

# Did the Global COVID-19 Recovery Address Climate Adaptation and Resilience?

An Analysis of Sixty-Seven Countries

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# Executive Summary

## Context

Investments in climate adaptation yield high rates of return and are increasingly beneficial as physical climate risks increase. The Global Commission on Adaptation's 2019 Adapt Now report (GCA & WRI 2019) indicates that the benefit-cost ratios for investing in climate adaptation often range from 2:1 to 10:1; in some cases, even higher. The significant resources invested in the recovery phase from the COVID-19 pandemic (January 31, 2020–May 5, 2023) presented an exceptional opportunity to integrate building climate resilience into a significant, yet unforeseen, increase in public spending in line with the goals of the Paris Agreement. Widespread calls from the United Nations and Multilateral Development Banks encouraged countries, as well as cities, to build resilience as part of their economic recovery plans by proactively addressing climate risks and avoiding investments that are poorly adapted to climate futures.

Little is known about how countries have responded to these calls. While there have been some efforts to analyse recovery measures for mitigation and other “green” efforts (Energy Policy Tracker 2021; Vivid Economics 2021), none have systematically considered climate adaptation and resilience aspects of the recovery during the 2020-2021 period. This paper aims to bridge this gap and determine to what extent countries incorporated climate adaptation and resilience into their COVID-19 recovery measures during the first two years of the pandemic.

To do this, the authors screened national policy statements, development plans, and budget documents—regardless of the funding source—approved by 67 countries between January 1, 2020, and December 31, 2021, for evidence of measures aimed at building climate resilience. To ensure geographic and economic diversity, the sample included 47 of the 68 Members of the Vulnerable Twenty (V20) Group and all Members of the Group of Twenty (G20), as well as the European Union (EU),

the latter as a single entity for this analysis, since it conducted its own coordinated stimulus planning and spending. To screen each country's recovery measures, the authors evaluated the integration of climate adaptation and resilience based on the eight adaptation components put forward by the Global Commission on Adaptation (GCA & WRI 2019; 2020).

## Key Findings

This paper improves our understanding of whether, and how, countries leveraged their COVID-19 recoveries to build climate resilience. The key findings of the analysis, summarised in Figure 1, reveal the paradox that a country's income proved to be a more significant determinant of whether it used COVID funds for adaptation than its degree of vulnerability. The most vulnerable countries, which were among the poorest in the sample, were the least likely to use COVID-era resources to address climate risks.

- Of the 67 countries, only 16 (24%) demonstrated a climate risk responsive recovery by articulating a high-level goal to build climate resilience, approving concrete adaptation actions that addressed specific physical climate risks, or both. Twenty-eight countries (42%) did not meet either criterion, and there was insufficient evidence from 23 countries (34%) to make any determination.
- The most vulnerable countries to climate-related risks (ND 2023) were found to have been much less likely to have integrated climate resilience into their pandemic recovery spending and policies than the least vulnerable countries. Only two of the 20 “most vulnerable” countries (10%), Kenya and Vanuatu, approved investments or policies during this timeframe that explicitly addressed specific physical climate risks, compared to 12 of the other 40 countries with available vulnerability data (30%).

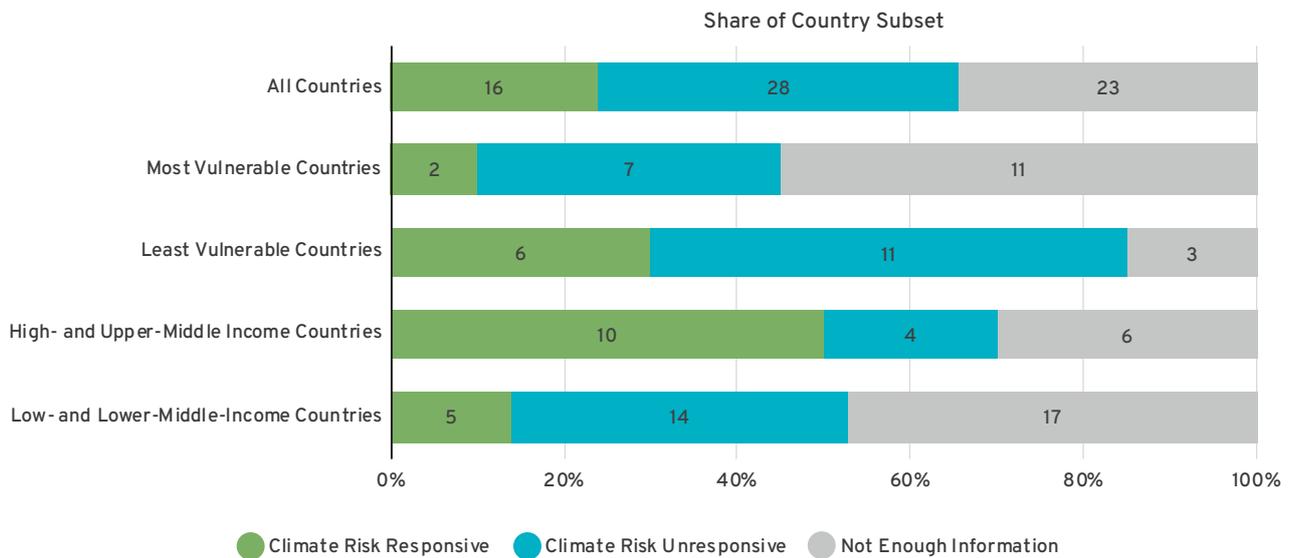


Figure 1. Climate Risk Responsive COVID-19 Recoveries by Country Sample

- Countries that established high-level climate adaptation goals or policy commitments were more likely to have taken concrete action in response to physical climate risks during their COVID-19 recoveries compared to countries without such goals. Many “most vulnerable” countries are poorer, have comparatively weaker institutions and have yet to set such goals for climate adaptation. Higher political awareness of the economic and social damages associated with climate change, therefore, could better enable countries to prioritize adaptation action.
- High-income countries were more likely to integrate physical climate risks into their recovery measures and approve adaptation actions during their COVID-19 recoveries than low- and middle-income countries. While 42% of high-income countries approved climate adaptation and resilience-building measures during the evaluated period, no low-income countries and only 21% of lower-middle-income countries were found to have done so. High- and upper-middle-income countries also were more likely to invest in climate adaptation and resilience during this period than lower-middle-income countries, which relied on diverse instruments to reduce and manage physical climate risks.
- Most countries that concretely addressed physical climate risks during their recoveries did so through measures related to water resources management, disaster prevention, infrastructure and nature-based solutions. These measures primarily aimed to manage drought and flooding.
- **Support ministries of finance, planning, and economy in vulnerable countries to mainstream climate adaptation and resilience into their annual planning and budgeting processes.** National development strategies and frameworks that prioritise climate resilience can guide adaptation action that aligns with countries’ development goals. The integration of climate adaptation into annual budget processes can further ensure availability of adequate and regular funding for climate adaptation investment.
- **Improve and expand the analytics on the economics and finance of climate risk management, so as to support how vulnerable countries perceive, prioritise, and budget for climate adaptation investment.** In the absence of a better understanding of the economic, social and environmental risks of climate change, governments—even in highly vulnerable countries—may lack the motivation to act.
- **Help vulnerable countries to develop a pipeline of shovel-ready climate adaptation and resilience projects.** While the mainstreaming of climate adaptation into annual planning and budget processes can ensure availability of funds (see above two actions), countries also will require a robust arsenal of shovel-ready projects to which funds can be allocated, especially in times of crises.
- **Provide the concessional finance and debt relief that low- and middle-income countries require to sustainably invest in climate adaptation and resilience.** Beyond their limited capacity to understand and plan for climate change risks, increasingly high debt burdens and competing development priorities constrain the ability of countries to actually invest in building climate resilience.

## Recommendations

Based on these findings, the international community can better enable vulnerable countries to address physical climate risks through the following actions:

## Box 1. Glossary

**Climate Resilience:** “Capacity of social, economic, and ecosystems to cope with a hazardous climate event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure as well as biodiversity in case of ecosystems while also maintaining the capacity for adaptation, learning, and transformation” (IPCC 2022).

**Climate Adaptation:** “The process of adjustment to actual or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities” (IPCC 2022).

**Climate Vulnerability:** “The propensity or predisposition to be adversely affected... including sensitivity or susceptibility to harm and lack of capacity to cope and adapt” (IPCC 2022).

**Group of 20 (G20):** A forum for international economic cooperation between 19 countries which, together, represent approximately 85% of the global gross domestic product, over 75% of global trade and about two-thirds of the world’s population.

**Physical Climate Risk:** IPCC (2022) defines risk as “the potential for adverse consequences for human or ecological systems, recognizing the diversity of values and objectives associated with such systems.” While transition risks typically refer to those associated with a green or low-carbon transition, physical risks refer to those that arise from climate-related hazards, vulnerability and exposure (Reisinger et al. 2020).

**Vulnerable Group of Twenty (V20):** A cooperation initiative of 58 countries systemically vulnerable to climate change which, and that together, represent approximately 2.5% of the global gross domestic product, 5% of the world’s share of global emissions, and about one-fifth of the world’s population.





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# I. Introduction: Leveraging COVID-19 Recovery Measures to Build Climate Resilience

The COVID-19 pandemic exposed the vulnerability of all countries to systemic risks and has required unprecedented spending levels to address them. Over 190 countries have responded to the crisis, with the world's 50 largest economies committing over US\$20 trillion to date. Roughly US\$16 trillion (80%) of this spending—most of which was committed in 2020—addressed the short-term effects of the pandemic and supported immediate responses (e.g., protecting vulnerable groups, safeguarding livelihoods, and developing vaccines). The US\$3.8 trillion that was dedicated to long-term recovery measures also provided the opportunity to integrate climate adaptation and resilience measures (UNDP n.d.).

Widespread calls urged countries to integrate both climate mitigation and adaptation into their economic recovery plans to advance towards greener, more resilient societies. Among others, the Organisation for Economic Co-operation and Development, World Bank and International Monetary Fund advocated for a greener, sustainable, and resilient recovery (OECD 2020; World Bank 2021; IMF 2020). The United Nations' Forum on Financing for Development also emphasised the need for short- as well as long-term measures to address compounding economic and environmental crises and to achieve the Sustainable Development Goals (UN n.d.).

Effective climate adaptation investments can build climate resilience while helping to achieve economic, social, and environmental priorities. The Adapt Now: A Global Call for Leadership on Climate Resilience report by the Global Commission on Adaptation showed that climate adaptation investments often demonstrate extremely high economic and financial returns (GCA & WRI 2019). Investment in early warning systems, resilient infrastructure, dryland crop production, mangrove protection, and water resources management, for example, can yield benefit-cost ratios ranging from 2:1 to 10:1 (GCA & WRI 2019). More recent work by Heubaum et al. (2022)

further revealed that investment in climate adaptation yields such high benefit-cost ratios as a result of the economic, social and environmental benefits that accrue, even when extreme climate-related events do not materialise. For example, a seafront protection project in Felixstowe, United Kingdom, prevented the town from loss of and damage to coastal properties and critical infrastructure due to flooding and erosion; it also led to increased tourism, which generated higher public and private investment in its restoration as a resort town (Heubaum et al. 2022).

Analyses of the global COVID-19 recovery, thus far, largely have focused on the mitigation or “green” pollution reduction components of country measures. Vivid Economics (2021) determined, for example, that the COVID-19 recovery spending of countries largely damaged, rather than enhanced, nature; this was despite more spending (in absolute terms) allocated towards green measures than during the recovery from the 2008 financial crisis. In a review of G20 COVID-19 responses, Energy Policy Tracker (2021) found that members, collectively, spent at least US\$46.7 billion more in support of fossil fuel energy than in clean energy. There has yet to be, however, a systematic review of whether countries sought to build climate resilience during their recoveries.

This paper bridges this gap by analysing whether, and how, countries integrated climate adaptation and resilience into their COVID-19 recovery measures, including in their investments and policies. This analytical contribution comes at a critical time as countries and development financial institutions assess their COVID-19 recovery measures, to date, and prepare to address longer-term development priorities. It aims to improve our understanding of where and how climate resilience has been integrated to highlight opportunities for further action to advance a more climate-resilient future.

## Box 2. The Case for Embedding Climate Resilience into Recovery Measures

Average global temperature rise has accelerated over the past few decades, with no sign of abating, and the frequency and intensity of extreme weather have increased. Research further shows that the world is edging closer and closer to “tipping points” in the Earth’s system—points beyond which small incremental changes could trigger large-scale, potentially cascading and unstoppable transformations across our atmosphere, carbon cycles and terrestrial, marine and freshwater ecosystems (Armstrong McKay et al. 2022). The need for climate resilience becomes clearer against this backdrop of increasing risk, instability and uncertainty.

This paper begs an important question: Why should climate resilience be integrated into COVID-19 recovery measures, whether in the form of stimulus, investment, or any other means? While the evidence surrounding the relationship between resilience and economic recovery is more complete for G20 countries than for developing countries, the World Bank’s first year of Country Climate and Development Reports presents clear evidence of the dire impacts of climate change on gross domestic product (GDP) growth in African countries by 2050. For example, impacts on GDP in five Sahel countries range from -6.8 to -11.9 percent without adaptation measures, and -4.2 to -6.7 percent even with adaptation (World Bank 2022a). Additional research suggests that including resilience concerns in recovery measures can simultaneously reduce vulnerability to climate risks and create economic benefits (Heubaum et al. 2022).

Certain areas such as food security and nature-based solutions have been identified as particularly strong candidates for building resilience, especially in less developed countries, where agriculture, tourism, and

related sectors contribute a greater share to GDP. For example, economic modeling of potential recovery measures in four African countries (i.e., Democratic Republic of the Congo, Egypt, Kenya, and South Africa) have shown that implementing various types of nature-based solutions and policies to enhance food security—including agroforestry, resilient seed and irrigation programs, reforestation, restoration of mangroves and wetlands and other country-dependent policies—is associated with higher levels of short- (5 years) and long-term (20 years) job creation compared to investment in traditional agriculture or natural resource management (GCA 2021).

In addition to short-term stimulus, the long-term benefits of these measures are especially pronounced. Adaptation measures have the potential to create a positive feedback loop, whereby they allow countries to weather the economic costs, damages, and disruptions of various climate risks while also using them as tools to create avenues for “green growth” and raise incomes and living standards (GCA 2021). Integrating resilience into pandemic recovery measures also can address social inequity, as areas with higher vulnerability to climate risks are associated with residents who have higher levels of economic vulnerability (Kane 2020). Therefore, recovery measures such as resilient infrastructure can potentially advance environmental justice and lead to “equitable, enduring economic growth” for marginalised communities (Kane 2020). It is important, however, to note that not all countries were able to finance or implement the same level of COVID-19 recovery measures.



## II. Methodology

### Scope of Review

The authors systematically evaluated whether climate adaptation and resilience were integrated into the COVID-19 recovery measures approved by 67 countries between 2020 and 2021 and, if so, how. The country sample was geographically and economically diverse; it included 47 Vulnerable Twenty (V20) Group Members and all Group of Twenty (G20) Members. The analysis treated the EU as a singular entity, since it conducted its own coordinated stimulus planning and spending and, therefore, is referred to as a “country.” See Appendix A for a full list of countries.

### Documents Reviewed

Primary and secondary sources published between January 1, 2020, and December 31, 2021, were reviewed to capture the recovery measures of countries during that period. In addition to national COVID-19 recovery strategies and stimulus packages, primary sources also included official budgets and development plans or strategies. This is because many countries used regular planning and budgetary processes to manage and recover from the pandemic. These primary sources were supplemented and corroborated with secondary sources (e.g., third-party analyses and news articles) wherever possible. The analysis of resilience measures was indifferent to the source of financing, whether from official development assistance or domestic budgets.

For each country, nine third-party platforms and reports, dedicated to tracking national COVID-19 recovery measures, were reviewed. Despite their primary focus on analysing mitigation or green recovery measures, the following sources were especially valuable in providing insight into country actions when primary sources were limited:

- IMF: “Policy Responses to COVID-19: Policy Tracker” (IMF 2021b)
  - International Labour Organization: “COVID-19 and the World of Work: Country Policy Responses” (ILO 2023)
  - Energy Policy Tracker: “G20 Analysis” (Energy Policy Tracker 2021)
  - Vivid Economics: *Greenness of Stimulus Index* (Vivid Economics 2021)
  - Rhodium Group: *It’s Not Easy Being Green: Stimulus Spending in the World’s Major Economies* (Larsen et al. 2020)
  - Carbon Brief: *Coronavirus: Tracking How the World’s ‘Green Recovery’ Plans Aim to Cut Emissions* tracker (Evans and Gabbatiss 2020)
  - Government of Japan: “Platform for Redesign: Online Platform for Sustainable and Resilient Recovery from COVID-19.” (GovJapan 2020).
  - NewClimate Institute, PBL Netherlands Environmental Protection Agency, and International Institute for Applied Systems Analysis: *Overview of Recently Adopted Mitigation Policies and Climate-Relevant Policy Responses to COVID-19: 2020 Update* (Moisio et al. 2020)
  - Asian Development Bank: “COVID-19 Policy Database: Policy Measures” (ADB 2022)
  - World Bank: “World Bank’s Operational Response to COVID-19 (Coronavirus): Projects List” (World Bank n.d(b))
- In the initial review, the following Google search terms were applied to identify documents that were deemed to warrant deeper analysis, beyond those referenced in the above resources:
- “Country name” + “COVID-19 stimulus measures”
  - “Country name” + “COVID-19” + “government response”
  - “Country name + government” + “COVID-19 economic measures.”

## Analytical and Country Classification Frameworks

Documents were subsequently assessed in greater detail for any evidence of a high-level goal or policy commitment to build climate resilience, concrete actions in response to specific physical climate risks, and considerations of equity. An analytical framework was created to guide this analysis, comprising a first-tier question and a set of second-tier questions (Table 1).

The first-tier question of the framework established whether or not a country had, in fact, a high-level goal to build climate resilience. Rather than

concentrate only on a particular physical climate risk, the aim was to determine if, overall, climate resilience or adaptation was a key pillar, guiding principle or outcome of a country's national recovery or development strategy.

The second-tier questions ascertained whether and how specific recovery measures addressed the adaptation components outlined by the Global Commission on Adaptation's *Adapt Now: A Global Call for Leadership on Climate Resilience* report (GCA & WRI 2019) and "Statement: Global Commission on Adaptation COVID-19 Call to Action" (GCA 2020), which span both risk reduction and management (Table 1 includes the components). For each of

Table 1. Overview of Analytical Framework

| 1. Did the country articulate a high-level goal to build climate resilience goal, not necessarily to a specific physical climate risk? |  |   |  |   |  |
|--|--|---|--|---|--|
| 2. Did the COVID-19 recovery phase support the following?  |  | (a)<br>Type of measure                        | (b)<br>Does the measure clearly respond to a specific physical climate risk? | (c)<br>Does the measure consider social or economic equity? | (d)<br>Does the measure have cross-cutting components? |
| Risk Reduction   | 2.1 <b>Food security:</b> Food-related safety net programs, climate resistant seed distribution or research, support for the agriculture sector                                    | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
|  | 2.2 <b>Urban areas:</b> Initiatives and investments in urban areas, including stormproof public housing, sanitation systems and stormwater management                              | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
|  | 2.3 <b>Water resource management:</b> New or improved sanitation or water access systems, flood or drought control, irrigation or watershed management                             | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
|  | 2.4 <b>Infrastructure:</b> Roads, bridges, electric grid, energy production/distribution systems and telecoms.   | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
|  | 2.5 <b>Nature-based solutions:</b> Green roofs, mangrove restoration and protection, flood protection and mitigation, afforestation/reforestation, wetlands restoration/protection | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
|  | 2.6 <b>Disaster prevention:</b> Early warning systems, resilient shelters, safety nets, communications facilities, capacity building, financing safety net forecasts               | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
| Risk Management  | 2.7 <b>Shock-responsive social safety nets:</b> Public works programs, cash transfers, stimulus payments or other safety nets  | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |
|  | 2.8 <b>Local decision-making:</b> Financial support for, or devolved decision-making authority, to sub-national governments, civil society organisations and local actors          | Policy;<br>Investment;<br>Fiscal;<br>Monetary | Yes; No;<br>Unknown  | Yes; No;<br>Unknown   | Yes; No  |

the eight adaptation components, the second-tier questions sought to evaluate (a) the type of measure; (b) whether it responded to a specific physical climate risk; (c) its consideration of social or economic equity (i.e., did it target vulnerable social or economic groups); and (d) whether it included any additional adaptation components.

The application of this analytical framework allowed for the classification of countries into the following three categories based on their response to physical climate risks across adaptation components during the specific timeframe of January 2020 through December 2021:

- 1. Climate Risk Responsive Recovery:** This category represents countries that articulated a high-level goal to build climate resilience and/or approved concrete recovery measures to explicitly adapt to specific physical climate risks, like droughts, floods, and variable rainfall. These countries were grouped into three sub-categories, based on whether they:
  - a. Articulated a high-level goal to build climate resilience *and* approved investments or policies to adapt to specific physical climate risks;
  - b. Articulated a high-level goal to build climate resilience *without* approving investments or policies to adapt to specific physical climate risks; or
  - c. Approved investments or policies to adapt to specific physical climate risks *without* articulating an overall goal to build climate resilience.
- 2. Climate Risk Unresponsive Recovery:** These countries did not articulate an overall goal to build climate resilience, nor did they approve investments or policies to adapt to specific physical climate risks.
- 3. Insufficient Information:** Due to a lack of publicly available data, it was difficult to establish whether or not these countries had, in fact, a high-level climate resilience goal or whether their recovery measures responded to specific physical climate risks.

Since the primary objective of this study was to evaluate the integration of physical climate risks within recovery measures, countries were not categorized based on their consideration of equity. As described above, the analytical framework nonetheless captured whether and how countries considered the social or economic equity of their recovery measures and related findings are discussed in Box 3.

## Limitations

The authors addressed various limitations during the data collection process, namely: language barriers, variance in data availability and quality between countries, and risk of subjectiveness. Concerning the language barriers, an online language translation tool was used to capture any mention of relevant climate-related words or phrases (e.g., “climate change,” “climate resilience” among others), as well as words within the adaptation components (e.g., “food security,” “disaster prevention,” “infrastructure” among others). Software language limitations, however, precluded this as a strategy for some countries.

The variance in data availability and quality between countries was partly resolved by relying on both primary and secondary sources, including third-party analyses or trackers of countries’ COVID-19 recovery measures. Secondary sources were deemed sufficient to establish whether a measure addressed an adaptation component, integrated a specific physical climate risk, and/or considered social or economic equity. Primary textual evidence was required, however, to determine if a measure did not. This acknowledged that a lack of transparency or communication around country investments and policies didn’t necessarily mean that countries did not consider nor respond to climate risks. The required reference to climate resilience or a specific physical climate risk, whether by a primary or secondary source, means, however, that this study did not capture recovery measures with adaptation “co-benefits.”

To reduce the risk of subjectiveness during the data collection phase, 28 countries (42% of the sample) were double-coded to identify supplementary documentation and to ensure the consistent application of the analytical framework by the authors. Due to time constraints, however, not all countries were able to be double-coded.

Finally, due to the limited time and inconsistent information across countries, this study did not evaluate the implementation or effectiveness of referenced adaptation investments or policies, nor whether they could be maladaptive. Nevertheless, recovery measures having generated some negative environmental or social impacts were documented. These measures, however, related mostly to climate mitigation or “green growth,” as such, they fell beyond the scope of the study.



### III. Findings

**Of the 67 countries, only 16 (24%) demonstrated a climate risk responsive recovery by articulating a high-level goal to build climate resilience, approving concrete adaptation actions, or both.**

Nine of these countries (13%) articulated a high-level goal to build climate resilience and approved specific adaptation investments or policies to support it. Six countries (9%) approved adaptation investments or policies without an overarching climate resilience goal. One country—South Africa—aimed to build climate resilience without approving any supporting adaptation policies or investments to do so. Figure 2 illustrates a mapping of these countries; Appendix A provides an overview of how countries integrated, within their recovery programs, climate adaptation and resilience across the eight components.

**The countries most vulnerable to climate-related risks largely have missed the opportunity to build climate resilience during their COVID-19 recovery period.** Based on the Notre Dame Global Adaptation Initiative’s (ND-GAIN) Country Index (ND

2023),<sup>1</sup> countries were divided into three categories according to their vulnerability score: least vulnerable, 20 countries; moderately vulnerable, 20 countries; and most vulnerable, 20 countries. There was no vulnerability score for the following seven countries: the EU, Kiribati, Palau, Palestine, Marshall Islands, Tuvalu, and South Sudan. The analysis revealed that in comparison to the most vulnerable countries, the least vulnerable were three times more likely to have taken concrete action (e.g., approval of policies or investments) to address specific physical climate risks during their COVID-19 recoveries (Figure 3). Kenya and Vanuatu were the only “most vulnerable” countries found to have taken adaptation action. Kenya invested KSh1 billion (US\$94 million) in flood mitigation measures (Agutu 2020), while Vanuatu

<sup>1</sup> The ND-GAIN Country Index, an initiative of the University of Notre Dame in the United States, is composed of two key adaptation dimensions: vulnerability and readiness. Vulnerability measures a country’s exposure, sensitivity and capacity to adapt to the negative effects of climate change. ND-GAIN measures their overall vulnerability by taking into account six life-supporting sectors: food, water, health, ecosystem service, human habitat and infrastructure. Higher vulnerability scores indicate higher levels of national vulnerability (Chen et al. 2023).

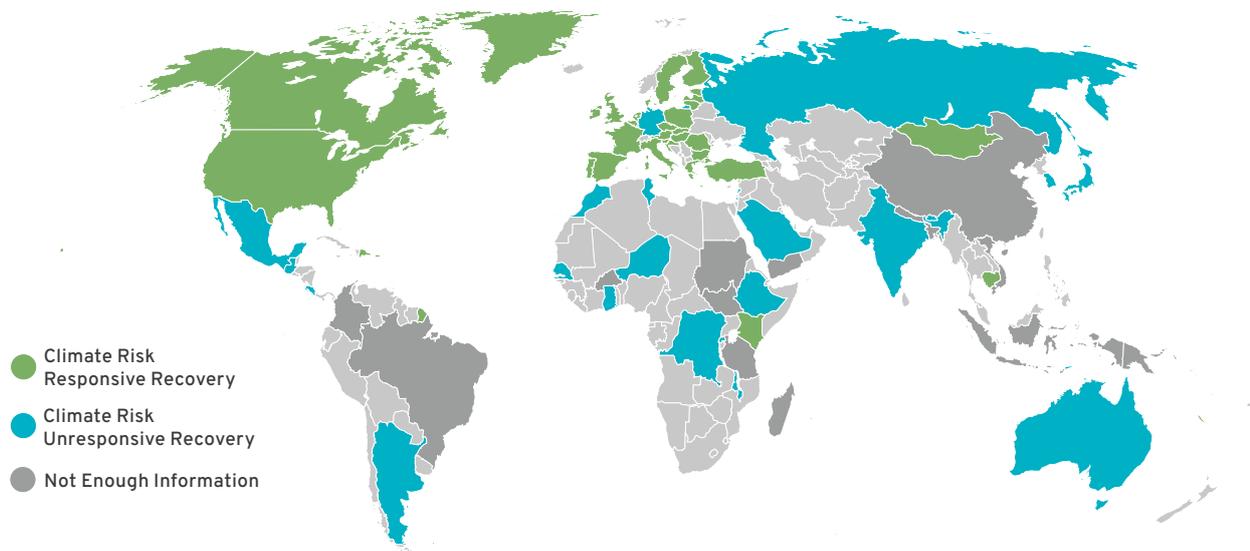


Figure 2. Countries with Climate Risk Responsive COVID-19 Recoveries (as of December 2021)

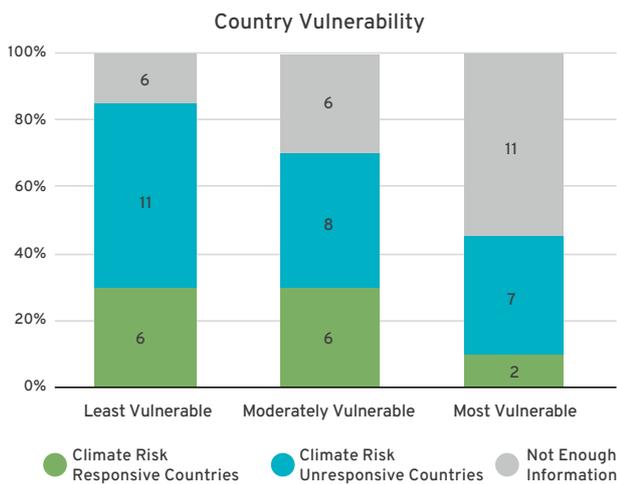


Figure 3. Climate Risk Responsive COVID-19 Recovery, by Country Vulnerability

included the improved resilience of vulnerable groups to cyclones as a key policy outcome of its recovery framework (GovVanuatu 2020). Of the least vulnerable countries, Canada, France, Italy, Mongolia, the United Kingdom and the United States all leveraged COVID-19 recovery measures to address physical climate risks. These six countries also were more likely to make available detailed information regarding their COVID-19 recovery measures.

**High-income countries were more likely to have taken concrete adaptation action during recovery efforts than were low- and middle-income countries.**

Excluding the EU, all countries were assigned income levels using the World Bank’s income level classifications for fiscal year 2022, reflecting countries’ gross national income per capita from July 1, 2020, through June 30, 2021 (World Bank n.d(a)). This revealed that countries with a higher income status were more likely to have integrated physical climate risks into their COVID-19 recovery measures (Figure 4). While five high-income countries (42% of the subset) had articulated a high-level goal

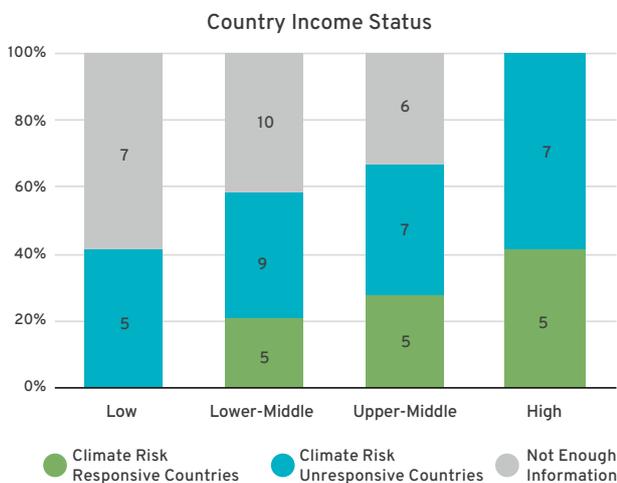


Figure 4: Climate Risk Responsive Recovery, by Country Income Status

to build climate resilience and approved climate risk responsive recovery measures during this period, no low-income countries were found to have done so. Even among V20 Members, which are mostly middle-income (70% of the subset), countries were half as likely to have responded to physical climate risks through their recovery measures than G20 Members. This is despite one goal of the V20 being to mobilise public climate finance (V20 2020; V20 n.d.).

**Countries with clearly expressed high-level goals or policy commitments to build climate resilience were more likely to have taken concrete adaptation action during their COVID-19 recoveries.**

Sixteen of the 17 countries (except for South Africa) with climate risk responsive recoveries approved specific adaptation policies or investments. On average, these 16 countries integrated physical climate risks into half of the adaptation components addressed. Climate risk responsive countries with high-level goals to build climate resilience, however, integrated physical climate risks into 53% of the adaptation components, while those without such goals integrated physical climate risks into 46% of components addressed (See Appendix B for country examples). Italy’s National Recovery and Resilience Plan, for example, referenced the country’s vulnerability to heatwaves, drought, sea-level rise and intense rainfall, so as to frame an overall goal to improve national climate resilience by protecting nature and biodiversity (GovItaly 2021). Under this framework, discrete investments funded improvements in flood mitigation measures; irrigation infrastructure to improve efficiency and better withstand drought; and water distribution systems to secure urban water supplies during drought (GovItaly 2021).

**Most countries responded to physical climate risk through recovery measures relating to water resources management (13 countries), disaster prevention (13 countries), infrastructure (9 countries) and nature-based solutions (9 countries).**

Figure 5 and Figure 7 summarise countries’ risk-responsive recovery measures, with a more in-depth overview included in Appendix B. Relevant recovery measures identified in the analysis mainly aimed to mitigate the risk or manage the impacts of drought and flooding. Fiji, France and Italy invested in measures to secure their water supplies in the face of increasingly intense and protracted drought (GovFrance 2020; GovFiji 2020; GovItaly 2021). France, for example, improved its drinking water distribution pipes to reduce leakage and increase efficiency (GovFrance 2020). Canada and the EU expanded and established funds to enable communities and member states, respectively, to mitigate the risk of floods (GovCanada 2023; EC n.d(a)). Kenya, the Philippines and the United Kingdom invested in flood mitigation measures

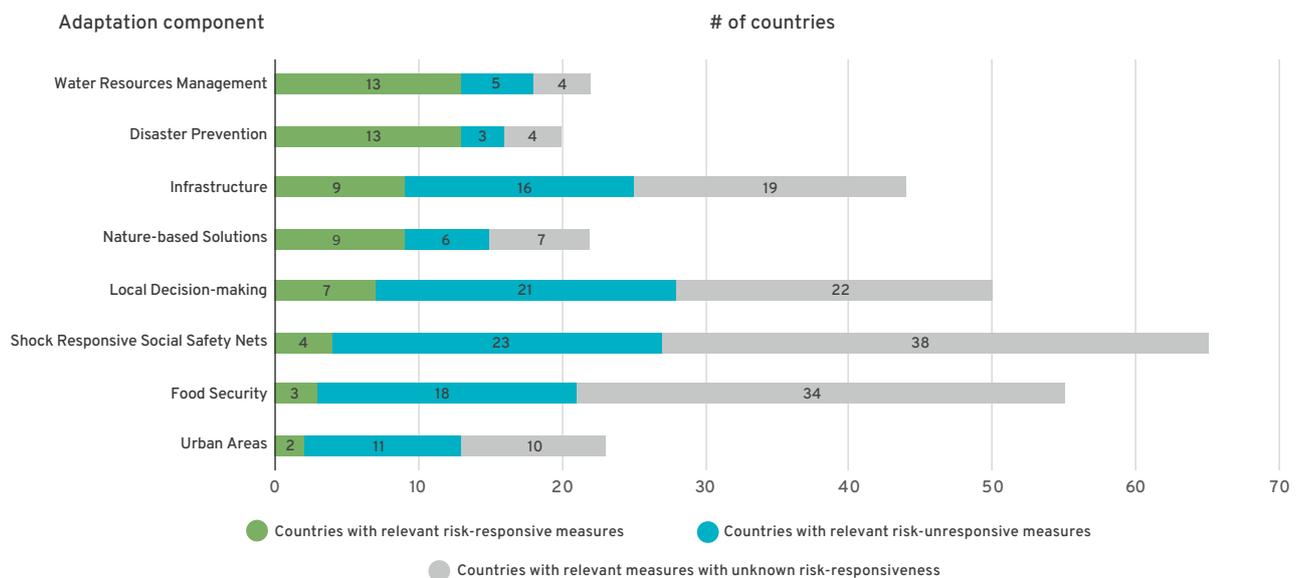


Figure 5: Country Integration of a Physical Climate Risk Category into COVID-19 Recovery Measures, by Adaptation Component

(Agutu 2020; GovUK 2020a; GovPhilippines 2021). The central role of water in a range of climate risks and the subsequent opportunity for effective water resources management to boost climate resilience across diverse systems and sectors (OECD 2021) might shed light on why most risk-responsive countries, in fact, took water-related adaptation action during this period.

**High- and upper-middle-income countries were more likely to invest in climate adaptation in response to particular physical risks than were lower-middle-income countries during this period.** Of the 16 risk-responsive countries (including the EU) that approved adaptation measures, eight invested

and six approved relevant policies (Figure 6). Only one country, Cambodia, leveraged its monetary policy to manage climate impacts during this period; it did so by extending forbearance on loan repayments in response to nation-wide flooding (IMF 2021b). Mongolia was the only country to demonstrate use of fiscal measures by directing the government through a presidential decree to spend 1% percent of annual gross domestic product (GDP) to combat desertification (Erdenejargal 2021). While 80% of high-income countries and all upper-middle income countries invested in concrete measures to reduce or manage climate-related risks, only 40% of lower-middle-income countries did so. Whereas high-income countries spent, on average, 21% of their GDP

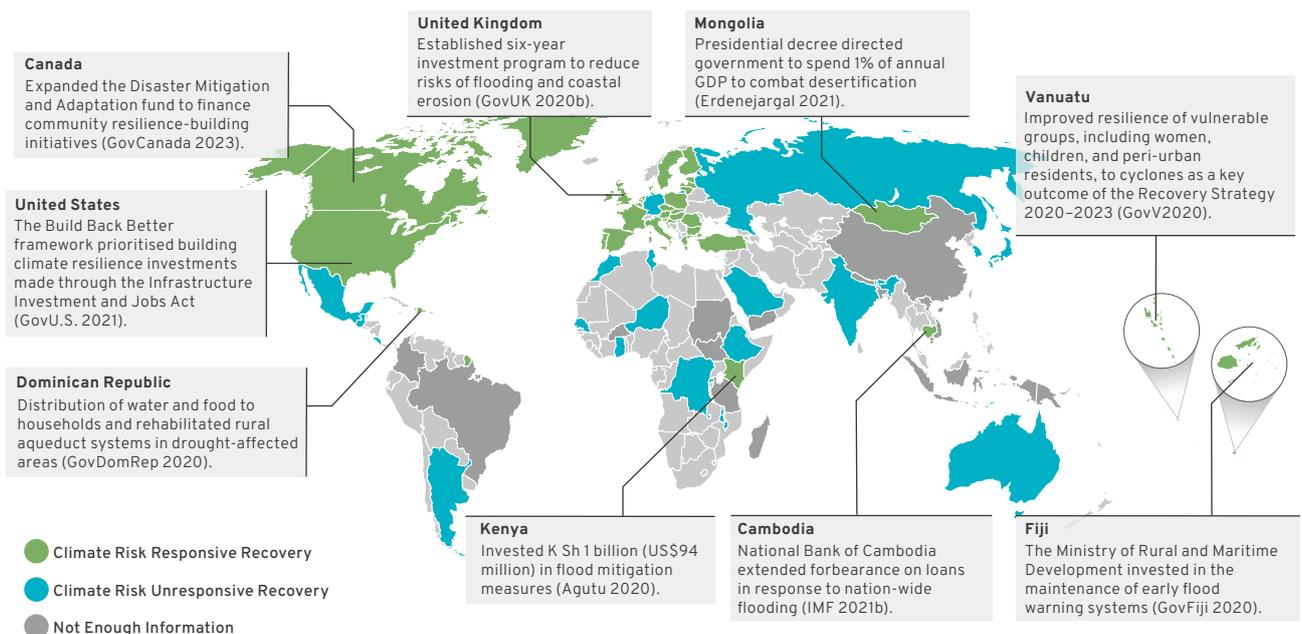


Figure 6: Highlighted Climate Risk Responsive Recovery Measures

to manage the impacts of the COVID-19 pandemic, lower-middle income countries spent an average of only 4% of their GDP (World Bank 2022b). Low private external finance, limited fiscal space, high debt levels (UN 2021) and weak state capacity were some of the factors that constrained the response of many developing countries to the COVID-19 pandemic (UNCTAD 2020).

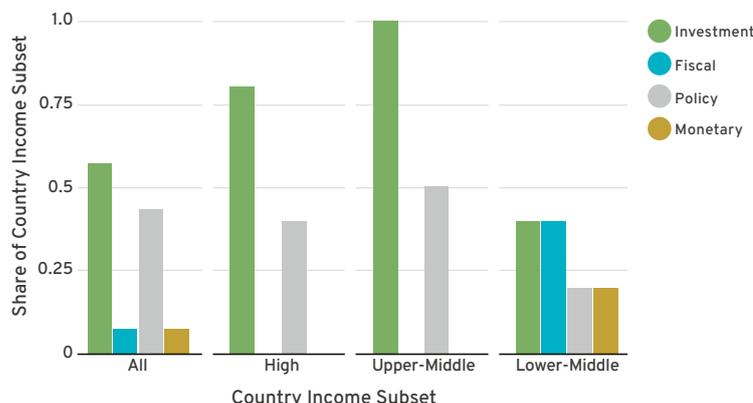


Figure 7: Risk-Responsive Use of Measures, by Country, Income and Measure Type

### Box 3: Integrating Equity into Recovery Measures

The COVID-19 pandemic has exacerbated existing inequities and disproportionately impacted groups facing social and economic vulnerabilities. These groups include racialised people, women, people with low income and those confronting homelessness, among others (Persaud et al. 2021). Based on the systematic analysis of documents for this study (Table 1), **most countries (91% of the total sample) considered the distributional equity of their recovery measures to ensure that the unique needs of those most affected by the pandemic were addressed.**

Illustrative measures included in these documents that took into account distributional equity are described below. Such measures do not necessarily directly contribute to building climate resilience. Nevertheless, increasing the socio-economic welfare of the most vulnerable populations is one important element in the building of climate resilience.

- **Women:** As violence against women significantly increased during lockdowns (UN Women 2021), Canada increased financial support for women's shelters and sexual assault centres (ILO 2023). Brazil and Guatemala provided targeted financial support to single mothers and female-headed households (KPMG 2020; GovGuatemala 2020). Cambodia provided additional subsidies to pregnant women (ILO 2023).
- **Children and Youth:** In response to higher rates of unemployment among youth compared to adults during the COVID-19 pandemic (Fleming 2021), Australia, the United Kingdom, Mongolia, and the Republic of Korea aimed to maintain and expand youth employment, including through wage subsidies and skills training programs (IMF 2021b; Baljmaa 2021). Ethiopia, Mongolia and the Republic of Korea adopted measures to ensure youth access to housing (GovSKorea 2021; IMF 2021b; ILO 2023; Baljmaa 2021), while the Dominican Republic and the United States established nutrition programs for children and students (IMF 2021b; GovU.S. 2021a).
- **Elderly:** Support for the elderly primarily focused on food security. Guatemala, for example, provided the elderly with food vouchers (GovG 2020; ILO 2023).

Sri Lanka and Uzbekistan delivered food and other essential items to the elderly (ILO 2023).

- **Irregular and Informal Workers:** Countries adopted targeted measures to smooth the income volatility of non-salaried workers outside of formal employment. Egypt established a wage subsidy program for irregular and informal workers, while Indonesia expanded unemployment benefits to include informal workers (IMF 2021b). Sudan provided women working in the informal sector with cash transfers (ILO 2023) and Burkina Faso suspended fees on informal vendors in urban markets (IMF 2021b).
- **Persons Experiencing Homelessness:** Some countries sought to provide persons experiencing homelessness with temporary shelter and other essential necessities. Costa Rica, for example, established a second shelter (GovCostaRica 2020). Turkey and South Africa also provided housing and food (ILO 2023; IMF 2021b; ADB 2022).

**While some countries used their COVID-19 recovery plans to mitigate and prepare for future climate-related disasters, measures supporting vulnerable communities were typically broad-based and not tied to building the climate resilience of specific groups.** There were some exceptions, however. Canada's A Healthy Environment and A Healthy Economy (GovCanada 2020) plan committed to better enabling Indigenous climate leadership, including by centering Indigenous knowledge and practices, respecting and promoting self-determination, and advancing more meaningful engagement in identifying and addressing needs. By leveraging traditional knowledge and practices, Vanuatu's Recovery Strategy 2022-2023 (GovVanuatu 2020) outlines goals and supporting lines of action to improve the disaster preparedness of vulnerable groups, including women and elderly people. Following the Locally Led Adaptation (LLA) principles agreed by over 100 governments, donors and local and international non-government organisations will ensure that people facing marginalisation can better design and implement effective adaptation actions that address the root causes of their climate vulnerability (WRI n.d(a); IIED n.d.).



## IV. Conclusions and Recommendations

**Governments can significantly scale their climate risk management efforts as they look beyond the immediate economic and social consequences of the COVID-19 pandemic to address their medium- and long-term development priorities.** While 24% of countries integrated climate adaptation and resilience into their COVID-19 recovery measures, the most vulnerable countries were three times less likely to do so than the least vulnerable countries. Many “most vulnerable” countries are poorer, have weaker institutions, and still have to set clear goals for climate adaptation. Higher political awareness of the economic and social damages associated with climate change, therefore, would better enable adaptation action. This is especially true for countries disproportionately experiencing the impacts of climate change, such as Bangladesh, the Comoros, Malawi, and Rwanda.

**To ensure that “post-COVID” recovery spending and funding windows lead to more countries investing in climate adaptation and resilience, governments will need to mainstream climate risk considerations into their regular planning and budgeting processes to establish pipelines for resilience-building investment.** Fiji, Kenya, and the Philippines, for example, already have integrated climate adaptation into their annual budgets and have invested in resilience-building during their COVID-19 recoveries. Ministries of finance, planning, and economy are responsible for fiscal and financial decision-making that shapes the economic trajectory of their countries. These ministries should apply systematic climate risk screening tools and methodologies (e.g., those developed by the World Bank and IMF) as part of their work on climate diagnostics to better identify adaptation priorities that align with their development goals. The positive correlation between high-level goals or commitments to build climate resilience and the integration of physical climate risks into concrete recovery

measures further points to the value of establishing national recovery frameworks or development plans that prioritise climate resilience and can guide adaptation action.

**Multilateral Development Banks, bilateral donors, and other entities, such as the Green Climate Fund and Adaptation Fund, can partner with countries to help improve their institutional capacity to mainstream climate adaptation and resilience into their planning and budgeting processes.** The World Bank’s Adaptation Principles (Hallegatte, Rentschler and Rozenberg 2020), for example, lay out 26 actions and 12 toolboxes that governments could use to approach adaptation. The Coalition of Finance Ministers for Climate Action has six working groups to help member countries integrate climate change into macro-fiscal and financial sector policies (CFMCA n.d.). World Resources Institute’s Resilience and Adaptation Mainstreaming Program (RAMP) partners with leading local universities to improve the understanding and management of macro-critical climate change risks by central ministries in V20 and African countries (WRI n.d.(b)). Bilateral donors have significant opportunities to support developing low- and middle-income countries’ efforts to mainstream and address climate risk through their official development assistance channels.

**Beyond improved capacity to understand and plan for climate-related risk, low- and middle-income countries also require additional concessional finance and debt relief to invest in climate adaptation and resilience.** The variation in pace, scale, and scope of country responses to the COVID-19 pandemic has laid bare global inequality and the interrelationship between health, economic, and climate crises. The rapid increase in developing countries’ financing needs, due in part to COVID-19, has significantly increased their debt burdens and undermined their capacity to address the

climate crisis (UN 2023). An analysis by the United Nations Development Programme of 54 developing economies found that in the wake of the pandemic, 28 of the top 50 countries most vulnerable to climate change face severe debt (Jensen 2022). In addition to the tools and knowledge to mainstream climate risk management into annual planning and budget processes, governments require the fiscal space to invest in climate adaptation.

**As the cost of inaction rises in the face of increasing climate change risks, countries do not have the luxury of waiting to recover from the next disaster before working to build climate resilience.** Rather, resilience planning should be undertaken and

implemented by all countries now. The economic case for investing in climate adaptation sooner than later is often overlooked, but it is clear. Proactively investing in climate adaptation and resilience is cheaper than waiting to respond to future climate-related disasters (GCA & WRI 2019). Going forward, every country should prudently work to ensure that their expenditures, whether as part of extraordinary stimulus spending or routine annual budgeting, build climate resilience.



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# Appendix

This Appendix includes a comparative chart, by country, that determines the extent to which a physical climate risk category has been incorporated into COVID-19 recovery measures (Table A.1); it also includes a selective summary of COVID-19 recovery climate risk response measures (Table A.2).

Table A.1 provides an overview of each country’s physical climate risk integration into its COVID-19 recovery measures, captured from their analytical frameworks. It also notes the income status of each country, based on the World Bank’s fiscal year 2022 Gross National Income classifications (July 1, 2020 to June 30, 2021) (World Bank n.d(a)), as well as country membership to the G20 or V20.

Table A.1 Integration of Climate Adaptation and Resilience into Adaptation Components, by Country. Green cells (■) clearly integrated a specific physical climate risk into related recovery measure

| Country      | Membership | Income Status | Climate Vulnerability | Adaptation Components |             |                            |                 |         |                     |                                     |                       |
|--------------|------------|---------------|-----------------------|-----------------------|-------------|----------------------------|-----------------|---------|---------------------|-------------------------------------|-----------------------|
|              |            |               |                       | Risk Reduction        |             |                            |                 |         |                     | Risk Management                     |                       |
|              |            |               |                       | Food Security         | Urban Areas | Water Resources Management | Infra-structure | NbS     | Disaster Prevention | Shock Responsive Social Safety Nets | Local Decision-Making |
| Afghanistan  | V20        | L             | Most                  | Y                     | Y           | Y                          | Y               | Unknown | Unknown             | Y                                   | Y                     |
| Argentina    | G20        | UM            | Least                 | Y                     | N           | N                          | Y               | N       | N                   | Y                                   | Y                     |
| Australia    | G20        | H             | Least                 | N                     | N           | N                          | Y               | N       | N                   | Y                                   | Y                     |
| Bangladesh   | V20        | LM            | Most                  | Y                     | Unknown     | Unknown                    | Y               | Y       | Unknown             | Y                                   | Unknown               |
| Barbados     | V20        | H             | Moderate              | Y                     | N           | Y                          | Y               | N       | N                   | Y                                   | N                     |
| Bhutan       | V20        | LM            | Most                  | Y                     | N           | N                          | Y               | N       | N                   | Y                                   | Y                     |
| Brazil       | G20        | UM            | Least                 | Unknown               | Unknown     | Unknown                    | Y               | Unknown | Unknown             | Y                                   | Y                     |
| Burkina Faso | V20        | L             | Most                  | Y                     | Y           | Unknown                    | Unknown         | Unknown | Unknown             | Y                                   | Unknown               |

|                                  |     |    |          |         |         |         |         |         |         |   |         |
|----------------------------------|-----|----|----------|---------|---------|---------|---------|---------|---------|---|---------|
| Cambodia                         | V20 | LM | Moderate | Unknown | Unknown | Unknown | Y       | Unknown | Unknown | Y | Unknown |
| Canada                           | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | Y       | Y | Y       |
| China                            | G20 | UM | Moderate | Unknown | Y       | Y       | Y       | Y       | Unknown | Y | Y       |
| Colombia                         | V20 | UM | Least    | Y       | Unknown | Unknown | Y       | Y       | Unknown | Y | Unknown |
| Comoros                          | V20 | LM | Most     | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Y | Unknown |
| Costa Rica                       | V20 | UM | Least    | Y       | N       | N       | N       | N       | N       | Y | Y       |
| Democratic Republic of the Congo | V20 | L  | Most     | Y       | N       | N       | N       | N       | N       | Y | Y       |
| Dominican Republic               | V20 | UM | Moderate | Y       | N       | Y       | Y       | N       | Y       | Y | Y       |
| Ethiopia                         | V20 | L  | Most     | Y       | N       | N       | Y       | Y       | Y       | Y | Y       |
| European Union                   | G20 | NA | No Data  | Y       | Y       | Y       | Y       | Y       | Y       | Y | Y       |
| Fiji                             | V20 | UM | Moderate | Y       | Y       | Y       | Y       | Y       | Y       | Y | N       |
| France                           | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | Y       | Y | Y       |
| Germany                          | G20 | H  | Least    | N       | Y       | N       | Y       | N       | N       | Y | Y       |
| Ghana                            | V20 | LM | Moderate | Y       | Y       | Y       | N       | N       | N       | Y | N       |
| Grenada                          | V20 | UM | Least    | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Y | Unknown |
| Guatemala                        | V20 | UM | Moderate | Y       | N       | N       | N       | N       | N       | Y | Y       |
| Haiti                            | V20 | LM | Most     | Unknown | Unknown | Unknown | Unknown | Unknown | Unknown | Y | Unknown |
| India                            | G20 | LM | Moderate | Y       | Y       | N       | Y       | Y       | N       | Y | Y       |
| Indonesia                        | G20 | LM | Moderate | Y       | Unknown | Unknown | Y       | Unknown | Y       | Y | Y       |

|                   |     |    |          |         |         |         |         |         |         |   |         |
|-------------------|-----|----|----------|---------|---------|---------|---------|---------|---------|---|---------|
| Italy             | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | Y       | Y | Y       |
| Japan             | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | Y       | Y | Y       |
| Kenya             | V20 | LM | Most     | Y       | Unknown | Y       | Y       | Y       | Unknown | Y | Y       |
| Kiribati          | V20 | LM | No Data  | Unknown | Unknown | Unknown | Y       | Unknown | Unknown | Y | Unknown |
| Lebanon           | V20 | UM | Moderate | Y       | N       | N       | N       | N       | N       | Y | Y       |
| Madagascar        | V20 | L  | Most     | Unknown | Y       | Unknown | Unknown | Unknown | Unknown | Y | Unknown |
| Malawi            | V20 | L  | Most     | Y       | Y       | Y       | Y       | N       | Y       | Y | Y       |
| Maldives          | V20 | UM | Most     | Y       | N       | N       | N       | N       | N       | Y | Y       |
| Marshall Islands  | V20 | UM | No Data  | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Y | Unknown |
| Mexico            | G20 | UM | Least    | Y       | Y       | N       | Y       | N       | N       | Y | Y       |
| Mongolia          | V20 | LM | Least    | Y       | Y       | Y       | Y       | Y       | N       | Y | Y       |
| Morocco           | V20 | LM | Least    | N       | N       | N       | N       | N       | N       | Y | Y       |
| Nepal             | V20 | LM | Moderate | Y       | Unknown | Unknown | Y       | Unknown | Unknown | Y | Y       |
| Niger             | V20 | L  | Most     | Y       | N       | N       | N       | N       | Y       | Y | Y       |
| Palau             | V20 | H  | No Data  | N       | N       | N       | Y       | Y       | N       | Y | Y       |
| Palestine         | V20 | LM | No Data  | Y       | N       | N       | N       | N       | Y       | Y | Y       |
| Papua New Guinea  | V20 | LM | Most     | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Y | Y       |
| Philippines       | V20 | LM | Moderate | Y       | Y       | Y       | Y       | N       | Y       | Y | Y       |
| Republic of Korea | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | N       | Y | Y       |

|                |     |    |          |         |         |         |         |         |         |         |         |
|----------------|-----|----|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Russia         | G20 | UM | Least    | Y       | N       | N       | Y       | Y       | N       | Y       | Y       |
| Rwanda         | V20 | L  | Most     | Y       | N       | N       | Y       | N       | N       | Y       | Y       |
| Samoa          | V20 | LM | Moderate | Y       | N       | N       | N       | N       | N       | Y       | Y       |
| Saudi Arabia   | G20 | H  | Moderate | Y       | N       | N       | Y       | N       | N       | Y       | N       |
| Senegal        | V20 | LM | Most     | Y       | Y       | Y       | Y       | N       | N       | Y       | Y       |
| South Africa   | G20 | UM | Moderate | Y       | Y       | N       | Y       | Y       | N       | Y       | Y       |
| South Sudan    | V20 | L  | No Data  | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Unknown | Y       |
| Sri Lanka      | V20 | LM | Moderate | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Y       | Unknown |
| St. Lucia      | V20 | UM | Moderate | Y       | N       | Y       | Y       | N       | Y       | Y       | N       |
| Sudan          | V20 | L  | Most     | Y       | Unknown | Unknown | Unknown | Unknown | Unknown | Y       | Unknown |
| Tanzania       | V20 | LM | Moderate | Unknown | Unknown | Unknown | Unknown | Unknown | Unknown | Y       | Y       |
| The Gambia     | V20 | L  | Most     | Y       | Unknown | Unknown | Y       | Unknown | Unknown | Y       | Y       |
| Timor-Leste    | V20 | LM | Moderate | Y       | N       | N       | N       | N       | Y       | Y       | Y       |
| Tunisia        | V20 | LM | Least    | Y       | N       | N       | Y       | N       | N       | Y       | Y       |
| Turkey         | G20 | UM | Least    | Unknown | Y       | N       | Y       | Y       | N       | Y       | Y       |
| Tuvalu         | V20 | UM | No Data  | Y       | N       | Y       | Y       | Y       | Y       | Y       | Y       |
| United Kingdom | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       |
| United States  | G20 | H  | Least    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       |
| Vanuatu        | V20 | LM | Most     | Y       | N       | Y       | Y       | N       | Y       | Y       | Y       |
| Vietnam        | V20 | LM | Moderate | Y       | Unknown | Unknown | Y       | Unknown | Unknown | Y       | Unknown |
| Yemen          | V20 | L  | Most     | Unknown |

Table A.2 highlights the 17 countries that demonstrate a climate risk responsive recovery by having articulated a high-level climate resilience goal, approving discrete and specific climate risk recovery policies or investments, or both. In the absence of evidence that a country has failed to meet either of these criteria, the corresponding box is colored grey.

Table A.2. Selective Summary of Country Climate Resilience Goals and Risk Responsive Recovery Measures

| Country            | High-Level Climate Resilience Goals  | Discrete Climate Risk Responsive Recovery Measures   |
|--------------------|--|--|
| Cambodia           |  | The National Bank of Cambodia extended forbearance on loans through its response to nation-wide flooding (IMF 2021b).  |
| Canada             | Canada's A Healthy Environment and A Healthy Economy includes, as its fifth pillar, embracing the power of nature to support healthier families and more resilient communities in the face of extreme weather (GovCanada 2020). It also commits to the development of Canada's first National Adaptation Strategy (GovCanada 2020).  | The Government of Canada allocated an additional US\$1.375 billion over 12 years to the Disaster Mitigation and Adaptation Fund, which was established in 2018 to support communities to build climate resilience (GovCanada 2023). Through the fund, the government has invested USD 10 million to enhance urban forests and combat extreme heat, flooding and erosion, as well as USD 76 million in grey infrastructure to mitigate coastal flooding (GovCanada 2020).   |
| Dominican Republic |  | The Presidential Commission for the Regulation and Management of the North Yaque River Watershed established a Drought Mitigation Committee, recognising the importance of water for hygiene, nutrition and agriculture (Center for Emergency Operations 2020). The committee delivered water and food to households; expanded water distribution systems; and redirected illegal household water connections to agricultural activities in drought-affected communities (GovDomRep 2020).   |
| European Union     | The European Green New Deal articulates the EU's strategy to achieve a more sustainable future, pledging to achieve a climate-neutral and resilient society by 2050 (EC 2021). The Next Generation EU Recovery Plan also aims to strengthen Europe's resilience to climate change, including by launching a nature restoration plan to preserving restore degraded ecosystems such as wetlands (EU n.d.) | A temporary €723.8 billion Recovery and Resilience Facility was established under NextGenerationEU to support the implementation of member states' national recovery and resilience plans by providing grants and loans (EC n.d.). The Programme for Environment and Climate Action (LIFE) includes a climate change mitigation and adaptation subprogram to co-finance projects that support urban adaptation and land-use planning; resilient infrastructure; sustainable management of water in drought-prone areas; flood and coastal management; and the climate resilience of the agriculture, forestry and tourism sectors (CINEA n.d.; EU 2021). |
| Fiji               |  | The Water Authority of Fiji allocated F\$3.5 million to the carting of water to communities in non-metered areas during droughts (GovFiji 2020). The Ministry of Rural and Maritime Development invested F\$10,000 to the maintenance of the early flood warning systems (GovFiji 2020).   |

|              |   |  |
|--------------|---|--|
| France       | France's COVID-19 recovery plan, France Relaunch aims, in part, to build the climate resilience of its economy (GovFrance 2020).  | France Relaunch allocated funds to improvements in water distribution systems to increase efficiency in the face of droughts; restoration and management of coastal areas to reduce coastal erosion; and the development of agricultural technology to improve the sector's resilience to extreme frost, hail and droughts (GovFrance 2020). The plan also aims to diversify and plan more plague-resistant timber species and strengthen the resilience of rural electricity grids to climate-related hazards, including hurricanes, heatwaves and floods (GovFrance 2020). |
| Italy        | Italy's National Recovery and Resilience Plan references the country's vulnerability to heatwaves, droughts, rising sea levels and intense rainfall; it articulates a goal to improve the country's climate resilience by protecting nature and biodiversity (GovItaly 2021).   | Italy's National Recovery and Resilience Plan includes investments to increase irrigation capacity and improve water infrastructure systems to secure and stabilise water supplies during droughts (GovItaly 2021). The plan also includes investments in flood management (GovItaly 2021).  |
| Kenya        |   | Kenya's COVID-19 stimulus package included K Sh 1 billion (US\$94 million) for flood mitigation measures (Agutu 2020).   |
| Mongolia     |   | A presidential decree directed the government to develop and allocate at least 1% of Mongolia's gross domestic product per annum to a comprehensive national program to combat climate change and desertification (Erdenejargal 2021).   |
| Philippines  |   | The Build, Build, Build program channeled PHI 869.5 billion (4.8% of gross domestic product) to infrastructure projects across the country, including flood mitigation structures (GovPhilippines 2021).   |
| South Africa | The green economy component of South Africa's Economic Reconstruction and Recovery plan aims to catalyze a green industrialisation to address inequality; poverty and unemployment; and climate vulnerability (GovSAfrica 2020). Green interventions in the agriculture sector are highlighted as having the potential to improve the country's food security by strengthening the resilience of crops to droughts (GovSAfrica 2020). |  |
| St. Lucia    | The sixth pillar of St. Lucia's Economic Recovery and Resilience Plan, climate change and disaster risk mitigation, cites the country's vulnerability, especially to hurricanes; it also focuses on climate change and disaster risk mitigation (Chastanet 2020; GovStLucia n.d.).  | The sixth pillar of St. Lucia's Economic Recovery and Resilience Plan included US\$1.12 million for the provision of 800 water tanks and essential services to vulnerable communities, especially regarding hurricanes, as well as measures to reduce the risk of flooding and landslides, including improved drainage capacity (Chastanet 2020).  |

|                |  |   |
|----------------|--|---|
| Tuvalu         | Tuvalu's National Strategy for Sustainable Development aims to achieve a peaceful, resilient and prosperous society, including through increased climate change and disaster resilience, which is included as a national outcome of the strategy (GovTuvalu 2020).   | The National Strategy for Sustainable Development outlines a policy framework with strategic lines of action that respond to specific climate-related risks. These include increasing national water storage capacity to ensure reliable access during droughts; developing and implementing a land rehabilitation and reclamation program to combat sea-level rise; and increasing the resilience of infrastructure, including to cyclones through climate-proof national housing and maintenance programs (GovTuvalu 2020).   |
| United Kingdom | The ninth point of the United Kingdom's Ten Point Plan for a Green Industrial Revolution to protect the natural environment and the National Infrastructure Strategy aim to safeguard landscapes and restore habitats to combat biodiversity loss and adapt to climate change (Gov UK, 2020(a); GovUK 2020(b)). Specific climate risks mentioned by the National Industrial Strategy include higher temperatures, extreme weather, droughts, floods and disease (GovUK 2020(a)). | Under the Ten Point Plan for a Green Industrial Revolution and the National Infrastructure Strategy, £5.2 billion is allocated to a six-year program that leverages nature-based solutions to reduce the risks of flooding and coastal erosion (GovUK 2020(a) GovUK 2020(b)).   |
| United States  | The United States' Build Back Better framework prioritises building climate resilience and guides investments made through the Infrastructure Investment and Jobs Act (GovU.S. 2021(c)).   | The Infrastructure Investment and Jobs Act allocates US\$1.4 bn to the Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) program to administer grants that improve the resilience of infrastructure to coastal erosion and flooding, sea-level rise and storm surges (GovU.S 2021(b)). It also provides US\$3.5 billion for flood mitigation actions and assistance through the National Flood Insurance fund and US\$50 million to increase the resilience of drinking water systems to extreme weather events (GovU.S. 2021(a)). |
| Vanuatu        | Vanuatu's Recovery Strategy 2020–2023 emphasises the compounding environmental, social and economic impacts of the COVID-19 pandemic and Tropical Cyclone Harold, as well as ongoing flooding and droughts. The strategy includes building back better by enabling more resilient communities through disaster risk reduction measures as one of four guiding principle (GovVanuatu 2020).   | One key outcome of the strategy is to improve the resilience of vulnerable groups, including women, children and peri-urban residents, to cyclones in alignment with cultural values and customary governance (GovVanuatu 2020).  |



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