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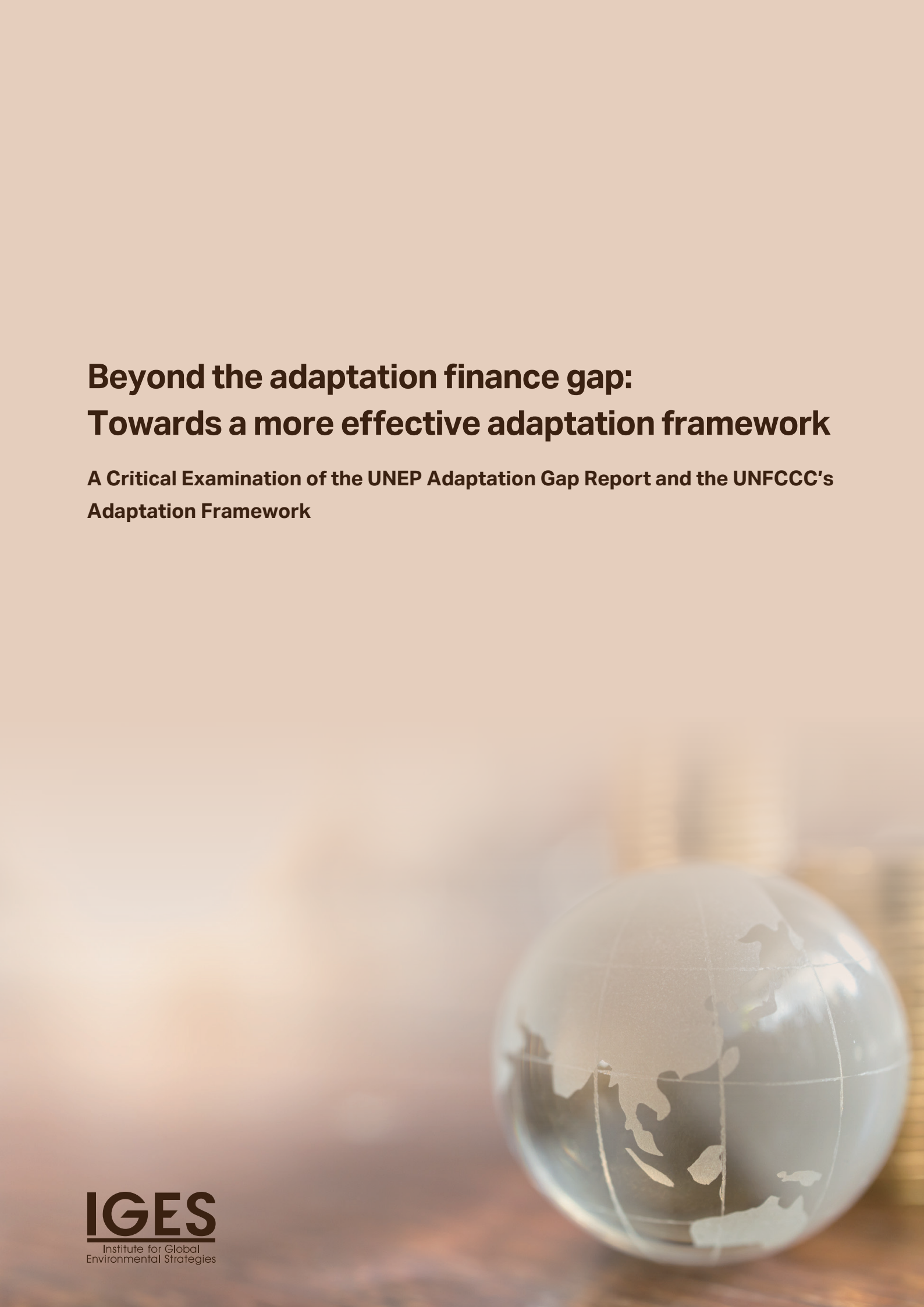

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A Critical Examination of the UNEP Adaptation Gap Report and the UNFCCC's Adaptation Framework

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Executive Summary

This paper critically reassesses the dominant narrative that insufficient adaptation finance is the primary obstacle to climate change adaptation in developing countries. Through a comprehensive review of UNEP's 2023 Adaptation Gap Report (AGR2023), which has played a pivotal role in shaping this narrative, the paper uncovers serious methodological challenges in the estimation of the adaptation finance gap. These challenges are rooted in deeper, underexplored structural issues within the UNFCCC's adaptation framework. Chief among these is the absence of clear boundaries for adaptation activities and the conflation of costs associated with human-induced climate change (HI-CC) and natural climate change (N-CC). This conflation creates a misalignment between National Adaptation Plans (NAPs) and the UNFCCC's core mandates, complicating the assessment of adaptation finance needs. By illuminating these overlooked issues, the paper advocates for more rigorous, evidence-based discussions at COP, urging a closer examination of the data underpinning climate negotiations. It argues that the complex challenges of adaptation—such as the lack of universally agreed targets and the difficulty in disentangling human and natural climate impacts—demand more precise, carefully designed solutions. Ultimately, addressing these systemic issues is vital to ensuring that adaptation efforts are both equitable and effective, enabling more resilient outcomes for all developing countries.

Keywords: adaptation finance; GAP report; national adaptation plans; adaptation policy; climate justice

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1. Common understanding of the international community on adaptation

There is a growing consensus that one of the significant impediments to climate change adaptation in developing countries is the lack of adaptation finance (UNFCCC 2023). The outcome document of the first global stocktake at COP28 in 2023 states:

"Notes with concern that the adaptation finance gap is widening, and that current levels of climate finance, technology development and transfer, and capacity-building for adaptation remain insufficient to respond to worsening climate change impacts in developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change" (UNFCCC, 2023).

While recognizing the progress made by developed countries in responding to the call for at least doubling their collective provision of climate finance for adaptation to developing countries from 2019 levels by 2025, the COP28 outcome document states:

"Recognizes that adaptation finance will have to be significantly scaled up beyond the doubling" and responded to the recognition of the adaptation finance gap (ibid.).

COP29 has been widely recognized as the "Finance COP," emphasizing the pivotal role of finance in addressing climate change. The New Collective Quantified Goal (NCQG) on climate finance is expected to dominate discussions, which must have implications for scaling up financial support for adaptation efforts.[1]

The UNEP Adaptation Gap Reports (AGR), published annually, have significantly contributed to this shared understanding within the international community (UNFCCC 2023). The adaptation cost estimates in these reports were referenced in the IPCC report (New et al., 2022) and the report by the Adaptation Committee, which assessed adaptation costs based on the submitted Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) (Adaptation Committee, 2022), and have been treated as reliable information. The latest publications, the Adaptation Gap Report 2023 (UNEP 2023a; hereinafter AGR2023) and the Adaptation Funding Gap Update 2023 (UNEP 2023b; hereinafter AFGU2023), were released just before COP28, with the explicit intention to impact international negotiations by stating that "this new adaptation finance gap estimate is relevant in the discussion of the nature and size of the new collective, quantified goal on climate finance, to be set prior to 2025 by the Parties to the UNFCCC" (UNEP, 2023a, 2023b).

Consequently, the COP28 outcome document uses the estimates and assessments for adaptation finance needs and gap given in the AGR2023 as they are, stating:

[1] World Economic Forum. 2024. *With fewer than 100 days to COP29, what's on the agenda?* Available at: https://www.weforum.org. Accessed [10/22/2024]

"Also highlights that the adaptation finance needs of developing countries are estimated at USD 215-387 billion annually up until 2030 ..." and "Notes with concern that the adaptation finance gap is widening...." (UNFCCC, 2023).

The impact of the reports on international negotiations at the COP was significant and their analyses are directly incorporated into the COP Decision. In this case, the validity of the contents of these reports should be carefully examined before reaching an agreement. However, there is no evidence that such verification was conducted in reaching an agreement at COP28. Subsequent research publications have endorsed the conclusions of this report, underscoring the gravity of the adaptation finance gap issue, while none have scrutinized the credibility of AGR2023's analysis (Malik et al. 2024, GCA and CPI 2023).

It is well understood that adaptation is one of the two key pillars of climate change actions. However, its advancement faces numerous challenges, many of which are not only complex but also deeply interconnected. Determining the most effective ways to drive adaptation efforts forward is far from straightforward. This complexity underscores the need for the COP to identify priority actions and formulate responses based on accurate information and thorough analysis.

However, questions persist about whether the emerging consensus—that a lack of adaptation finance is the primary barrier to climate change adaptation in developing countries—has been built upon sufficiently scrutinized information. Doubts also arise regarding the robustness of the analysis presented in AGR2023 and AFGU2023, which have significantly shaped this narrative.

This paper begins by critically examining AFGU2023's analysis of adaptation finance, revealing significant challenges that highlight the need for more careful vetting of such information before it is used in COP discussions. However, this paper goes beyond critiquing these financial estimates to address deeper, underexplored structural issues in the adaptation framework under the UNFCCC. Most notably, it identifies the lack of clear boundaries for adaptation activities in NAPs and the misalignment between these activities and the UNFCCC's mandates (i.e. conflation between HI-CC adaptation and N-CC adaptation). These structural issues could potentially be the root cause of the problems in the AFGU2023's adaptation finance gap estimate. These systemic issues present substantial challenges to the reliability and relevance of adaptation finance (AF) needs reported in NAPs, as well as the equitable distribution of funds.

By uncovering these root causes, the paper calls for a fundamental rethinking of the UNFCCC's approach to adaptation, advocating for the development of a more structured and cohesive system that can address the inherent complexities of adaptation. Ultimately, the paper aims to foster more informed and evidence-based COP discussions, ensuring that key institutions provide more relevant and reliable information to support effective adaptation efforts.

2. Review of the Adaptation Gap Report[2]

This section examines AFGU2023, which COP cited in the COP 28 Decision without verifying its contents. First of all, it is essential to recognize the numerous challenges involved in producing comprehensive adaptation finance estimates. AFGU2023 was fully aware of these challenges and elaborated on them before estimating the necessary adaptation finance (Watkiss, 2023). The critiques offered here are intended to make constructive contributions to enhance the robustness and reliability of such estimates rather than undermine the credibility of the efforts behind them.

It should be also noted that the analysis here assumes that AFGU2023 formulated various estimates so as to inform COP negotiations. Hence, if the purpose of the estimations is redefined and specified as such in future AFGUs, the criticisms stated herein will no longer be relevant.

AFGU2023 estimated the necessary adaptation finance for all developing countries using two methods:

1. Sectoral model calculations (adaptation cost estimation)
2. Reviewed adaptation finance needs (AF needs) reported in NDCs and NAPs (AF needs estimation)

It calculated the adaptation finance gap by comparing these estimated values with estimates of the amount of finance available for developing countries (UNEP 2023b).

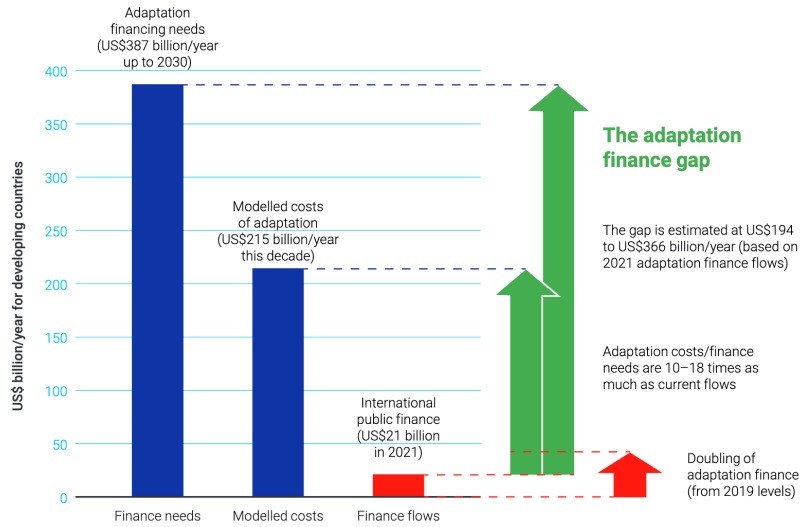
AGR2023 showed Figure 1 below and concluded:

"Estimated adaptation costs and needs for developing countries are significantly higher than previous estimates, with a plausible central range of USD 215 billion to USD 387 billion per year this decade" and "the adaptation finance gap is likely 10-18 times as great as current international adaptation finance flows - at least 50 percent higher than previous estimates." (UNEP, 2023a).[3]

[2] Several reports on adaptation finance were published recently. However, only a limited number of reports made their own analysis of finance needs, and most of them refer to the estimates of the AGR (CPI 2023; Falduto et al. 2024; OECD 2023; Oxfam 2022, 2023; Songwe et al. 2022). In addition, the COP28 outcome document cited only the AGR2023's estimate. Therefore, this article focuses on the review of AGR2023 and AFGU2023. Entities under the UNFCCC analyse financial needs based on NDCs and NAPs (Adaptation Committee 2022; Standing Committee on Finance 2021). This paper also analyses the characteristics of these values in the latter half of this paper.

[3] In contrast, GCA and CPI, which reanalyse the AFGU2023 results, find that "developing countries currently need about USD 212 billion per year in adaptation finance up to 2030. Only USD 56 billion were tracked for adaptation in 2021-2022. Adaptation finance flows must almost quadruple." GCA and CPI have the same basic message as AFGU2023 by saying, "adaptation funding gap continues to widen concerningly." However, there is a marked difference from AFGU2023 in the assessment of the size of that gap (GCA and CPI, 2023).

Figure 1: Comparison of adaptation financing needs, modelled costs and international public adaptation finance flows in developing countries



Note: Values for needs and flows are for this decade, while international public finance flows are for 2021. Domestic and private finance flows are excluded.

Source: UNEP, 2023a

This section sequentially examines each step leading to the estimation of the adaptation finance gap conducted by AFGU2023, highlighting key challenges within its analyses. First, regarding the adaptation cost estimation step, the challenges related to the necessity of distinguishing between human-induced climate change (HI-CC) and natural climate change (N-CC) is the main target of the analysis. Next, for the AF needs estimation step, the focus is primarily on the reliability of the estimates through conducting a sensitivity analysis with respect to the chosen estimation methodology (Note: The issue of distinguishing between HI-CC and N-CC in the context of AF needs estimation is revisited in the next section, where an analysis of the NAP scheme is undertaken). Following this, the fundamental concerns in attempting such assessments in these two steps are explained. Finally, for both the step on estimating the amount of finance available for adaptation and the final step on calculating the adaptation finance gap, the analysis focuses mainly on the logical consistency of their analyses.

2.1 Adaptation cost estimation based on sector-specific model calculations

First, the adaptation cost estimation of AFGU2023 is examined here primarily through the perspective of the imperative to differentiate between HI-CC and N-CC. In doing so, a few key concepts should be explained first as prerequisites.

The UNFCCC defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate

variability observed over comparable time periods" (UNFCCC, 1992). The UNFCCC covers only HI-CC, excluding N-CC, which occurs even without human influence. Therefore, adaptation under the UNFCCC refers only to activities to address HI-CC and does not cover activities to address N-CC.

The principle of Common But Differentiated Responsibility and Respective Capability (CBDR-RC) was established under the UNFCCC (UNFCCC, 1992), considering factors such as historical GHG emissions, economic capabilities, and technological capacities. Considering this principle, financial mechanisms such as the Green Climate Fund (GCF), funded by contributions mostly from developed countries, have been established, supporting adaptation efforts in developing countries.[4] Discussions on justice and equity in adaptation negotiations are also mainly based on this principle and its background factors.

Conversely, the IPCC defines adaptation as "The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects" (IPCC, 2022).

AFGU2023 adopts the IPCC's definition of adaptation. This includes adaptation to N-CC, i.e., general disaster prevention activities against natural climate risks. This difference in definition has significant implications. Adaptation to N-CC is deemed ineligible for international financial support under the UNFCCC. Preparing for N-CC, including mobilizing necessary funds, is primarily a national government responsibility or a matter that should be discussed outside the UNFCCC. Adaptation to N-CC also lacks arguments that should be discussed regarding issues such as justice and equity under UNFCCC. The estimated necessary adaptation finance, which includes both adaptation to HI-CC and adaptation to N-CC, cannot be used as an approximation of the necessary adaptation finance for HI-CC for the discussion under the UNFCCC, as there is a significant global shortage of investment both in adaptation to N-CC as well as in adaptation to HI-CC (Parry et al., 2009; Miyamoto International, 2019; Hallegatte et al., 2019).

Therefore, distinguishing adaptation costs for HI-CC from those for N-CC is crucial for providing meaningful insights in UNFCCC negotiations. Scenario analyses, while imperfect, could contribute to more relevant financial assessments.[5]

With this understanding in mind, this subsection examines the adaptation cost estimation conducted through the sectoral model calculations performed in AFGU2023.

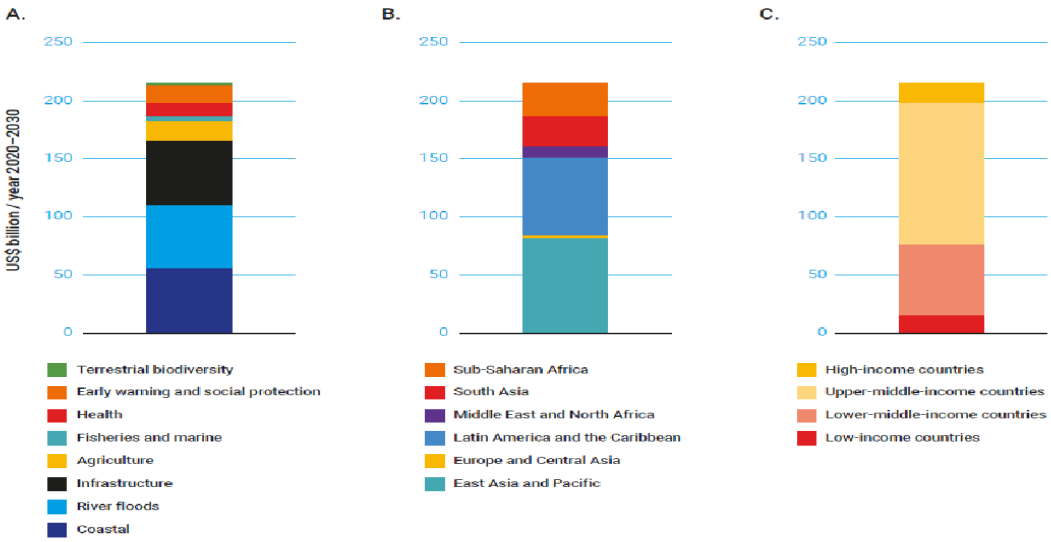
Based on sectoral model calculations, adaptation costs were estimated at approximately USD 215 billion per year over the current decade, with a range of USD 130-415 billion per year (UNEP, 2023a). As indicated in

[4] However, in the overall adaptation finance landscape, the share of adaptation finance provided via bilateral actors is much larger (Weikmans, 2023).

[5] One possible approach to estimating such a cost is to subtract the adaptation cost calculated separately under the zero HI-CC scenario from the total adaptation costs. For example, by extrapolating the trend of the values indicated in the three middle bars (RCP2.6, RCP4.5, RCP8.5) in Figure 3, we can predict that the estimated adaptation costs under the zero HI-CC scenario are far from negligible. Other approaches could also be used.

Figure 2, coastal zones, river floods, and infrastructure accounted for about 80% of the total costs (Watkiss et al., 2023). Therefore, analyzing these sectors' model calculations provides an overview of this estimate.

Figure 2: Estimated costs of adaptation for developing countries by sector, region and income group for 2030 (indicative central value)



Source: Watkiss et al., 2023

2.1.1 Coastal Zones

The model calculations for coastal zones utilized the Co-designing the Assessment of Climate Change (COACCH) project's Dynamic Interactive Vulnerability Assessment (DIVA) model (Watkiss et al., 2023). Starting from the current protection level, this model determined the necessary protection costs as the value of protection cost when the sum of the additional protection cost and the residual damage cost is minimal, depending on the future sea level rise scenarios (Lincke et al., 2018). These calculations included climate disaster prevention costs for N-CC beyond the adaptation costs for HI-CC.

2.1.2 Flood protection and water

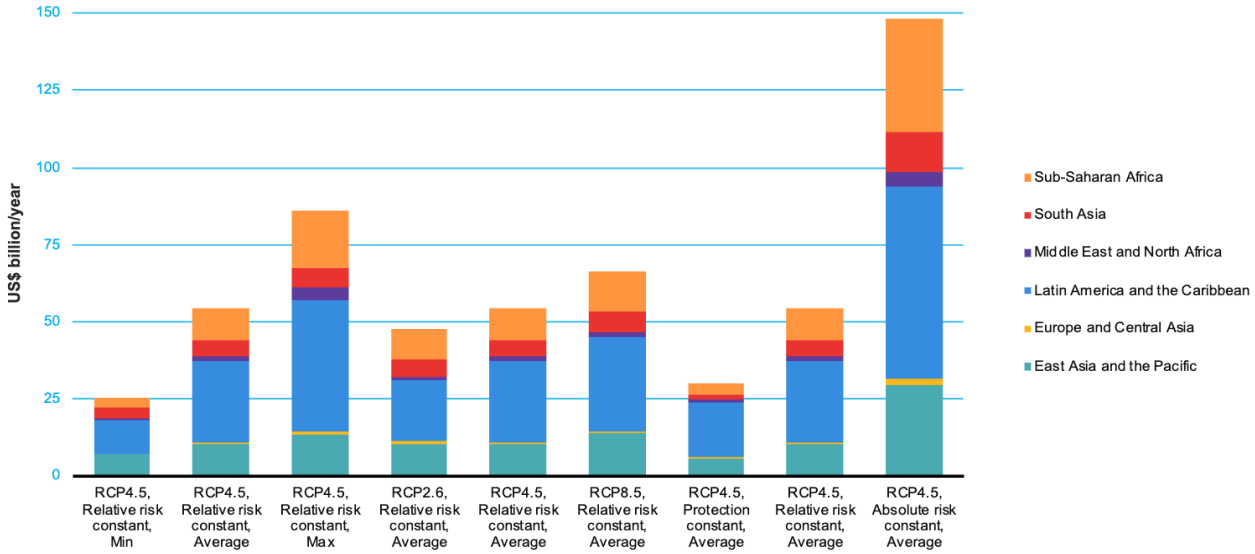
Model calculations for flood protection were conducted using the GLOFRIS flood model (Ward et al., 2017; Watkiss et al., 2023), which set three adaptation objectives as below:

1. Protection constant
2. Relative risk constant
3. Absolute risk constant

Calculations were performed under several RCP-SSP scenarios for each objective as illustrated in Figure 3 (ibid.). The GLOFRIS flood model's calculations incorporated existing infrastructure maintenance costs, indicating the

inclusion of disaster prevention costs for N-CC preparedness (Ward et al., 2017).

Figure 3: Adaptation river flood costs for developing countries for different RCPs, climate model runs and objectives for the period 2010-2050 (constant 2021 USD)



Source: GLOFRIS model team, as cited in Watkiss et al., 2023

The value of the relative risk constant was used as an "indicative central value" in calculating the total adaptation costs, as it represented the median among the three objectives' calculations. However, the median value does not necessarily indicate the most appropriate objective.
Ward et al.'s original paper set three adaptation objectives as below:

1. Optimize
2. Relative risk constant
3. Absolute risk constant

They calculated the Net Present Value (NPV) and required costs for each scenario (Ward et al., 2017), showing that the "optimize" objective has the highest NPV and requires about half the cost compared to the "relative risk constant" objective, suggesting it is the most desirable objective. Despite this, AFGU2023 did not calculate adaptation river flood costs using the "optimize" objective but used the "relative risk constant" in the final estimate without providing any reasons for this.

As demonstrated in Figure 3, the choice of an adaptation objective has a more significant impact on cost estimates than the choice of a RCP scenario, resulting in cost disparities up to fivefold. This type of adaptation cost estimate requires at the very least, some meticulous analysis for defining and justifying a suitable adaptation objective. Unfortunately, the AFGU2023 did not provide any such arguments.

2.1.3 Infrastructure

The model calculations for infrastructure relied on several studies by the World Bank team, whose results were adjusted to be comparable with those for other sectors (Watkiss et al., 2023). The focus was on calculations for the energy and transport subsectors, as values for other infrastructure subsectors were estimated using different approaches (ibid.).

In the World Bank team's study, Rozenberg et al. estimated the investment needed to achieve universal access to electricity (SDG 7), greater mobility, and other developmental goals, recognizing the significant global infrastructure gap: 94 million individuals without electricity, 663 million lacking improved drinking water sources, and 2.4 billion without improved sanitation facilities (Rozenberg et al., 2019).

Building on this, Hallegatte et al. estimated the additional investment required to make all this infrastructure more resilient (Hallegatte et al., 2019). They clarified that this investment for resilience is necessary even in the absence of climate change but is even more significant in the presence of climate change. This estimation approach implies that the calculation results for building resilience include not only the cost of adaptation under the UNFCCC but also costs for additional disaster preparedness for N-CC. Moreover, the original study included costs for preparedness against non-climate hazards such as earthquakes (Miyamoto International, 2019; Hallegatte et al., 2019). AFGU2023, however, did not explain how these factors were handled, potentially leading to an overestimation of adaptation costs (UNEP, 2023b).

The cost of building resilience is comparatively small when viewed against the investment required to establish the infrastructure (Hallegatte et al., 2019). Therefore, discussions centered solely on the incremental cost of resilience without addressing the larger infrastructure investment needs can be misleading.

The assessments of the model calculations for the three main sectors revealed the following:

- The adaptation costs for both HI-CC and N-CC were included in the estimates of AFGU2023.
- The calculation results can vary by up to a factor of five depending on the choice of adaptation objective (as inferred from the flood protection model calculations).
- This type of adaptation cost estimate requires at the very least, meticulous analysis for defining and justifying a suitable adaptation objective. Unfortunately, AFGU2023 did not provide any such arguments.

2.2 AF needs estimation based on NDCs and NAPs

The method used for calculating adaptation finance needs (AF needs) of all developing countries was a statistical analysis based on data from 85 Nationally Determined Contributions (NDCs) or National Adaptation Plans (NAPs) that have reported AF needs. The results showed that “the average adaptation finance needs for

all developing countries for 2021-2030 are estimated at USD 387 billion per year (with a range of USD 101-975 billion per year)" (Chapagain et al., 2023).

The methodology involved:

1. Per Capita Calculation: AF needs values reported in NDCs or NAPs were divided by each country's population to derive per capita AF needs values, with some adjustments.

2. Income Categories: The per capita AF needs values were categorized into three income levels (Income 1: low-income, Income 2: lower-middle-income, Income 3: upper-middle-income and high-income).

3. Median Values: Median values were calculated for each category, multiplied by the total population in each income category, and then aggregated to obtain an overall estimate.

The range value (USD 101-975 billion per year) corresponds to the values calculated using the upper and lower limits of the interquartile range (IQR) for each income category.

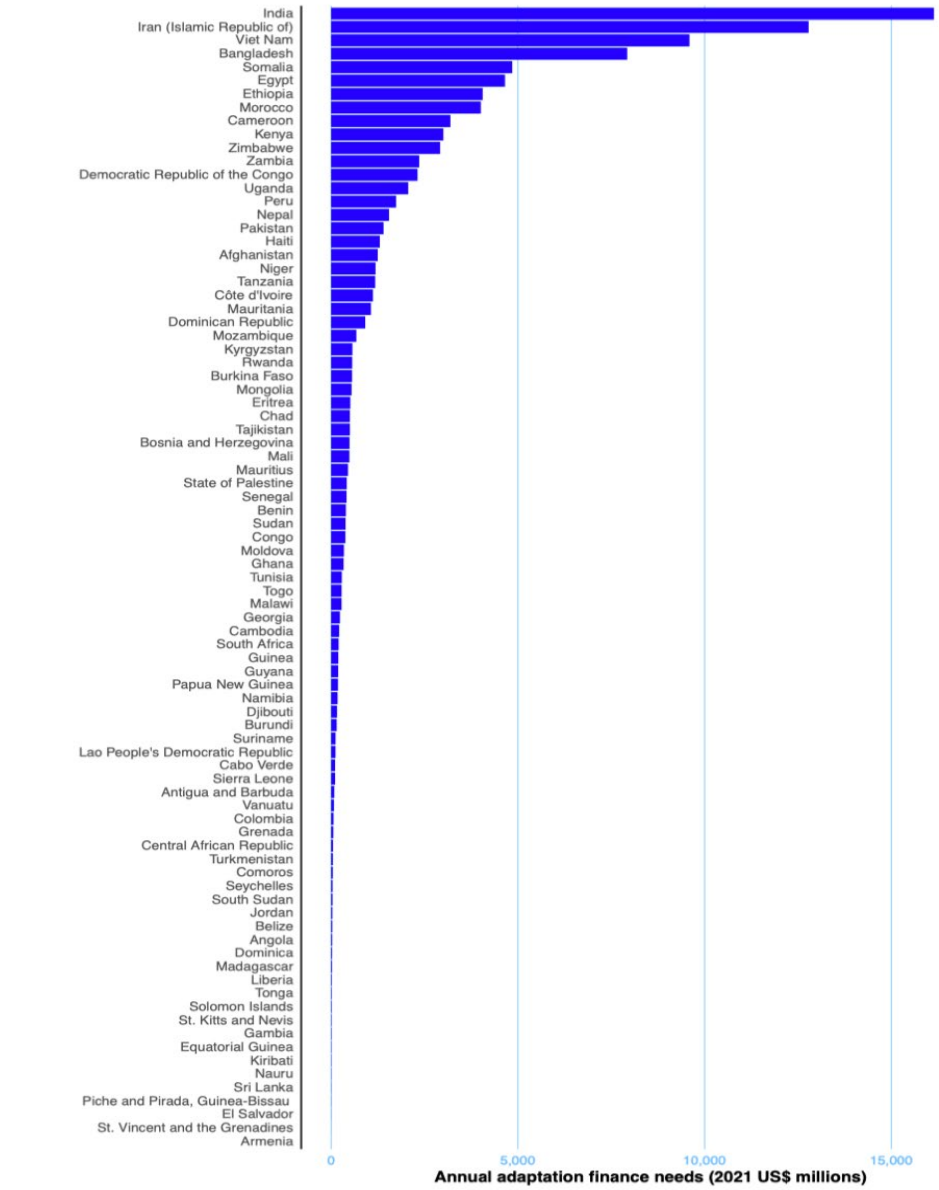
To verify the AFGU2023 estimate, this paper conducted additional estimations using four alternative approaches after attempting to reproduce the original calculation. Two of these approaches involve different selection methods for representative values, while the other two utilize the reported data from the countries without modification. The data for these estimations were extracted from the bar chart values in Figure 4 of AFGU2023 and converted to numerical values using a web application.[6] Population and GDP data were sourced from the World Bank's World Development Indicators database[7], as referenced in AFGU2023.

The primary focus here is on a sensitivity analysis of the AFGU2023 estimate with respect to the chosen estimation methodology. The analysis distinguishing between HI-CC and N-CC is deferred for later consideration of the NAP scheme. To conclude first, the AF needs reported through NDCs and NAPs include both HI-CC and N-CC AF needs.

[6] Automeris. n.d. *WebPlotDigitizer: Extract Data from Plots, Images, and Graphs.* Available at: https://automeris.io. Accessed [7/1/2024]

[7] World Bank (2023). *World Development Indicators.* Available at: https://databank.worldbank.org/source/world-development-indicators. Accessed [7/1/2024].

Figure 4: Adaptation finance needs of countries as reported in their NDCs or NAPs



Note: The amounts are normalized to an annual average for 2021–2030 and adjusted to constant 2021 dollars.

Source: Chapagain et al., 2023

Using the same methodology as AFGU2023, the calculation yielded a figure of USD 383 billion per year, closely matching the AFGU2023 value, as shown in Table 1.

In contrast, the first alternative approach involved calculating the median for each category after weighting the per capita AF needs by the population of each country, instead of using the per capita AF needs without weighting, accounting for the validity of the values in proportion to their populations.

The second alternative approach involved using a single median value derived from the per capita AF needs of all countries, multiplied by the total population. This method was based on the evaluation of the necessity of categorizing countries into three income levels by estimating the correlation coefficient between per capita GDP (as a proxy for income level) and per capita AF needs. The correlation coefficient was found to be only 0.474, after excluding one outlier and countries with AF needs of USD 50 million per year or less due to potential reading errors. This low correlation suggests that categorizing by income level may not be essential.

The third and fourth alternative approaches used the reported AF needs of the 85 countries as they are and estimated values only for the remaining countries applying two methods (using median with and without weighting). This approach contrasted with AFGU2023's, which recalculated almost all the country values using the median of each income category. AFGU2023 method used unmodified data for only 3 out of 85 reported AF needs data as median values of three categories. Table 1 summarizes the results from these different calculations.

The table demonstrates that all alternative estimations yielded significantly lower values than the AFGU2023 estimate, ranging from USD 65 billion to 327 billion per year. The lowest estimate is less than 20% of the AFGU2023 value.

Reproducing the AFGU2023 range estimate (USD 101-975 billion per year) results in values between USD 103-967 billion per year. Using the weighted median approach, the range narrows to USD 57-293 billion per year, with both upper and lower limits considerably lower than the AFGU2023 estimates.

Table 1: Estimated Adaptation Finance Needs of Developing Countries by Income Category by using different approaches (USD million)

	Estimates for All Countries			Estimates Only for Countries Without Reported Values	
	Using AFGU Median (AGR Method)	Weighted Median	Without Grouping	Using AFGU Median	Weighted Median
Income 1	15,802	18,007		24,770	25,016
Income 2	173,163	39,013		118,404	86,275
Income 3	194,342	8,278		184,169	12,916
Total	383,306	65,297	291,455	327,343	124,207

Source: Author's calculation

One reason for the large discrepancies in estimates is the wide variation in per capita AF needs across countries. Table 2 highlights the top and bottom 15 countries in terms of per capita AF needs. Values for countries with AF needs of USD 50 million per year or less are excluded due to potential inaccuracies.

*Table 2: List of Top and Bottom 15 Countries in Per Capita Adaptation Finance Needs (USD/capita/year)**

Ranking	Bottom 15 Countries	per capita AF needs	Top 15 Countries	per capita AF needs
1	Colombia	1.19	Antigua and Barbuda	880.50
2	South Africa	3.45	Grenada	494.02
3	Pakistan	6.03	Mauritius	356.49
4	Sudan	8.54	Somalia	283.77
5	Turkmenistan	9.71	Vanuatu	257.19
6	Ghana	10.00	Guyana	255.04
7	Central African Republic	11.28	Suriname	234.33
8	Burundi	11.44	Mauritania	231.21
9	India	11.49	Cabo Verde	209.41
10	Sierra Leone	12.18	Zimbabwe	182.19
11	Cambodia	13.61	Mongolia	165.49
12	Malawi	14.44	Bosnia and Herzegovina	150.56
13	Guinea	15.16	Djibouti	148.49
14	Lao PDR	16.58	Iran	145.40
15	Tanzania	18.39	Eritrea	141.70

* These estimates are not based on the values reported by each country but on the values read from the bar chart in Figure 4.
Source: Author's calculation

There is substantial disparity between the highest and lowest values for per capita AF needs. For example, the difference between the top and bottom ranks is 740 times. Even at the 5th, 10th, and 15th ranks, the differences are 26, 15, and 8 times, respectively. This indicates a broad overall variation rather than a few outliers. Consequently, changing the selection method for representative values can result in significant differences in the estimated results.

The significant discrepancies in per capita AF needs between the top and bottom countries may arise from various factors, including the scope of 'country needs,' the boundaries set for adaptation activities, and the climate risks faced by each country. While some of the top-ranking countries, such as Small Island Developing States (SIDS), are indeed highly vulnerable to climate change, the presence of more populous countries like Somalia, Zimbabwe, and Iran suggests that these figures might also reflect decisions made at the national level regarding the scope of their adaptation activities, rather than purely environmental, geographical, or demographic characteristics.

Even when using reported data for 85 countries, the final estimates differed by more than a factor of 2.5, depending on the estimation method for the remaining population. One contributing factor to this discrepancy is that countries with almost half of the total population of developing countries have not yet reported AF needs, necessitating extensive extrapolation, as shown in Table 3.

Table 3: Total Population by Income Category, with and without Adaptation Finance Needs Reporting (million)

	Total Population	Reported Population	Remaining Population
Income 1	718	638	80
Income 2	3,395	2,582	813
Income 3	2,399	191	2,208
Total	6,513	3,411	3,102

Source: Author's calculation

For the Income 3 category, extrapolation is required for the portion of the population that is more than 10 times the population of the countries reporting AF needs. This category alone accounts for about 70% of the extrapolated population, significantly impacting the overall estimate.

To illustrate the characteristics of AFGU2023's estimate, the cumulative share of AF needs for the most populous countries out of the total estimated AF needs for all developing countries (USD 383 billion per year) is presented in Table 4. China and India alone account for 49%, and the top 10 countries represent 70%.

Therefore, the AFGU2023 estimate, if valid, suggests that a limited number of populous countries lack adaptation funds rather than indicating widespread underfunding across all developing countries. (However, it is worth noting that AFGU2023 offered equivalent AF needs values for LDCs and SIDs. Therefore, AFGU2023 partially addressed this issue of representativeness.) Note that among these countries, India, Pakistan, Bangladesh, and Ethiopia have reported AF needs in their NDCs or NAPs. Their combined reported needs total USD 29,569 million per year, whereas the corresponding (recalculated) AFGU2023 estimate is USD 94,871 million per year, more than three times the reported value, casting doubt on its validity even for a limited number of large countries.

Table 4: Cumulative Needs of the Top 10 Most Populous Countries as a Percentage of Total Adaptation Finance Needs

Country	Population (million)	Estimated AF Needs (USD million /year)	Cumulative (%)	Reported Value* (USD million /year)
China	1412	114,401	29.8	
India	1408	71,786	48.6	16,170
Indonesia	274	13,961	52.2	
Pakistan	231	11,802	55.3	1,395
Brazil	214	17,360	59.8	
Nigeria	213	10,883	62.7	
Bangladesh	169	8,637	64.9	7,941
Mexico	127	10,263	67.6	
Ethiopia	120	2,646	68.3	4,063
Philippines	114	5,808	69.8	
Red total		94,871		29,569

* These are not the values reported by each country itself, but the values read from the bar chart in (Chapagain et al., 2023) cited in Figure 4.

Note: Countries in red denote those countries that reported adaptation finance needs in their Nationally Determined Contributions (NDCs) or National Adaptation Plans (NAPs)

Source: Author's calculation

As described above, calculations based on AF needs reported through NDCs and NAPs revealed several characteristics:

- AFGU2023's estimates relied on extrapolation or recalculation for almost all countries, with minimal use of the reported values by countries as they are.
- The results are highly variable; minor changes in calculation conditions can lead to significantly different values.
- The substantial variation in per capita AF needs across countries significantly impacts estimates.
- The figures predominantly represent the AF needs of a few populous countries rather than the overall situation in developing countries.

2.3 What does adaptation finance estimation mean?

The AFGU2023 estimates raise serious concerns regarding their relevance and reliability. The conflation of adaptation costs for HI-CC and N-CC raises concerns about the relevance of such estimations to the UNFCCC negotiations. The high sensitivity of the calculation results when it comes to the choice of calculation method and the lack of a justifiable calculation method casts doubts on the reliability of such an estimate. The estimate disproportionately reflects the needs of a limited number of populous countries, overshadowing the diverse and specific AF needs of less populous nations.

The report by Rozenberg et al., which AFGU2023 relied on for infrastructure model calculations, underscores the issue of presenting such a single-number estimate, stating, "we make clear how misleading single-number estimates can be" and "most assessments of infrastructure investment needs produce a single number that cannot inform the debate about the ambitions and goals of infrastructure investments or about cost drivers and critical assumptions" (Rozenberg et al., 2019). This problem is evident in the adaptation finance estimation in AFGU2023.

However, the issues with the AFGU2023 estimates do not end there. A more significant concern is that AFGU2023 fails to fully account for the context in which these estimations were made. AF needs in NDCs and NAPs are reported information under the rules of the UNFCCC. As long as these reports comply with the defined rules, the reported values are required to be respected as they are unless COP requests their verification. Unless specifically mandated by a COP agreement, these cannot be replaced by alternative values calculated separately. Discussions on adaptation finance should be based on information submitted by countries to the UNFCCC through NDCs, NAPs, etc., with equal respect. In contrast, AFGU2023 not only estimated AF needs based on country-reported information through NDCs and NAPs but also calculated adaptation costs using models, AGR2023 presenting them together as a "plausible central range" (UNEP, 2023a). Even in the former estimation, statistical processing involved excluding some country data as "outliers" and recalculating almost

all countries' values (ibid.). This approach is equivalent to the AFGU2023 arguing that developing countries' reported values are unreliable and should be replaced by alternative calculations, but such an approach should not have been acceptable under the UNFCCC framework, despite COP28 highlighting the AFGU2023 estimation results in its decision.

The IPCC has pointed out the difficulty of estimating adaptation costs for all developing countries based on submitted NDCs and has suggested the need for more transparency and better guidance for calculating adaptation costs (New et al., 2022). However, this is not merely a technical issue, as IPCC suggested, but a fundamental one that concerns the integrity of the UNFCCC scheme.

2.4 Available Adaptation Finance and the Adaptation Finance Gap

After estimating the necessary adaptation finance for developing countries using the two methods described above, AFGU2023 estimated the "amount of finance available for adaptation" (Savvidou et al., 2023). This estimation only included international financial flows, excluding domestic expenditure and private finance entirely (ibid.). The AFGU2023 key messages acknowledged the importance of domestic expenditure and private finance but noted that quantitative estimates remain unavailable and asserted that neither could bridge the adaptation finance gap alone (ibid.).

The difference between the estimated necessary adaptation finance and the estimated amount of available international adaptation finance was referred to as the "adaptation finance gap" (Chapagain et al., 2023). AFGU2023 emphasized the significance of the adaptation finance gap, stating that "the adaptation finance needs of developing countries are estimated to be 10-18 times as much as international public finance flows" (ibid.).

Furthermore, AGR2023 and AFGU2023 claimed that the "adaptation finance gap is widening" and that "a widening adaptation finance gap indicates a deepening climate crisis and will lead to increased loss and damage" (UNEP, 2023a; Watkiss et al., 2023). The AFGU2023 key messages also emphasized that there are important equity issues in using domestic budgets to address the finance gap in these developing countries.

However, these arguments have foundational challenges.

First, although the adaptation finance gap was defined as "the difference between the estimated costs of meeting a given adaptation target and the amount of finance available for adaptation" (UNEP, 2014), AFGU2023 excluded domestic expenditure and private finance in its estimation. By presenting the difference between the necessary adaptation finance for developing countries and the international adaptation finance flows as the adaptation finance gap, AFGU2023 inflated the gap drastically.[8] Moreover, the more eye-catching

[8] For example, Allan et al. analysed adaptation spending in diverse developing countries and reported that share of climate expenditure from domestic sources accounted for 45%-91% (Allan et al., 2019).

materials, such as key messages (UNEP, 2023c) and web pages,[9] argued that the estimated result was the adaptation finance gap without explaining this critical limitation by omitting the footnote on domestic expenditure. The explanation that "neither domestic expenditures nor private finance flows are likely to bridge the adaptation finance gap alone" conflated additional domestic expenditures that can be used to bridge the gap with the domestic expenditures already used, which should be counted in estimating the adaptation finance gap.

Second, AFGU2023 inconsistently argued that it is not possible to provide quantitative estimates for domestic expenditure and private finance, despite acknowledging studies that assessed domestic climate expenditures (Savvidou et al., 2023). As a reason for this, AFGU2023 mentioned that the Adaptation Committee, which assessed 14 national studies reporting adaptation-only expenditure, claimed not to recommend direct cross-country comparisons due to methodological differences (ibid.). However, AFGU2023 used a similar approach to estimate the AF needs of all developing countries, comparing all the reported AF needs values in NDCs and NAPs and conducting statistical analysis. This inconsistency undermines the credibility of AFGU2023's argument.

Third, in estimating the amount of adaptation finance needed in developing countries, through both adaptation cost estimation and AF needs estimation, the costs of adaptation for both HI-CC and N-CC are counted (This is further explained in the case of AF needs estimation later in this paper). However, this fact is not fully considered in the discussion. For instance, the statement that "the adaptation finance needs of developing countries are estimated to be 10-18 times as much as international public finance flows" (Chapagain et al., 2023) could be construed as a proposition advocating that all N-CC adaptation efforts, not just HI-CC adaptation efforts, should be entirely financed by international assistance, potentially misleading the discussion.

Fourth, the claims that "the adaptation finance gap is widening" and "a widening adaptation finance gap indicates a deepening climate crisis" are unfounded. AFGU2023 conducted a more comprehensive estimate than the assessment in 2016, finding significantly larger values than earlier estimates (UNEP, 2016, 2023b). This change reflects a shift in calculation methods, not an analysis of changes in the adaptation finance gap over time. Nor does it justify the link between a widening gap and a deepening climate crisis or increased loss and damage (UNEP, 2023b).

As described above, the AFGU2023's estimation process exposed serious concerns at all stages of calculating the adaptation finance gap: adaptation cost estimation, AF needs estimation, estimation of adaptation finance available, and estimation of the adaptation finance gap. Unless these challenges are resolved, it would be better if COP refrained from relying on AFGU2023's evaluations on adaptation finance to advance the discussion on

[9] UNEP (2023d). *Adaptation Gap Report 2023: Underfinanced, Underprepared.* Available at: https://www.unep.org/resources/adaptation-gap-report-2023. Accessed [10/1/2024].

adaptation finance. Resolving these issues is essential to ensuring that the AFGU estimates are relevant and valuable to COP in the future.

3. The nature of AF needs information reported in NAPs

If COP discussions on adaptation finance are to move beyond the estimates presented in AFGU2023, it is crucial to explore alternative sources of information. A key source is the AF needs reported by countries through their NDCs, NAPs, or other official submissions to the UNFCCC, which AFGU2023 had already partially relied on. If we could fully rely on such reported AF needs, we may well be able to overcome the challenges in estimating the adaptation finance gap.

This section begins by reviewing the current state of AF needs reporting through NDCs and NAPs, along with its broader implications. The analysis then shifts to the UNFCCC's adaptation framework, focusing specifically on the NAP scheme and how it shapes the way AF needs are characterized. By highlighting underexplored issues within the NAP scheme, this section raises broader concerns about the coherence and overall effectiveness of the UNFCCC's approach to adaptation.

Ultimately, this paper calls for a fundamental rethinking of the adaptation framework and advocates for a more cohesive, structured system that can address the inherent complexities of adaptation. While the challenges are undoubtedly difficult and solutions may not be immediate, the intention here is to bring attention to these overlooked issues and encourage COP to take meaningful, incremental steps toward a more practical and effective framework for collective adaptation efforts.

3.1 Reporting status of AF needs from developing countries

Table 3 already shows the reporting status of AF needs from developing countries through NDCs and NAPs. Many developing countries, whose total population represents almost half of the entire population of developing countries, have not yet reported their AF needs. Therefore, if COP is to discuss adaptation finance for all developing countries as a package, it is imperative that these countries report their AF needs by identifying appropriate bankable adaptation activities. The priority is to accelerate the identification of such activities and the reporting of AF needs.

There is limited value in estimating AF needs or adaptation costs for all developing countries using methodologies like those used in AFGU2023. This is because the results must be interpreted as an estimate such that "if countries could 'adequately' identify their AF needs, the funds required to meet those needs would be about this amount for all developing countries." However, if many countries have not yet reported their AF needs—it could mean they do not know how to use the funds or are, at least, not ready to convert their adaptation ideas to specific bankable project proposals—even if significant resources were secured now, they

would not guarantee the progress of adaptation activities. Numbers related to AF needs (and adaptation cost) only become meaningful when there is first an identification of what needs to be done and then an estimate of the funds required to meet those needs. Thus, bringing estimates such as the ones by AFGU 2023 into COP negotiations could be misleading, causing excessive focus on the scale of funds to be mobilized, despite no clear evidence that securing such funds is a priority for promoting adaptation worldwide.

3.2 The nature of AF needs indicated in NAPs

Accordingly, if all developing countries were to report their AF needs through NDCs or NAPs, should we be satisfied with these reported values and rely on them to assess the necessary adaptation finance? In other words, should we consider the sum of the reported values from each country as the global AF needs? This subsection analyses this point by examining the COP Decisions and guidelines on NAPs.

3.2.1 The unrestricted scope of the adaptation activities in NAPs

NAPs have been continuously discussed at COP meetings, resulting in various agreements. However, while the objectives of the NAP process were stipulated in Decision 5/CP.17, the specific objectives and roles of the NAP itself, as well as the scope of adaptation activities to be included, have not been stipulated in any COP Decisions to date (UNFCCC 2011, 2012, 2013, 2014, 2015a, 2015b, 2016, 2018, 2019, 2021, 2022).

Although not a COP Decision itself, the "Technical Guidelines for the National Adaptation Plan Process" (NAP Guidelines) prepared by the LDC Expert Group in response to a request in Decision 5/CP.17 (LDC Expert Group, 2012) can serve as a reference regarding the scope of adaptation activities and the associated AF needs included in NAPs. The NAP Guidelines explicitly state that they are indicative rather than prescriptive, and countries are not required to follow them (ibid.). Nevertheless, the guidelines have, to a considerable extent, directed subsequent efforts made for the NAP process (Mizuno et al., 2024).

The NAP Guidelines do not specify criteria for the scope of adaptation activities to be included in NAPs. However, they highlight that countries should select adaptation activities meeting reasonable criteria, emphasizing the review and appraisal of adaptation options based on their costs, effectiveness, efficiency, and contribution to sustainable socio-economic development (LDC Expert Group, 2012). Therefore, if countries adhered to the NAP Guidelines, only those adaptation options meeting specific criteria would be incorporated with their cost estimates.

Unfortunately, in practice, many developing countries do not consider such criteria and do not prioritize adaptation activities. The Adaptation Committee analysed 76 NDCs or NAPs reported by May 2022 and found that "most typically they [developing countries] cost long lists of identified activities, rather than prioritized actions (and levels of action). They are not based on an analytical assessment of baseline risks and the benefits of adaptation (in reducing climate change impacts) or use an economic appraisal framework. They therefore

do not consider adaptation effectiveness, the comparison of the costs and benefits of adaptation, and thus the estimated level or scale of adaptation" (Adaptation Committee, 2022).

Currently, NAPs are formulated with no boundaries on the scope of adaptation activities to be included. Developing countries incorporate any adaptation activities in NAPs that are deemed necessary in light of their "country needs" and AF needs information to implement them in their NAPs. Therefore, the key question is to clarify what is meant by "country needs."

3.2.2 Developing countries' country needs

Developing countries can design adaptation activities for their NAPs with the assumption that most costs will be covered by international financial support. As a result, they may focus primarily on the benefits of these activities without being constrained by cost considerations. If benefits alone guide decisions, effective and efficient use of funds cannot be guaranteed. Developing countries could design activities that maximize gross benefits rather than NPV for their NAPs. In addition, the prioritization of adaptation activities differs significantly from those based on metrics like NPV.[10] Furthermore, there is no COP agreement on the level of climate risk a society should tolerate or the extent of social resilience that NAP implementation should achieve (UNFCCC 2010, 2011, 2012, 2013, 2014, 2015a, 2015b, 2016, 2018, 2019, 2021, 2022). Therefore, countries can legitimately present any range of adaptation activities and their associated costs in their NAPs, claiming they reflect their "country needs." For example, if the aim is to minimize climate risk, countries could theoretically propose an almost limitless number of adaptation activities, leading to substantial budgetary requests, as zero risk is the unattainable target. In extreme cases, even projects with negative NPVs might be justified, as long as they offer some level of benefits.[11] Even if most countries do not aim to minimize the climate risk, this lack of boundaries on adaptation activities means that the scope of adaptation activities and the associated AF needs can vary significantly, depending on each country's judgment regarding adaptation objectives, as highlighted by this paper in the discussion on the AFGU2023 model calculations.

If COP discussions were to reference such information, and if all AF needs were assumed to be covered primarily by international financial flows, as possibly posited by AFGU2023[12], countries would have strong incentives to report significant AF needs beyond economically and politically justifiable from global perspectives.[13]

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[10] UNFCCC article 3.3 states that "The Parties should take precautionary measures ... taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost" (UNFCCC, 1992). Already at the level of principles, there is international agreement that the adaptation activities chosen should be cost-effective. The problem here, therefore, is that the principle has not yet fully reached the design of the NAP scheme. However, since the principle does not require maximization of NPV, it does not address the issues of the efficient use of the available resources or the prioritization of adaptation activities.

[11] In reality, if a project proposal with a negative NPV is submitted to the GCF, it will not be approved. This is because applications for the GCF are required to estimate the expected economic rate of return based on a comparison of scenarios with and without the project (GCF, 2022). However, if the selection of adaptation activities based solely on benefit aspects is allowed at the NAP stage, and if the AF needs required to implement such activities can be the basis for international negotiations, then this must be taken seriously. Even if not to this extreme, there is still a risk of distortions in prioritizing project proposals for submission to the GCF.

[12] AFGU2023 claims that there are important equity issues in using domestic budgets to address the finance gap in these developing countries (UNEP 2023b).

[13] As AFGU2023 and GCA and CPI 2023 have reiterated, many factors make the reported values rather underestimated, such as lack of

Given the open-ended nature of NAPs, it is problematic to accept the AF needs expressed by countries as fully representative of legitimate country needs, both in terms of the appropriateness of proposed adaptation activities and equity among developing countries. This embedded unreliability of reported AF needs in NAPs could be a potential root cause of the issues we examined in the AFGU2023.

3.2.3 Discrepancy between NAPs and the UNFCCC

Another critical issue is the lack of distinction between HI-CC and N-CC. The NAP Guidelines, which adopt the IPCC's definition of adaptation, do not exclude human-driven adjustments to N-CC from adaptation (LDC Expert Group, 2012). COP subsequently welcomed the NAP Guidelines, allowing countries to include adaptation to N-CC and its associated costs in their NAPs (UNFCCC, 2013). Consequently, NAPs can encompass a broad range of disaster preparedness activities for N-CC and their costs. For example, Kiribati and Tonga have developed their NAPs as joint implementation plans for adaptation and disaster risk management, summarizing both types of activities (Government of Kiribati, 2014; Government of Tonga, 2018). This inclusion of N-CC adaptation costs in AF needs creates a misalignment between NAPs and the UNFCCC's mandate. Despite its significance, this discrepancy has received little scrutiny from key entities such as the UNFCCC's constituted bodies, IPCC, and UNEP (Standing Committee on Finance, 2021; New et al., 2022; Kreibiehl et al., 2022; Adaptation Committee, 2022; UNEP, 2023b). This lack of clarity complicates discussions around justice and equity, as adaptation to N-CC does not fall within the UNFCCC's scope. Nevertheless, AFGU2023 fails to acknowledge this distinction and suggests, "there are important equity issues in using domestic budgets to address the finance gap in these countries," without addressing the underlying issue.

Integrating adaptation with disaster risk reduction (DRR) as much as possible is crucial for ensuring efficient and consistent planning and implementation in actual adaptation efforts. In this respect, it is highly recommended that countries should be encouraged to integrate adaptation and DRR activities into their NAPs. However, whether the AF needs estimation for implementing such a plan could be a basis for deliberating the scale of financial support to the developing countries under the UNFCCC is a completely different matter.

To make the AF needs in NAPs relevant to UNFCCC discussions, practical measures must be introduced to report only the needs for HI-CC adaptation, even if the rigid scientific separation between N-CC and HI-CC remains challenging. While the scientific distinction may be complex, future-oriented tools such as scenario analyses provide practical ways to project climate risks and adaptation costs specifically linked to HI-CC.[14] These methods, though not perfect, offer meaningful insights that can guide financial assessments without requiring unattainable scientific precision.

information (UNEP, 2023b; GCA and CPI, 2023). However, this potential underestimation reinforces the previous section's argument that necessary adaptation activities have not yet been properly captured. Conversely, the risk of overestimating is that even if AF needs have already been reported, they may not be appropriate values. Thus, the two are not contrasting issues.

[14] See footnote 5.

In fact, the GCF has made strides in introducing various practical rules, aiming to fund only activities aligned with the UNFCCC's mandate. Specifically, the GCF requires project proponents to, among others, differentiate between climate-related expenses and development or other expenses, and to justify the incremental cost (GCF, 2022a, 2022b). While this approach is not without its challenges, it represents the best effort currently available to separate adaptation costs related to HI-CC from those related to N-CC. Therefore, this level of distinction should be mirrored in AF needs assessments used in UNFCCC negotiations. The scientific difficulty of separating HI-CC from N-CC should not justify using conflated AF needs estimates in these critical discussions. Furthermore, for these reported AF needs to serve as the basis for discussions on adaptation finance under the UNFCCC, a verification process—albeit less stringent than that applied by the GCF during project appraisals—may be necessary.

If it is not an option for COP to entrust the GCF and other financial mechanisms under the UNFCCC to deliberate on adaptation finance and refrain from discussing it based on the reported AF needs, COP should take this challenge seriously and find a way to address it.

3.3 Adaptation Negotiation Priorities

The current discourse on adaptation finance, largely shaped by the notion of a 'finance gap,' overlooks a more pressing need for a comprehensive rethinking of the adaptation agenda. Approximately half of the population in developing countries resides in nations that have yet to report their AF needs (Chapagain et al., 2023). For COP to advance discussions on adaptation finance and ground-level efforts, the priority should not be on estimating AF needs through extrapolation. Instead, the focus must shift towards accelerating the reporting of AF needs from these countries and identifying bankable adaptation activities in these countries as a prerequisite for such reporting.

However, merely accelerating the reporting process will not resolve the fundamental challenges. The scope of adaptation activities outlined in NAPs remains entirely undefined, with no clear boundaries that align with the UNFCCC's mandates or reflect sound economic justification. This creates significant obstacles in relying on the AF needs reported in NAPs as a reliable basis for deliberating the level of support to developing countries. Significant discrepancies in per capita AF needs—from Antigua and Barbuda's claim of USD 880 per capita annually to Colombia's USD 1 per capita—highlight the actuality of the issues. Without well-established boundaries, countries can report widely varying estimates, making it difficult to ensure legitimacy and fairness in allocating international support. Addressing these discrepancies requires setting appropriate boundaries for adaptation activities, a task that COP must tackle urgently.

However, defining the boundaries for adaptation activities is only the first step. COP must also establish a policy framework that operationalizes these boundaries effectively and accelerates the identification and implementation of appropriate adaptation activities. Simply articulating such boundaries, for instance, in the

NAP Guidelines, is insufficient to ensure progress, as previous efforts have shown (Adaptation Committee, 2022). Historically, efforts on adaptation under the UNFCCC have lacked a cohesive system design perspective, particularly in terms of incentivizing appropriate adaptation activities. COP must engage in discussions to create such a framework, ensuring the efficient and equitable use of funds. This discussion should be integrated into broader efforts on the Global Goal on Adaptation (GGA) and the New Collective Quantified Goal on Climate Finance.

COP discussions often falter when they encounter the concept of "country needs." It is now time to move beyond this paradigm and reconsider what "country needs" truly entail. While country ownership and a country-driven approach are fundamental to the adaptation efforts under the UNFCCC, discussions must not stagnate at the concept of "country needs." Reassessing this paradigm is not an infringement of sovereignty but a step toward ensuring effective adaptation practices and responsible resource use, transcending the limitations of the "country needs" narrative.

Conclusion

This paper critically examined the UNEP Adaptation Gap Report 2023 (AGR2023) and the Adaptation Finance Gap Update 2023 (AFGU2023), revealing important methodological challenges used to estimate the adaptation finance gap. Uncritically accepting these inflated assessments of the adaptation finance gap risks diverting attention from other pressing adaptation priorities and could create unnecessary obstacles within the negotiations, leading to a potentially unproductive dichotomy. Any adaptation finance assessments should be scrutinized before being used as a basis for international negotiations.

Beyond the shortcomings of these reports, deeper systemic issues within the UNFCCC adaptation framework pose even greater challenges. The lack of clear boundaries for adaptation activities, as reported in NAPs, and the misalignment between NAPs and the UNFCCC's mandates create substantial problems regarding the relevance and reliability of reported AF needs, as well as the equitable distribution of funds. If left unresolved, these issues could undermine the effectiveness of international adaptation efforts. Unless these issues are addressed, the challenges in estimating the adaptation finance gap will not be fully resolved.

To address these concerns, this paper advocates for the establishment of well-defined boundaries for adaptation activities, supported by a robust framework to operationalize these boundaries effectively. Such a framework should incentivize the identification and implementation of relevant and economically justifiable adaptation activities, ensuring that they align with the UNFCCC's mandate. A similar system is already operational under the Green Climate Fund (GCF), demonstrating that it is feasible to establish such a structure within the UNFCCC framework as well. While these challenges are complex, incremental progress is necessary to drive more effective and equitable adaptation actions.

Given the multifaceted nature of climate change adaptation, global decision-making must be based on thoroughly vetted reliable, and contextually relevant information. The unique challenges posed by adaptation——such as the absence of universally shared targets and the difficulty in distinguishing between human-induced climate change and natural climate change—require targeted and carefully crafted solutions.

By shedding light on these underexplored issues, this paper aims to contribute to more informed and evidence-based dialogue at future COP discussions, which should eventually lead to a fundamental rethinking of the adaptation framework. Ultimately, addressing these systemic barriers will be essential in achieving more equitable and effective adaptation outcomes.

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