



Does funds-based adaptation finance reach the most vulnerable countries?

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ABSTRACT

The evolving architecture of global climate change adaptation finance is shifting towards fund mechanisms with competitive application and allocation principles. At the same time, prioritization of the most vulnerable countries is a key goal within this emerging architecture. The paper analyses whether the Green Climate Fund (GCF), by far the largest climate change fund, has so far delivered on its promise to prioritize the most vulnerable countries. For our analysis, we consider the USD 2.5 billion GCF funding allocated until the end of the first mobilization phase and disaggregate it project-by-project into its mitigation and adaptation related amounts. We then analyze the adaptation flows in terms of the recipient country's level of vulnerability and institutional capacity. We further analyze whether funds are being accessed through independent national entities or international intermediaries and whether recipient countries have developing country priority status. The results show that funds-based adaptation finance creates an ambiguous picture: On the one hand, the GCF is on track in allocating its funds largely to country groups which its statutes aim to prioritize, particularly LDCs, African countries and SIDS. At the same time, the proposal process results in the fact that many countries with the highest climate vulnerability but weak government institutions and fragile state-bureaucracies have missed out and not been able to access project funding, mostly LDCs in Africa and conflict-ridden countries. Further, most countries have not yet been able to access project funds independently through their national entities, limiting direct access and country ownership – the strengthening of which is a major goal of the fund. The findings suggest that simplified approval tracks need to be strengthened in the emerging climate finance architecture so that populations in countries with the lowest institutional capacity but highest vulnerability are not being left behind in the long-run.

1. Introduction

Global mechanisms for financing climate change adaptation are of increasing importance (IPCC, 2018). They aim to support resource poor and highly vulnerable countries following the principle of common but differentiated responsibility within the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement (UNFCCC, 2015). Respective redistribution mechanisms from richer to poorer countries now constitute a cornerstone of the architecture of international adaptation finance (Brown et al., 2013). In the logic and legal terminology of the Paris Agreement, it is the “developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change and have significant capacity constraints” which qualify for such support and should be prioritized (UNFCCC, 2015 Article 9, Paragraph 4).

At the same time, an important trend in finance mechanisms is underway and increasingly foreseen for the future: Funds-based

mechanisms for distributing climate change adaptation finance globally have been on the rise (OECD, 2019) and they are expected to contribute a major part of annual USD 100 billion climate finance goal under the Paris Agreement (OECD, 2016; Scoville-Simonds, 2016; Yeo, 2019b). A principle logic of the fund mechanism is that vulnerable countries can apply for funding, thereby strengthening ownership of climate finances (Brown et al., 2013). Countries therefore compete for funding, following the assumption that countries most in need and with the best concept for adaptation will succeed (GCF, 2013). The assessment criteria for this selection process are still under development for some funds, with a mixture of effectiveness, efficiency, justice and sustainability being considered (Amerasinghe, 2017; Fankhauser and Burton, 2011; Persson and Remling, 2014; Adaptation Fund, 2017; GCF, 2020c; Stadelmann, et al., 2011).

Yet, the rise of competitive fund-based mechanisms also brings about a set of considerable requirements for applying countries and their administrations (Brown et al., 2013; Masullo et al., 2015; World Risk

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Report, 2015; Lo, 2016; Velasquez, 2018; Mattar et al., 2019; Tanner et al., 2019). These span conceptual, methodological, technical, financial and language aspects of proposal-writing as well as project management and implementation (Klein and Möhner, 2011; OECD, 2015; Amerasinghe et al., 2017). But given that vulnerability is often driven by fundamental development deficits, many of the most vulnerable countries are also those being the least ready to attract, administer and use climate finance since they are often suffering from poor governance, weak institutions and a lack of financial and human capacities in their administrations (World Risk Report, 2016; Pelling and Garschagen, 2019; UNDP 2015).

The question therefore is whether funds-based global climate adaptation finance has been flowing to those developing country Parties with the highest vulnerability – or to those with the strongest institutional capacity? Related to that question, the paper also asks whether countries have been able to access funding directly or whether they have to rely on institutional support of doing so.

In order to answer these questions, our analysis concentrates on adaptation-related funding by the Green Climate Fund (GCF), by far the biggest fund within the emerging landscape of climate change funds (see Section 2 and Table 1 for a comparative overview over the main funds, their characteristics and volumes). We choose the GCF for three main reasons. First, the GCF has been conceived as a major incubator of rising international climate finance ambitions under the Paris Agreement and one of the main vehicles for the collection and distributions of such finance (UNFCCC, 2009; Yeo, 2019a). Second, it is timely to take stock and analyze whether the fund has so far been successful in achieving its goal to prioritize particularly vulnerable countries. This is because it has completed the first round of funding mobilization worth USD 7.2 billion of which 5.4 billion have already been allocated, and it is in the process of organizing its replenishment (Table 1), (Yeo, 2019a). Third, a focus on the Green Climate Fund's distributional performance will also become ever more important as the pipeline of project proposals, currently worth USD 16 billion (Antonich, 2019; Parthasarathy, 2019; GCF, 2020d), increasingly outpaces the replenishment pledges. The latter currently stand at USD 9.8 billion and are hence even slightly lower than in the fund's first round of original pledges (USD 10.3 billion) (GCF, 2020e) at times when it had received way less applications for projects. Therefore, while to date almost all of the projects proposed to the GCF could also be funded, this might no longer be the case in the future, meaning that the competition for available funding will rise and

prioritization will become more necessary.

Despite an increasing academic interest on the changing climate finance architecture and the GCF in particular, this study goes beyond previous analyses and contributes to the literature in two key ways. First, this is the first study that tracks, on a global level, all adaptation-related funding of the GCF during the first mobilization phase before the replenishment started to take off, i.e. 2015–2019. Second, whilst previous work on the GCF's adaptation funding has highlighted the importance of vulnerability within its normative and legal framework (Klein and Möhner, 2011; Brown et al., 2013; Yeo, 2019a), no study has in fact evaluated in a quantitative and globally comprehensive manner whether so far the GCF's target to prioritize the most vulnerable countries has been met and what role institutional capacity constraints play for hindering access to GCF adaptation finance.

The paper is structured in five parts: Section 2 reviews and discusses the state of the international finance landscape and the current knowledge in terms of tracking adaptation finance to the most vulnerable countries. Section 3 explains the data and methods used for the analysis. Section 4 presents the results. Section 5 discusses our main findings and highlights key challenges for the GCF to address in its next allocation phase. Section 6 draws key conclusions and discusses ways forward to arrive at more penetration of global adaptation finance into the countries of highest vulnerability and lowest institutional capacity.

2. State of the art in tracking adaptation finance to the most vulnerable countries

2.1. The climate finance landscape

International climate adaptation finance can be divided into three streams: bilateral, multilateral and funds. Bilateral flows continue to make for the largest share of international adaptation finance, with over USD 17 billion distributed in 2018 (OECD, no date). Multilateral non-fund climate finance sources mainly include Multilateral Development Banks (MDBs). In 2018, MDBs committed USD 11.4 billion to adaptation (OECD, no date). Multilateral climate funds have been a quickly growing source of international adaptation finance. There are four major funds connected to the institutional framework of the UNFCCC, including the Least Developed Countries Fund (LDCF), Special Climate Change Fund (SCCF), Adaptation Fund (AF) and Green Climate Fund (GCF) (see Table 1 for an overview of their main characteristics). Funds outside of

Table 1

Comparative overview of main adaptation-related climate change funds and their characteristics Sources: own draft based on data until the end of 2019 (Adaptation Fund, no date; GCF, no date; Data Dashboard – Climate Funds Update, no date; GEF, 2016).

FUND	LEAST DEVELOPED COUNTRIES FUND (LDCF)	SPECIAL CLIMATE CHANGE FUND (SCCF)	ADAPTATION FUND (AF)	GREEN CLIMATE FUND (GCF)
YEAR ESTABLISHED/ OPERATIONALIZED	2001/2002	2001/2004	2001/2008	2010/2015
OBJECTIVE	Adaptation only	Adaptation and technology transfer	Adaptation only	Adaptation and mitigation, with a target 50–50-split in allocation
OVERALL FUNDING	USD 1.3 billion, of which USD 1.2 billion have been allocated	USD 366 million, of which USD 285 million have been allocated	USD 755 million, of which over USD 720 million have been allocated	USD 7.2 billion mobilized (2015–2019), of which 5.6 billion have been allocated
CURRENT STATUS/ HORIZON	Both funds are part of the Global Environment Facility's (GEF) 2018–2022 Programming Strategy on adaptation to climate change			First replenishment phase mobilized USD 9.8 billion for the term 2020–2023
ELIGIBLE COUNTRIES	Least Developed Country (LDC) Parties to UNFCCC and countries which have completed their National Adaptation Programmes of Action (NAPAs)	Non-Annex I Parties to the UNFCCC, prioritizing most vulnerable countries in Africa, Asia, and Small Island Developing States (SIDS)	Developing country Parties to the Kyoto Protocol, prioritizing those which are particularly vulnerable to climate change	All developing country Parties to the UNFCCC which are Party to the Paris Agreement, prioritizing LDCs, SIDS and African states
ACCESS MODALITY	Through an Implementing Agency of the Global Environment Facility (GEF)	Through an Implementing Agency of the Global Environment Facility (GEF)	Multilateral, Regional and National	Multilateral, Regional and National
GOVERNANCE	GEF	GEF	AF Board	GCF Board
TRUSTEE	World Bank	World Bank	World Bank	World Bank

the UNFCCC include the Climate Investment Funds (CIFs) comprising of the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF) (Amerasinghe et al., 2017). The CIFs include a “sunset clause” which calls for the funds to close down once a new climate finance architecture, mostly around the Green Climate Fund, is effective. As they fall outside the UNFCCC governance framework, they are supposed “not to prejudice the on-going UNFCCC deliberations regarding the future of the climate change regime, including its financial architecture” (SCF, 2011).

2.2. Challenges in assessing the “most vulnerable” countries

The discussion on the need to prioritize international adaptation finance to the most vulnerable countries is not new and has been emphasized in both scientific and political spheres – with the most recent and prominent commitment being made in the Paris Agreement. However, both scientists and policymakers face two challenges in operationalizing and implementing this objective. Scientists are confronted by the ontological and conceptual difficulty of defining vulnerability and measuring it in an objective manner (Bohle, 2001; Turner et al., 2003; IPCC, 2007; Fussler, 2010; Hinkel, 2011; Birkmann et al., 2013). This has implications on policy, since without an agreed definition, decision-makers struggle to prioritize the “particularly vulnerable” countries. A comparison of vulnerability metrics at the global level shows that different indices do not always produce a coherent picture and results depend on the indicators and weighting methods used (Garschagen et al., 2021). However, the same analysis also shows that the most widely used vulnerability indices in fact do show a significant agreement in their results, particularly at the end of their spectrum, i.e. for identifying high vulnerability countries (ibid.). Such information is likely to become increasingly relevant for climate policy. In many contexts such as the GCF regulations, certain groups of countries have been highlighted for prioritization i.e. LDCs, SIDS and African countries (see Section 2.4). However, there is no further specification on how countries within such groups should be ranked to identify the “most vulnerable”, despite the fact that such a ranking could have significant financial implications related to funding prioritization in line with the principles of the GCF (Klein and Möhner, 2011). In conclusion, there is still a wide gap between the political ambition to identify and prioritize the “most vulnerable” countries and the epistemological and methodological challenges to do so.

2.3. Challenges in assessing readiness and institutional capacity

Finding indicators and data to measure institutional capacity in general and the quality and effectiveness of government action in particular has been a long-standing interest in various fields of research and development work. For the context of this study, institutional capacity has been discussed as one of the core factors shaping climate finance readiness (Samuwai and Hills, 2018), meaning the readiness to “plan for, access, deliver, and monitor climate finance”, notably at the national level (UNDP, 2015). Further, detailed studies on the factors that enable or constrain countries to attract international adaptation finance have repeatedly found that strong institutional capacity – and not least the donor perception of whether or not the capacity in a certain country is strong – plays a significant, often dominant, role in explaining whether and how much international climate finance a country is able to attract, next to other factors such as the perceived commitment to climate change issues or the alignment of political agendas between donors and recipients of funding (e.g. Doku et al., 2021; Mori et al. 2019; Doshi and Garschagen, 2020). The link between institutional capacity and the readiness to attract and use globally available climate finance is therefore also important for this study. In the absence of comprehensive data for institutional capacity, we focus on government effectiveness for which comprehensive data is available (see 3.4). Here, we draw on the World Bank’s understanding that it includes the “quality of public services, the quality of the civil service and the degree of its independence

from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies” (World Bank, n.d.a).

2.4. Previous work aiming to track adaptation finance

A limited number of studies have in the past aimed at tracking international adaptation finance and analyzing whether and to which extent bi- and multilateral as well as funds-based adaptation finance has been prioritized according to the vulnerability of recipient countries (Christiansen, Martinez and Naswa, 2018; Yeo, 2019b). Studies specifically on bilateral adaptation finance found that donors do take vulnerability into account when allocating adaptation finance (Klöck, 2015; Betzold and Weiler, 2017; Weiler et al., 2018). However, looking at the variables used to operationalize vulnerability, physical vulnerability or exposure seems to play a stronger role than determinants of socio-economic vulnerability (Turner et al., 2003; IPCC, 2007; Barrett, 2015; Betzold and Weiler, 2017; Robinson and Dornan, 2017; Weiler, Klöck and Dornan, 2018; Saunders, 2019). At the same time, studies highlight the multiple challenges in relation to methods and data. These do not only address the difficulties in operationalizing vulnerability (see above section) but also the fact that adaptation finance data according to the OECD Rio Adaptation Marker – in principle the most comprehensive database on international adaptation finance globally – is oftentimes not reliable and consistent due to the fact that many donors tend to over-code and report committed rather than dispersed amounts (Michaelowa and Michaelowa, 2011; Junghans and Harmeling, 2012; Nakhoda, 2013; Roberts and Weikmans, 2017; Weikmans et al., 2017). A more detailed account on bilateral adaptation finance tracking – which is beyond the focus of this paper – is provided in Doshi and Garschagen (2020).

Previous literature on tracking multilateral and funds-based adaptation finance to the most vulnerable countries is rather limited, marking a relatively new field compared to the bilateral stream. Analysis on the Adaptation Fund (AF), for example, shows that rather than vulnerability other factors are stronger in explaining the allocation of the fund’s resources. Persson and Remling (2014) suggest that the AF tends to adopt an equality approach by applying an equal fund ceiling of USD 10 million on all eligible countries. Stadelmann et al., (2014) also confirm the weak role of vulnerability in the AF’s allocation and argue that the absolute economic savings of the project appeared to play a stronger role. This pattern has also been further confirmed and tested by Saunders (2019), who collectively analyses several multilateral climate adaptation sources including MDBs and funds within the time frame 2013–2015 (excluding the GCF). Hence, no study in our knowledge has tracked the flow of GCF’s adaptation funding to the most vulnerable countries.

2.5. The Green Climate Fund

Table 1 clearly shows that the GCF is by far the largest climate change fund in terms of overall funding. It also has the clearest and strongest future growth perspective. While the future of the other funds is currently unclear beyond 2022, the GCF has completed its first mobilization phase and is currently undergoing replenishment. It has the perspective to become the major multilateral fund within the emerging climate finance architecture towards the goals of the Paris Agreement. According to its mandate, the GCF aims to prioritize adaptation funding with a “floor of fifty percent of the adaptation allocation for particularly vulnerable countries, including least developed countries (LDCs), small island developing States (SIDS) and African States” (GCF, 2020c, p. 39).

The GCF includes two types of funding: Readiness support and project funding. The Readiness Support Programme is aimed at providing support to improve the “readiness” of countries to successfully attract, administer and use climate change adaptation finance. According to the Governing Instrument of the GCF it supplies “resources for

strengthening institutional capacities, governance mechanisms, and planning and programming frameworks to identify a transformational long-term climate action agenda for developing countries" (GCF, 2020f, p.2). The five core objectives of GCF's revised Readiness Programme Strategy for 2019–2021 include capacity building for climate finance coordination, strategic frameworks for low-emission investment, strengthened adaptation planning, paradigm-shifting pipeline development and knowledge sharing and learning (GCF, 2019). All developing country Parties to the UNFCCC are eligible for receiving readiness support. Eventually, readiness support aims to enhance country ownership and access to GCF (GCF, 2020f). The readiness amounts are capped at up to USD 3 million per year per country, depending on the purpose of the readiness support (GCF, 2020f).

By contrast, adaptation-related "project funding" targets activities that concretely aim to adapt to the impacts of climate change, promote sustainable development and show a potential for upscaling (GCF, 2020c). Examples include developing early warning systems, climate resilient agricultural practices or flood protection infrastructure, to name a few. Allocated sums for such concrete adaptation activities can be much higher than for readiness support and accessing project funding is the ultimate goal of eligible countries.

Allocation principles of the GCF clearly state that the board will "take into account the urgent and immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change" (GCF, 2011). Hence, vulnerability considerations are in principle an important guide within the GCF's focus on developing country Parties. Countries can access GCF funding through so-called accredited entities, i.e. "[i]nstitutions or organizations accredited to the Green Climate Fund (GCF) to carry out a range of activities, particularly developing and submitting project/programme funding proposals and overseeing the management and implementation of projects and programmes." (GCF, 2020f, p.iv). Accredited entities (AE) can be private or public, non-governmental, sub-national, national, regional or international. Examples of accredited entities include UNDP (international AE), the Secretariat of the Pacific Regional Environment Programme (SPREP, regional AE), Fiji Development Bank (national AE). Access through a nationally accredited entity, also known as "direct access" is the target modality of the GCF, aiming to enhance and directly increase country ownership of recipient countries.

2.6. Previous analysis on the GCF

Scientific literature on the GCF has been emerging and is very diverse in covering different aspects of the fund, its principles and performance. A number of studies concentrated on providing knowledge needed for supporting the design of the fund before it came into force as well as the early adjustments (Bracking, 2014; Kumar, 2015). For example, studies focused on the GCF's role in boosting innovation (van der Veen, 2012), financing options for the GCF (Silverstein, 2013; Cui and Gui, 2015) and challenges in operationalizing vulnerability (Klein and Möhner, 2011). Later studies have also highlighted other aspects of the fund, for example, the role of intermediaries (Chaudhury, 2020), country ownership (Zamarioli et al., 2020), overall governance of the fund (Bowman and Minas, 2019), role in supporting the REDD+ mechanism (Recio, 2019), proposal for a poverty-mitigation-adaptation window (Mathy and Blanchard, 2016), championing climate action (Manzanares, 2017), financing schemes (Cui and Huang, 2018), refinement of the 50:50 ratio of adaptation and mitigation (Brechtin and Espinoza, 2017), economic evaluation of the allocation of 93 GCF projects (Seo, 2019) and challenges and opportunities for the GCF in general (Chen, 2018).

Being an extremely policy relevant topic, there are a large number of sources in grey literature including policy briefs, working papers, news and blog articles, as well as official GCF documents that were referred to in the background for preparing this paper (Schalatek et al., 2015). Similar to the scientific literature, a large number of documents

highlighted considerations to be taken into account in designing different operations of the GCF (Kerkhoff et al., 2011; Sadat, 2011; Sierra, 2011), incorporating lessons learnt from other funds (Potten, 2013; Bird, 2014), gender (Ihalainen et al., 2017), access modalities (Müller and Pizer, 2014), financing options for the GCF (Grießhaber, 2012; Antimiani et al., 2014) and its role in initiating paradigm shifts (Harmeling and Grießhaber, 2013) as well as specific aspects in relation to cities (Junghans et al., 2016), gender responsiveness (Schalatek, 2015), energy efficiency (Ryan, Selmet and Aasrud, 2015), renewable energy (Michaelowa et al., 2013), REDD+ (Savedoff, 2013), allocation criteria and principles for mitigation funding (Vieweg, 2013), Nationally Appropriate Mitigation Actions (NAMAs), and accountability (Basak, 2017). Looking out to the future development of the fund, some studies have questioned the replenishment process (Waslander and Vallejos, 2018; Waslander and Amerasinghe, 2019) and the impact of the US stepping out of its pledged contribution to the GCF on its governance (Minas and Bowman, 2017).

An important emerging debate within the literature specifically to the GCF as well as to the larger competitive funds based climate finance architecture, points to the lack of readiness for climate finance in general and the lack of institutional capacity in particular, as a challenge for the most vulnerable countries to access funding (Bird, 2014; Masullo et al., 2015; Wang et al., 2018). Studies capturing experiences across Africa (Fonta et al., 2018) and South Asia on challenges faced in accessing the GCF (Tanner et al., 2019) highlight the need for strengthening and establishing national institutional capacities. The GCF's accreditation, project application and approval process have also been criticized as being lengthy and placing a strain on the resources of the most vulnerable countries. "Capacity constraints and the complex procedures involved in accessing funding are seen as affecting many developing countries' ability to compete fairly and effectively for this support" (Tanner et al., 2019, p.3). Al-Saidi (2019) suggests a lack of "technical and managerial capacities or prior knowledge" as a potential barrier for the most vulnerable countries to successfully access GCF funding (p.8). However, apart from country case studies or quite generic observations, no systematic large-scale assessment across all GCF adaptation projects has been conducted on either the vulnerability prioritization nor the barriers in terms of institutional capacity.

3. Data and methods

For our analysis, we manually generated a comprehensive data set of all GCF funding allocated thus far, comprising of project funding and readiness support. We drew on data available on the the GCF website by going through the "Projects and Programmes", "Country Profiles", project proposals and board meeting documents. We disaggregated project funding according to (a) country allocation in multi-country projects, (b) the mitigation-adaptation-split in cross-cutting combined projects and (c) the implementing entity. We considered data for project funding during the funds first mobilization phase from 2015 to 2019, hence up until the 24th Board Meeting i.e. the last meeting of the GCF until the end of 2019. As we only want to analyze adaptation funding out of the GCF at a country level, we first created a dataset with the total of all adaptation related project funding received by each of the recipient countries, comprising a total of 91 projects. Hence, no mitigation-only project funding is included in the analysis. Since the GCF data is available at a project level, we disintegrated this data to get a country-level resolution. For multi-country projects, 13 out of the 91 adaptation and adaptation-related cross-cutting projects, we assumed an equal split between each of the countries due to the lack of information in project proposal documents on how the funding is split between countries. For projects cutting across mitigation and adaptation (cross-cutting projects), the overall breakdown of mitigation vs. adaptation components is not included in many of the project documents. In those cases, we reviewed the project proposals, sorted the listed activities into mitigation (e.g. afforestation for carbon sinks) vs. adaptation measures (e.g.

climate-resilient cropping) and calculated the share of the GCF amount towards adaptation based on the cost items of described adaptation-related actions or measures. As a result of this disaggregation, our project funding database includes 84 countries that have received a total of USD 2.49 billion adaptation-related funding. This includes projects across all four sizes of GCF project funding, i.e. micro (up to USD 10 million USD), small (10–50 million), medium (50–250 million) and large projects (>250 million) (GCF, 2020c). It also includes projects under the simplified approval process for GCF volumes up to USD 10 million (10 out of the 91 projects) (GCF, 2020b) as well as the remaining projects under the general board approval. To generate data on readiness support, we created a database using data available under “Country Profiles” on the GCF website. To our knowledge, such a comprehensive data set did previously not exist publicly.

As a result, we used three categories of countries for our further analysis. First, countries which have received project funding; second, countries which have received readiness support and, third, eligible countries which have not yet received any support. The first and second category can overlap, i.e. some countries have received both readiness support and project funding (Fig. 1). To test for the role of the countries’ vulnerability vs. other factors, we calculated the finance flows (or non-flows) against each of these three categories in relation to four variables: access modality (see 3.1 for details), GCF’s own prioritization of country groups (see 3.2), mean vulnerability levels (see 3.3) and institutional capacity (see 3.4).

3.1. Access modalities

As the modality through which recipient countries accessed GCF funding also speaks of their own institutional capacity, we disaggregated and analyzed the funding flows accordingly. For project funding, the data provided clearly labelled projects as International, Regional and National. For readiness support, only the entity name was provided, which we cross-checked with the directory of accredited entities on the GCF website or the internet to decide which of the three modalities applies. As a country can access funds through different modes or for multiple projects, we categorized the countries into i) International, ii) Regional, iii) National, iv) International and Regional, v) International and National, vi) National and Regional, vii) National, Regional and International.

3.2. Grouping of priority countries

Our analysis pays particularly attention to the country groups prioritized in the GCF statutes (see 2.4). As countries can belong to two or even three of these categories at the same time, we grouped all eligible countries into eight groups, namely, i) LDCs in Africa, ii) SIDS in Africa, iii) Africa, LDC and SIDS, iv) SIDS in LDCs, v) others in Africa, vi) other LDCs, vii) other SIDS viii) other eligible countries. Out of 154 eligible countries, there are a total of i) thirty LDCs in Africa, ii) three SIDS in Africa, iii) three in Africa, LDC and SIDS, iv) five SIDS in LDCs, v) eighteen others in Africa, vi) nine other LDCs, vii) twenty-four other SIDS, and viii) sixty-two other eligible countries.

3.3. Vulnerability levels

We draw on global indices to gauge a country’s level of vulnerability towards climate hazards. While assessing a country’s vulnerability through indices is difficult (see 2.2), they are common tools to assess vulnerability levels in a globally comparative manner. We drew on the three most widely used and accepted indices with a dedicated vulnerability component: ND-GAIN (ND-GAIN et al., 2015), INFORM (INFORM, 2015) and World Risk Index (World Risk Report, 2015). These three are in principle positively correlated as they share significant overlaps in their concepts and indicators (Garschagen et al., 2021). Still they produce slightly different country rankings (ibid.). We therefore calculated the mean for every country across these three indices in order to increase the robustness of our assessment. In a first step, we normalize the vulnerability scores of the 154 eligible countries for the GCF out of the global vulnerability datasets using the Min-Max method on a scale from 0 to 1. Following this step, we calculated an average vulnerability score for each country by dividing the sum of each of the three index scores by three, when all three values were available. In the case of missing values in one or two of the indices, the available score was weighted three times or two times respectively to accommodate the missing data. For four eligible countries - Andorra, Cook Islands, Niue and San Marino - vulnerability data was available in neither of the three indices. As a final step, we ranked the average vulnerability scores and grouped them using the ‘quartile method’ of categorization. In this way we divide the countries in four groups in which each contains roughly the same number of countries resulting in four quartile groups of countries

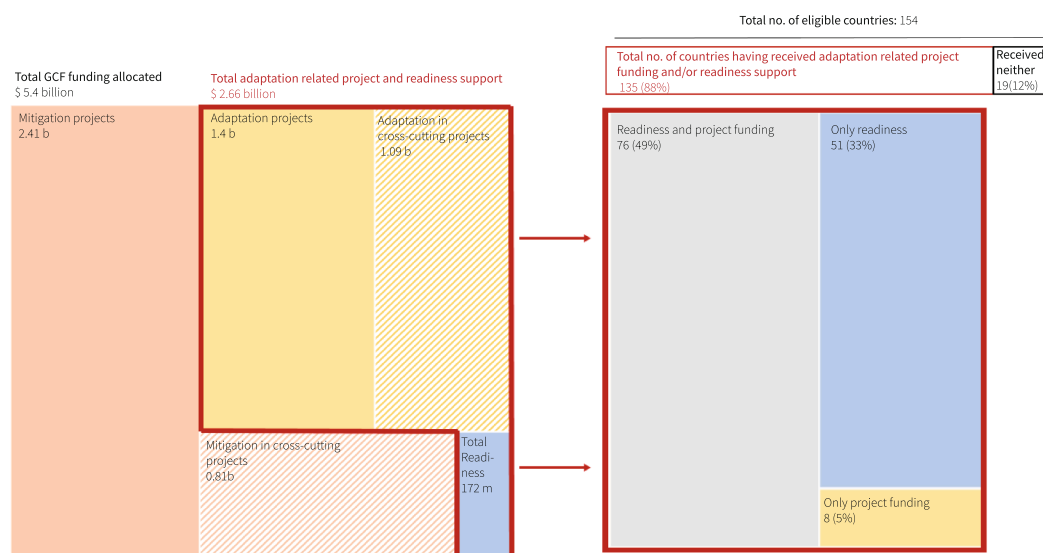


Fig. 1. Adaptation-related project funding and readiness support allocated by the Green Climate Fund (GCF) during the first mobilization phase until the end of 2019. The left side shows the funding split between project and readiness funding or a combination thereof in relation to mitigation-related project funding. The right side shows the distribution by number of countries, out of the 154 countries eligible for GCF funding. Numbers in brackets indicate percentage of the total number of eligible countries (n = 154).

classified according to their vulnerability. The size of the quartiles are 37 countries each in the first 3 quartiles, 39 in the last quartile and 4 missing.

3.4. Institutional capacity

Finally, we use globally available “Government Effectiveness” index data provided as a subset of World Governance Indicators by the World Bank (World Bank, n.d.a), as a proxy for a country’s institutional capacity to succeed in competitive funding acquisition, particularly through the direct access stream, i.e.. without the help of international or regional accredited entities. In contrast to vulnerability, as there are no eligibility criteria attached to institutional capacity for receiving funding from the GCF, we take into consideration the entire global dataset. The scores for all countries in the dataset ($n = 209$) are normalized using the Min-Max method of normalization and ranked on a scale from 0 to 1. Similar to vulnerability, using the ‘quartile method’ of categorization, countries are divided into four groups, each of which contains approximately the same number of countries, therefore resulting in four quartile groups of countries classified according to their institutional capacity from being very low to very high. The size of the quartiles are 52 countries each in the first 3 quartiles, 53 in the last quartile and 4 missing. No Government Effectiveness data was available for State of Palestine, Cook Islands, Niue and San Marino.

4. Results

Overall, 88% of the 154 countries eligible for GCF funding have received some sort of adaption or readiness related resources out of the fund (Fig. 1, right panel). One third has received only readiness support and an additional 49 percent a mixture of readiness support and project funding. This shows the significant role that readiness support has played within the overall picture of GCF funding to date. Only 5 percent of the eligible countries have immediately received project funding without first tapping into the readiness support funds (Fig. 1). This indicates that many countries are either self-selecting or being encouraged to improve their capacity to prepare high quality funding proposals and design as well as implement effective projects within the GCF’s scope. Yet, in terms of financial volumes, it is not surprising that project funds by far exceed the readiness support, i.e. by a factor of 15.

In total, the funding allocated by the GCF to adaptation-related activities is almost as large as the sum for mitigation-related activities according to our measure, i.e. USD 2.49 billion for adaptation-related project funding and USD 172 million for readiness support, out of the USD 5.4 billion allocated before the start of the current replenishment phase. The GCF’s funding allocation is therefore coming close to the aspired 50–50-split between mitigation and adaptation finance (GCF, 2011; GCF, 2013).

4.1. Modes of access for GCF funding

In terms of the modalities with which successful countries have accessed GCF project funds, it is remarkable that only 6 percent have filed their funding proposals through their own national accredited entity exclusively (Fig. 2, panel A), which mirrors the fact that most countries have not yet been able to get national entities accredited. As of February 2020, only 31 out of the 154 eligible countries had national accredited entities (GCF, 2020a). The vast majority of countries (67 percent) have therefore drawn on the support of international organizations and the remainder on regional (13 percent) or mixed mechanisms. The picture for the distributed amounts of project funds is very similar: 70 percent of the funding volume was in projects with international organizations, 14 percent with regional or combined regional and international entities and only 2 percent with nationally accredited organizations exclusively. The remaining 14 percent were handled by national organizations in combination with regional and/or

international ones. Furthermore, within the international and regional mechanisms, a few organizations play a dominant role: Almost 60 percent of project funds are channeled through only 3 international entities – UNDP, World Bank and the European Bank for Reconstruction and Development. The picture is slightly different for the readiness track, although even here, international and regional organizations constitutes the dominant access modality whilst direct access exclusively through nationally accredited organizations again plays only a minor role (Fig. 2, panel B). But partnering with national organizations is more common in the readiness track.

4.2. Success of priority country groups

In terms of the distribution between country groups and world regions, 54 percent of the project funds allocated so far went to countries that are given special priority within the GCF, i.e. LDC, SIDS and/or African countries. Hence, the distribution of funds during the first financial round met the GCF’s aim of allocating at least 50 percent of its adaptation-related funds to these countries (GCF, 2020c). The largest receivers include LDCs in Africa (18 percent of all adaptation project funds), other states in Africa (14%) and SIDS outside of LDCs or Africa (10%) (Fig. 1, panel A, left hand side). Yet, non-priority eligible countries received 45 percent of the adaptation project funding. In terms of the number of countries, the picture is similar (Fig. 1, panel A, right hand side). The allocation of readiness funds closely matches this pattern in terms of both number of countries and funding volumes (Fig. 1, panel B). Yet, SIDS make for a slightly higher proportion of countries and funding volumes.

However, the strong featuring of priority countries amongst the recipients does not mean that all countries which belong to either of these high priority categories have received GCF funds, particularly project funds. For some country groups the share is surprisingly small: for example, just over half of all LDCs in Africa so far received GCF project funding. 10 percent of countries in this group have not yet received either project nor readiness funding (Fig. 2, panel C). Countries with the highest funding ratio in terms of project funding have been SIDS in LDCs. 4 out of 5 countries in this group have already received such funds (Fig. 2, panel B). The other countries in this group have at least received readiness funds. At the same time, over half of the countries which are eligible but not amongst the priority countries have received adaptation project funds (Fig. 2, panel A, right side).

4.3. The role of vulnerability levels

If one defines climate vulnerability along demarcations of GCF priority country groups (LDCs, SIDS, African countries), the findings of the previous sections would suggest that the GCF overall is on track to deliver to its aim of prioritizing the most vulnerable countries. However, when measured along standard global vulnerability indices, the GCF prioritization towards the most vulnerable countries is less clear: If one ranks all 154 GCF-eligible countries in terms of their vulnerability (using the average of their scores in the three leading global vulnerability indices) and then groups the eligible countries into four equally-sized groups with very high, high, moderate and low vulnerability according to this measure, only 53 percent of the financial volume of adaptation-related projects went to the 50 percent of countries with either very high or high vulnerability (Fig. 2, panel A, left side). This indicates an equal distribution along the entire vulnerability spectrum, rather than any sort of prioritization according to vulnerability within the eligible countries. A very similar picture emerges when considering the volume of allocated readiness funding (Fig. 2, panel B).

On the flipside, just over half of the countries in the highest vulnerability quartile (57%) of eligible countries have received adaptation-related project funding out of the GCF. In this group, the countries which have not received GCF project funding despite being within the highest vulnerability quartile of all eligible countries include

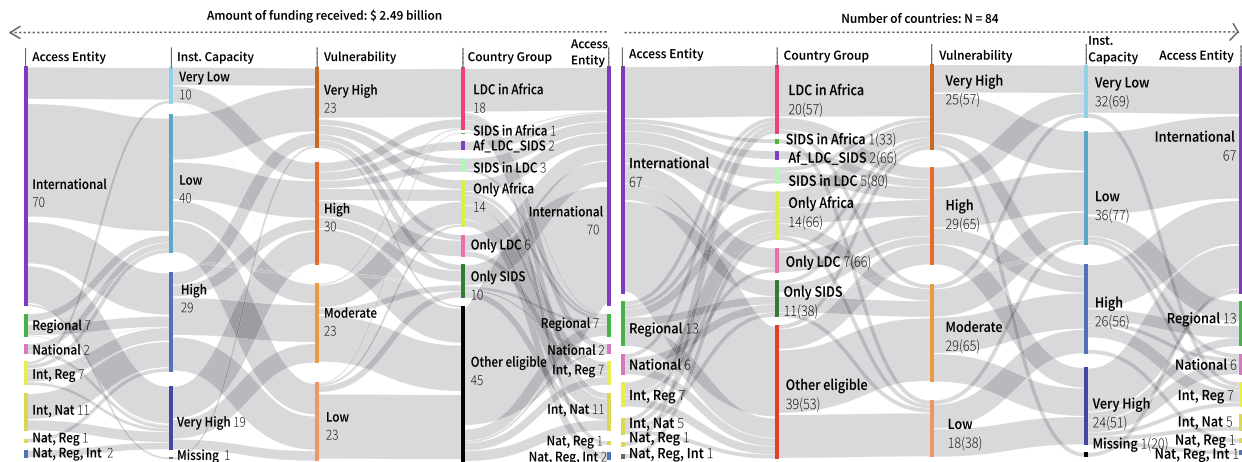
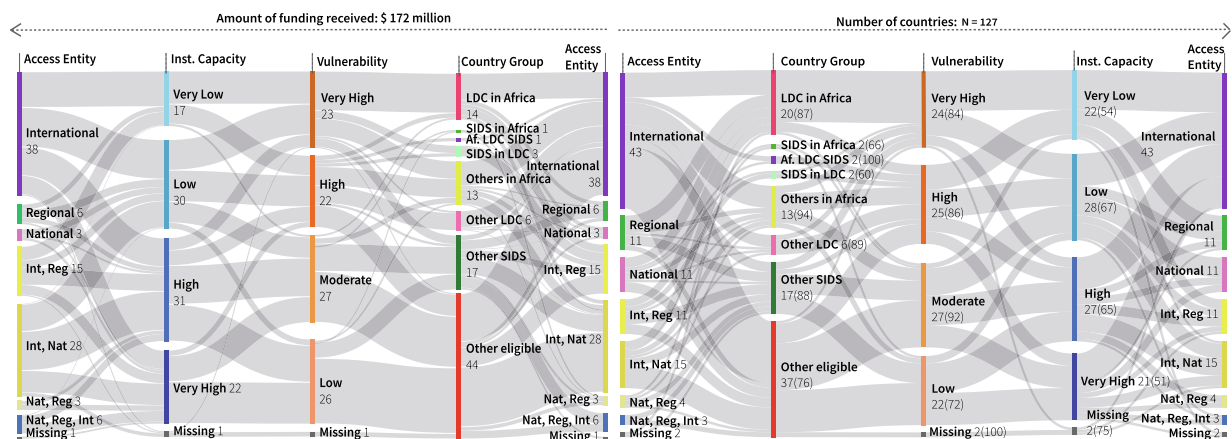
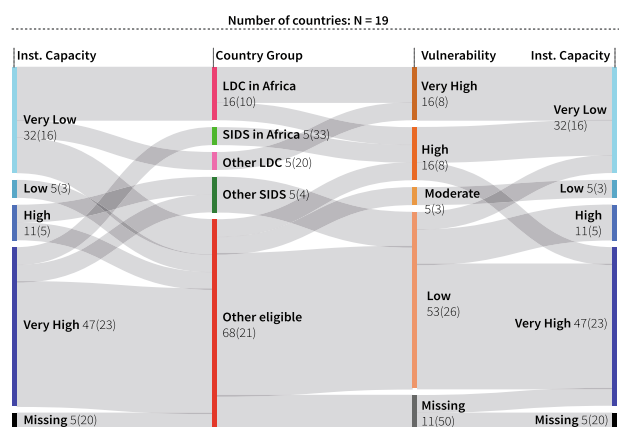
A: Adaptation-related project funding allocation by the GCF**B: Readiness support allocation by the GCF****C: Eligible countries with neither project nor readiness funding**

Fig. 2. Distribution of GCF project funding and readiness funding. The figure has three main panels showing patterns of adaptation-related project funding (panel A), readiness support (Panel B) and those countries that have received neither (panel C). In panels A and B the left side provides distributions according to financial amounts. The right side of panels A, B and C shows distributions broken along the number of receiving countries. Within each of the five Sankey charts the different bars represent the percentage distributions along the main variables considered: access modality, priority country grouping, vulnerability level, and institutional capacity. Numbers indicate the percentage within each bar. Numbers in brackets indicate the percentage the countries in the respective segment of the bar make towards the overall size of the respective group. For example, on the right side of panel A, 20 percent of the 84 countries that have received project funding were LDCs in Africa, corresponding to 57 percent of all LDCs in Africa.

Afghanistan, Burundi, Central African Republic, Democratic Republic of the Congo, Eritrea, Guinea-Bissau, Haiti, Liberia, Mauritania, Micronesia (Federated States of), Papua New Guinea, Sierra Leone, Somalia, South Sudan, Sudan and Yemen. Many of these countries have recently been challenged by violent conflicts.

The funding rate for readiness support amongst the top vulnerability countries is higher. 84 percent of the countries in the top quartile have received readiness funds. Still, 8 percent of the eligible countries within the highest vulnerability quartile have received neither project nor readiness funding. This list comprises Eritrea, Somalia and Yemen. All of these countries show comparatively low scorings in terms of some standard indices of institutional strength and have experienced violent conflicts in the past.

4.4. The role of institutional capacity

Overall, the institutional capacity or bureaucratic fitness of countries, measured here in terms of the World Bank data on government effectiveness, does not determine whether or not a country has been receiving GCF funds. While the GCF's priority countries often are characterized by comparatively weak institutions, almost half (48%) of the project funding allocated so far was taken-up by countries belonging to the world's top half of institutional fitness, measured by the World Bank's government effectiveness indicator (Fig. 2, panel A, left side). Countries belonging to the bottom half of bureaucratic performance globally have received the other half.

However, the data suggests that institutional capacity has been an important factor in determining the respective access modality, and hence the level of countries' ownership and control. Countries which have been succeeding in getting national entities accredited and secured GCF funds through them usually had high or very high institutional capacity (e.g. Antigua and Barbuda, Dominica and the Philippines). Countries with low or very low institutional capacity, on the other hand, needed to draw on the support of international or regional entities for accessing funds – or even did not receive GCF funds at all. Yet, interestingly, a little more than half of the readiness support has been allocated to those countries already belonging to the better half of global countries in terms of institutional capacity (Fig. 2, panel B, left side). At the same time, roughly a third of the GCF-eligible countries which have so far neither received project funding nor readiness support belongs to the bottom 25 percent of countries globally in terms of institutional capacity (Fig. 2, panel C). In these cases, countries have not been able to access GCF funding even through the support of international and regional accredited entities, let alone through their own national entities (e.g. Eritrea, Somalia, Yemen).

5. Discussion

The analysis shows that the GCF is on track in allocating its available funds for adaptation-related activities according to the priorities it has set itself in terms of country groups. Over half of its funding went to such priority countries, including LDCs, SIDS and other African countries. As a result, the majority of the eligible countries have already received some type of adaption-related funding during the first mobilization round of the GCF. However, our analysis also highlights a number of considerable challenges which need to be addressed in the GCF's next round of mobilization and funding allocation: First, the prioritization of the most vulnerable countries remains a political as well as analytical challenge (Klein and Möhner, 2011). While the GCF is on track in prioritizing its defined priority countries, the picture looks quite different when considering standard metrics otherwise used in the literature to assess and rank country-level vulnerability. According to this measure, a clear prioritization of the most vulnerable countries within GCF's eligible countries has not been observed. Second, the institutional capacity and bureaucratic fitness of a country seems to be a major factor in determining how independently a country is able to

access GCF funding. Our analysis clearly shows that the countries with comparatively low institutional capacity almost exclusively have been relying on the support of international and regional organizations (often consultants) for attracting project funds. At the same time, such international and regional entities have proven helpful in compensating for institutional capacity gaps within the countries, meaning that many low capacity countries have been successful in attracting GCF funding, even if not directly through their own national accredited entities. Third, however, the frequent overlap of highest vulnerability and poorest institutional capacity has led to a situation in which a considerable group of countries have lost out in the first allocation round. Many of them are ought-to-be-prioritized LDCs in Africa which have not yet received adaptation project funding at all (not even through the help of international or regional accredited entities), nor, some of them, even readiness funding. They will hence remain a particularly hard-to-reach group of countries under the current mechanisms. Our data suggests that readiness funding needs to prioritize these countries in order to at least achieve successful proposals through the collaboration with international or regional entities. Otherwise the implications for these countries could be troublesome in the long run if they do not effectively participate in major – and likely growing – global streams of adaptation finance. In that sense it could be helpful to consider expanding the GCF selection and prioritization criteria to not only include additional vulnerability metrics (see above) but also to focus on where the biggest gaps in terms of institutional capacity lie. Such prioritization will be of growing importance from the next replenishment round onwards as the demand for funding can be expected to increasingly outpace the supply. In the same vein, researchers and the GCF governing bodies will also need to track whether readiness support and other means of improving countries' readiness will be successful in putting countries onto to a path to direct access.

In this study, we do not claim that the variables considered in our analysis are complete or provide a full explanation of the observed funding distribution. Other variables are probably at play which we have not yet included in our analysis and which call for further research. These might include expectations regarding the effective and adequate utilization of funding, the overall expected performance of adaptation or the effectiveness of capacity building and readiness support. Additional factors might also comprise partnerships between fund donors and recipient countries or between implementing agencies and recipient countries. Such factors deserve increased attention in future research.

6. Conclusions and outlook

Our analysis suggests that with the emerging architecture of global adaptation finance in the post-Paris-world and its shift towards more competitive elements and funds-based allocation, some countries might be at risk of failing to develop direct access to funds and ownership over them - or even miss to access critical funds altogether. The question therefore emerges whether a competitive funds-based architecture will in the future reach the countries which face the simultaneous challenges of the highest vulnerability and lowest institutional capacity. This is a real concern for the populations of these countries as they are often suffering from the multiple burdens of high vulnerability, poor governance, and in many cases violent conflict.

Looking ahead, the analysis suggests that the current support for capacity building will not be enough to lift these countries' institutional capacity and competitiveness to a sufficient level. Rather, the GCF and other similarly designed funds need to strengthen additional mechanisms such as the emerging simplified approval track so that the countries with the lowest institutional capacity and highest vulnerability, and their populations, are not being left behind in the long-run.

CRedit authorship contribution statement

Matthias Garschagen: Conceptualization, Formal analysis,

Investigation, Methodology, Project administration, Supervision, Validation, Visualization. **Deepal Doshi:** Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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