

Coherent climate and sustainable development finance. The role of development assistance in boosting climate action

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Abstract:

The Paris Climate Agreement and the 2030 Agenda on Sustainable Development were adopted in 2015. Yet, to date, countries are still struggling to take the necessary action to set themselves on course for the achievement of both international agendas while the currently available financial resources are rather limited. Transitioning to a low-carbon and climate resilient world and staying below a maximum temperature increase of 1.5°C and even 2°C, require deep changes across all economic sectors. Moreover, climate change itself will have substantial negative implications for development. In that sense, climate action and sustainable development are strongly interconnected and this is clearly reflected in countries' Nationally Determined Contributions (NDCs) under the Paris Agreement, which put forward climate activities that span across all Sustainable Development Goals (SDGs) of the 2030 Agenda. Countries have always struggled to raise the promised (and even less so the needed) climate finance. Yet, we argue that climate finance could be seen as sustainable development finance more broadly, and that closely tailoring it to countries' needs and requests could improve acceptability of action and a more efficient use of this limited resource. In this paper, we seek to understand to what extent climate-relevant financial flows from the Copenhagen to the Paris international climate negotiations and beyond (2010-2015 and 2016-2018, respectively) have been aligned with countries' priorities. By means of the NDC-SDG Connections Tool, linking NDC activities to the SDGs, we identify key areas of intended climate action and place these findings in the context of OECD climate-related official development assistance. In this way, we aim to identify coherence, gaps and opportunities for further alignment of climate and development actions. We observe substantial coherence between climate plans and development finance flows by SDG, but improvements could still be made, in particular at the SDG-target level and through a more balanced allocation of finance between mitigation and adaptation. We discuss potential ways forward to make international climate and development assistance more climate proof across the SDGs and for both mitigation and adaptation.

Keywords: Paris Agreement, Sustainable Development Goals (SDGs), climate finance, official development assistance, policy coherence, climate change

1. Introduction

The Paris Climate Agreement and the 2030 Agenda on Sustainable Development, encompassing the 17 Sustainable Development Goals (SDGs), were adopted in 2015. The purpose of these global agendas is to transition the world to low-carbon and climate-resilient sustainable development. To date, however, countries are still struggling to take the necessary action and to set themselves on course for the achievement of these agreements. On one side, progress on SDG implementation has so far been slow (UNSG, 2019). On the other side, current Nationally Determined Contributions (NDCs) of Parties under the Paris Agreement only add up to a global temperature increase limit of 3°C (Rogelj et al. 2016), still far from the global target limit of a maximum temperature increase of 2°C and striving for 1.5°C.

One key reason for this lack of progress is that the two agendas, the Paris Agreement and the 2030 Agenda, have been addressed separately, with little consideration to the positive interactions between them (UNDP 2017). As such, achieving the targets set out in the two agendas will require deep transformations across all economic sectors (Roy et al. 2018). Moreover, climate change itself will have substantial negative implications for development (Huq, Reid and Murray 2006). As a result, a considerable scaling-up and delivery of available climate and development finance, particularly for those countries that are vulnerable would be urgently needed (UNFCCC SCF, 2018). Given these interlinkages and the need for efficient use of financial resources, the two Agendas (for climate and sustainable development) could be best considered jointly in their implementation (Janetschek et al. 2019; Iacobuta, Höhne and van Soest, submitted).

At the climate change conference in Copenhagen in 2009, developed countries committed to “mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries” to mitigate their greenhouse gas emissions and adapt to the negative impacts of climate change (UNFCCC, 2009, para. 8). At the Paris Climate Conference in 2015 this goal was reiterated and extended to 2025 (UNFCCC, 2015, para. 53). In parallel, achieving the 2030 Agenda for Sustainable Development worldwide requires an estimated USD 5-7 trillion a year (UNCTAD, 2014). While these enormous amounts of finance needed to implement the Paris Agreement and the 2030 Agenda can only be raised by also making use of private resources available, official development assistance (ODA) still plays the key role in realizing these global agreements (UNFCCC SCF, 2018). One key question is how to make good use of financial support, especially in light of the joint consideration of the two agendas.

The Nationally Determined Contributions (NDCs), national climate plans submitted by all countries under the Paris Agreement as the core mechanism for increasing climate ambition, were drafted in a bottom-up process with countries setting their own priorities and ambitions. Our previous analysis of these documents has shown that they include numerous activities that are part of the 2030 Agenda (Dzebo et al. 2019). In fact, as the NDC-SDG Connections data (Brandt et al., 2017) indicates, pledged climate activities in the NDCs touch upon all SDGs entailed in the 2030 Agenda.¹ In that sense, it can be argued that climate and development are strongly interconnected and an efficient use of financial resources would require coherence between climate finance and development priorities.

In this study, we seek to provide new insights into the challenge of implementing the two agendas by examining climate-related ODA flows relative to countries’ NDC activities through an SDG lens. More precisely, we make use of the NDC-SDG Connections tool data to identify key SDG areas of climate action and match these findings with the focus areas of climate-related ODA, which we categorized across the SDG for comparability. In this way, we analyze correlations between countries’ focus on specific SDGs for climate action and respective allocation of finance, to determine changes in coherence of demand and supply in the pre- and post-Paris periods (2010-2015 and 2016-2018). Hence, this study investigates the

¹ For the interactive online tool that visualizes the data, see ndc-sdg.info.

alignment between the priorities expressed by recipients on the one hand and the donor allocation decisions on the other, from a joint climate and sustainable development perspective.

Taking into account overlaps between the SDG-relevant content in the NDCs in the context of climate finance can contribute to leveraging synergies and avoiding goal conflicts between the Paris Agreement and the 2030 Agenda. The more money is adequately spent on commitments in the NDCs that overlap with the content of the SDGs, the better climate finance can make use of synergies between the Paris Agreement and the 2030 Agenda. Moreover, this also ensures that climate action is more strongly driven by recipient countries, ensuring adequate consideration of needs. Notably, through our analysis, we identify existing gaps as well as opportunities for further alignment of climate and development action.

Our assessment of climate finance through the lens of SDG-themes shows that while there is considerable alignment between recipient countries' needs and donors' aid allocation by SDG, there is no clear positive change towards more policy coherence from the pre- to the post-Paris period. We find that coherence between climate and development finance can be substantially improved and not only with regard to the relative SDG focus, in particular at the target level, but also in view of the finance allocation between mitigation and adaptation. Through a closer look at countries' stated needs, and drawing upon literature on climate-development interlinkages, we discuss potential ways forward to make climate-related ODA better aligned for a coherent implementation of the two agendas.

The remainder of the paper is organized as follows: Section 2 outlines the relevant literature before Section 3 introduces the methodology used in this paper. Section 4 presents and interprets the results of the empirical analysis, while Section 5 provides a discussion on the key challenges and limitations of this study. The final section concludes and outlines policy implications as well as avenues for future research.

2. Theory

Climate finance is a key ingredient for the implementation of the Paris Agreement as many activities in developing countries' NDCs have been made conditional upon receiving international support (Pauw et al. 2019 and 2020; Hedger and Nakhouda, 2015; Zimm and Nakicenovic, 2019, Iacobuta and Höhne, under review). While conditionality in terms of financial support, as well as technology transfer and capacity building (Stender et al., 2019), can contribute to strengthening the equity and ambition of NDCs (Lehr et al., 2019), it can also become the "Achilles heel" of the NDC approach (Pauw et al., 2020) since it could undermine the goals of the Paris Agreement if the required amounts of finance are not provided to the recipients. For instance, Iacobuta and Höhne (under review) have found that there is no correlation between the ambition of conditional greenhouse gas emissions targets and climate-relevant finance received between 2010 and 2017. This emphasizes the importance of not only ensuring that climate finance is scaled-up globally as agreed upon in the Paris Agreement, but also that finance reflects the countries' needs as stated in the NDCs, both to meet ambition and to align to sectoral priorities (UNEP 2018).

While equity-based justifications for climate finance such as solidarity or responsibility can play an important role for the provision of financial resources (e.g. Rübberke, 2011), donor interests are also relevant. For example, the aid allocation literature finds that donors have incentives to provide financial resources to recipients that generate co-benefits for the donor country, also because this makes the justification of transfers to domestic constituencies easier (for a review, see Doucouliagos and Paldam, 2009). In the case of climate finance, three types of donor motivations are pertinent in terms of shaping allocation decisions (Pauw et al., 2020): Donors might opt to support the provision of global public goods such as mitigation, which generates advantages both for donors and recipients (Rübberke, 2011); donors might use climate aid to get developing countries' backing in UNFCCC negotiations (Bagchi et al., 2017);

and donors might consider furthering their self-interest by supporting their export markets when considering aid allocation, including aid for adaptation (Weiler et al., 2018).

In the context of climate finance, exploiting synergies between contributions to climate protection and the achievement of the SDGs can leverage the implementation of the Paris Agreement and the 2030 Agenda as there are strong links between climate and the SDGs (Roy et al., 2018; Iacobuta, Höhne and van Soest, submitted) and most NDC activities include multiple SDG-relevant commitments (Brandi et al., 2017; Dzebo et al., 2019; Janetschek et al., 2019). In other words, financing NDC implementation can simultaneously contribute to climate action and SDG implementation. As a result, coherent implementation of climate and the SDGs can in turn motivate donors to supply additional needed resources as they lead to multiple benefits. This would make the use of financial resources more efficient and could, in light of these development and climate co-benefits and their links to global public goods, be better justified to donors' constituencies (Basak and van der Werf 2019). Moreover, as the NDCs express the priorities of recipient countries, allocating climate finance in line with these priorities, can also increase the alignment between recipient interests and needs and donor finance decisions, thereby promoting coherence and potentially strengthening aid effectiveness (OECD, 2005 & 2008).

In the case of climate finance, the first key dimension of alignment between recipient and donor concerns the balance between support for adaptation- and for mitigation-relevant climate actions. Although climate finance is meant to address both facets of climate action (UNFCCC, 2009) and significantly scale-up the amount of adaptation finance (UNFCCC 2015), climate finance donors have so far put the focus on providing mitigation rather than adaptation finance (UNFCCC SCF 2018). One key reason for a typically stronger focus on mitigation rather than adaptation finance is that the former entails more benefits in terms of providing global public goods (Rübbelke 2011) and potentially also more business opportunities and is thus more attractive to the private sector (Agrawala et al. 2011). In contrast, finance for adaptation often gets intertwined with development finance (Klein et al. 2005) and the opportunities for the private sector to invest and mobilize additional adaptation finance are much more challenging (Pauw 2017; Dzebo and Pauw 2019). Conversely, we expect developing countries' activities in the NDCs to focus more on adaptation than on mitigation because they tend to be especially vulnerable to the impacts of dangerous climate change and tend to have a lower mitigation potential, capability and interest, also in light of issues around historical responsibility. While we thus expect a mismatch between mitigation and adaptation finance, in light of ever stronger calls for adaptation finance (de Nevers, 2015; Smith et al. 2011) and a better understanding of the potential of private adaptation finance (Goldstein et al. 2019), we also expect to see a shift towards more balance across these two types of climate finance in this study, from the pre- to the post-Paris periods.

The second key dimension of alignment is, as indicated above, the question whether the specific climate action priorities expressed in the NDCs are taken seriously by donors when allocating climate finance. This dimension is particularly essential as it does not only affect ownership but also because, as mentioned above, this dimension can generate co-benefits by simultaneously promoting the implementation of the Paris Agreement and the 2030 Agenda. We expect the allocation of climate finance to vary across different SDG-relevant issues. For example, we expect donors to allocate more climate finance to sectors with high mitigation potential, such as energy (SDG 7), than to sectors with a lower potential, such as peace, justice and institutions (SDG 16). If we find little alignment in terms of SDG priorities, it could be for various reasons. On the one hand, it could be the case that donor countries follow their own interests (in geopolitical or economic terms) when allocating aid, thereby disregarding recipients' needs and interests; interests of donors might differ from those of recipients not only in terms of the mitigation-adaptation-balance but also in terms of which SDG-relevant issues merit attention. On the other hand, a lack of alignment could simply be due to the fact that the demand for finance by developing countries has not been clear enough for donors pre-Paris, in which case we expect to see improvements post-Paris.

As we explore these two dimensions of alignment, we also assess how recipient-donor coherence changes over time. For example, recipient countries' priorities might have been different pre-Paris compared to post-Paris, but they were likely also less transparent. Since the bottom-up process of drafting the NDCs has revealed countries' needs concerning climate action, the Paris Agreement has increased the transparency regarding countries' priorities. We thus expect donors' climate finance allocation decisions to be more strongly aligned with recipient priorities after rather than before the conclusion of the Paris Agreement in terms of both dimensions of alignment under study, especially considering that these priorities might have changed between Copenhagen and Paris.

3. Methodology

While there is no international consensus on what counts as climate finance, the OECD Development Assistance Committee (DAC) reporting methodology² and its respective Rio Marker on climate change have been so far most commonly used in official reporting on climate finance (Weikmans and Roberts, 2019). Hence, in this study, we use the OECD external development finance data on committed climate-relevant ODA³ to assess the development areas to which climate finance has contributed between the period 2010 and 2018 (as the latest available year).

To ensure a high coverage of climate finance, we included reported finance from all types of donors - DAC members, multilateral development banks, non-DAC members, other multilaterals and private donors – through all types of financial instruments - debt instruments, debt relief, equity and shares in collective investment vehicles, grants, mezzanine finance instruments, unallocated/unspecified - and with all objective levels – principal, significant and climate component. However, as we aimed to assess this data against countries' NDC climate activities, we only used finance data where the recipient was defined as a specific country, party to the UNFCCC, and excluded financial transfers that were committed to broader regions, overseas or disputed territories (Kosovo, West Bank and Gaza Strip), as well as Libya, as the only country to have not yet submitted an NDC. Overall, this excluded finance amounted to 16% of the total climate-relevant finance. Moreover, as we aimed to link climate finance to the SDGs based on the reported (sub-)sectoral purpose, we eliminated transfers that did not indicate the (sub-) sectors (2% of total climate finance during 2010-2018) and those (sub-)sectors that could not be linked to the SDGs, for being too broad or unspecific (an additional 7%). The remaining financial data covered 146 recipient countries and approximately 75% of the total committed climate-relevant finance.

To analyze the climate finance data through an SDG lens, we allocated all (sub-)sectoral categories in the OECD climate database to individual SDGs and specific SDG targets. We provide an overview of these linkages in Annex A. Given the complexity and overlaps of the SDG targets, we defined both a set of primary targets, belonging to the most relevant SDG, and a set of secondary targets, linked to other SDGs. In this study, we only used the primary SDG targets for the analyses and aimed to emphasize the broader impact of climate-relevant finance for sustainable development through the secondary targets, as well as the challenge of examining and addressing SDG interlinkages. As the focus of the analysis was climate-relevant finance, in some cases we made assumptions about the scope of the (sub-) sectoral categories, for instance, that education activities would entail inclusion of climate-related topics in curricula or development of climate-relevant skills.

For an overview of climate activities in the NDCs and how these relate to the SDGs, we used the NDC-SDG Connections tool. This tool was best suited to our analysis, as it breaks the NDCs down into individual

² For a more detailed overview of the OECD ODA CRS methodology, see - <http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/>

³ OECD DAC External Development Finance Statistics - Climate Change. Accessed 20.04.2020 at <http://www.oecd.org/environment/climate-change.htm>

climate activities that countries aim to implement in the future and codes them by SDG target. Other tools that link NDCs and SDGs tend to only apply keywords for textual analysis and do not extract specific activities⁴. Being able to identify and count individual future-oriented activities facilitates the comparison to climate finance data and allows for a more accurate determination of a country's focus on specific priority areas post-Paris. To ensure full comparison, we only included the 146 climate finance recipient countries into the analyses, accounting for a total of 7455 climate activities. While we included all NDC climate activities in most analyses, we also provide an overview of the request for international support in the form of finance, capacity building or technology transfer by SDG, as a share of respective activities.

To analyse to what extent the priority areas of climate-relevant finance are aligned with those identified in the NDCs, we ran correlation analyses and plotted the share of finance and that of NDC activities dedicated to each SDG and their respective targets. For climate finance, we assessed both the financial flows in USD 2017 and the number of transactions, i.e. the number of projects (data points) recorded in the finance database. This approach allowed us to account for potential differences in costs of various activities. Moreover, for parts of the analysis, we choose to also analyse climate finance that was dedicated to climate adaptation or mitigation as a “principal” objective only, rather than only as a “significant” or “component” contribution. The OECD database provides an indication to the role of climate as an objective to individual projects based on these three tiers, whereby “climate component” is an approach used by multilateral development banks, in line with that of the OECD.

4. Results and discussion

Figure 1 provides an overview of the country-level distribution of climate-relevant finance that was included in this study, covering the period between 2010-2018. While the annual average climate-relevant finance, according to OECD data, has increased considerably from USD 28 billion per year to USD 54 billion per year (excluding regional financing) from pre-Paris to post-Paris, the share of finance between country groups by income has not changed substantially - more than 50% went to lower middle income countries, around 30% to upper middle income and only around 14% to low income countries in total.

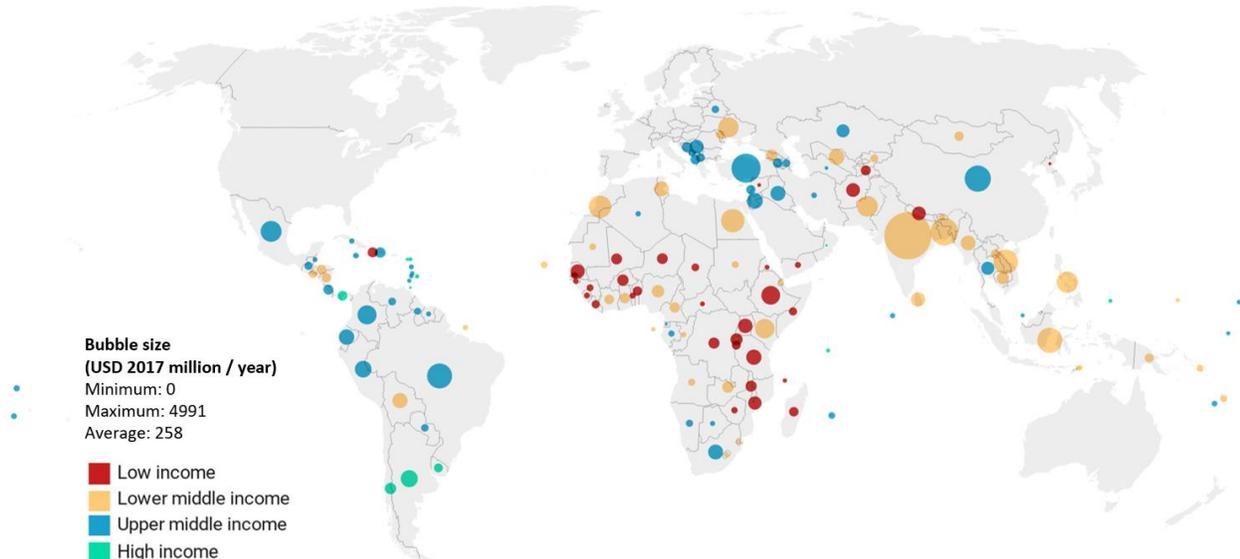


Figure 1 Average annual climate-relevant finance received between 2010-2018 (USD 2017 million per year) by a recipient country, including all climate objective levels (principal, significant and climate component). This figure only shows climate-relevant finance included in this study, covering approximately 75% of the total climate-relevant finance.

⁴ For example, Climate Watch, NDC-SDG Linkages, Accessed 28.05.2020 at: www.climatewatchdata.org/ndcs-sdg

At a country level, Iacobuta and Höhne (under review) have found that low income countries have conditional greenhouse gas reduction targets per capita comparable to those of lower-middle income countries. Moreover, they have shown that capability in the form of GDP per capita plays an important role in the level of unconditional climate mitigation ambition, suggesting that international support could boost countries confidence and willingness to engage in more ambitious conditional climate action. By comparison to the finance data, the NDC-SDG Connections tool identified a larger share of climate activities in the NDCs of low income recipient countries as compared to upper-middle income countries, 30% and 25% respectively, while lower middle income countries covered 39% of the total activities. These values shares are relatively similar to those of the climate-relevant transactions included in this study, respectively 30%, 41% and 27% for low income, lower middle income and upper middle income countries.

As a first step of our analysis, we investigated whether the actions in NDCs are indicated to belong to the category of mitigation, adaptation or both and found that the balance between mitigation and adaptation varies substantially across SDGs (see Figure 2). The assessment of NDC actions through the SDG lens shows that in the case of most SDGs, the larger share of actions focuses on adaptation rather than mitigation. However, the share of mitigation actions is much higher than the share of adaptation actions for SDG 7 (energy) and also substantially higher for SDG 12 (sustainable consumption and production) and somewhat for SDG 11 (cities) and 17 (global partnerships), reflecting the higher potential for GHG emissions reductions of these areas (Gomes-Echeverri, 2018). By comparison, the share of adaptation actions is particularly high for the more socially-oriented – SDG 1 (poverty), 2 (agriculture), 3 (health), 4 (education), 5 (gender equality), 10 (inequality) and 16 (peace, justice and strong institutions) – and the environmentally-oriented SDGs – SDG 6 (water), 13 (climate change), 14 (oceans) and 15 (life on land). In the case of SDG 13, the considerably higher share of adaptation actions could be explained by the fact that the targets formulated under this SDG are more strongly speaking to adaptation action. Nevertheless, Figure 2 also indicates that climate action cuts across all SDGs (Dzebo et al. 2019).

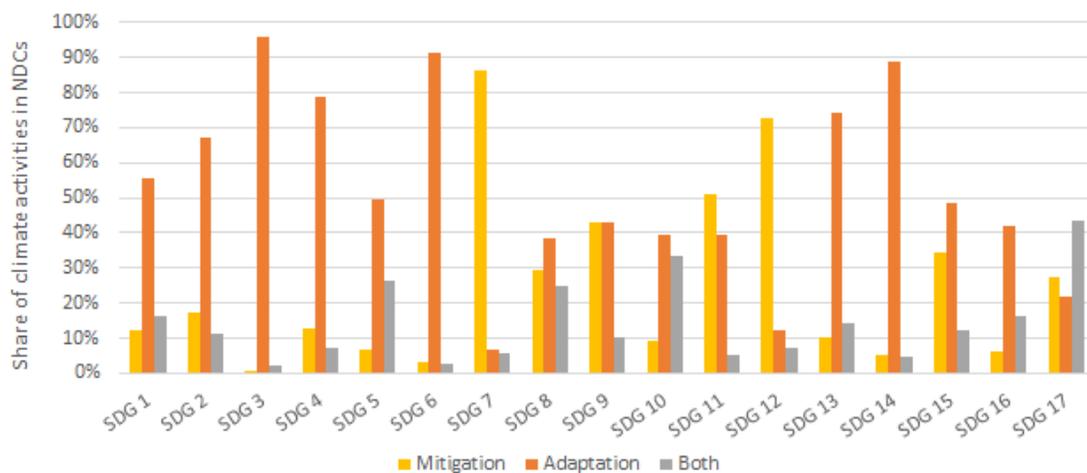


Figure 2 Type of climate activities (mitigation, adaptation, both) in recipient countries' NDCs by SDG, based on the NDC-SDG Connections tool. The values show the share of relevant activities under each SDG.

Overall, based on the NDC-SDG Connections tool, countries that have been analyzed in this study put forward a share of 49% climate activities related to adaptation and 36% to mitigation, with the remaining activities applying to both categories (12%) and a small share that was not defined (4%). In contrast, climate finance shows a greater focus on mitigation. As depicted in Figure 3, the number of climate-relevant transactions tend to be relatively balanced between mitigation and adaptation activities, both in pre- and post-Paris. However, the total amount of climate finance is strongly skewed towards mitigation,

in particular for those activities with climate as a principal objective. This difference between finance and transactions can potentially be explained by the fact that some mitigation projects (such as building power plants) are very costly, but it may also be the result of the greater challenge to differentiate between adaptation and development and to determine additionality (Funder et al. 2020). This analysis reveals that climate finance is still focused considerably more on mitigation than on adaptation, in spite of the Copenhagen Accord’s call for a balanced allocation between the two. A comparison over time shows that this balance has been slightly improved over time, with a higher share of adaptation finance in post-Paris than in pre-Paris, but far greater improvements are still needed. Finally, when we focus only on finance where climate was the principal objective, the imbalance between mitigation and adaptation finance is even larger than in the case of total climate finance. This result may indicate that climate mitigation is the major priority of donors (especially pre-Paris), while adaptation has often been a co-benefit. Nevertheless, as the principal objective excludes multilateral development banks due to their sole inclusion of ‘climate component’ as an objective, the results may also reveal that country donors are more focused on mitigation, while multilateral development banks tend to strike a better balance. As discussed in the introduction, mitigation is a more attractive objective for donor countries for a number of reasons.

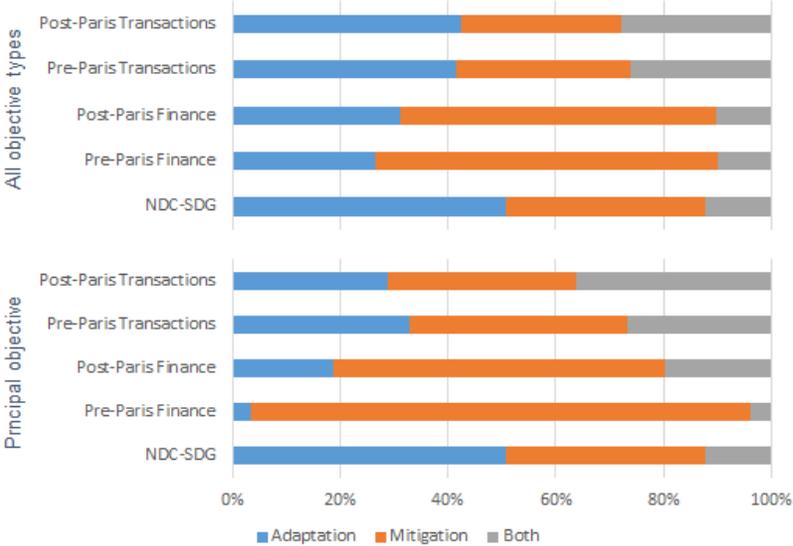


Figure 3 Share of NDC climate activities and pre- and post-Paris climate-relevant finance and respective transactions by activity type (mitigation, adaptation, both). The top figure shows total climate-relevant finance and respective transactions for all objective types (principal, significant and climate component), while the bottom figure shows only climate-relevant finance and transactions where climate change was the principal objective.

To better understand recipient countries’ needs, we assessed the type of international support requested in the NDCs for specific climate activities (Figure 4). Our assessment shows that the largest share of requests concerns finance, with approximately 25% of all activities specifically requesting finance and more than 40% being covered by a general NDC-level request for finance. However, finance requests vary across SDGs. There are particularly many finance requests in the context of SDG-7-related NDC actions, possibly due to the fact that energy-related NDC actions tend to require high amounts of finance (see analysis above, and Gomes-Echeverri, 2018). Moreover, activities in SDG 7 also has one of the highest shares of activities that request technological transfer, reflecting the large demand for renewables and energy efficiency technologies in the energy sector. On the other hand, the high number of requests for

capacity-building in the context of SDG 13 can be explained by the great significance of adaptation actions under this goal, which in turn demand substantial capacity-building in developing countries.

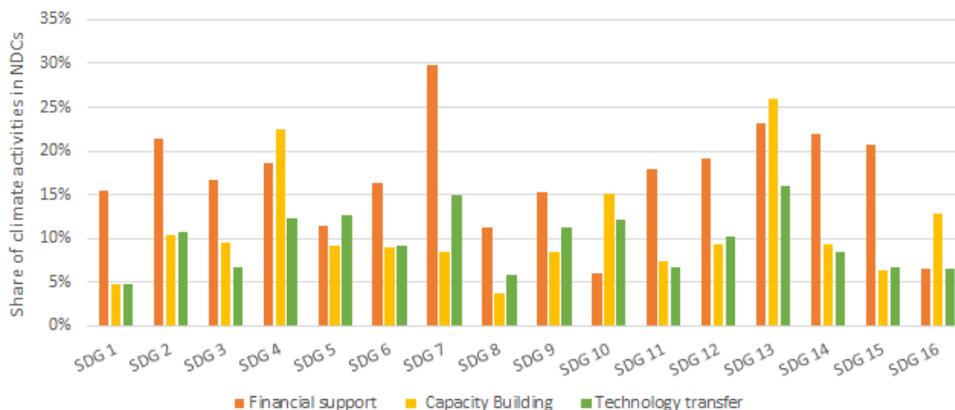


Figure 4 Share of international support requested by recipient countries for specific climate activities in the form of financial support, capacity building and technology transfer. The values are shown as share of total climate activities under each SDG.

In the next steps of this study, we assess coherence between climate-relevant finance in pre- and post-Paris, and countries’ NDC activities. As illustrated in Figure 5, the climate-relevant finance and transactions committed vary strongly across the 17 SDGs. Furthermore, Figure 5 also depicts the extent to which this allocation of finance and transactions by donors mirrors the needs and interests expressed by recipient countries in their NDCs. In terms of the overall amount of finance committed by donors (see Figure 5 a), there is a strong focus on SDG 7 and SDG 11 but also on SDG 2, SDG 15 and SDG 6.

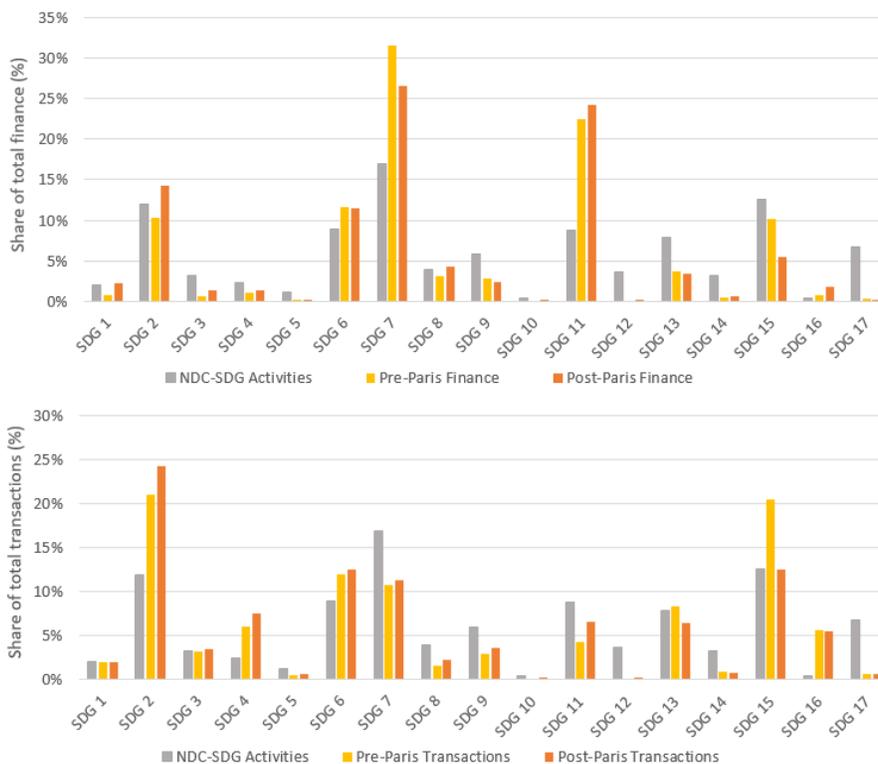


Figure 5 Share of NDC climate activities, and pre- and post-Paris climate-relevant finance and respective transactions for all objective types (principal, significant and climate component), by SDG.

The focus of both recipients and donors on SDG 7 is unsurprising in light of the considerable mitigation potential of the energy sector and its key relevance for sustainable development. Similarly, the spotlights on SDG 11 is reflective of the rapidly expanding urbanization and the large share of greenhouse gas emissions by cities (71–76% of energy-related CO₂ emissions in 2006 already, based on IPCC, 2014), as well as the potential for strengthening sustainable transport systems and disaster risk reduction. The strong demand for finance on SDG-7-related actions in the NDCs is important. For example, as a recent study in Nature Communications underlines, “all countries would need to accelerate the implementation of policies for renewable technologies” to reach the Paris goals (Roelfsema et al. 2020). Moreover, as mitigating GHG emissions can become costly and hit a technological and societal limit, countries will also need to look towards enhancing carbon sinks through forest- and ecosystem-related activities (IPCC 2018), represented by SDG 15 and reflected both by the NDCs and by climate finance.

From an adaptation perspective, as climate change begins to pose serious threats to food and water security (IPCC, 2019), it is perhaps unsurprising that both NDCs and climate-relevant finance pay substantial attention to these areas (SDG 2 and 6, respectively) that are tightly linked to key basic human needs. Moreover, as climate impacts also directly affect human settlements, it is unsurprising that substantial financial flows have been committed to SDG 11 and SDG 13 for adaptation purposes (see also Figure 6). While SDGs 13 and 17 (partnerships for the goals) are shown to have numerous activities in the NDCs, the figures suggest that they are not strongly represented in the climate-relevant finance data. However, this cannot be seen as a lack of coherence but rather a result of data representation. Climate-relevant ODA could be linked to SDG 17 in its totality, as international cooperation and support. Similarly, all climate-relevant finance, especially when climate is a principal objective, could be linked to climate change, represented by SDG 13, but the purpose of this study was to analyze climate-relevant finance through a comprehensive SDG lens and SDG 13 mostly captured finance related to disaster risk reduction.

While there have been some changes in the focus of finance in the pre- and post-Paris period, these are not very high, except for those related to SDGs 7 and 15. The decrease in finance for SDG 7 could be explained by a drop in costs of renewables and other low-carbon energy-related technologies, also substantiated by the concomitant increase in the number of relevant projects. Yet, the relative decrease in both finance and transactions for SDG 15 is rather surprising, especially in the context of an ever-increasing sense of urgency to substantially and rapidly reduce GHG emissions. An increase in climate-finance focus on SDGs 2, 6 (and possibly also 11) is likely reflective of the felt effects of climate change to date. However, this is surprisingly not also observed under SDG 13.

*Table 1 Correlation analysis between recipient countries NDC climate activities and climate-relevant finance and respective transactions. The analysis is conducted for all types of climate activities (adaptation, mitigation, both, total) and all objectives as well as principal objective only, across all 17 SDGs. Correlation coefficients, $r(15)$, marked with * have p -value<0.001. All other values have p -value>0.1. The degrees of freedom, 15, are given by the number of SDGs.*

Correlation Coefficient	Finance				Transactions			
	All objective types		Principal objective		All objective types		Principal objective	
	Pre-Paris	Post-Paris	Pre-Paris	Post-Paris	Pre-Paris	Post-Paris	Pre-Paris	Post-Paris
Adaptation	0.88*	0.83*	0.91*	0.88*	0.86*	0.82*	0.84*	0.86*
Mitigation	0.92*	0.87*	0.92*	0.96*	0.82*	0.88*	0.81*	0.85*
Both	0.38	0.32	0.32	0.36	0.32	0.23	0.37	0.31
Total	0.83*	0.78*	0.81*	0.86*	0.74*	0.71*	0.76*	0.83*

The comparison of the finance allocation undertaken by donors and countries’ priorities expressed in the NDCs shows that there is considerable alignment between the former and the latter. While there are

some exceptions (which can partially be explained by the nature of the SDG, e.g. SDG 13 and SDG 17), there is a substantial fit between what countries focus on in their NDCs and what donors focus on in their finance allocation decisions. This considerable alignment between recipient priorities and donor decisions is also substantiated by a correlation analysis (with 15 degrees of freedom), whereby the correlation coefficients for adaptation, mitigation and total type of climate activities and finance/transactions show a strong positive linear relationship (see Table 1 and Figure 6). The lack of correlation for activities relevant to both mitigation and adaptation (marked as 'Both') may be explained by a lack of common understanding and reporting on activities that were equally relevant to both types of climate action.

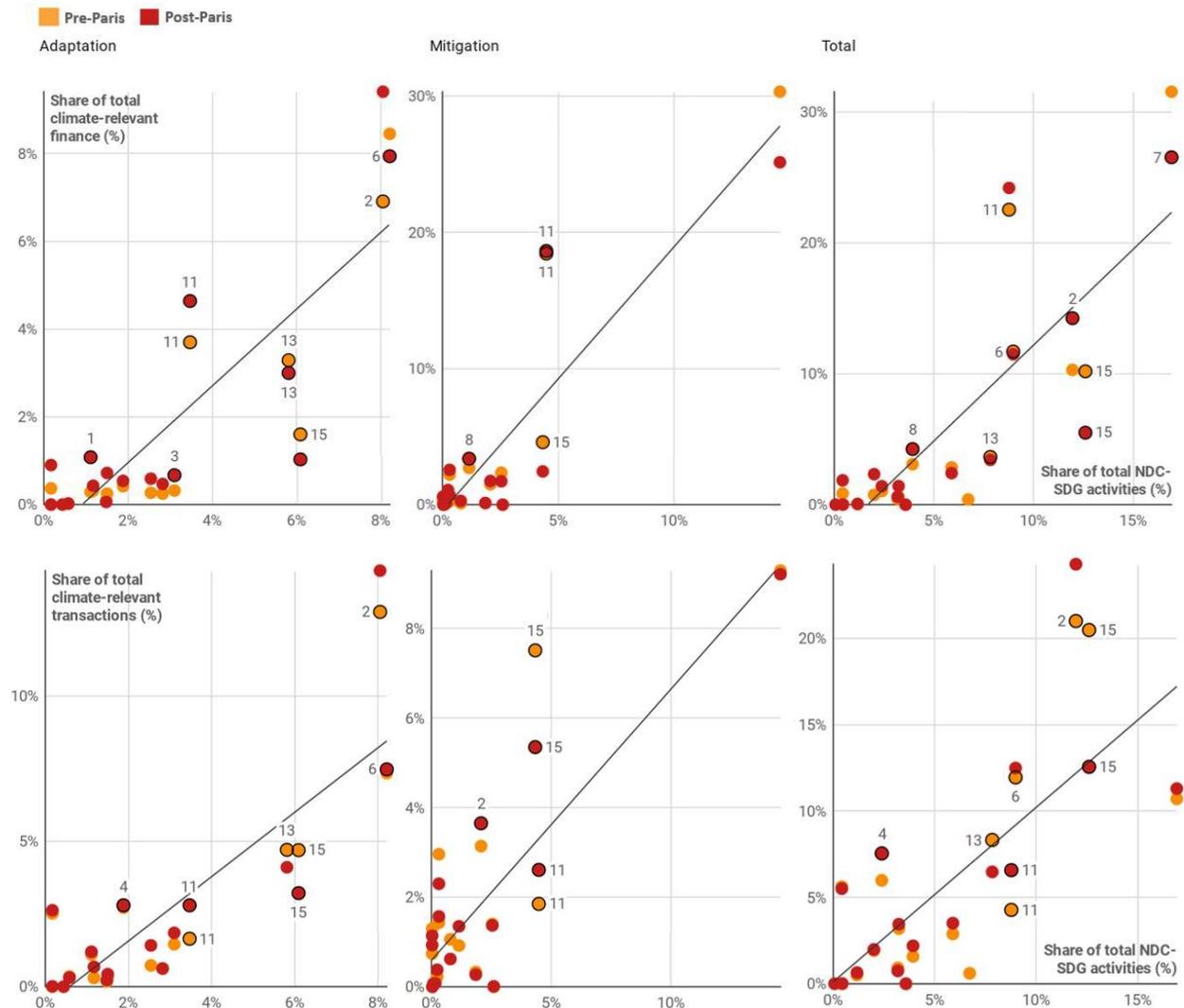


Figure 6 Share of recipient countries' NDC climate activities relative to the share of climate-relevant finance and respective transactions. The analysis is conducted across the main types of climate activities (adaptation, mitigation, total) and all SDGs, and covers all objective types of climate finance (principal, significant and climate component). The top figure presents the analysis for climate-relevant finance, while the bottom figure presents climate-relevant transactions.

Similar to what we observed in Figure 5, Table 1 indicates that there is no clear tendency towards stronger alignment between recipient and donor priorities after the conclusion of the Paris Agreement. In fact, when we analyze the amount of allocated climate finance for all objective types, we see a decrease in alignment from pre-Paris to post-Paris, for mitigation, adaptation and total finance. On the other hand,

there is an increase in alignment from pre-Paris to post-Paris for the mitigation and total amount of finance as principal objective, but not for adaptation. Similar changes in correlation coefficients can be observed for climate-relevant transactions. Nevertheless, given the substantial shortcoming of climate-relevant ODA data, combined with potential minor inconsistencies in the NDC-SDG Connections data and limitations of climate finance categorization by SDGs, it is not possible to draw conclusions based on the small observed changes.

Table 2 Correlation analysis between recipient countries' NDC climate activities and climate-relevant finance and respective transactions. The analysis covers all types of climate activities (adaptation, mitigation, both, total) and all objectives as well as principal objective only, across all individual SDG targets. All correlation coefficients have p-value<0.001. The degrees of freedom, 124, are given by the number of SDG targets included in the NDC-SDG Connections tool, i.e. all SDG targets that are not related to means of implementation (only those indicated by numbers and not by letters).

	Finance (all)		Finance (principal)		Transactions (all)		Transactions (principal)	
	Pre-Paris	Post-Paris	Pre-Paris	Post-Paris	Pre-Paris	Post-Paris	Pre-Paris	Post-Paris
Correlation coefficient, r(124)	0.65	0.66	0.64	0.69	0.53	0.55	0.58	0.61

As a final step of this study, we went into greater detail and conducted a similar correlation analysis at the SDG-target level (see Table 2 and Figure 7). Surprisingly, the correlation coefficients (with 124 degrees of freedom) for total climate-relevant finance and NDC activities at the SDG-target level are much lower than those related to the SDGs more broadly. These results may suggest that, while priority areas are matched between donors and recipients, there may be less agreement on how these broad development areas ought to be addressed in concrete terms. For example, in Figure 7 we observe that, while NDC activities focus far more on SDG 2.4 (sustainable food production) than 2.3 (increased agricultural productivity and incomes), a similar amount of finance and transactions were allocated between the two of them. Yet, the two targets can be linked, as sustainable food production could be used as a means to increase agricultural productivity and incomes. Therefore, considering that the assessed finance was climate relevant, it is likely that most finance included under target 2.3 was related to 2.4 as well, aiming to increase agricultural productivity and incomes through sustainable agriculture. On the other hand, a negative relation can be seen between the less related SDG targets 15.3 (degraded land and soil) and 15.2 (sustainable forest management). In this case, climate finance and transactions focused more on the former, while NDC activities speak more strongly to the latter. While it is possible to tackle land degradation through forest management, the link is likely less strong than in the previous case. In contrast to these two examples, the allocation of finance across SDG targets 7.1 (energy access), 7.2 (renewable energy) and 7.3 (energy efficiency) appear to be well aligned with the number of relevant climate activities in the NDCs. More generally, the mismatch between climate finance and NDC activities in this case could also be caused by the use of primary targets only (see Annex A), as there is a small risk that some activities were included under secondary targets rather than primary targets in the NDC-SDG Connections tool, and also that some were included under both, showing a larger number of activities for those targets where both primary and secondary actions are counted. See also the Discussion section for further details.

Overall, in this final analysis, we see an increase in correlation coefficients for both finance and transactions under all and under principal objective. However, similar to the previous analysis, the changes in correlation coefficients from pre- to post-Paris are rather small and strong conclusions cannot be drawn in the context of potential data- and methodologically-related variations.

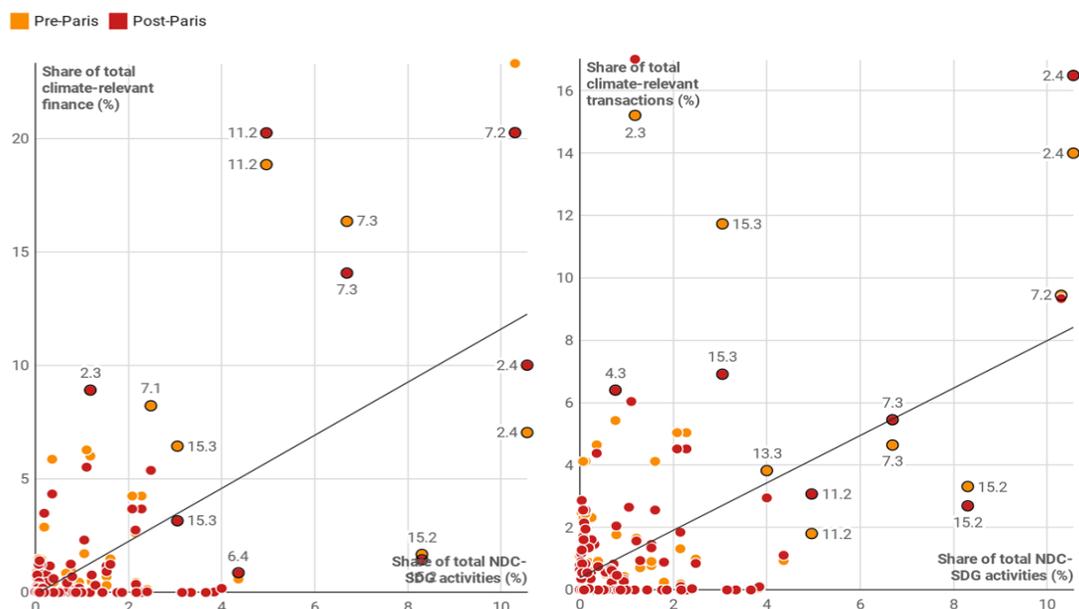


Figure 7 Share of countries' NDC climate activities relative to the share of climate-relevant finance and respective transactions. The analysis is conducted across all SDG targets, and covers all objective types of climate finance (principal, significant and climate component). The figure on the left hand side presents the analysis for climate-relevant finance, while the figure on the right hand side presents climate-relevant transactions.

5. Discussion

One challenge for the analysis of climate finance provisions is the absence of an international agreement on “what counts” as climate finance, which generates controversies around climate finance statistics (for a review, see Weikmans and Roberts, 2019). Nevertheless, to date, the DAC Rio Markers methodology is most commonly used by developed countries to report on climate-relevant financial commitments towards developing countries to the UNFCCC Secretariat (ibid.). In this study, we used OECD data of climate-relevant finance reported by DAC donors under the climate change Rio Marker. While this data entails many weaknesses due to the fact that it is based on self-reporting and is likely to reflect overestimations as well as labeling mistakes (e.g. Junghans and Harmeling, 2012; Michaelowa and Michaelowa, 2011; Weikmans et al. 2017) it is still the best data source available (Weikmans and Roberts, 2019). Keeping in mind these limitations, we refrained from drawing strong conclusions on changes in correlation coefficient pre- and post-Paris and rather use the climate-relevant finance data for indicative work.

Apart from earmarking per se, the types of financial instruments and how they should be accounted for is another hot topic in the international climate finance discussions. The types of financial instruments covered in the database used in this study are: debt instruments; debt relief; equity and shares in collective investment vehicles; grants; mezzanine finance instruments; unallocated/unspecified. Of these instruments, only grants and debt relief (23% of analysed climate-relevant finance) would remain fully with the recipients, in particular when they are not tied to any conditions. Yet, as the interest rate and other details concerning the other instrument types often remain confidential, it is not possible to disentangle the amount of finance that the recipient country would fully benefit of. However, while such a distinction is key in determining the total amount of international climate finance and the extent to which developed countries live up to their promises, it is not essential for the type of analyses undertaken in this study, which merely seeks to determine the focus areas of action. Similarly, substantial differences may exist between committed and disbursed finance and OECD climate-relevant finance data is currently only available for committed finance. However, committed finance can still be used as a measure of

priorities, which was the scope of this study, and may reflect these even better as it is not prone to potential time-lags and other challenges of specific project types that may be reflected in the disbursed finance data.

Perhaps the most important limitation of this study is that the NDC-SDG Connections tool provides the number of distinct climate activities mentioned in NDCs, but it does not reflect the extent to which countries aim to focus on these individual activities. For instance, an NDC may mention reforestation and expansion of solar energy as two distinct climate activities, but it may not indicate how many projects or how much finance it seeks to dedicate to each of them. This lack of weighing of activities makes the NDC-SDG data less comparable to the finance data, as some activities may require more financing per project, while others may need to be implemented on a small scale, leading to a large number of projects (and respective transactions) of the same type. To address this limitation, we conducted our analyses both for financial flows and for transactions. Moreover, by analyzing correlations over all recipient countries, rather than individual countries, other potential such errors could be attenuated.

Importantly, at the core of our analysis lies the categorization of climate finance (sub-)sectors to the SDGs and their targets. A key issue here was that some of the (sub-)sectoral categories were rather broad or vague and that distinct donors may have also made different decisions on how to best fit their projects within these categories. In order to perfectly match projects to SDG targets, sufficiently detailed project descriptions would need to be individually considered. However, the final climate finance data that we used included approximately 85000 individual projects with very limited description, making it impossible to carry out a detailed analysis. The OECD has already developed a tool based on machine learning to link financed projects to the SDGs, but this tool has not been applied to the climate-relevant finance data and most importantly, it only functions at the SDG level and not also at the target level (Pincet, Okabe and Pawelczyk, 2019). In this study, we took an additional step by linking projects to the SDG target level. Moreover, by basing our linkages on careful reading of the categories descriptions, we could more accurately place these under the correct SDG targets by avoiding the use of misleading keywords and having a better overview of the full context. Finally, as these were all climate-related projects, we could also make educated decisions based on potential climate-related activities that may have been placed under a certain (sub-)sector. The issue of SDG targets overlaps could be partly addressed through the use of primary and secondary targets, but as explained in the Results section, some limitations still remain. By only using the primary SDGs and respective targets in the analysis, we could better avoid double counting or missing activities between the NDC-SDG Connections tool and the climate-related finance data. As the developers of the NDC-SDG Connections tool, we had a good overview of the primary SDG of specific types of climate activities and ensured that this was well reflected in the finance-SDG linkages.

6. Conclusions

Our assessment of NDC actions through the SDG lens shows that in the case of most SDGs, the majority of actions puts the focus on adaptation rather than mitigation, except in the case of SDGs 7, 11, 12 and 17. Although countries include more adaptation-relevant actions in their national climate plans than mitigation-relevant actions, as our data illustrates, and although the split between mitigation and adaptation finance was internationally agreed to seek to be balanced, much more climate finance is allocated to mitigation than to adaptation. While the donors' allocation of climate finance, as our data shows, has become more balanced in the post-Paris period, there is still a much stronger focus on mitigation than on adaptation to this day. Donors need to further address this issue in order to align with the international agreement on this matter.

At the SDG level, our findings show that there is substantial alignment between recipient countries' broad priorities and what donors focus on in their finance allocation decisions. While this is positive from a coherence and ownership perspective, surprisingly, there does not seem to be a clear trend for stronger

alignment between recipient and donor priorities after the conclusions of the Paris Agreement. Moreover, a less strong alignment is observed at the target level, suggesting that, while the key priority areas are matched, there is less agreement between donors and recipients on the specificities of how these areas should be addressed. For the future, a more detailed analysis of committed finance project descriptions relative to specific countries' NDCs could reveal further insights into what causes this mismatch and why donors and recipients may be in disagreement on the climate and SDG implementation approach. Moreover, another promising avenue for research includes investigating whether the alignment between recipient and donor priorities increase or decrease in the context of the ongoing process of NDC updates. For policy makers, improving transparency on needs and interests on both sides, donors and recipients, and seeking to further align climate-relevant financial support with development priorities could help increase acceptability of external projects, enhance the sense of ownership and attract more private finance.

This study highlights the great potential of climate finance to contribute to other sustainable development areas and vice versa. A better alignment and a focus on maximizing synergies between climate and the SDGs, especially with a view to long-term impacts, could improve the efficient use of development finance in the future, achieving more with less. Yet, while the urgency of climate change is looming ever closer, this study also shows that countries are far from meeting their climate finance promises. While the international agreement has been to reach USD 100 billion / year of climate finance by 2020 (postponed to 2025), the sum total of climate-relevant finance, even when projects that do not have climate as a principal objective are included, only reached an average of USD 65 billion / year during 2016-2018. In this context, the results of this study are especially important as they could help both boost the interest in climate-relevant finance and also improve the efficient use of available financial resources.

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