goal was adopted to mobilize USD 300 billion per year by 2035 for the developing countries: it envisages the 3-fold increase in annual international climate funding to be secured by the developed states, and it replaces the previous annual target of USD 100 billion. Its mechanisms were fixed in 2024 during the climate conference of the parties (COP-29), Baku by the so called *New Collective Quantified Goal* (NCQG) [6], which also suggests a broader global perspective to enable USD 1.3 trillion annually in climate finance for developing countries during the same period.

As a part of the new North-South climate finance deal it envisages more ambitious and comprehensive format, which reflects the growing needs of the developing countries to realize their climate action. In order to meet them, it intends to encompass contributions from a broader range of actors, including the combination of public and private finance, and involve a wider variety of sources worldwide. To a high extent, it is the result of international climate diplomacy and negotiations to coordinate the conflicting interests of the parties: till the last moment at COP-29 the final quantitative goal remained un-fixed, and it reflected significant variation in positions of donors, recipients and alliances of the states. Importantly, this process was accompanied by the strong bargaining and pressures from the developing countries. The climate finance deal with its NCQG could be regarded as a marker of the new role of the global South and its climate diplomacy in formation of multilateral climate aid framework. It also envisages important tools for implementation of the Paris agreement with its provisions towards enhancing climate resilience and adaptation capacity through climate aid; realization of the new finance deal is associated with stronger national climate plans, formulated in Nationally Determined Contributions, NDCs of the parties, to become due from 2025.

## II. Approaches to adaptation aid: Recent shifts

Currently, the dynamic global discourse is reflecting a variety of approaches to the role of international climate finance, which is commonly perceived as North-South international aid, particularly to climate vulnerable and least developed countries. Usually it targets the long-term development of their domestic systems both in climate mitigation and adaptation, rather than short-term emergency humanitarian relief. Our discussion focuses on peculiarities of adaptation aid, as one of the types of broader international development support (recently more often termed as ‘development cooperation’), and measured by governmental ODA. It could be either bilateral

given by one country to another, or multilateral and channeled by donors through international organizations and development banks. Climate aid usually comes from the developed countries listed in the UNFCCC Annex II. However, since recently some of the rapidly emerging economies from the non-Annex I group, like for example, China, UAE, India have been also increasing their contributions to international climate flows to vulnerable developing states. It becomes one of the new features in the structure of international climate development cooperation.

Today, a variety of conceptual approaches to typology of international adaptation aid are in place, including, for example: (1) global development cooperation, which includes a variety of actors, linkages and bonds between donor-recipient states, activity types, coordination between governmental, profit-making and humanitarian actions, sources, investment flows; it is relatively new approach usually rooted in polycentric concepts; (2) climate ODA provided by the donor governments primarily to least developed climate vulnerable countries, and aimed at building their climate governance systems and implementation of international norms; (3) international aid associated with disaster emergencies, humanitarian relief, and voluntary funding; it could indirectly relate to climate infrastructure, but cover broader socio-economic challenges. We share the polycentric approach in adaptation governance which presupposes new trends in the structure, diversity of participants and interacting networks, multiple sources, cross-level interaction and coordination, and consolidation of regional development cooperation [7]. Among the novel illustrations, for example, is the recently broadened framework of climate development assistance to include not only public aid as it has been earlier envisioned by the UNFCCC regime, but also climate investment flows - with clear signals for possible climate investors from the COP-29; possible option of climate South-South aid is another innovation.

New approaches to typology of adaptation development assistance have direct links to introducing the new 'climate specifics' into the general system of international development cooperation. It is important not only for advances in theoretical discourse, but for practice as well – enhancing the effectiveness of international climate regime, removing gaps in its implementation and national compliance with its norms by the member states. Besides, the global climate diplomacy and recently dynamic negotiations are covering inter alia the coordination of conflicting positions and interests within the North-South dialogue, including the design of international climate development cooperation, forms and terms of financial flows to the recipients, their access to funding, eligibility criteria, links between adaptation and emergency relief. Our research results presented above indicate that new frameworks for international development cooperation clearly demonstrate the climate specifics, including a combination of such innovations as increase in the level of annual international adaptation funding, collectively set quantified goals, package of finance, technology, capacity building aid, assistance for designing domestic adaptation plans, new instruments for fast-track access to aid and others.

Refinement of climate aid architecture involves the system of norms, regulations and their application in practice. During the last three decades of climate negotiations the significant deviations in approaches of donors and recipients of climate aid had been registered. They are based on differences not only in their interests and perceptions, but also in positions within groups and alliances of states. For example, during the COP-29 a number of concerns were expressed by the developing countries and their groups about the major principles and design of adaptation aid within the new multilateral climate strategy with its NCQG. Bangladesh and the group of Small Islands Developing States (SIDS)<sup>2</sup> was insisting on incorporating the guaranteed minimum allocation floor for this group, while the Less Developed Countries (LDC) called for the NCQG to include a special annual allocation to them of USD 200 billion. The latter also rejected the investment goal as they intended to secure guaranteed funding for their budgets and instruments of local control versus private interests, because they consider that private standards cannot contribute to high integrity of adaptation finance flows. Similar suggestion was introduced by the

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<sup>2</sup> SIDS – group of 39 UN member states and territories in the Caribbean, Pacific, Atlantic, Indian oceans and the South China Sea regions characterized by similar socio-economic and climate vulnerabilities.

St Vincent and the Grenadines, who opposed the investment component of the NCQG, underlying that 'relying on private sector to pick up the bill will not do'. Some others introduced quite exaggerated requests. The Marshall Islands noted that specific national allocation targets need to be fixed, as for example, for its national adaptation plan with domestic needs estimated at USD 35 billion; they also accused parties of 'playing with peoples' lives'. Tuvalu urged for recognizing within the collective goal the special circumstances of LDCs a SIDS. At the same time China called for all decisions to reflect common but differentiated responsibilities: it highlighted that the category of voluntary support provided by the developing countries is different from developed countries' responsibilities under the international climate regime, and it should not be considered as a component of the NCQG. Israel stressed that while broadening the donor base, there is no need in renegotiating the obligation of responsibility of the developed countries; Sierra Leone characterized the NCQG as the payment of the '*climate debt*' developed countries owe to the developing. The issue of common, but differentiated responsibility often emerges in international climate negotiations.

The problem of North-South climate *responsibility, compensation and justice* with related issues of loss and damage reduction still remains unresolved, and it might add certain controversies into the donor-recipient climate diplomacy regarding implementation of the global climate finance deal. Until recently it has been among the core impediments in international dialogue and bargaining between two groups of states. Still, this item remains on the agenda of climate adaptation and development assistance: developing countries would like to keep it for later use as a strong argument in climate negotiations, and also as a possible tool of control over realization of the international finance deal in practice. Some experts underline that selection of particular international funding instruments has direct links to this issue: they suggest that multilateral loss and damage coverage could not be qualified as international development aid, but should be regarded as climate responsibility of the global North, and thus it should be provided as grants, but not as non-concessional funding, loans and finance return-focused instruments, favored particularly by the EU.

### III. Adaptation aid: Structure and instruments

Recent shifts in design and structure of climate adaptation aid reflect the specifics of climate development cooperation. To a high extent they are driven by results of the emerging South-North international climate deal, which is accompanied by donor-recipient coordination of preferences in selection of aid instruments. *First*, international adaptation development finance may be now secured from a variety of public and private sources, and by multilateral and bilateral donors. But, the resulting problem is that aid instruments could have very different profiles and impacts at the sub-national level in the recipients, and particularly - on most climate vulnerable groups of society. *Second*, since recently not only the donors from industrialized states could be sources of international adaptation aid. Some non-Annex I developing countries with the relevant capacities are encouraged to voluntarily contribute to climate development aid. *Third*, a variety of aid instruments are tested to promote fast-track and easier access to adaptation funding. A number of incentives and normative options are discussed, including, for example, the reduction of constraints for direct access to funding, application of co-financing, non-debt-inducing instruments, increased concessional finance, especially in case of vulnerable LDC and SIDS with limited domestic capacity.

Today, there are several types of adaptation finance instruments available to less developed countries. Among the major of them - multilateral/bilateral public grants, concessional sovereign loans, debt coverage, concessional and non-concessional blended bonds flowing from multilateral and bilateral public sources, climate finance from international institutions. Such structure defines not only the dynamics of climate aid flows, but also a diversity of parties' positions in South-North climate negotiations. In the core of the discourse is "*who ultimately pays for*

*adaptation, and who benefits from it*” as it is formulated by the UNEP [1]. Indeed the major conditions that accompany each type of finance instrument are associated with the level of its concessionality, and resulting benefit/burden for the society and citizens of a beneficiary, as well as with the funding burden and preferences of a donor. Selection of a particular instrument is always in the focus of international climate negotiations and bargaining.

*Adaptation grant* project is usually favored by a beneficiary of adaptation aid, because it allows generating maximum public benefits for the society and citizens in a recipient, and does not presume the financial return. On the contrary, the aid flows from international finance institutions, or financial markets in the form of non-concessional loans/bonds envisage full repayment by the beneficiary, and needs to be generated through accumulated domestic revenues, charges, taxes. As a result, simple grant model, where the international funder bears all costs of adaptation, and the most vulnerable communities in the LDC receive all the benefits, is the most appealing for recipient. But, its approval is inevitably accompanied by debates and controversies. Grants public finance accounts for about two thirds of the total concessionary public funding. They are considered as useful financial instrument for adaptation actions where it is hard to generate a financial return. Usually they are small and short termed, but might not be highly sufficient in creating, for instance, the disaster proof infrastructure and stable institutional settings. Often they are destined to adaptation capacity-building, development of competences, piloting adaptation innovations and institutions, where there are significant non-financial benefits [8].

In contrast, *loans* and other *debt* instruments could support larger investments, for example, by embedding adaptation and resilience into general development schemes. Currently, a large portion of international climate finance for adaptation in developing countries, especially in the Sub-Saharan Africa and Oceania, has been grant based, sourced from the OECD public funds, indicating that financing via loans is considered either too risky by commercial investors, or it has been hard to demonstrate sufficient return on investment. Concessionary finance at lower interest rates in contrast to commercial markets might benefit to domestic adaptation, but unless revenues are generated it would result in growing government borrowing, or require additional taxation or charges; the burden of repayment is still on the recipient. As a result, besides grants, the aid finance instruments could contribute to increase in adaptation finance, promote resilience and reduce loss and damage, but the impacted groups of the population finally bear the adaptation costs.

Selection of particular aid instruments was reflected in the debates during the COP-29. Varieties in positions of donors and recipients, and also among the beneficiaries of adaptation aid were demonstrated. For example, India along with its pledge for general up-scaling the global climate finance has requested to re-structure the aid format with the emphasis on grants and concessional instruments; it insisted that at least half of the allocated international finance under the NCQG should be mobilized in a form of grants and equivalent resources. Senegal and Nepal outlined the importance of grant-based finance for adaptation, and particularly when dealing with the loss and damage issues. Columbia pointed at the importance of leveraging the efforts in the international community beyond the UNFCCC, and to aim at debt cancellation. Negotiation positions of LDCs suggest that domestic finance should be excluded from the NCQG finance (Palau), and multilateral climate funding should not depend on available domestic resources (Mexico).

#### IV. Institutions to address loss and damage

In 2023 the multilateral *Fund for Responding to Loss and Damage* was established under the UNFCCC: it represents an interesting case for featuring the peculiarities of adaptation aid. Its aim is to channel international aid to protect lives, settlements and infrastructure in climate vulnerable least developed countries affected by disasters and to consolidate their adaptation capacity. Primary mission – mobilization of funding to support actions for climate hazards loss and damage

reduction, and regulating easier and faster access of the recipients to external resources. In order to consolidate its specific commitment to fast-track support and to avoiding complicated bureaucratic procedures, it plans to refine operational modalities for recipients' access. The Fund is an institutional innovation, introduced as a result of three decades of dynamic North-South climate negotiations. Mobilization of multilateral funding to particularly cover the growing costs of loss and damage from emergencies is critical for its success. It is governed by the Board which is hosted in Philippines, and it balances the membership from the developed and developing states<sup>3</sup> [9]. It is at the final stage of its operationalisation, and it is supposed to start pilot financing for climate adaptation projects in 2025.

At the beginning of 2025 a total of USD 741 million has been pledged by its 27 potential contributors. The European countries are leading among them: the main donors are France (104 million), Italy (104 million) Germany (96 million); the UAE (100 million) is the key contributor from Asia. Announced pledges of its other donors from Annex II, UNFCCC list are comparatively lower (in millions: the UK 49, the EU 26, Norway 25, the USA 18, Canada 11, Japan 10). Today, the contributions assembled by the FRLD account for about a half of the total pledged amount - USD 353 million. According to its procedures the donors' involvement is based on their voluntary commitments. The major question remains open to what extent the new Fund would be effective to provide sufficient support for actions to address loss and damage, and at least partially cover its beneficiaries' needs in consolidating their resilience against hazards. This question arises because according to recent assessments its transfers might be a dozen times lower than costs of constantly progressing loss and damage to livelihoods and infrastructure of its potential clients.

A number of important issues relating to FRLD success in climate adaptation and disaster risk reduction still remain open as there are certain impediments for its functionality. Uncertainties remain in methods and metrics for loss and damage evaluation attributed to climate change; the monetary value of loss and damage to settlements and infrastructure as a result of disasters. Existing loopholes in evaluation methods might be used by potential donors as an excuse for certain delays in realization of their financial commitments. Besides, despite the announced close start of pilot projects, the norms on enhanced access to funding via the fast-track and simplified modalities in case of emergencies remain not thoroughly clarified; the procedures for transfer of smaller grants to communities with destroyed infrastructure are still under discussion. The same relates to the eligibility criteria, i.e. who could be the main beneficiary of multilateral funding. These important operational details and the roadmap for practical action are still not finalized. The annual FRLD report, 2024 updates on administrative and structural procedures, but its operationalisation, programming and the eligibility criteria which could be considered as the key for its practical action, are limited in detail.

Despite these concerns, the FRLD creation could be regarded as a milestone in formation of the global climate adaptation institutional network representing the expanding assemblage of multilateral financial institutions to aggregate climate finance. Potentially it might turn into one of the key actors in international aid coordination, with its special focus on climate adaptation practice. For example, as a start, in 2025 the FRLD and the international Adaptation Fund<sup>4</sup> agreed on the Framework of collaboration to assist climate vulnerable countries to address the most pressing issues. It is based on collaboration and complementarity of two funds aiming at fostering the innovation, refining collective expertise and knowledge to address climate adaptation of communities and their infrastructures. Such joint mission illustrates the new trend towards building international constellations and coordination networks for climate adaptation.

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<sup>3</sup> Among 26 members of FRLD, 12 represent the developed and 14 the developing states: 3 from the Asia-Pacific, 3 - Africa, 3 - L. America and the Caribbean, 2 - small islands developing states, 2 - least developed countries, 1- developing countries non-members of the regional groups.

<sup>4</sup> International Adaptation Fund established in 2010 mobilized adaptation grants of USD 1.25 billion; 183 adaptation projects are under implementation

## V. Finance and technical assistance packaged together

Finance and technology transfers are the key cornerstones in international climate development aid. Our research shows that international development *finance* for climate adaptation packaged with transfer of *technology* and *competences* to support domestic capacity building and resilience of infrastructure is a promising tool. Application of adaptation development finance instrument as such, although being appealing and widely promoted by the global South, is not able alone to successfully solve the complexity of existing international and domestic adaptation problems in recipients. Technology transfer is an integral element of climate aid.

Today, there is broadening evidence about the diversity of international technology-oriented actions for domestic capacity building and disaster-proofing of infrastructure, including transfer of equipment and technical appliances, know-how and data to stakeholders and institutions. It is supplemented by the recently increasing international adaptation funding. In 2018-2022 the climate adaptation development finance for *technology transfer* showed more than a double increase - from USD 5.7 billion to USD 12.7 billion, and its share in total climate-related development finance for technology grew from 26 percent in 2018 up to 35 percent in 2022 [1].

Below, we discuss *three* major aspects of international transfer of climate adaptation technologies - its implications for domestic, international and implementation frameworks.

*First*, despite high interest of the developing countries in promoting the international climate finance aid, the recent messages from their national climate adaptation strategies indicate at certain shifts in approaches, with increased preferences towards its combination with technical transfers. In 2024, the national climate reports from 56 developing countries put emphasis on technical development cooperation: about 43 per cent of their national plans cover different aspects of adaptation technologies and competences transfer. There is a wide variety of context-dependent technology priorities across regions and countries, and recent assessments show that according to aggregated data from developing countries during 2011-2023, the majority, i.e. about 88% of their adaptation technology needs are in three main sectors - water, agriculture and coastal zone management. These sectors are highly sensitive to climate risks and technologies for enhancing safety of local infrastructure and livelihoods are usually of a priority. They include, for example, construction of coastal storm surge barriers, dams, canals and installations for protection from sea level rise and flooding, water storage facilities, water harvesting technologies, etc.

Global funding portfolio under the UNFCCC, i.e. mobilized through the Adaptation Fund, Green Climate Fund, Global Environmental Facility, presents forty two adaptation technology-oriented projects realized during 2016-2023 with climate finance mobilized accounting for about USD 443 million. But it is more than ten-fold lower than domestic adaptation needs of the developing countries. There is also certain imbalance in international supply of technology aid across sectors, and it doesn't cover the risk-sensitive areas leaving safety of livelihoods and infrastructure under threat. Currently, its major focus is on agricultural sector which is getting support of about twice higher than aid to transport/storage and to water supply and sanitation, which are respectively ranking 2<sup>nd</sup> and 3<sup>rd</sup> in development finance for adaptation technology transfers.

*Second*, besides support for domestic adaptation the technical aid becomes an essential tool for strengthening compliance with the international norms and implementation of the UNFCCC regime by vulnerable developing countries. Particularly, it relates to meeting the standard international requirements for national reporting, formats for domestic compilation of adaptation data, establishing technology and information networks. Art. 10 of the Paris Agreement deals with the technology transfers, and it specifies norms for technology development cooperation. In 2023 the Technology Implementation Program was introduced to support formulation of adaptation technology preferences and to identify the major needs of climate vulnerable countries: they are invited to regularly report about their adaptation technology priorities, and its format is specified in detail.

Another urgent strand of technology development cooperation - consolidation of the global climate data networks, early warnings systems and disaster forecasting. Participation of climate vulnerable regions in international information supply and exchange is increasingly essential. Today, the global infrastructure for climate services and early warning systems is characterized by serious loopholes: only about one-third of the world is accountable for compatible climate data coverage. Regular collection and flows from the major areas of the global South to support the worldwide mapping, monitoring and services coverage remains insufficient. Their input into the Big Data centers becomes critical to synchronize systems of disaster early warnings and ensure better quality of emergency alerts to locales worldwide. Transfer of technology and competences, application of digital tools, performance of innovative education projects in the developing countries is a prerequisite for effective global climate infrastructure and services, and it is among the core segments in adaptation development cooperation.

*Third*, certain problems in domestic implementation of technology-oriented adaptation projects in recipients could occur; although in many cases the *planning* versus *implementation* issues within the adaptation cycle are also typical for the global North. The majority of the recently reported climate strategies from the National Adaptation Plans of the developing countries present a variety of targets aimed at enhancing climate resilience. National climate programs mostly focus on strategies and on climate risk assessment, without proportional attention paid to concrete implementation actions in disaster risk reduction. In many cases the adaptation plans are used as a kind of 'window-dressing' to substitute, or postpone the implementation under climate uncertainty. Major deviations in strategic adaptation planning versus implementation could result in further adaptation gaps. We believe that both phases should be closely intertwined, their major milestones packaged together, coherently realized and regularly verified in order to ensure effective performance within the integral adaptation chain. Among new directions of international coordination – development of indicators, methods and metrics to measure and compare the climate resilience across states, effectiveness in implementation of adaptation action and input of multilateral development aid. Today, standard formats for adaptation capacity data reporting by states are discussed, as well as indices for enabling factors and means for implementation depending on the local contexts for adaptation.

Among specific implementation quests - domestic performance of technology oriented adaptation projects in the beneficiaries after technical competences are transferred. Lack of technical expertise, services, infrastructure and information are typical factors hindering implementation of transferred technologies; ineffective domestic legal, regulatory and planning frameworks are also a constraint. According to rankings selected by the developing countries the economic and financial factors are regarded as the major barrier for success in application of adaptation technologies. Conditional aid is also among possible implementation concerns of recipients: sometimes donors tie technology transfers with conditions to purchase certain goods and services from the donor (that might be more expensive than locally), and it results in increase of project costs; another clause might relate to creating favorable conditions for investments from the donor country. Recipients also note that negative side-effects of ODA might include the corruption and short-term programs that are not sufficient for functioning of stable domestic adaptation systems.

#### **CONFLICT OF INTEREST**

Author declare that they do not have any conflict of interest.

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