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Recommendations for the Operationalization of a Loss and Damage Fund

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Abstract

This thesis examines the several facets of the operationalization of the abstract and broad proposal of a “Loss and Damage Fund” following the 27th Conference of the Parties under the United Nations Framework Convention on Climate Change that took place in November of 2022. It examines the current mechanisms in place for developed nations providing climate finance to developing countries that are on the front lines of fighting a crisis heavily caused by historic reliance on and consumption of fossil fuels by wealthier, better-off nations. It delves into various criteria regarding which counties should share the burden and how much each should contribute. This follows with recommendations for who should receive funding and formulae as to how much each country should be allocated. In addition, there is a final formula that demonstrates both the burden and allocation for every country. This thesis provides a variety of options and recommendations for the committee tasked with the complex and contentious issue of addressing losses and damages in the face of climate change before the 28th Conference of the Parties.

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Introduction

Prime Minister Mottley of Barbados gave an opening speech at the 27th Conference of the Parties (COP27) to the United Nations Framework Convention on Climate Change (UNFCCC) calling out the injustices countries in the Global South endure that continue to intensify with the climate crisis. The UN Secretary General António Guterres stated that we are “on the highway to climate hell with our foot still on the accelerator.” Additionally, Prime Minister Sharif of Pakistan spoke of the devastating floods that killed over a thousand people and left over twenty million in need of aid. He reprimanded the many countries of the Global North that failed to follow through on climate financing. One thing that countries such as Barbados and Pakistan have in common is their very low carbon footprint. Another is that they have become the greatest victims to climate change (Curtis & McConnell). These speakers at COP 27 gave urgent messages for action and for aid from the countries that have historically contributed the greatest amounts of carbon to the atmosphere.

In November 2022, COP 27 was held in Sharm El-Sheikh, Egypt. Funding was a great concern, and the main focus at the conference was to make progress in the commitments of wealthier, developed countries to loss and damage. At COP 15 in Copenhagen in 2009, developed countries committed to mobilizing US$100 billion each year by 2020 for climate action. The goal set for developed nations has not been met. New funding pledges occurred at COP 27 with just US$ 230 million pledged to climate finance, but developing countries could face annual adaptation costs of US$ 300 billion by 2030. Additionally, pledges such as these commonly do not materialize (UNEP, “COP 27 Ends With Announcement”).

Global warming is likely to reach 1.5°C (2.7°F) above pre-industrial levels between 2030 and 2052 at the current rate of carbon emissions (IPCC, “Summary for Policymakers”). The risks associated with global climate change depend on the geographic location, levels of development and vulnerability, and the choices of implementation of adaptation and mitigation measures. The differences in regional climate characteristics are robust and include increases in mean temperatures in land and ocean regions, heavy precipitation in several regions, and drought and precipitation deficits in other regions (IPCC, “Summary for Policymakers”). Those living in developing countries are most vulnerable to the effects of climate change (Dahiya and Oktasari). Some of the poorest and most disadvantaged communities will be forced to relocate due to slow-onset impacts such as decreased crop productivity, shortage of water, and rising sea level (Clement et al. xx).

Adaptation is the process of taking the appropriate actions to prevent or minimize the damage climate related events can cause by, for example, building defenses to protect against sea level rise. Mitigation means making the impacts of climate related disasters less severe by preventing or reducing GHG emissions. This can be achieved by, for example, increasing the share of renewable energy sources. Loss and damage is linked to adaptation and mitigation because it occurs when efforts to reduce emissions are not ambitious enough and when adaptation efforts are not implemented successfully (Bhandari et al.).

COP 27 ended with a historic decision to establish a “Loss and Damage Fund”. According to the UN, “loss and damage” is generally understood as the negative impacts of climate change that occur despite, or in the absence of, adaptation and

mitigation. With the Loss and Damage Fund, countries responsible for high carbon emissions, such as the United States, Germany, and Japan, will contribute varying amounts of financial support to countries struggling with climate effects. Overall, the primary purpose of the Fund is to provide financial assistance to developing countries that are most vulnerable to the effects of climate change (Dahiya and Oktasari).

This landmark decision to officially establish by consensus a Loss and Damage Fund is the first step following decades of pressure from climate vulnerable countries. The success of the Fund depends on how quickly it can be funded and put to use. According to the UN Environmental Programme (UNEP), dealing with losses and damages cannot be avoided even with the most ambitious investment in adaptation. Global efforts in adaptation financing and implementation continue to make progress but cannot keep pace with the accelerating climate risks. In fact, the adaptation finance gap in developing countries is five to ten times greater than current international adaptation finance flows (UNEP, “Too Little Too Slow”).

Pakistan spearheaded a group of 134 developing countries that advocated for loss and damage repayments at COP 27. This came as a result of the devastating floods that caused US$30 billion in damages despite Pakistan's contribution of less than one percent to the planet’s warming emissions. Toward the end of the COP, the European Union consented to the Loss and Damage Fund. This left the United States as the largest holdout, eventually accepting it in overtime conversations at the end of COP 27 (Berwyn and Tonio). While the UN classifies China as a developing nation, the United States and the European Union are insistent that China eventually contribute to the Fund and not receive any money from it.

History of Loss and Damage

The history of the loss and damage journey is important to understand because it highlights the contentiousness associated with the advocacy and development of the Fund. In as early as 1991, the Alliance of Small Island States (AOSIS) was the first to call for the financial burden of loss and damage suffered by vulnerable nations to be distributed equitably among industrialized countries. The world's small island developing states (SIDS) are on the frontline of the climate crisis, pushing their people and ecosystems beyond adaptation (Liao et al.).

Between 2017-2018, fifty percent of climate finance was non-concessional, meaning that it came through loans or non-grant mechanisms, and only three percent was bilateral climate finance. Over the past 50 years, SIDS have lost US$153 billion due to climate related events; money was redirected from education, health, infrastructure, and development (UNFCCC, "Summary Report," pg 14). Climate disasters are exacerbating SIDS' and others' debt struggles and forcing them to borrow additional money for aid recovery. As a response, SIDS proposed the formation of a Loss and Damage Fund and called for it to be adopted as an official agenda item at COP 27.

There are many major milestones that defined the history of loss and damage up to COP 27. At COP 16 in Cancun in 2010, the parties established that they would consider approaches to loss and damage. A climate insurance facility and other options for risk sharing was set to be due at COP 18. Following this, the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM) was established in 2013 at COP 19 in Warsaw, Poland. The validity of WIM has been

questioned and remained ineffective due to the lack of political will and leadership to address the needs, specifically lacking from developed countries (Liao et al). The 2015 Paris Agreement established at COP 21 in 2015 had a specific article dedicated to losses and damages. It did not include a basis for any liability or compensation resulting in shifting conversations of Loss and Damage away from liability and compensation. This means countries must seek compensation for loss and damage through other avenues (Franczak 3). In 2021, Tuvalu and Antigua and Barbuda established the Commission for Small Island States on Climate Change and International Law with the intention to take claims of loss and damage to international courts (Liao et al.).

Since then, loss and damage continued to gain significant traction despite remaining a very contentious and politicized topic. The controversy is largely over the assignment of culpability to the developed countries that are responsible for most of the historical emissions. Wealthy nations are concerned that the liability of loss and damage will trigger unwanted legal battles (Nishi).

Outside of the UNFCCC, additional important contributions and developments have been made for financing loss and damage. This includes the G7 and Vulnerable 20's (V20) Global Shield against Climate Risks. The V20 group is dedicated to tackling global climate change through dialogue and action and is made up of twenty economies systemically vulnerable to climate change ("About"). The Global Shield is an initiative for pre-arranged financial support designed to be quickly deployed in times of climate disasters. Initial contributions include about EUR 170 million from Germany and EUR 40 million from other countries. The first recipients of Global Shield packages include Bangladesh, Fiji, Ghana, and the Philippines. Ghana Finance Prime Minister states that

this package will help relieve the threat of inflationary pressures and that it will contribute to building mutual trust and understanding to help bridge resourcing gaps facing climate action ("V20 and G7").

As a result of the advocacy of many groups and countries, the Transitional Committee was established at COP 27 and is tasked with operationalizing the Loss and Damage Fund and bringing clear recommendations for adoption at COP 28. The Committee will consist of 24 members, 14 from developing countries and 10 members from developed countries (Abbasi).

What counts as loss and damage?

There are two sides to the question of how to define loss and damage. Loss and damage can result from extreme weather events such as heat waves and hurricanes, or it can be slow onset changes such as sea level rise and ocean acidification. There are permanent impacts from each of these with, for example, sea level rise encroaching low lying islands. The communities that are particularly vulnerable to experiencing loss and damage are those that cannot adapt to the impacts of climate change or pay for the costs of adapting. This may be due to there being no feasible options to implement or because there is simply not enough money to adapt (Bhandari et al.).

Additionally, the damages caused by the effects of climate change are divided into economic losses and non-economic losses. Economic losses directly affect resources, goods, and services that are commonly traded in markets at both a national and local level. Non-economic losses include the toll of losing families or being forced to migrate from ancestral lands (Bhandari et al.).

Who should be contributing to the loss and damage fund, and who should be receiving the funds?

Two of the most contentious questions around the Loss and Damage Fund are who pays and who gets paid? The UNFCCC divides countries into three main groups according to varying commitments: Annex I, Annex II, and Non-Annex I. Annex I countries include industrialized countries that were members of the Organization for Economic Co-operation and Development (OECD), including the United States and European Union countries, and economies in transition such as several Central and Eastern European countries. Annex II consists of Annex I countries without the counties in transition. Annex II countries are required to provide financial resources that enable developing countries to undertake emissions reduction activities and adapt to climate change. Non-Annex I parties are largely developing countries. There are 40 Annex I countries and 23 Annex II countries. The Annex II countries that are committed to pay for costs of developing countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States (UNFCCC, “Parties and Observers”).

Another area of contention around the loss and damage fund is whether China should pay or would receive compensation. The United States pushed for China to be included in the group of nations responsible for reparations as the world’s current largest GHG emitter, largest consumer of coal, and the second largest economy. As a result, much of the criteria set forth throughout this thesis will show China as both a part of the payment and not a part of it.

The other side of this fund is who should be recipients of the loss and damage contributions. Should it be directed at vulnerable countries - national or subnational governments, or vulnerable communities with local NGOs and organizations acting as the intermediaries? Additionally, how will it be decided if money is used for adaptation or mitigation, and for preventative measures of the slow onset impact of climate change or emergency climate disasters?

Current Funds and Proposed Formulae

There have been several efforts to provide climate finance to developing countries. Many of these have fallen short for many reasons, but there are lessons to be learned from both the advantages and disadvantages of each. This section will address many of the current funds and projects in place. It is important to understand the history of what has been done and learn from what has and has not worked to create an efficient and productive Loss and Damage Fund.

Current Climate Financing Mechanisms

In 2019, a technical paper by the UNFCCC Secretariat addressed potential sources for addressing losses and damages associated with climate change impacts, and it analyzed current funds with their advantages and disadvantages. First, the Adaptation Fund (AF) provides resources to countries through grants only. It is financed through voluntary contributions from governments and donors and in part from a two percent share of proceeds from certified emissions reductions issued under the Clean Development Mechanism (CDM). CDMs, defined under the Kyoto Protocol, allows a country with an emission reduction or emission limitation commitment to implement an emission reduction project in developing countries. The AF has a fixed mode of finance that limits the areas and sectors it can support. Similar to other funds mentioned, there is high uncertainty around funding, monitoring, and evaluation (UNFCCC “Adaptation Fund”).

The Least Developed Countries Fund (LDCF), established in 2001, supports least developed countries (LDCs) through grants only and is financed through contributions through public sources. Like the AF, the LDCF specifically aims to help

countries adapt to the impacts of climate change and non-economic losses such as human mobility, loss of territory, and loss of cultural identities. Both these funds have barriers that make it difficult to access due to their high unpredictability and lack of financial stability (UNFCCC “Report on the Global Environmental Facility” 4)

The Special Climate Change Fund (SCCF), created in 2001, covers incremental costs of interventions to address climate change relative to a specified development baseline. It is administered by the Global Environmental Facility (GEF), a multilateral fund dedicated to confronting biodiversity loss, climate change, pollution, and strains on land and ocean health. Adaptation is this fund’s top priority, providing resources through grants and programmes that are country driven, cost effective, and integrated into national sustainable development (UNFCCC “Report on the Global Environmental Facility” 23). As of 2021, the SCCF had reached a “dormancy phase” due to suffering from a virtual absence of new pledges and receiving little attention from traditional donors despite its relevance and importance to countries (Independent Evaluation Office 2).

The Green Climate Fund (GCF) is intended to address a balance of both mitigation and adaptation and addresses a broad array of actions related to loss and damage. It offers loans, grants, equity, and results-based payments. Created in 2010, it is the first multilateral fund that is entirely dedicated to fighting climate change. The money given consists of grants, concessional loans, and paid-in capital. Similar to other funds, the unpredictability of finance and therefore inability to implement long term strategies makes the effectiveness of the fund much lower than its potential (UNFCCC “Report on the Global Environmental Facility” 23). The GCF lacks adequate local

delivery of climate finance and therefore needs to operationalize its commitment. To do so, Omukuti et al. recommends developing a framework that emphasizes local actors' leadership in implementation and management of projects. Including local community leaders in creation of projects that the Loss and Damage Fund would finance has been highlighted as a key recommendation to address the needs of specific communities and regions.

While the missions, goals, and outcomes of these programs and funds are well intentioned, the effectiveness and efficiency of them are undermined by limited and unpredictable funding. With the Loss and Damage Fund, assessed (as opposed to voluntary) contributions from developed countries as the main source of funding is the best way to ensure vulnerable countries receive the necessary resources and that the finance available is predictable and consistent. The funds mentioned above provide great resources for project implementation and ways to accrue funding beyond assessed contributions.

How much and who will contribute?

Article 9 of the Paris Agreement explicitly states that “developed country Parties shall provide financial resources" to developing countries. To date, contributions to climate finance have thus far been voluntary and do not correlate with historic responsibility relative to prior emissions. The foundational concern remains that finance provided or mandated for loss and damage by developed countries such as the United States may be painted by some as an admission of liability and catalyst for legal challenges over historic emission levels. This has led to all funds thus far being financed

by voluntary efforts. Attempts to reduce dependence on voluntary contributions have continually fallen short or been affirmatively blocked (Bakhtaoui and Shawoo 12)

There are many possible financing options that have been proposed beyond assessed contributions that are not voluntary. A financial transaction tax (FTT) is a small levy placed on monetary transactions or financial instrument trading like bonds, stocks, and foreign currency exchange. This has been proposed as a partial possible solution to climate finance needs but talks of implementation in EU member states have lagged on since 2011. The benefits of this option include strong predictability and reliability in funding, about US$ 7-16 billion. Additionally, it is technically and politically feasible given strong support in EU member states (Durand et al. 11). A disadvantage in FTT implementation is that while it has been successful in many domestic markets, a global system will pose more obstacles. Domestic markets may not be as politically willing to impose, implement, and administer the tax (Durand et al. 12).

Another proposed tool to contribute to raising adequate funds is an international airline passenger levy (IAPAL). This is a fee that airline passengers pay, initially being proposed to the UNFCCC in 2008 by Maldives on behalf of the LDC group of nations. At the time of proposal, this fee would be about US$ 5-10 per passenger and would be paid directly into the Adaptation Fund of the UNFCCC Kyoto Protocol, now to be paid into the Loss and Damage Fund of COP 27. This applies well to the Loss and Damage Fund because air travel is a large contributor to GHG emissions and no less-emitting substance or technology to replace jet fuel is likely on the 2050 horizon (Durand et al. 12).

Additionally, the fossil fuels major carbon levy is based upon the 2013 Carbon Majors Study that found that 90 companies were responsible for 63 percent of anthropogenic GHG emissions. The Climate Justice Programme proposed that a global fossil fuel extraction levy be imposed that target big oil, coal, and gas producers and that the revenues be directly funneled into a “loss and damage mechanism.” This has not caught traction yet, mainly because of resistance from the fossil fuel industry (Durand et al 14).

Another possible source of financing for the Fund that has been proposed is to use the pool of over US$ 870 billion in Special Drawing Rights (SDRs) held by countries worldwide. An SDR is a reserve asset allocated by the International Monetary Fund (IMF), and the allocation to each country is proportional to the country’s IMF quota or member share (Plant). The IMF and World Bank have lagged on climate finance but have tremendous resources to make an impact (Franczek 8). They are the property of each country rather than the IMF, and more developed countries hold larger balances of SDRs that they do not actively use. Countries that do not need their entire SDR endowment can “recycle” the allocation to help more vulnerable countries, specifically those suffering disproportionately from climate change (Plant).

Creating a Formula

While not explicitly stating a formula, Dixon states that the key to a Loss and Damage Fund formula is to have metrics with the right incentives. That is, carbon polluters that share a burden of the fund will pay less into the fund if they cut their emissions, and those who suffer damages will receive less if they don't reduce theirs.

One question is how far back to go to measure carbon pollution: back to 1750, the dawn of the industrial revolution? Or back to when countries knew carbon emissions were damaging the planet? Modern day taxpayers are reluctant to accept the blame for their country's historic emissions because the harm was not always obvious or even known. Additionally, for many countries it was the colonizers that profited from pollution, not necessarily the ancestors of today's citizens (Lo). One compromise is to look at emissions since 1992, when the Rio Earth Summit came up with the first UN treaty on climate change (Dixon). Another option is to include emissions from 1990 because at this point scientists were in no doubt that humans were causing climate change. This year is also important because there is a fairly comprehensive dataset for this period (Lo). One last option is to take emissions from the past four years to simulate historical emissions - 2016-2019, before the COVID 19 pandemic. This takes away discrepancies as to when it was known that GHG were harmful, or when countries became industrialized. To create a fairer formula, adjustment can be made for population size by looking at a country's "above average emissions." Meaning, countries should pay into the Fund the share they have polluted more than the global average on a per capita basis (Dixon).

How will the funds be allocated?

Many policy variables come into play when attempting to define allocation of resources. When allocating money, should losses that have already occurred be included and should it consider efforts that countries may have already taken to protect themselves from climate change? One option is that countries that pollute less on

average would receive more compensation, with those polluting much less on average receiving the most funding. A well designed formula will limit the “free rider problem” - when countries receive the benefits of reduced GHG emissions without contributing to the costs - that has been a large reason as to why it is so difficult to stop climate change (Dixon).

As of recent years, no matter how much climate finance is mobilized, only a fraction of losses and damages caused by climate change will be covered. So, funds must be fairly distributed among potential recipients, and governments must be able to provide for those affected by slow onset impacts of climate change. Weighing the different impacts and finding adequate resources to compensate affected people is a large feat. The challenge is that each situation is a unique combination of geographies, threats and needs. (Shawoo et al. 12-13).

There are many delivery mechanisms proposed to channel funds to those experiencing loss and damage. One includes developed climate finance (DCF) mechanisms for local investment in public goods and urban poor funds to build community resilience. The DCF mechanism is an innovative model that builds sustainable and climate resilient livelihoods. The main concept of the DCF is its focus on community-led planning that supports existing institutions, promotes social inclusion of climate vulnerable people, has an emphasis on public goods, and enables adaptive management towards resilient investments (DCF Alliance 11).

The mechanisms and funds in this section highlight the many opportunities to continue to raise funds for climate finance. One fact remains: it is simply not enough. Mitigation finance has continued to dominate over 90% of total climate finance, with the

majority going towards energy systems. While mitigation financing is essential to seek to curb future catastrophes, it does nothing to backfill losses of those on the frontline of present-day climate-driven losses. Filling the investment gap for adaptation is critical to achieving the goals of the Paris Agreement and ensuring the resilience of countries most vulnerable.

Before deciding who will contribute what amount and who will receive the funds, there first must be improved standardized definitions, methodologies, and data access to inform necessary climate investment decisions. The Transitional Committee has a critical job ahead of them to create an efficient fund that can adequately finance the necessary projects and avoid going over the climate tipping points (Buchner et al).

Criteria and formulae for the Burden of the Loss and Damage Fund

Several of these contentious questions hinge on finding an acceptable model for determining what the burdens should be and what the balance for recipients should be. In addition to relying on one of the formulae established in burden sharing to support international organizations, the Transitional Committee could choose a variety of fund contribution approaches, such as looking at countries' official development assistance (ODA), accounting for the total historical and per capita carbon emissions, total gross national income (GNI) of a country, GNI per capita, and combinations of each. The countries listed here are Annex II countries and the following section includes China.

The Development Assistance Committee (DAC) is an international forum of many of the largest providers of aid. Official development assistance (ODA) is government aid that promotes and targets economic development in developing countries, and the DAC adopted ODA as the "gold standard" of foreign aid in 1969 (OECD, "Official Development Assistance").

Carbon Emissions: 2016-2019

To simulate historical emissions, the average emissions for each country for the years 2016-2019 was determined, as seen in the table below. To normalize this and create a formula, the average emissions was totaled to 9207.54 $MtCO_2e$. The average amount of emissions from 2016-2019 was divided by the total to get the percent share of each country. The percent each country contributed is the final row, and would represent the amount each country should pay based upon the polluters-pay principle. This principle states that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment. Most notably, the

United States makes up fifty percent of the emissions of Annex II countries. So, using just the polluters pay principle and contributions just from Annex II countries, the United States would be asked to pay a significant amount of money. This is highly unlikely to pass in Congress, meaning there must be more to this burden sharing formula. The next largest contributor based solely on emissions is Japan at just under 12 percent.

Country	2016	2017	2018	2019	Average Emissions	Percent Share
Australia	387.18	391.35	389.25	388.71	389.1225	4.23%
Austria	56.56	58.73	30.81	33.59	44.9225	0.49%
Belgium	94.38	92.88	93.82	93.17	93.5625	1.02%
Canada	591.93	603.22	615.36	615.48	606.4975	6.59%
Denmark	36.18	33.99	33.99	30.55	33.6775	0.37%
Finland	52.32	49.71	51.52	47.65	50.3	0.55%
France	251.94	255.85	245.07	238.53	247.8475	2.69%
Germany	717.68	702.73	678.22	627.92	681.6375	7.40%
Greece	68.25	68.19	66.41	61.39	66.06	0.72%
Iceland	1.55	1.59	1.61	1.55	1.575	0.02%
Ireland	36.03	34.98	34.87	32.96	34.71	0.38%
Italy	320.53	316.37	312.06	304.42	313.345	3.40%
Japan	1135.73	1123.17	1084.08	1049.5	1098.12	11.93%
Luxembourg	8.58	8.72	9.04	9.21	8.8875	0.10%
Netherlands	159.9	157.12	152.72	147.7	154.36	1.68%
New Zealand	20.57	22.31	21.74	23.39	22.0025	0.24%
Norway	19.81	18.77	18.67	17.02	18.5675	0.20%
Portugal	49.06	53.63	49.8	44.93	49.355	0.54%
Spain	233.15	249.57	243.16	226.09	237.9925	2.58%
Sweden	22.13	21.72	19.7	18.69	20.56	0.22%
Switzerland	37.43	36.46	35.24	35.14	36.0675	0.39%

United Kingdom	369.85	356.04	349.78	337.96	353.4075	3.84%
United States	4662.71	4587.55	4743.58	4585.99	4644.9575	50.45%
Totals	9333.45	9244.65	9280.5	8971.54	9207.535	100.00%

Table 1: Emissions for Annex II countries from 2016-2019 and the average emissions from each country

Formula 1: Gross National Income and Total Historical Carbon Emissions

For this calculation, the metrics used are the average carbon dioxide emissions from 2016-2019 and each country's GNI share from the sum of GNIs of the Annex II countries. Using the total amount for each of these for Annex II countries, the percentage share of each of these metrics was found. Then, the average of these percentages was calculated as the share of the burden for each country. The benefits of this strategy are that GNI takes into account a country's capacity to pay and simulates historical emissions accounts for the total emissions that have persisted overtime.

	GNI (trillions)	**Percent Share of GNI**	**Emissions of Annex II countries 2016-2019**	**Percent Share of Emissions**	**Average Share of GDP and Emissions**
Australia	1.5	2.93%	389.1225	4.23%	**3.58%**
Austria	0.482	0.92%	44.9225	0.49%	**0.70%**
Belgium	0.5996	1.15%	93.5625	1.02%	**1.08%**
Canada	1.974	3.77%	606.4975	6.59%	**5.18%**
Denmark	0.412	0.79%	33.6775	0.37%	**0.58%**
Finland	0.302	0.58%	50.3	0.55%	**0.56%**
France	3.045	5.82%	247.8475	2.69%	**4.26%**
Germany	4.411	8.43%	681.6375	7.40%	**7.92%**
Greece	0.213	0.41%	66.06	0.72%	**0.56%**
Iceland	0.024	0.05%	1.575	0.02%	**0.03%**
Ireland	0.383	0.73%	34.71	0.38%	**0.55%**

Italy	2.145	4.10%	313.345	3.40%	**3.75%**
Japan	5.129	9.80%	1098.12	11.93%	**10.86%**
Luxembourg	0.0596	0.11%	8.8875	0.10%	**0.11%**
Netherlands	0.99	1.89%	154.36	1.68%	**1.78%**
New Zealand	0.245	0.47%	22.0025	0.24%	**0.35%**
Norway	0.503	0.96%	18.5675	0.20%	**0.58%**
Portugal	0.25	0.48%	49.355	0.54%	**0.51%**
Spain	1.434	2.74%	237.9925	2.58%	**2.66%**
Sweden	0.653	1.25%	20.56	0.22%	**0.74%**
Switzerland	0.797	1.52%	36.0675	0.39%	**0.96%**
United Kingdom	3.117	5.96%	353.4075	3.84%	**4.90%**
United States	23.617	45.14%	4644.9575	50.45%	**47.79%**
Total	52.3	100.00%	9207.535	100%	100.00%

Table 2: The average of the share of GNI and share of historical emissions for Annex II countries.

These results are very similar to the amount each country would pay if only based upon carbon emissions. The United States is paying the most at almost 50 percent, with the next largest contributor being Japan at about 11 percent.

Formula 2: Historical Carbon Emissions and Emissions Per Capita

This formula looks at both historical emissions and per capita emissions for countries. Historical emissions from Annex II countries represent the bulk of emissions that have caused the climate to change, and per capita emissions look at what countries are currently doing and the impact they are currently causing. Additionally, by using per capita emissions of recent years, countries may be incentivized to cut emissions if this will decrease their share of the burden for new replenishments. The drawbacks of this formula are that it does not account for the wealth of a country or its capacity to pay.

The per capita emissions of each country are added here in column two, and each country's value was divided by this total to get the percent share of emissions per capita.

	Carbon Emissions Per Capita	Percent Share of Carbon Emissions Per Capita	Emissions of Annex II countries 2016-2019	Percent Share of Emissions	Average of Share of Total Emissions and Per Capita Emissions
Australia	15.254	8.64%	389.1225	4.23%	**6.43%**
Austria	7.294	4.13%	44.9225	0.49%	**2.31%**
Belgium	8.096	4.59%	93.5625	1.02%	**2.80%**
Canada	15.431	8.74%	606.4975	6.59%	**7.66%**
Denmark	5.108	2.89%	33.6775	0.37%	**1.63%**
Finland	7.373	4.18%	50.3	0.55%	**2.36%**
France	4.460	2.53%	247.8475	2.69%	**2.61%**
Germany	7.912	4.48%	681.6375	7.40%	**5.94%**
Greece	5.596	3.17%	66.06	0.72%	**1.94%**
Iceland	4.548	2.58%	1.575	0.02%	**1.30%**
Ireland	7.245	4.10%	34.71	0.38%	**2.24%**
Italy	5.311	3.01%	313.345	3.40%	**3.21%**
Japan	8.541	4.84%	1098.12	11.93%	**8.38%**
Luxembourg	15.306	8.67%	8.8875	0.10%	**4.38%**
Netherlands	8.437	4.78%	154.36	1.68%	**3.23%**
New Zealand	6.830	3.87%	22.0025	0.24%	**2.05%**
Norway	6.722	3.81%	18.5675	0.20%	**2.00%**
Portugal	4.340	2.46%	49.355	0.54%	**1.50%**
Spain	5.091	2.88%	237.9925	2.58%	**2.73%**
Sweden	3.405	1.93%	20.56	0.22%	**1.08%**
Switzerland	4.359	2.47%	36.0675	0.39%	**1.43%**
United Kingdom	5.221	2.96%	353.4075	3.84%	**3.40%**

United States	14.673	8.31%	4644.9575	50.45%	**29.38%**
Total	176.553	100.00%	9207.535	100.00%	100.00%

Table 3: The average of the share of historical emissions and emissions per capita for Annex II countries.

The United States share has decreased to 30 percent, while the share from most other countries has increased except for Germany and Japan.

Formula 3: Official Development Assistance and Historical Carbon Emissions

This formula looks at the share of ODA of each country compared to other Annex II countries and the historical total carbon emissions. It does not account for a country's capacity to pay, but does address contributions that countries are already making, and how that may translate into climate finance.

The average ODA of Annex II countries is calculated at the bottom of column two, 6587, and each country's weight based upon ODA contributions was calculated by dividing the current ODA by the average contribution. To ensure that a higher weight meant that countries with less ODA paid more, the inverse is calculated by taking one divided by the weight, shown in column four. The inverse was then multiplied by the percent share of Annex II emissions for each country to show each country's contribution to the Fund. The last column normalizes these results.

	Total ODA (US$ Millions)	**ODA divided by the average**	**Inverse: One Divided by the Previous Column**	**Emissions of Annex II countries 2016-2019**	**Percent Share of Emissions**	**Total Share of Burden (share of emissions multiplied by inverse of weighted**	**Normalize**

						average)	
Australia	3070	0.46607	2.1456	389.1225	4.23%	9.08%	**9.767%**
Austria	1256	0.19068	5.2444	44.9225	0.49%	2.57%	**2.765%**
Belgium	2259	0.34295	2.9159	93.5625	1.02%	2.97%	**3.201%**
Canada	4864	0.73842	1.3542	606.4975	6.59%	8.92%	**9.604%**
Denmark	2654	0.40291	2.4819	33.6775	0.37%	0.92%	**0.988%**
Finland	1163	0.17656	5.6638	50.3	0.55%	3.12%	**3.352%**
France	12651	1.92060	0.5207	247.8475	2.69%	1.40%	**1.507%**
Germany	24627	3.73873	0.2675	681.6375	7.40%	1.98%	**2.130%**
Greece	322	0.04888	20.4565	66.06	0.72%	14.73%	**15.850%**
Iceland	73	0.01108	90.2329	1.575	0.02%	1.80%	**1.942%**
Ireland	976	0.14817	6.7490	34.71	0.38%	2.56%	**2.760%**
Italy	5136	0.77972	1.2825	313.345	3.40%	4.36%	**4.693%**
Japan	15224	2.31122	0.4327	1098.12	11.93%	5.16%	**5.555%**
Luxembourg	486	0.07378	13.5535	8.8875	0.10%	1.36%	**1.459%**
Netherlands	5429	0.82420	1.2133	154.36	1.68%	2.04%	**2.194%**
New Zealand	575	0.08729	11.4557	22.0025	0.24%	2.75%	**2.959%**
Norway	4671	0.70912	1.4102	18.5675	0.20%	0.28%	**0.304%**
Portugal	389	0.05906	16.9332	49.355	0.54%	9.14%	**9.840%**
Spain	3006	0.45635	2.1913	237.9925	2.58%	5.65%	**6.084%**
Sweden	5711	0.86701	1.1534	20.56	0.22%	0.25%	**0.273%**
Switzerland	3121	0.47381	2.1105	36.0675	0.39%	0.82%	**0.886%**
United Kingdom	19829	3.01032	0.3322	353.4075	3.84%	1.28%	**1.373%**
United States	34009	5.16305	0.1937	4644.9575	50.45%	9.77%	**10.515%**
Average/Total	6587	1.00000		9207.535	100.00%	92.92%	100.000%

Table 4: Using ODA as a weight and average of historical carbon emissions among Annex II countries to determine a burden sharing formula.

Countries paying the most here are Greece, United States, and Australia. Many countries would like this formula because they would be discounted based upon current assistance to other countries. The drawback is that smaller countries would be penalized for not contributing the same amount of ODA that richer countries can.

Formula 4: Official Development Assistance, Total Historical Carbon Emissions, Gross National Income

This formula includes GNI to highlight a country's ability to pay but is the same as the prior formula otherwise. This did not have a large impact on any country's share of the Loss and Damage Fund burden compared to the previous.

	Total ODA (US$ Millions)	**Percent Share of total Annex II ODA**	**Inverse: One Divided by the Previous Column**	**Percent Share of Emissions**	**Total GNI of each country (trillions)**	**Percent Share GNI of Annex II countries**	**Average of Share of Emissions and GNI Multiplied by ODA**	**Normalize**
Australia	3070	2.03%	2.1456	4.23%	1.5	2.93%	7.69%	**8.094%**
Austria	1256	0.83%	5.2444	0.49%	0.482	0.92%	3.70%	**3.894%**
Belgium	2259	1.49%	2.9159	1.02%	0.5996	1.15%	3.16%	**3.326%**
Canada	4864	3.21%	1.3542	6.59%	1.974	3.77%	7.02%	**7.389%**
Denmark	2654	1.75%	2.4819	0.37%	0.412	0.79%	1.44%	**1.516%**
Finland	1163	0.77%	5.6638	0.55%	0.302	0.58%	3.19%	**3.358%**
France	12651	8.35%	0.5207	2.69%	3.045	5.82%	2.22%	**2.337%**
Germany	24627	16.26%	0.2675	7.40%	4.411	8.43%	2.12%	**2.231%**
Greece	322	0.21%	20.4565	0.72%	0.213	0.41%	11.53%	**12.136%**
Iceland	73	0.05%	90.2329	0.02%	0.024	0.05%	2.97%	**3.126%**
Ireland	976	0.64%	6.749	0.38%	0.383	0.73%	3.75%	**3.947%**
Italy	5136	3.39%	1.2825	3.40%	2.145	4.10%	4.81%	**5.063%**
Japan	15224	10.05%	0.4327	11.93%	5.129	9.80%	4.70%	**4.947%**
Luxembourg	486	0.32%	13.5535	0.10%	0.0596	0.11%	1.45%	**1.526%**
Netherlands	5429	3.58%	1.2133	1.68%	0.99	1.89%	2.17%	**2.284%**
New Zealand	575	0.38%	11.4557	0.24%	0.245	0.47%	4.06%	**4.273%**
Norway	4671	3.08%	1.4102	0.20%	0.503	0.96%	0.82%	**0.863%**
Portugal	389	0.26%	16.9332	0.54%	0.25	0.48%	8.62%	**9.073%**
Spain	3006	1.98%	2.1913	2.58%	1.434	2.74%	5.83%	**6.136%**
Sweden	5711	3.77%	1.1534	0.22%	0.653	1.25%	0.85%	**0.895%**
Switzerland	3121	2.06%	2.1105	0.39%	0.797	1.52%	2.02%	**2.126%**
United	19829	13.09%	0.3322	3.84%	3.117	5.96%	1.63%	**1.716%**

Kingdom								
United States	34009	22.45%	0.1937	50.45%	23.617	45.14%	9.26%	**9.746%**
Total	151501	100.00%		100.03%	52.3	100.00%	95.01%	**100.000%**

Table 5: The average of the share of historical carbon emissions and GNI multiplied by the inverse of the weighted average for ODA for Annex II countries.

Greece's share has gone down, but they are still the largest contributor according to this formula. The United States and Australia are the two next largest contributors, but the percent contributed has gone down compared to the previous formula.

Formula 5: Per Capita Emissions and Per Capita Gross National Income

This model includes both per capita emissions and per capita GNI, highlighting the current carbon impact and the current economic condition of a country. The benefit to this formula is that it will incentivize countries to decrease their carbon emissions when a new share of the burden is determined. This drastically changes the share of the burden compared to previous formulae, with the burden being more evenly distributed among Annex II countries. Here, Luxembourg has the largest share of the burden for the first time. This is unrealistic and is an example of why total GNI and total emissions should be included in the calculations. While not a viable formula, it provides strong evidence that total economy and historical emissions are more important than per capita metrics in a viable formula.

	Per Capita Carbon Emissions	**Percent Share of Per Capita Emissions**	**Per capita GNI**	**Percent Share of GNI**	**Average of Per Capita Emissions and GNI**
Australia	15.254	8.64%	57170	4.55%	**6.60%**
Austria	7.294	4.13%	52760	4.20%	**4.17%**
Belgium	8.096	4.59%	50490	4.02%	**4.30%**

Canada	15.431	8.74%	48310	3.85%	**6.29%**
Denmark	5.108	2.89%	68300	5.44%	**4.17%**
Finland	7.373	4.18%	53510	4.26%	**4.22%**
France	4.460	2.53%	44160	3.52%	**3.02%**
Germany	7.912	4.48%	51660	4.11%	**4.30%**
Greece	5.596	3.17%	20000	1.59%	**2.38%**
Iceland	4.548	2.58%	63460	5.05%	**3.81%**
Ireland	7.245	4.10%	76110	6.06%	**5.08%**
Italy	5.311	3.01%	35990	2.86%	**2.94%**
Japan	8.541	4.84%	42650	3.40%	**4.12%**
Luxembourg	15.306	8.67%	88190	7.02%	**7.84%**
Netherlands	8.437	4.78%	55200	4.39%	**4.59%**
New Zealand	6.830	3.87%	45230	3.60%	**3.73%**
Norway	6.722	3.81%	83880	6.68%	**5.24%**
Portugal	4.340	2.46%	23890	1.90%	**2.18%**
Spain	5.091	2.88%	29690	2.36%	**2.62%**
Sweden	3.405	1.93%	59540	4.74%	**3.33%**
Switzerland	4.359	2.47%	90600	7.21%	**4.84%**
United Kingdom	5.221	2.96%	44480	3.54%	**3.25%**
United States	14.673	8.31%	70930	5.65%	**6.98%**
Total	176.553	100.00%	1256200	100.00%	100%

Table 6: The average of the share of per capita emissions and per capita GNI among Annex II countries.

Formula 6: Per Capita Gross National Income, Per Capita Emissions, Official Development Assistance

This formula looks similarly at per capita GNI, per capita emissions, and then ODA. By adding ODA, this raises the contributions of overall richer countries that contribute more aid, such as the United States, Germany and Japan. While still not viable because it does not include total GNI or total emissions, it does demonstrate that

ODA is an important metric for showing current contributions by richer countries and how ODA could translate into loss and damage contributions.

	Per capita emissions	Percent Share of Emissions	Per capita GNI	Percent Share of GNI	ODA	Percent Share of ODA	Average of Per Capita Emissions, GNI, ODA
Australia	15.254	8.64%	57170	4.55%	3070	2.03%	**5.07%**
Austria	7.294	4.13%	52760	4.20%	1256	0.83%	**3.05%**
Belgium	8.096	4.59%	50490	4.02%	2259	1.49%	**3.37%**
Canada	15.431	8.74%	48310	3.85%	4864	3.21%	**5.27%**
Denmark	5.108	2.89%	68300	5.44%	2654	1.75%	**3.36%**
Finland	7.373	4.18%	53510	4.26%	1163	0.77%	**3.07%**
France	4.460	2.53%	44160	3.52%	12651	8.35%	**4.80%**
Germany	7.912	4.48%	51660	4.11%	24627	16.26%	**8.28%**
Greece	5.596	3.17%	20000	1.59%	322	0.21%	**1.66%**
Iceland	4.548	2.58%	63460	5.05%	73	0.05%	**2.56%**
Ireland	7.245	4.10%	76110	6.06%	976	0.64%	**3.60%**
Italy	5.311	3.01%	35990	2.86%	5136	3.39%	**3.09%**
Japan	8.541	4.84%	42650	3.40%	15224	10.05%	**6.09%**
Luxembourg	15.306	8.67%	88190	7.02%	486	0.32%	**5.34%**
Netherlands	8.437	4.78%	55200	4.39%	5429	3.58%	**4.25%**
New Zealand	6.830	3.87%	45230	3.60%	575	0.38%	**2.62%**
Norway	6.722	3.81%	83880	6.68%	4671	3.08%	**4.52%**
Portugal	4.340	2.46%	23890	1.90%	389	0.26%	**1.54%**
Spain	5.091	2.88%	29690	2.36%	3006	1.98%	**2.41%**
Sweden	3.405	1.93%	59540	4.74%	5711	3.77%	**3.48%**
Switzerland	4.359	2.47%	90600	7.21%	3121	2.06%	**3.91%**
United Kingdom	5.221	2.96%	44480	3.54%	19829	13.09%	**6.53%**
United States	14.673	8.31%	70930	5.65%	34009	22.45%	**12.14%**
Total	176.553	100.00%	1256200	100.00%	151501	100.00%	100.00%

Table 7: The average of the share of total per capita GNI, per capita emissions, and ODA.

Formula 7: Official Development Assistance and Historical Emissions Penalty

The 2022 Adaptation Gap Report produced annually by the UNEP estimates that annual adaptation needs are US$ 160-340 billion by 2030 and US$ 315-565 billion by 2050 (UNEP “Too Little Too Slow”). This formula will use US$ 340 billion as the desired yearly assistance. The total historical emissions from 2016-2019 is used as a country’s emissions penalty. The percent emissions from Annex II countries for each country was multiplied by 340 to calculate the amount each country should pay to reach US$ 340 billion. Then, the current ODA is subtracted from the emissions penalty to determine the payment by each country.

	Emissions of Annex II countries 2016-2019	**Percent Share of Emissions**	**Amount each country needs to pay (millions)**	**Current ODA (US$ Millions)**	**Payment minus current ODA (millions)**
Australia	389.1225	4.23%	14382	3070	**11312**
Austria	44.9225	0.49%	1666	1256	**410**
Belgium	93.5625	1.02%	3468	2259	**1209**
Canada	606.4975	6.59%	22406	4864	**17542**
Denmark	33.6775	0.37%	1258	2654	**-1396**
Finland	50.3	0.55%	1870	1163	**707**
France	247.8475	2.69%	9146	12651	**-3505**
Germany	681.6375	7.40%	25160	24627	**533**
Greece	66.06	0.72%	2448	322	**2126**
Iceland	1.575	0.02%	68	73	**-5**
Ireland	34.71	0.38%	1292	976	**316**
Italy	313.345	3.40%	11560	5136	**6424**
Japan	1098.12	11.93%	40562	15224	**25338**
Luxembourg	8.8875	0.10%	340	486	**-146**
Netherlands	154.36	1.68%	5712	5429	**283**
New Zealand	22.0025	0.24%	816	575	**241**
Norway	18.5675	0.20%	680	4671	**-3991**
Portugal	49.355	0.54%	1836	389	**1447**

Spain	237.9925	2.58%	8772	3006	**5766**
Sweden	20.56	0.22%	748	5711	**-4963**
Switzerland	36.0675	0.39%	1326	3121	**-1795**
United Kingdom	353.4075	3.84%	13056	19829	**-6773**
United States	4644.9575	50.45%	171530	34009	**137521**
Total	9207.535	100.03%	340102	151501	**188601**

Table 8: ODA of each Annex II country subtracted from the amount each country would pay based upon historical emissions.

There are negative numbers, which means that this formula would need to be reworked to give accurate amounts of what each country should be paying. But this gives an example of ways in which current levels of assistance can be incorporated into the Loss and Damage Fund formula to benefit countries that contribute higher amounts of ODA.

Formula 8: Using the Green Climate Fund (GCF) and Total Historical Emissions

This formula is very similar to formula 7, but it uses current contributions to the GCF instead of ODA as current contributions. It still uses total historical emissions as emissions penalty of which ODA is subtracted from.

	Percent Share of Emissions 2016-2019 of Annex II countries	**Percent Share of Emissions**	**Amount each country needs to pay (millions)**	**GCF Contribution (millions)**	**Needs to pay minus current GCF Contribution**
Australia	389.1225	4.23%	14382	0	**14382**
Austria	44.9225	0.49%	1666	146.41	**1520**
Belgium	93.5625	1.02%	3468	112.62	**3355**
Canada	606.4975	6.59%	22406	225.43	**22181**
Denmark	33.6775	0.37%	1258	120.69	**1137**

Finland	50.3	0.55%	1870	112.62	**1757**
France	247.8475	2.69%	9146	1,324	**7822**
Germany	681.6375	7.40%	25160	169	**24991**
Greece	66.06	0.72%	2448	0	**2448**
Iceland	1.575	0.02%	68	2.8	**65**
Ireland	34.71	0.38%	1292	18.02	**1274**
Italy	313.345	3.40%	11560	337.86	**11222**
Japan	1098.12	11.93%	40562	1500	**39062**
Luxembourg	8.8875	0.10%	340	45.05	**295**
Netherlands	154.36	1.68%	5712	135.15	**5577**
New Zealand	22.0025	0.24%	816	10.05	**806**
Norway	18.5675	0.20%	680	417.48	**263**
Portugal	49.355	0.54%	1836	1.13	**1835**
Spain	237.9925	2.58%	8772	168.93	**8603**
Sweden	20.56	0.22%	748	852.55	**-105**
Switzerland	36.0675	0.39%	1326	150	**1176**
United Kingdom	353.4075	3.84%	13056	1851	**11205**
United States	4644.9575	50.45%	171530	0	**171530**
Total	9207.535	100.00%	340000	7700.79	332401

Table 9: Contributions to the Green Climate Fund subtracted from what each country should pay based on historical emissions.

The only country that is negative here is Switzerland, who has contributed more to the GCF than they would need to contribute to the Loss and Damage Fund. The remaining contributions to the Loss and Damage Fund should come from a carbon tax to fill this gap. There are several other options that were mentioned in the previous sections that could account for this gap.

Outliers and Formulae Comparisons

Since GNI is a clear outlier in these scenarios, GNI, GNI & historical emissions and & ODA, and Total Historical Emissions & GNI, were removed for the summary

below table. Resulting in the following contributions by United States, Japan, and Germany:

	United States	Japan	Germany	United Kingdom
Formula 2: Emissions per capita & Historical Emissions	29.38%	8.38%	5.94%	3.40%
Formula 3: ODA & Historical Emissions	10.52%%	5.55%	2.13%	1.37%
Formula 4:ODA, Emissions, GNI	9.746%	4.947%	2.231%	1.716%
Formula 5: Per Capita Emissions & Per Capita GNI	6.98%	4.12%	4.30%	3.54%
Formula 6: ODA & Per capita Emissions & Per Capita GNI	12.14%	6.09%	8.28%	6.53%
Emissions Per Capita	8.31%	4.84%	4.48%	2.96%
Total Historical Emissions	50.54%	11.93%	7.40%	3.84%
ODA	22.45%	9.80%	16.26%	13.09%
I am	5.65%	3.40%	4.11%	3.54%

Table 10: Comparison of contributions of United States, Japan, Germany, and United Kingdom to the Loss and Damage Fund for varying formulae

This table includes five formulae described above and the shares based upon the individual metrics used in determining the formulae as a reference. In every instance the United States bears the largest share of the burden. It makes sense that emissions, both per capita and historical, skew the results the most towards larger contributions for the United States.

Proposed Formulae Including China

Each of the following formulae are identical to the first seven formulae of the previous section, but each includes China in the share of the burden.

Averaged Emissions Including China from 2016-2019

Country	2016	2017	2018	2019	Average	Percent Share
Australia	387.18	391.35	389.25	388.71	389.1225	2.06%
Austria	56.56	58.73	30.81	33.59	44.9225	0.24%
Belgium	94.38	92.88	93.82	93.17	93.5625	0.50%
Canada	591.93	603.22	615.36	615.48	606.4975	3.22%
China	9224.56	9445.91	9852.83	10057.12	9645.105	51.16%
Denmark	36.18	33.99	33.99	30.55	33.6775	0.18%
Finland	52.32	49.71	51.52	47.65	50.3	0.27%
France	251.94	255.85	245.07	238.53	247.8475	1.31%
Germany	717.68	702.73	678.22	627.92	681.6375	3.62%
Greece	68.25	68.19	66.41	61.39	66.06	0.35%
Iceland	1.55	1.59	1.61	1.55	1.575	0.01%
Ireland	36.03	34.98	34.87	32.96	34.71	0.18%
Italy	320.53	316.37	312.06	304.42	313.345	1.66%
Japan	1135.73	1123.17	1084.08	1049.5	1098.12	5.82%
Luxembourg	8.58	8.72	9.04	9.21	8.8875	0.05%
Netherlands	159.9	157.12	152.72	147.7	154.36	0.82%
New Zealand	20.57	22.31	21.74	23.39	22.0025	0.12%
Norway	19.81	18.77	18.67	17.02	18.5675	0.10%
Portugal	49.06	53.63	49.8	44.93	49.355	0.26%
Spain	233.15	249.57	243.16	226.09	237.9925	1.26%
Sweden	22.13	21.72	19.7	18.69	20.56	0.11%
Switzerland	37.43	36.46	35.24	35.14	36.0675	0.19%
United Kingdom	369.85	356.04	349.78	337.96	353.4075	1.87%
United States	4662.71	4587.55	4743.58	4585.99	4644.9575	24.64%
Total	18558.01	18690.56	19133.33	19028.66	18852.64	100.00%

Table 11: Emissions for China and Annex II countries from 2016-2019 and the average emissions from each country.

The average emissions over the past four years is calculated below, with China making up over fifty percent of the emissions and the United States making up about a quarter.

Formula 1: Gross National Income and Total Historical Carbon Emissions

	GNI (trillions)	Percent Share of GNI	Average Annex II Emissions from 2016-2019	Annex II Percent Share of Carbon Emissions	Average of Share of GDP and Emissions
Australia	1.5	2.20%	389.1225	2.064021%	2.130130%
Austria	0.482	0.69%	44.9225	0.238282%	0.463958%
Belgium	0.5996	0.86%	93.5625	0.496283%	0.677088%
Canada	1.974	2.82%	606.4975	3.217043%	3.020696%
China	17.57	25.14%	9645.105	51.160501%	38.151038%
Denmark	0.412	0.59%	33.6775	0.178635%	0.384057%
Finland	0.302	0.43%	50.3	0.266806%	0.349450%
France	3.045	4.36%	247.8475	1.314657%	2.835683%
Germany	4.411	6.31%	681.6375	3.615608%	4.963378%
Greece	0.213	0.30%	66.06	0.350402%	0.327578%
Iceland	0.024	0.03%	1.575	0.008354%	0.021346%
Ireland	0.383	0.55%	34.71	0.184112%	0.366049%
Italy	2.145	3.07%	313.345	1.662075%	2.365543%
Japan	5.129	7.34%	1098.12	5.824755%	6.581599%
Luxembourg	0.0596	0.09%	8.8875	0.047142%	0.066208%
Netherlands	0.99	1.42%	154.36	0.818771%	1.117619%
New Zealand	0.245	0.35%	22.0025	0.116708%	0.233624%
Norway	0.503	0.72%	18.5675	0.098488%	0.409084%
Portugal	0.25	0.36%	49.355	0.261794%	0.309744%
Spain	1.434	2.05%	237.9925	1.262383%	1.657057%
Sweden	0.653	0.93%	20.56	0.109056%	0.521676%
Switzerland	0.797	1.14%	36.0675	0.191313%	0.665820%

United Kingdom	3.117	4.46%	353.4075	1.874578%	3.167152%
United States	23.617	33.79%	4644.9575	24.638234%	29.214421%
Total	69.9	100.00%	18852.64	100.000000%	100.000000%

Table 12: The average of the share of GNI and share of historical emissions for China and Annex II countries.

By including China, the most notable change was the United States share decreased by 20 percent compared to China not being included, from 48 to 28 percent. China now bears the largest share of the burden by almost ten percent.

Formula 2: Total Historical Carbon Emissions and Emissions Per Capita

	Carbon Emissions Per Capita	**Percent Share of Carbon Emissions Per Capita**	**Average Annex II Emissions from 2016-2019**	**Percent Share of Historical Emissions**	**Average of Share of Total Emissions and Per Capita Emissions**
Australia	15.254	8.28%	389.1225	2.06%	**5.17%**
Austria	7.294	3.96%	44.9225	0.24%	**2.10%**
Belgium	8.096	4.40%	93.5625	0.50%	**2.45%**
Canada	15.431	8.38%	606.4975	3.22%	**5.80%**
China	7.600	4.13%	9645.105	51.16%	**27.64%**
Denmark	5.108	2.77%	33.6775	0.18%	**1.48%**
Finland	7.373	4.00%	50.3	0.27%	**2.14%**
France	4.460	2.42%	247.8475	1.31%	**1.87%**
Germany	7.912	4.30%	681.6375	3.62%	**3.96%**
Greece	5.596	3.04%	66.06	0.35%	**1.69%**
Iceland	4.548	2.47%	1.575	0.01%	**1.24%**
Ireland	7.245	3.93%	34.71	0.18%	**2.06%**
Italy	5.311	2.88%	313.345	1.66%	**2.27%**
Japan	8.541	4.64%	1098.12	5.82%	**5.23%**
Luxembourg	15.306	8.31%	8.8875	0.05%	**4.18%**
Netherlands	8.437	4.58%	154.36	0.82%	**2.70%**

New Zealand	6.830	3.71%	22.0025	0.12%	**1.91%**
Norway	6.722	3.65%	18.5675	0.10%	**1.87%**
Portugal	4.340	2.36%	49.355	0.26%	**1.31%**
Spain	5.091	2.76%	237.9925	1.26%	**2.01%**
Sweden	3.405	1.85%	20.56	0.11%	**0.98%**
Switzerland	4.359	2.37%	36.0675	0.19%	**1.28%**
United Kingdom	5.221	2.83%	353.4075	1.87%	**2.35%**
United States	14.673	7.97%	4644.9575	24.64%	**16.30%**
Total	184.153	100.00%	18852.64	100.000000%	100.00%

Table 13: The average of the share of historical emissions and emissions per capita for China and Annex II countries.

The inclusion of China decreased the United States' share by almost 50 percent, from 30 percent of the share to 16 percent of the share. Other countries were not as affected, for example the United Kingdom decreased its share by only one percent, and China now makes up over a quarter of the burden.

Formula 3: Official Development Assistance and Historical Carbon Emissions

	Total ODA (US$ Millions)	**ODA divided by the average**	**Inverse: One Divided by the Previous Column**	**Emissions of Annex II countries 2016-2019**	**Percent Share of Emissions**	**Total Share of Burden (share of emissions multiplied by inverse of weighted average)**	**Normalize**
Australia	3070	0.4772	2.0956	389.1225	2.06%	4.33%	**2.74%**
Austria	1256	0.1952	5.1221	44.9225	0.24%	1.22%	**0.77%**
Belgium	2259	0.3511	2.8479	93.5625	0.50%	1.41%	**0.90%**
Canada	4864	0.7561	1.3227	606.4975	3.22%	4.26%	**2.70%**
China	2900	0.4508	2.2184	9645.105	51.16%	113.49%	**72.02%**
Denmark	2654	0.4125	2.4240	33.6775	0.18%	0.43%	**0.27%**

Finland	1163	0.1808	5.5317	50.3	0.27%	1.48%	**0.94%**
France	12651	1.9665	0.5085	247.8475	1.31%	0.67%	**0.42%**
Germany	24627	3.8280	0.2612	681.6375	3.62%	0.94%	**0.60%**
Greece	322	0.0501	19.9794	66.06	0.35%	7.00%	**4.44%**
Iceland	73	0.0113	88.1284	1.575	0.01%	0.74%	**0.47%**
Ireland	976	0.1517	6.5916	34.71	0.18%	1.21%	**0.77%**
Italy	5136	0.7983	1.2526	313.345	1.66%	2.08%	**1.32%**
Japan	15224	2.3664	0.4226	1098.12	5.82%	2.46%	**1.56%**
Luxembourg	486	0.0755	13.2374	8.8875	0.05%	0.62%	**0.40%**
Netherlands	5429	0.8439	1.1850	154.36	0.82%	0.97%	**0.62%**
New Zealand	575	0.0894	11.1885	22.0025	0.12%	1.31%	**0.83%**
Norway	4671	0.7261	1.3773	18.5675	0.10%	0.14%	**0.09%**
Portugal	389	0.0605	16.5382	49.355	0.26%	4.33%	**2.75%**
Spain	3006	0.4673	2.1402	237.9925	1.26%	2.70%	**1.71%**
Sweden	5711	0.8877	1.1265	20.56	0.11%	0.12%	**0.08%**
Switzerland	3121	0.4851	2.0613	36.0675	0.19%	0.39%	**0.25%**
United Kingdom	19829	3.0822	0.3244	353.4075	1.87%	0.61%	**0.39%**
United States	34009	5.2863	0.1892	4644.9575	24.64%	4.66%	**2.96%**
Average/Total	6433.375	1.0000	1.0000	18852.64	100.00%	157.58%	**100.00%**

Table 14: The average of the share of total ODA and historical carbon emissions for China and Annex II countries.

For China, ODA was determined by looking at the OECD's documentation of other official providers not reporting to the OECD to get an estimate of China's ODA, US$ 2.9 billion (OECD, "Other Official Providers"). China bears almost three quarters of the burden here due to its lack of significant aid contributions and very significant emissions. This is not a viable formula and provides evidence that if ODA is included, weights should be carefully determined to ensure countries that are expected to pay more have the capacity to do so. It does not make sense for China to cover 72 percent of the burden because it is such a disproportionate share. A more viable formula would not penalize China as much for the lack of development assistance. Including China

decreased the United States contributions using this formula from over ten percent to under three percent.

Formula 4: Official Development Assistance, Total Historical Carbon Emissions, Gross National Income

	Total ODA (US$ Millions)	ODA divided by the average	Inverse: One Divided by the Previous Column	Emissions of Annex II countries 2016-2019	Percent Share of Emissions	Total GNI (trillions) (2021)	Percent Share of GNI of Annex II countries	Average of Share of Emissions and GNI Multiplied by ODA	Normalize
Australia	3070	0.4772	2.0956	389.1225	2.06%	1.5	2.20%	4.47%	3.147%
Austria	1256	0.1952	5.1221	44.9225	0.24%	0.482	0.69%	2.38%	1.675%
Belgium	2259	0.3511	2.8479	93.5625	0.50%	0.5996	0.86%	1.93%	1.360%
Canada	4864	0.7561	1.3227	606.4975	3.22%	1.974	2.82%	3.99%	2.812%
China	2900	0.4508	2.2184	9645.105	51.16%	17.57	25.14%	84.63%	59.618%
Denmark	2654	0.4125	2.4240	33.6775	0.18%	0.412	0.59%	0.93%	0.656%
Finland	1163	0.1808	5.5317	50.3	0.27%	0.302	0.43%	1.93%	1.358%
France	12651	1.9665	0.5085	247.8475	1.31%	3.045	4.36%	1.44%	1.016%
Germany	24627	3.8280	0.2612	681.6375	3.62%	4.411	6.31%	1.30%	0.913%
Greece	322	0.0501	19.9794	66.06	0.35%	0.213	0.30%	6.50%	4.577%
Iceland	73	0.0113	88.1284	1.575	0.01%	0.024	0.03%	1.69%	1.191%
Ireland	976	0.1517	6.5916	34.71	0.18%	0.383	0.55%	2.42%	1.704%
Italy	5136	0.7983	1.2526	313.345	1.66%	2.145	3.07%	2.96%	2.088%
Japan	15224	2.3664	0.4226	1098.12	5.82%	5.129	7.34%	2.78%	1.959%
Luxembourg	486	0.0755	13.2374	8.8875	0.05%	0.0596	0.09%	0.91%	0.639%
Netherlands	5429	0.8439	1.1850	154.36	0.82%	0.99	1.42%	1.33%	0.934%
New Zealand	575	0.0894	11.1885	22.0025	0.12%	0.245	0.35%	2.61%	1.839%
Norway	4671	0.7261	1.3773	18.5675	0.10%	0.503	0.72%	0.56%	0.397%
Portugal	389	0.0605	16.5382	49.355	0.26%	0.25	0.36%	5.14%	3.622%
Spain	3006	0.4673	2.1402	237.9925	1.26%	1.434	2.05%	3.54%	2.497%

Sweden	5711	0.8877	1.1265	20.56	0.11%	0.653	0.93%	0.59%	0.412%
Switzerland	3121	0.4851	2.0613	36.0675	0.19%	0.797	1.14%	1.37%	0.967%
UK	19829	3.0822	0.3244	353.4075	1.87%	3.117	4.46%	1.03%	0.724%
United States	34009	5.2863	0.1892	4644.9575	24.64%	23.617	33.79%	5.53%	3.893%
Average/ Total	6433.375	1.0000	1.0000	18852.64	100.00%	6985.52%	**100.00%**	141.96%	100.000%

Table 15: The average of the share of ODA, historical carbon emissions, and GNI for China and Annex II countries

The inclusion of China in this formula again greatly decreased the share of the burden among the rest of the countries. It significantly decreases the share of the burden for the United States, decreasing less for Germany and Japan.

Formula 5: Per Capita Emissions and Per Capita Gross National Income

	Per Capita Carbon Emissions	**Percent Share of Per Capita Emissions**	**Per capita GNI**	**Percent Share of GNI**	**Average of Per Capita Emissions and GNI**
Australia	15.254	8.28%	57170	4.51%	**6.40%**
Austria	7.294	3.96%	52760	4.16%	**4.06%**
Belgium	8.096	4.40%	50490	3.98%	**4.19%**
Canada	15.431	8.38%	48310	3.81%	**6.09%**
China	7.600	4.13%	11,880	0.94%	**2.53%**
Denmark	5.108	2.77%	68300	5.39%	**4.08%**
Finland	7.373	4.00%	53510	4.22%	**4.11%**
France	4.460	2.42%	44160	3.48%	**2.95%**
Germany	7.912	4.30%	51660	4.07%	**4.19%**
Greece	5.596	3.04%	20000	1.58%	**2.31%**
Iceland	4.548	2.47%	63460	5.00%	**3.74%**
Ireland	7.245	3.93%	76110	6.00%	**4.97%**
Italy	5.311	2.88%	35990	2.84%	**2.86%**
Japan	8.541	4.64%	42650	3.36%	**4.00%**
Luxembourg	15.306	8.31%	88190	6.95%	**7.63%**
Netherlands	8.437	4.58%	55200	4.35%	**4.47%**

New Zealand	6.830	3.71%	45230	3.57%	**3.64%**
Norway	6.722	3.65%	83880	6.61%	**5.13%**
Portugal	4.340	2.36%	23890	1.88%	**2.12%**
Spain	5.091	2.76%	29690	2.34%	**2.55%**
Sweden	3.405	1.85%	59540	4.70%	**3.27%**
Switzerland	4.359	2.37%	90600	7.14%	**4.76%**
United Kingdom	5.221	2.83%	44480	3.51%	**3.17%**
United States	14.673	7.97%	70930	5.59%	**6.78%**
Total	184.153	100.00%	1268080	100.00%	**100.00%**

Table 16: The average of the share of per capita emissions and per capita GNI for China and Annex II countries.

In this case, the share of the burden was distributed among the countries more evenly than any other case, and it remains this way when China is added. This is the first instance in which China does not have the largest share of the burden. Similar to this formula without China, Luxembourg has the largest share of the burden and China has one of the lowest. With China having the lowest, this formula also highlights the large population of China that is not reflected in formulae that include overall total emissions. For instance, among Annex II countries, China's per capita emissions is only 4 percent when the per capita emissions for all countries are added. When looking at the total emissions, China makes up over half. This sparks a debate as to whether overall emissions or per capita emissions are more important in determining the share of the burden.

Formula 6: Per Capita Gross National Income, Per Capita Emissions, Official Development Assistance

	Per capita emissions	Percent Share of Per Capita Emissions	Per capita GNI	Percent Share of GNI Per Capita	ODA	Percent Share of ODA	Average of Per Capita Emissions, GNI, ODA
Australia	15.254	8.28%	57170	4.51%	3070	1.99%	**4.93%**
Austria	7.294	3.96%	52760	4.16%	1256	0.81%	**2.98%**
Belgium	8.096	4.40%	50490	3.98%	2259	1.46%	**3.28%**
Canada	15.431	8.38%	48310	3.81%	4864	3.15%	**5.11%**
China	7.600	4.13%	11880	0.94%	2900	1.88%	**2.31%**
Denmark	5.108	2.77%	68300	5.39%	2654	1.72%	**3.29%**
Finland	7.373	4.00%	53510	4.22%	1163	0.75%	**2.99%**
France	4.460	2.42%	44160	3.48%	12651	8.19%	**4.70%**
Germany	7.912	4.30%	51660	4.07%	24627	15.95%	**8.11%**
Greece	5.596	3.04%	20000	1.58%	322	0.21%	**1.61%**
Iceland	4.548	2.47%	63460	5.00%	73	0.05%	**2.51%**
Ireland	7.245	3.93%	76110	6.00%	976	0.63%	**3.52%**
Italy	5.311	2.88%	35990	2.84%	5136	3.33%	**3.02%**
Japan	8.541	4.64%	42650	3.36%	15224	9.86%	**5.95%**
Luxembourg	15.306	8.31%	88190	6.95%	486	0.31%	**5.19%**
Netherlands	8.437	4.58%	55200	4.35%	5429	3.52%	**4.15%**
New Zealand	6.830	3.71%	45230	3.57%	575	0.37%	**2.55%**
Norway	6.722	3.65%	83880	6.61%	4671	3.03%	**4.43%**
Portugal	4.340	2.36%	23890	1.88%	389	0.25%	**1.50%**
Spain	5.091	2.76%	29690	2.34%	3006	1.95%	**2.35%**
Sweden	3.405	1.85%	59540	4.70%	5711	3.70%	**3.41%**
Switzerland	4.359	2.37%	90600	7.14%	3121	2.02%	**3.84%**
United Kingdom	5.221	2.83%	44480	3.51%	19829	12.84%	**6.40%**
United States	14.673	7.97%	70930	5.59%	34009	22.03%	**11.86%**
Total	184.153	100.00%	1268080	100.00%	154401	100.00%	**100.00%**

Table 17: The average of the share of total per capita GNI, per capita emissions, and ODA for China and Annex II countries

In this case, the United States again holds the largest share of the burden.

Adding in China did not greatly affect the share of the burden as it did for the first four

formulae, with China only making up about 2 percent due to its low per capita GNI and lower than average ODA contribution.

Formula 7: Official Development Assistance and Historical Emissions Penalty

	Emissions of Annex II countries 2016-2019	**Percent Share of Emissions**	**Amount each country needs to pay (millions)**	**Current ODA (US$ Millions)**	**Payment minus current ODA (millions)**
Australia	389.1225	2.06%	7017.672326	3070	**3947.672326**
Austria	44.9225	0.24%	810.1597442	1256	**-445.8402558**
Belgium	93.5625	0.50%	1687.363149	2259	**-571.6368509**
Canada	606.4975	3.22%	10937.94556	4864	**6073.945561**
China	9645.105	51.16%	173945.702	2900	**171045.702**
Denmark	33.6775	0.18%	607.3605606	2654	**-2046.639439**
Finland	50.3	0.27%	907.1408567	1163	**-255.8591433**
France	247.8475	1.31%	4469.832872	12651	**-8181.167128**
Germany	681.6375	3.62%	12293.06612	24627	**-12333.93388**
Greece	66.06	0.35%	1191.366302	322	**869.366302**
Iceland	1.575	0.01%	28.40450993	73	**-44.59549007**
Ireland	34.71	0.18%	625.9812949	976	**-350.0187051**
Italy	313.345	1.66%	5651.054706	5136	**515.0547064**
Japan	1098.12	5.82%	19804.16536	15224	**4580.165358**
Luxembourg	8.8875	0.05%	160.2825917	486	**-325.7174083**
Netherlands	154.36	0.82%	2783.822319	5429	**-2645.177681**
New Zealand	22.0025	0.12%	396.806495	575	**-178.193505**
Norway	18.5675	0.10%	334.8576115	4671	**-4336.142389**
Portugal	49.355	0.26%	890.0981507	389	**501.0981507**
Spain	237.9925	1.26%	4292.101796	3006	**1286.101796**
Sweden	20.56	0.11%	370.7915708	5711	**-5340.208429**
Switzerland	36.0675	0.19%	650.4632773	3121	**-2470.536723**
United Kingdom	353.4075	1.87%	6373.566249	19829	**-13455.43375**
United States	4644.9575	24.64%	83769.99455	34009	**49760.99455**

Total	18852.64	100.00%	340000	154401	

Table 18: ODA of China and each Annex II country subtracted from the amount each country would pay based upon historical emissions.

The inclusion of China leads to significantly more negative values as a result. This makes sense because each country would pay less into the Fund and therefore the difference between the amount already being contributed and the amount subtracted from ODA decreases significantly.

China, United States, Germany, and Japan contributions:

	United States	Japan	Germany	China
Formula 2: Emissions per capita & Historical Emissions	16.30%	5.23%	3.96%	27.64%
Formula 3: ODA & Historical Emissions	2.95%	1.56%	0.60%	72.02%
Formula 4:ODA, Emissions, GNI	3.89%	1.96%	0.91%	59.62%
Formula 5: Per Capita Emissions & Per Capita GNI	6.78%	4.00%	4.19%	2.53%
Formula 6: ODA & Per capita Emissions & Per Capita GNI	11.86%	5.95%	8.11%	2.31%
Emissions Per Capita	11.86%	4.64%	4.30%	4.13%
Total Historical Emissions	24.64%	5.82%	3.62%	51.16%
ODA	11.86%	5.95%	8.11%	2.31%
GNI per capita	5.59%	3.36%	4.07%	0.94%

Table 19: Comparison of China, United States, Japan, and Germany contributions of each formula.

For the most part, China bears the greatest share of the burden when dispersed among Annex II countries, but there is a large range. The largest burden is 72 percent when China's below average ODA contributions means a greater burden share, and the smallest being 2.31 percent when ODA is included but countries are not penalized. Rather, when ODA is used as a baseline for current contributions and as a determinant of Loss and Damage contributions, the percentage shared by China is much less. In this case, the United States bears the greatest share.

Loss and Damage Allocation

Who?

All countries not included in Annex II countries, those contributing to the fund, should be in the pool of countries to receive loss and damage funding, with some exceptions. There are many exporting countries that have average per capita incomes above the average of the OECD countries. These include Saudi Arabia (high income), Iraq (upper middle income), Russia (upper middle income), United Arab Emirates (high income), Kuwait (high income), and Kazakhstan (upper middle income). These are not included in the Annex II list of countries but should be omitted from receiving contributions because of their high-income levels.

Operationalizing the Fund

The UNFCCC writes that operationalizing a fund for losses and damages should consider establishing one or more funds, regional and global. They state the importance to find ways to widen fiscal space for vulnerable countries in the aftermath of climate related disasters; increased flexibility and speed of access to finance; enhance the responsiveness of the UN entities; and encouragement of multilateral development banks (MDBs) to respond to loss and damage through increased capitalization (UNFCCC, “Climate Finance,” 3)

Finance to address losses and damages must be provided in a timely manner in amounts adequate to recipients’ needs and it is crucial that it not create more of a financial burden to recipient countries. Therefore, it should be delivered as grants rather than loans, and portions should be provided at the local level to provide sustained support (Bakhtaoui and Shawoo 12). Reversing climate injustices includes providing

finance that improves the recipient's financial situation rather than worsening it with burdens such as sustained debt. There is evidence that smaller grants as opposed to larger scale projects are more likely to reach marginalized groups, be more flexible, and strengthen the capacity of local actors to design, implement and monitor projects (Bakhtaoui and Shawoo 14).

Additionally, accessing finance should be simple, manageable and not have "overly burdensome requirements." Access should also be designed to minimize the risk of elites getting the benefits at the expense of disadvantaged communities (Bakhtaoui and Shawoo 12). Those intended to receive climate finance should have sufficient decision-making power over how the finance is utilized. Until this point, mainstream climate finance has rarely accounted for local power dynamics and tends to dismiss recipients' capacity for agency or reinforce power inequalities (Bakhtaoui and Shawoo 16).

Looking at development indices is a promising way to target countries that are most at risk and need the most overall aid in adaptation and mitigation. The United Nations Economic and Environmental Vulnerability Index, the Notre Dame Global Adaptation Initiative, and INFORM Risk are a variety of indices that provide baselines for the countries most at risk and vulnerable to climate change.

United Nations Economic and Environmental Vulnerability (EVI)

The United Nations has an economic and environmental vulnerability index for all LDCs, with lower scores representing more at-risk countries. The EVI is determined by share of agriculture, hunting, forestry and fishing; remoteness and landlockedness; merchandise export concentration; and inability to export goods and services. A

country’s EVI score is also determined by the share of the population in low elevation coastal zones, share of population living in drylands, instability of agricultural production, and victims of disaster (“The EVI in Summary").

The values for the 2021 EVI are shown below, and if using this index those countries with the most severe scores should be prioritized to receive loss and damage finance. The countries with the five lowest scores are Togo, Myanmar, Nepal, Bhutan and Sao Tome and Principe.

Country	EVI Value	Country	EVI Value
Afghanistan	44.8	Madagascar	34.8
Angola	45.6	Malawi	44.5
Bangladesh	27.2	Mali	49.3
Benin	33	Mauritania	45.2
Bhutan	25.7	Mozambique	41.4
Burkina Faso	48.6	Myanmar	24.3
Burundi	38.7	Nepal	24.7
Cambodia	30.6	Niger	48.5
Central African Republic	27.4	Rwanda	32.3
Chad	51.8	Sao Tome and Principe	25.8
Comoros	37.7	Senegal	43
Dem Rep of the Congo	28.3	Sierra Leone	40.3
Djibouti	53.9	Solomon Islands	45.1
Eritrea	50.2	Somalia	51.9
Ethiopia	34.3	South Sudan	54.6
Gambia	51.3	Sudan	37.9
Guinea	28.8	Timor-Leste	38.7
Guinea Bissau	41	Togo	23.3
Haiti	33.5	Tuvalu	57.1
Kiribati	51.7	Uganda	29.1
Lao People's Dem Rep	27	United Rep of Tanzania	34.7
Lesotho	43.4	Yemen	35.1

Liberia	40.2	Zambia	41.7

Table 20: Economic and environmental vulnerability Index of the least developed countries according to the United Nations.

Notre Dame Global Adaptation Initiative

The Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. ND-Gain assesses the vulnerability of a country through considering six life supporting sectors: food, water, health, ecosystem services, human habitat, and infrastructure. ND-GAIN measures readiness by considering a country's ability to leverage investments to adaptation actions. It utilizes the following three components: economic readiness, governance readiness, and social readiness (Chen et al. 4).

The most recent scores for 2020 show Chad, Central African Republic, Guinea-Bissau, Eritrea, and Democratic Republic of the Congo as the lowest ranking countries of 182 countries listed. Norway, Finland and Switzerland make up the top three countries, with Germany at 8, the United States at 18, and Japan at 19.

This index looks at data over time to see how countries' scores change from year to year, which may be a key determinant for when replenishments occur and how financial assistance is distributed and to where. Combining this information with per capita carbon emissions over each year creates an incentive for countries to decrease their emissions to receive more financial assistance. So, those countries that decrease carbon emissions are eligible for more assistance.

INFORM Risk

The INFORM initiative began in 2012 as a convergence of interests of UN agencies, donors, NGOs, and research institutions to establish a common evidence base for global humanitarian risk analysis. While not specific to climate damages and losses, the INFORM risk identifies the countries at high risk of humanitarian crisis and are most likely to require international aid that will likely be exacerbated due to climate change. It looks at both natural and human hazard and exposure, including elements such as floods, droughts, epidemics, current conflict intensity, socioeconomic vulnerability that includes inequality and aid dependency as part of its metrics, and infrastructural and institutional lack of coping capacity that includes access to health system and communication (Marin-Ferrer et al. 12). There are twenty countries classified with risk as being “very high.” The top five most at risk are Somalia, Central African Republic, South Sudan, Afghanistan, and Yemen.

There is an additional metric that looks specifically at climate change, entitled the INFORM Climate Change Brochure. This index includes flooding, coastal flooding, drought, epidemic, and conflict (Thow et al. 4). The five countries classified as the highest risk according to the climate change specific index are Somalia, South Sudan, Yemen, Afghanistan, and Chad. Three of these countries make the top five in each of the INFORM indices, Somalia, South Sudan, and Afghanistan.

Community Driven Development - Community Focus

To target local communities, the Loss and Damage Fund should incorporate the World Bank’s Community-Driven Development (CDD) structure that operates programs

based upon transparent rules, participation, local empowerment, demand responsiveness, downward accountability and enhanced local capacity. CDD approaches are important elements of effective poverty reduction and sustainable development strategy. They have a strong track record of moving funds quickly and flexibly in response to natural disasters and can be used to treat climate events. The programs consistently show an ability to deliver an increase in infrastructure and services cost effectively and with community support. This is in part because CDD programs adapt to many different local contexts and needs and deliver results in some of the most geographically remote places in the world (Holmlund and Rao).

Green Climate Fund

The Green Climate Fund (GCF) is accountable to the United Nations and is guided by the UNFCCC. It is the only stand-alone multilateral financing entity whose sole mandate is to serve the UNFCCC and deliver equal amounts of funding to adaptation and mitigation. The GCF is a good model for how the loss and damage fund could be structured. The biggest difference is that the GCF structures its financial support through a combination of grant, concessional debt, guarantees or equity instruments, whereas the Loss and Damage Fund should, as recommended herein, structure its finance as grants to ensure there is not an additional financial burden on developing countries. Additionally, the GCF accepts donations from developed countries, whereas the Loss and Damage Fund should comprise assessed contributions.

Funding is accessed through the GCF through a ten-stage project cycle, many aspects of which can and should be applied to the Loss and Damage Fund. In Stage 1, a country's government and National Designated Authorities (NDAs) - the interface between each country and the fund - set national priorities, analyze financial needs, and identify Accredited Entities (AEs) to design and implement funding proposals and projects. AEs work with the GCF to implement projects, and these can be private or public, national or regional, as long as they meet the GCF standards. The GCF Secretariat then works closely with the NDAs and AEs to distinguish highly impactful project ideas that meet the GCF investment criteria.

Stage 2 fosters additional funding proposals that meet the criteria of the GCF investment. Stage 3 is voluntary, but highly recommended, and outlines the development and submission of concept notes that present a summary of a proposed project and allows the Secretariat to provide feedback.

Stage 4 consists of submission of funding proposals (FPs) by AEs. This stage helps the AE decide if the proposal offers an effective solution to address the problem and if it is technically, financially, economically, environmentally, and socially sound and cost effective. Stage 5 is a funding proposal review period where the Secretariat's review is a formal assessment process. Stage five takes about 190 days, and the Loss and Damage Fund structure would need to be quicker and more efficient in this manner to ensure funding is obtained when needed and given in the case of a sudden climate disaster ("Project Cycle").

The remaining stages consist of board approval, legal arrangements, monitoring for performance and compliance, management, and evaluation. The stages of GCF are

important components that the Loss and Damage Fund should follow when deciding where and when to give financial grants. The Loss and Damage Fund should build off of this to create a more efficient but still comprehensive system to review potential projects and proposals and in determining where specifically finance should be dedicated.

The following formulae illustrate various options for the allocation of funding that would come from assessed contributions. There are too many countries that would receive funding without limiting parameters, so this section will use five low income countries and five countries that are not classified as low-income and are not classified as Annex II to demonstrate the formulae and Fund allocation. The five low-income countries chosen are the five most vulnerable according to the ND-GAIN index: Chad, Central African Republic, Guinea-Bissau, Eritrea, and Democratic Republic of the Congo. The five developing countries chosen for this example that are not classified as low income are: Egypt, Peru, Lebanon, Morocco, and Algeria.

Formula 1: Population

A simple model for receiving funds would be based upon the population of each country. This equation does not have incentives for decreasing emissions or giving low income countries a larger share of the Fund. It also does not incorporate current countries' vulnerability or ability to adapt. But, it does ensure even allocation based upon population size so that a small country and larger are given the same per capita allocation.

Country	**Population (millions)**	**Percent Share of Funding**
Chad	17.18	**4.86%**

Central African Republic	5.457	**1.54%**
Guinea-Bissau	2.061	**0.58%**
Eritrea	3.62	**1.02%**
Democratic Republic of the Congo	95.89	**27.10%**
Egypt	109	**30.81%**
Peru	33.72	**9.53%**
Lebanon	5.593	**1.58%**
Morocco	37.08	**10.48%**
Algeria	44.18	**12.49%**
Totals:	353.781	100.00%

Table 21: Funding allocation based on population size of each country.

Formula 2: Weighted Population

This formula again uses population to determine funding but gives countries different weights as to how much they should receive. For example, the poorest countries here are the first five and have a 15 percent weight. Whereas, the higher income countries, the last five, have only a five percent weight each.

Country	**Population (millions)**	**Percent of funding**	**Multiplying share by 0.15 (LDCs) or 0.05 (Non-Annex I)**	**Percent Share of Funding**
Chad	17.18	4.86%	0.007284	**8.56%**
Central African Republic	5.457	1.54%	0.002313	**2.72%**
Guinea-Bissau	2.061	0.58%	0.0008738	**1.03%**
Eritrea	3.62	1.02%	0.0015343	**1.80%**
Democratic Republic of the Congo	95.89	27.10%	0.04065	**47.77%**
Egypt	109	30.81%	0.015404	**18.10%**

Peru	33.72	9.53%	0.004765	**5.60%**
Lebanon	5.593	1.58%	0.0007904	**0.93%**
Morocco	37.08	10.48%	0.005248	**6.16%**
Algeria	44.18	12.49%	0.006243	**7.34%**
Totals:	353.781	100.00%	0.08510	100.00%

Table 22: Funding allocation based on the population, weighted for poorest countries to be prioritized.

Here, the percent share of funding increased for the first five and decreased for the bottom five. This formula can assign varying weights based on the World Bank classifications of countries with each classification receiving a different weight. It ensures that the poorest countries receive more finance, but still does not account for the vulnerability or coping capacity of a country. It may also result in countries that are not classified as least developed to receive almost no financial assistance despite potentially being extremely at risk. World Bank classifications are helpful in identifying countries that are the poorest and generally the most in need of assistance, but it does not identify those most in need specifically due to climate change.

Formula 3: ND GAIN Index

This formula uses the scores from the ND-GAIN index to determine allocation of finance to countries. The maximum of the ND GAIN index is 100, with lower scores representing countries more at risk. To prioritize poorer countries the ND GAIN score is subtracted from 100. The percent share will then be calculated by dividing the 100 - ND GAIN score by the total in that column.

Country	ND GAIN index	100-ND GAIN Score	Percent Share
Chad	26	74	**11.94%**
Central African Republic	27	73	**11.77%**
Guinea-Bissau	30	70	**11.29%**
Eritrea	31	69	**11.13%**
Democratic Republic of the Congo	31	69	**11.13%**
Egypt	45	55	**8.87%**
Peru	48	52	**8.39%**
Lebanon	43	57	**9.19%**
Morocco	52	48	**7.74%**
Algeria	47	53	**8.55%**
Totals:	380	620	**100.00%**

Table 23: Funding allocation based on each country's ND GAIN Index score

The results of this formula gives a much more even distribution of funding to each of the countries. There was not great variation in the funding, with no more than four percent difference in allocation between countries.

Formula 4: INFORM Risk Index

Unlike the ND-GAIN Index, the higher the score, the more at risk a country is. The table includes the country's numerical score and classification based on its score. Using the same idea as formula three, the percent share of funding is calculated by finding the sum of the total scores and dividing each country's score by that total to get the percent share. The total each country would receive is in column four.

Country	INFORM Risk Score	Category	**Percent Share of Allocation**
Chad	7.9	Very High	**14.21%**
Central African Republic	8.5	Very High	**15.29%**
Guinea-Bissau	3.8	Medium	**6.83%**

Eritrea	6.2	High	**11.15%**
Democratic Republic of the Congo	7.6	Very High	**13.67%**
Egypt	4.7	Medium	**8.45%**
Peru	4.8	Medium	**8.63%**
Lebanon	4.5	Medium	**8.09%**
Morocco	4	Medium	**7.19%**
Algeria	3.6	Medium	**6.47%**
Totals:	55.6		**100.00%**

Table 24: Funding allocation based on each country's INFORM Risk score.

The INFORM Risk index identifies countries at high risk of humanitarian crisis that are most likely to require international aid and that will likely be exacerbated due to climate change. This percent share in funding was calculated by adding up the scores for each country, then dividing each country's score by the total. There is more variability in the funding here compared to the ND-GAIN index. For both, Chad received the greatest funding.

Formula 5: INFORM Risk Index and Population

This formula takes both the population and the country's classification according to the INFORM Risk Index by averaging the scores of both formulae one and four.

Country	**INFORM Risk Score**	**INFORM Risk Category**	**Percent Share of Index**	**Population (millions)**	**Percent Share of Population**	**Average of both**
Chad	7.9	Very High	14.21%	17.18	4.86%	**9.53%**
Central African Republic	8.5	Very High	15.29%	5.457	1.54%	**8.42%**
Guinea-Bissau	3.8	Medium	6.83%	2.061	0.58%	**3.71%**
Eritrea	6.2	High	11.15%	3.62	1.02%	**6.09%**

Democratic Republic of the Congo	7.6	Very High	13.67%	95.89	27.10%	**20.39%**
Egypt	4.7	Medium	8.45%	109	30.81%	**19.63%**
Peru	4.8	Medium	8.63%	33.72	9.53%	**9.08%**
Lebanon	4.5	Medium	8.09%	5.593	1.58%	**4.84%**
Morocco	4	Medium	7.19%	37.08	10.48%	**8.84%**
Algeria	3.6	Medium	6.47%	44.18	12.49%	**9.48%**
Totals:	55.6		100.00%	353.781	100.00%	**100.00%**

Table 25: Funding allocation based on each country's population and INFORM Risk score.

This formula shows the Democratic Republic of the Congo receiving the highest allocation, a larger country that is very at risk according to the INFORM Risk Index.

Formula 6: Natural Hazard and Lack of Coping Capacity of INFORM Risk Index

This formula takes the individual country scores of the Natural Hazard and Lack of Coping Capacity sections of the 2023 INFORM Risk index. These two are most specific to the goals of the Loss and Damage Fund and identify those most at risk of climate related catastrophes. The average is taken by the percent share of each category to determine the allocation of funding for each country.

Country	**Natural Hazard**	**Natural Hazard Percent Share**	**Lack of Coping Capacity**	**Lack of Coping Capacity Percent Share**	**Average Percent Share**
Chad	4	8.85%	8.8	13.46%	**11.15%**
Central African Republic	3.6	7.96%	8.8	13.46%	**10.71%**
Guinea-Bissau	2.8	6.19%	7.8	11.93%	**9.06%**
Eritrea	3.4	7.52%	7.7	11.77%	**9.65%**
Democratic	4.6	10.18%	8.1	12.39%	**11.28%**

Republic of the Congo					
Egypt	4.8	10.62%	5.6	8.56%	**9.59%**
Peru	7.1	15.71%	4.4	6.73%	**11.22%**
Lebanon	5.2	11.50%	4.5	6.88%	**9.19%**
Morocco	4.9	10.84%	4.7	7.19%	**9.01%**
Algeria	4.8	10.62%	5	7.65%	**9.13%**
Totals:	45.2	100.00%	65.4	100.00%	**100.00%**

Table 26: Funding allocation based on the Natural Hazard and Lack of Coping Capacity sections of the INFORM Risk Index**.**

The range of percentages is very narrow, with each country receiving between nine and twelve percent of the allocation. Many countries that have a low natural hazard exposure score have a higher lack of coping capacity score, for example Chad, or have similar, middle range scores, for example Algeria. All the countries that are classified as medium risk by the Index receive more using these two specific metrics compared to the scores for the overall index.

Formula 7: INFORM Climate Change Risk Brochure

Country	**Score**	**Percent Share**
Chad	7.8	**15.06%**
Central African Republic	7.7	**14.86%**
Guinea-Bissau	4.1	**7.92%**
Eritrea	4	**7.72%**
Democratic Republic of the Congo	7.6	**14.67%**
Egypt	4.8	**9.27%**
Peru	4.5	**8.69%**
Lebanon	3.9	**7.53%**
Morocco	3.5	**6.76%**
Algeria	3.9	**7.53%**
Totals:	51.8	**100.00%**

Table 27: Funding allocation based upon the Climate Change INFORM Index.

The INFORM Climate Change Brochure is separate from the INFORM Risk Index. It looks at the mid-century risk (about 2050), the end-century risk (2080), the change in hazard and exposure for 2050, and the total population for in 2022 and 2050. The components of the INFORM Risk Index that is included in the Climate Change index are natural and human hazard and exposure, socio economic vulnerability and vulnerable groups, and infrastructural and institutional lack of coping capacity. Each of these has a pessimistic and optimistic scenario to project outcomes and determine each country's individual risk score. The optimistic and pessimistic scores are determined using Representative Concentration Pathways (RCPs) that describe the evolution of future atmospheric GHG concentrations and other radiative forcings, and the IPCC Shared Socioeconomic Pathways (SSPs). The optimistic scenario uses SSP 1, taking the green road, and RCP 4.5 and means there is a global population peak mid-century, high pace mid-century, lessened inequalities, rapid growth in low carbon technologies, and high productivity of land. The pessimistic scenario uses RCP 8.5 and SSP 3, entitled regional rivalry, and would mean low-income growth, low human capital investments, high fertility and population growth rates in current low fertility rate countries, low migration and slow urbanization (Thow et al. 6-7). The results show Chad, Democratic Republic of the Congo, and Central African Republic receiving the most funding, similarly to the INFORM Index.

Comparisons

The funding to each country varies greatly for each of the different formulae, as seen below for Chad, Algeria, Egypt, and Democratic Republic of the Congo.

	Chad	Algeria	Egypt	D.R. Congo
Population	4.86%	12.49%	30.81%	27.10%
Weighted Population	8.56%	7.34%	18.10%	47.77%
ND GAIN Index	11.94%	8.55%	8.87%	11.13%
INFORM Risk Index	14.21%	6.47%	8.45%	13.67%
INFORM RISK and Population	9.53%	9.48%	19.63%	20.33%
Climate Change Inform Risk	15.06%	7.53%	9.27%	14.67%

Table 28: Comparison of allocation of funding based on the above formulae for Chad, Algeria, Egypt and Democratic Republic of the Congo.

There is not any obvious consistency for all the formulae, as the indices prioritize different metrics, and the populations vary extensively. Egypt would receive considerably more funding when population is included, with Egypt's population being 109 million compared to Algeria with 44 million and Chad with 17 million. A clear outlier is almost 50 percent of allocation going to the Democratic Republic of the Congo for the second formula that uses a weighted population model. While this would not be the case with the inclusion of all countries that receive funding, it would still not be a viable option. Formulae 3 and 4 that look at indices show a much more even distribution of funds and seems to be a more viable option, with the key being which index most aligns with the goals of the Fund.

Overall formulae

An additional approach to determining the contributions and allocation of finance for the Loss and Damage Fund is to calculate the share of the burden of the Fund for every county, not just Annex II, and to calculate the allocation of the Fund for every country, not just countries not in Annex II. Then, by subtracting the allocation of the funding from the burden, the amount every country should either receive or contribute is determined. A negative result means the country is contributing to the fund (denoted in red) and a positive result show that the country is receiving funding (denoted in yellow).

Formula 1

For the first formula, emissions from 2016-2019 were used as the contributions to the Fund and each country's share of the burden, showing the first ten countries alphabetically below in Table 29. The amount each country receives was calculated using the lack of coping capacity, natural exposure from the INFORM Risk Index, and population. The results for the first ten countries in alphabetical order are below to demonstrate the calculations. The weight column is calculated by dividing each country's average of natural hazard and coping capacity shares by the average of all the countries to determine how much population should be weighted. The yellow means an above average score (greater than 1), and red means below average score (lower than 1).

Country	Percent Share of Emissions 2016-2019
Afghanistan	0.06%
Albania	0.02%
Algeria	0.58%

Angola	0.27%
Antigua and Barbuda	0.00%
Argentina	0.86%
Armenia	0.02%
Australia	1.30%
Austria	0.15%
Azerbaijan	0.11%

Table 29: Share of the burden for the first ten countries alphabetically determined by emissions.

Country	Natural Hazard Score	Natural Hazard Percent Share	Lack of Coping Capacity	Lack of Coping Capacity Share	Average of Natural Hazard and Coping Capacity Shares	Weight	Population (thousands)	Percent of total population	Percent of Population Multiplied by the Weight	Normalize: Percent share of the allocation each country will receive
Afghanistan	6.8	0.85%	7.1	0.85%	0.85%	1.61	40,099	0.51%	0.008219	0.6796%
Albania	6.1	0.76%	4.2	0.50%	0.63%	1.20	2,811	0.04%	0.000429	0.0355%
Algeria	4.8	0.60%	4.4	0.53%	0.56%	1.07	44,177	0.56%	0.006001	0.4962%
Angola	3.1	0.39%	6.7	0.80%	0.59%	1.13	34,503	0.44%	0.004950	0.4093%
Antigua and Barbuda	3.7	0.46%	3.7	0.44%	0.45%	0.86	93	0.00%	0.000010	0.0008%
Argentina	4.3	0.54%	3.6	0.43%	0.48%	0.92	45,808	0.58%	0.005348	0.4423%
Armenia	4.3	0.54%	4.5	0.54%	0.54%	1.02	2,790	0.04%	0.000362	0.0299%
Australia	4.8	0.60%	2.1	0.25%	0.42%	0.81	25,688	0.33%	0.002636	0.2180%
Austria	2.5	0.31%	1.5	0.18%	0.25%	0.47	8,955	0.11%	0.000531	0.0439%
Azerbaijan	4.8	0.60%	4.5	0.54%	0.57%	1.08	10,137	0.13%	0.001392	0.1151%

Table 30: Calculation of the allocation of funding of the first ten countries alphabetically for the first overall formula.

The overall formula was calculated by subtracting the results of the formula for allocation of funding, as calculated below in Table 31, from the share of the burden. The results here are interesting, with the United States, Germany, Japan, United Kingdom, India, China, Chad, Central African Republic, and Algeria below.

Country	Percent Receiving	Percent of the Burden	Received minus Burden
Algeria	0.4962%	0.58%	-0.088%
Central African Republic	0.0818%	0.11%	-0.031%
Chad	0.2661%	0.22%	0.050%
China	18.5894%	24.74%	-6.147%
Germany	0.4284%	1.66%	-1.229%
India	20.3826%	6.94%	13.446%
Japan	1.4929%	2.53%	-1.039%
United Kingdom	0.3463%	0.95%	-0.607%
United States of America	3.6000%	12.31%	-8.709%

Table 31: Example calculations from the first overall formula of nine countries and their contributions to or allocations of funding from the Loss and Damage Fund. Red denotes contributions to the Fund, and yellow indicates those receiving finance.

Formula 2

This formula used the scores from the Climate Change INFORM Risk to compare with the overall INFORM Risk Index used in the first formula, shown in Table 32 below. This was calculated using the same methodology as the previous, and emissions were again used to calculate the share of the burden.

Country	Climate Change INFORM Risk Score	Percent Share	Weight	Population (thousands)	Percent Share of Population	Weighted Value Multiplied by Percent Share of Population	Normalize
Afghanistan	8	1.18%	2.24	40,099	0.51%	1.15%	0.901%
Albania	2.6	0.38%	0.73	2,811	0.04%	0.03%	0.021%
Algeria	3.9	0.58%	1.09	44,177	0.56%	0.61%	0.484%
Angola	4.5	0.66%	1.26	34,503	0.44%	0.55%	0.436%
Antigua and Barbuda	2	0.30%	0.56	93	0.00%	0.00%	0.001%
Argentina	2.9	0.43%	0.81	45,808	0.58%	0.47%	0.373%
Armenia	5.3	0.78%	1.49	2,790	0.04%	0.05%	0.042%
Australia	2.4	0.35%	0.67	25,688	0.33%	0.22%	0.173%

Austria	1.9	0.28%	0.53	8,955	0.11%	0.06%	0.048%
Azerbaijan	5.8	0.86%	1.63	10,137	0.13%	0.21%	0.165%

Table 32: Calculation of the allocation of funding of the first ten countries alphabetically for the second overall formula.

The results were unsurprisingly similar, with some exceptions being that the Central African Republic no longer was contributing and was now receiving a small fraction of funding, Panama was now contributing, and Turkey was now receiving some funding rather than contributing. The United States and China were contributing the most again. India is receiving by far the most at almost 15 percent. The results for nine chosen countries are below.

Country	Percent Receiving	Percent of the Burden	Received minus Burden
Algeria	0.484%	0.58%	-0.100%
Central African Republic	0.118%	0.11%	0.006%
Chad	0.377%	0.22%	0.161%
China	15.478%	24.74%	-9.258%
Germany	0.561%	1.66%	-1.096%
India	21.753%	6.94%	14.817%
Japan	0.812%	2.53%	-1.720%
United Kingdom	0.378%	0.95%	-0.574%
United States of America	2.891%	12.31%	-9.418%

Table 33: Example calculations from the second overall formula of nine countries and their contributions to or allocations of funding from the Loss and Damage Fund. Red denotes contributions to the Fund, and yellow indicates those receiving finance**.**

Formula 3

For the third formula, the burden is calculated using each country's emissions and found the weighted amount, multiplied by each country's percent share of per capita GNI, shown in Table 34. The benefit was calculated the same way as the first formula,

using the lack of coping capacity and natural exposure from the INFORM Risk Index and population.

Country	Percent Share of Historical Emissions	Weight	Per Capita GNI (PPP)	Normalize per capita GNI	Per Capita GNI Multiplied by Emissions Weight	Normalize
Afghanistan	0.05882%	0.1118	1680	0.04%	0.00%	0.00%
Albania	0.01932%	0.0367	15590	0.40%	0.01%	0.01%
Algeria	0.58381%	1.1092	11860	0.30%	0.33%	0.24%
Angola	0.27343%	0.5195	5980	0.15%	0.08%	0.06%
Antigua and Barbuda	0.00249%	0.0047	20770	0.53%	0.00%	0.00%
Argentina	0.86054%	1.6350	23170	0.59%	0.96%	0.69%
Armenia	0.02037%	0.0387	15140	0.38%	0.01%	0.01%
Australia	1.29758%	2.4654	55330	1.40%	3.46%	2.49%
Austria	0.14883%	0.2828	59480	1.51%	0.43%	0.31%

Table 34: Calculation of the share of the burden of the first ten countries alphabetically for the third overall formula.

The results of nine selected countries are in Table 35 and other observations are noted below. The overall comparisons of every country for each formula follows this in Table 36. Notably, Barbados is still contributing but it is less, Lebanon is now receiving rather than contributing, the Central African Republic is receiving more, and Thailand and Brazil are now on the receiving end. China is also receiving in this formula when it was one of the larger contributors in the first two. The United States, Germany, and Canada are contributing the most here, and India is receiving 18 percent of the funding. This formula is not the most viable, but it is interesting and useful to see how per capita GNI influences the results.

Country	Percent Receiving	Percent of the Burden	Received minus Burden
Algeria	0.50%	0.24%	0.26%
Central African Republic	0.08%	0.00%	0.08%
Chad	0.27%	0.01%	0.25%
China	18.59%	16.44%	2.15%
Germany	0.43%	3.45%	-3.02%
India	20.38%	1.72%	18.67%
Japan	1.49%	3.84%	-2.35%
United Kingdom	0.35%	1.67%	-1.32%
United States of America	3.60%	30.09%	-26.49%

Table 35: Example calculations from the third overall formula of nine countries and their contributions to or allocations of funding from the Loss and Damage Fund. Red denotes contributions to the Fund, and yellow indicates those receiving finance.

In the above countries, the only countries that contribute to the share of the burden of the above nine are Annex II countries. The reason for this is that wealthier countries are already being penalized because their INFORM Risk score takes this into account in the lack of coping capacity section. Therefore, this is being double counted, putting a higher burden on the richer, more developed countries.

Comparisons of three overall formulae

The formula most effective and viable is formula 2 that uses the Climate Change INFORM Risk index and emissions to determine each country's contribution/allocation. Table 36 below shows the top five countries contributing the most to the Fund and the top five countries receiving the greatest share of the Fund. Two of the most unusual countries are China and India in which China is contributing a very large share of the burden, and India is being allocated more than four times any other country. China has contributed the greatest to emissions (almost a quarter of all emissions from 2016-2019) and has a large coping capacity. On the other hand, India has contributed just seven

percent of the overall emissions, has a very large population, and is extremely vulnerable to climate change.

Top 5 Greatest Share of the Burden	Share
United States	-9.418%
China	-9.258%
Russian Federation	-2.559%
Japan	-1.720%
Canada	-1.536%
Top 5 Greatest Allocation of Funding	Share
India	14.817%
Nigeria	3.224%
Pakistan	2.992%
Bangladesh	2.133%
Ethiopia	1.915%

Table 36: The 5 greatest contributors to the fund and five greatest receivers according to formula 2

Table 37 below shows the results of all countries for each of the three formulae, with negative values (red) signifying contributions to the fund and positive values signifying the country would receive funding (yellow).

Country	Result 1: Burden is defined by historical emissions; benefit is based upon Lack of Coping Capacity and Natural Exposure from the INFORM Risk	Result 2: Burden is defined by historical emissions; benefit is based upon the Climate Change INFORM Risk	Result 3: Burden is defined by historical emissions and per capita GNI, Benefit is coping capacity and exposure from INFORM Risk
Afghanistan	0.621%	0.843%	0.676%
Albania	0.016%	0.001%	0.025%
Algeria	-0.088%	-0.100%	0.256%
Angola	0.136%	0.163%	0.353%

Antigua and Barbuda	-0.002%	-0.002%	-0.001%
Argentina	-0.418%	-0.487%	-0.249%
Armenia	0.010%	0.021%	0.019%
Australia	-1.080%	-1.124%	-2.272%
Austria	-0.105%	-0.101%	-0.263%
Azerbaijan	0.009%	0.059%	0.058%
Bahamas	-0.003%	-0.004%	-0.003%
Bahrain	-0.103%	-0.105%	-0.172%
Bangladesh	2.216%	2.133%	2.585%
Barbados	-0.006%	-0.007%	-0.002%
Belarus	-0.080%	-0.101%	-0.042%
Belgium	-0.180%	-0.171%	-0.431%
Belize	-0.009%	-0.011%	0.000%
Benin	0.096%	0.096%	0.142%
Bhutan	0.007%	0.006%	0.007%
Bolivia	-0.131%	-0.163%	0.066%
Bosnia and Herzegovina	-0.019%	-0.026%	0.003%
Botswana	-0.093%	-0.093%	-0.039%
Brazil	-0.958%	-0.089%	0.465%
Brunei Darussalam	-0.017%	-0.018%	-0.045%
Bulgaria	0.013%	0.000%	0.015%
Burkina Faso	0.154%	0.280%	0.262%
Burundi	0.141%	0.163%	0.158%
Cabo Verde	0.003%	0.002%	0.004%
Cambodia	0.088%	0.065%	0.213%
Cameroon	0.056%	0.209%	0.284%
Canada	-1.310%	-1.356%	-2.638%
Central African Republic	-0.031%	0.006%	0.078%
Chad	0.050%	0.161%	0.255%
Chile	0.109%	0.072%	0.117%
China	-6.147%	-9.258%	2.152%
Colombia	0.090%	0.220%	0.328%
Comoros	0.008%	0.007%	0.010%
Congo	0.022%	0.026%	0.074%
Congo DR	0.028%	0.599%	1.421%

Costa Rica	0.037%	0.029%	0.042%
Côte d'Ivoire	0.235%	0.254%	0.322%
Croatia	-0.003%	-0.015%	-0.011%
Cuba	0.033%	-0.007%	0.116%
Cyprus	-0.007%	-0.009%	-0.014%
Czech Republic	-0.198%	-0.210%	-0.326%
Denmark	-0.085%	-0.078%	-0.218%
Djibouti	0.013%	0.011%	0.015%
Dominica	0.000%	0.000%	0.001%
Dominican Republic	0.069%	0.052%	0.095%
Ecuador	0.026%	0.010%	0.152%
Egypt	0.528%	0.748%	0.943%
El Salvador	0.056%	0.048%	0.075%
Equatorial Guinea	-0.015%	-0.018%	0.005%
Eritrea	0.034%	0.027%	0.048%
Estonia	-0.037%	-0.037%	-0.055%
Eswatini	0.006%	0.006%	0.010%
Ethiopia	1.253%	1.915%	1.602%
Fiji	0.008%	0.009%	0.008%
Finland	-0.119%	-0.111%	-0.243%
France	-0.337%	-0.321%	-0.965%
Gabon	-0.017%	-0.018%	0.006%
Gambia	0.022%	0.021%	0.027%
Georgia	-0.003%	-0.005%	0.014%
Germany	-1.229%	-1.096%	-3.022%
Ghana	0.322%	0.348%	0.339%
Greece	-0.076%	-0.102%	-0.094%
Grenada	-0.004%	-0.004%	-0.002%
Guatemala	0.171%	0.167%	0.223%
Guinea	0.096%	0.084%	0.171%
Guinea-Bissau	0.018%	0.015%	0.026%
Guyana	-0.032%	-0.031%	-0.024%
Haiti	0.175%	0.153%	0.196%
Honduras	0.091%	0.083%	0.138%
Hungary	-0.066%	-0.092%	-0.097%
Iceland	-0.004%	-0.005%	-0.010%
India	13.446%	14.817%	18.667%

Indonesia	0.581%	-0.098%	2.532%
Iran	-0.709%	-0.863%	0.112%
Iraq	0.021%	0.170%	0.442%
Ireland	-0.106%	-0.107%	-0.332%
Israel	-0.109%	-0.117%	-0.205%
Italy	-0.295%	-0.411%	-0.814%
Jamaica	0.011%	0.003%	0.024%
Japan	-1.039%	-1.720%	-2.348%
Jordan	0.038%	0.032%	0.089%
Kazakhstan	-0.393%	-0.491%	-0.319%
Kenya	0.566%	0.547%	0.679%
Kiribati	0.001%	0.001%	0.001%
Korea DPR	0.209%	0.178%	0.367%
Korea Republic of	-0.931%	-1.098%	-1.835%
Kuwait	-0.259%	-0.264%	-0.526%
Kyrgyzstan	0.046%	0.022%	0.070%
Lao PDR	0.013%	0.000%	0.073%
Latvia	-0.008%	-0.012%	-0.011%
Lebanon	-0.008%	-0.013%	0.031%
Lesotho	0.020%	0.014%	0.025%
Liberia	0.040%	0.044%	0.072%
Libya	-0.154%	-0.123%	-0.117%
Liechtenstein	0.000%	0.000%	0.000%
Lithuania	-0.026%	-0.028%	-0.043%
Luxembourg	-0.019%	-0.019%	-0.060%
Madagascar	0.383%	0.337%	0.464%
Malawi	0.225%	0.213%	0.262%
Malaysia	-0.484%	-0.488%	-0.465%
Maldives	-0.001%	-0.002%	0.001%
Mali	0.198%	0.335%	0.280%
Malta	-0.001%	-0.002%	-0.004%
Marshall Islands	0.000%	0.000%	0.000%
Mauritania	0.038%	0.033%	0.059%
Mauritius	-0.004%	-0.007%	-0.001%
Mexico	0.305%	0.331%	0.796%
Micronesia	0.001%	0.000%	0.001%

Moldova Republic of	-0.002%	-0.011%	0.011%
Mongolia	-0.087%	-0.095%	-0.014%
Montenegro	-0.002%	-0.004%	-0.001%
Morocco	0.255%	0.185%	0.380%
Mozambique	0.242%	0.418%	0.462%
Myanmar	0.433%	0.436%	0.859%
Namibia	-0.018%	-0.025%	0.014%
Nauru	0.000%	0.000%	0.000%
Nepal	0.314%	0.279%	0.400%
Netherlands	-0.316%	-0.288%	-0.779%
New Zealand	-0.112%	-0.129%	-0.203%
Nicaragua	0.020%	0.002%	0.085%
Niger	0.273%	0.430%	0.357%
Nigeria	1.990%	3.224%	2.591%
North Macedonia	-0.005%	-0.011%	0.004%
Norway	-0.061%	-0.061%	-0.178%
Oman	-0.158%	-0.177%	-0.203%
Pakistan	2.686%	2.992%	3.417%
Palau	0.000%	0.000%	0.000%
Panama	0.006%	-0.002%	0.005%
Papua New Guinea	0.036%	0.019%	0.153%
Paraguay	-0.147%	-0.152%	-0.047%
Peru	0.072%	0.023%	0.297%
Philippines	1.271%	1.218%	1.596%
Poland	-0.462%	-0.525%	-0.646%
Portugal	-0.074%	-0.093%	-0.107%
Qatar	-0.222%	-0.227%	-0.809%
Romania	0.003%	-0.055%	-0.035%
Russian Federation	-2.117%	-2.559%	-2.567%
Rwanda	0.124%	0.163%	0.138%
Saint Kitts and Nevis	0.000%	0.000%	0.000%
Saint Lucia	0.000%	-0.001%	0.001%
Saint Vincent and the Grenadines	0.000%	0.000%	0.000%

Samoa	0.000%	0.000%	0.002%
Sao Tome and Principe	0.001%	0.000%	0.002%
Saudi Arabia	-1.274%	-1.337%	-2.203%
Senegal	0.130%	0.144%	0.190%
Serbia	-0.065%	-0.087%	-0.028%
Seychelles	-0.001%	-0.001%	-0.001%
Sierra Leone	0.088%	0.090%	0.108%
Singapore	-0.128%	-0.132%	-0.489%
Slovakia	-0.045%	-0.058%	-0.057%
Slovenia	0.099%	0.044%	0.081%
Solomon Islands	-0.088%	-0.091%	0.002%
Somalia	0.231%	0.331%	0.318%
South Africa	-0.522%	-0.565%	0.073%
South Sudan	0.038%	0.119%	0.171%
Spain	-0.308%	-0.359%	-0.579%
Sri Lanka	0.169%	0.134%	0.208%
Sudan	0.339%	0.550%	0.573%
Suriname	-0.023%	-0.023%	-0.008%
Sweden	-0.037%	-0.015%	-0.113%
Switzerland	-0.062%	-0.060%	-0.219%
Syria	0.193%	0.315%	0.297%
Tajikistan	0.094%	0.060%	0.121%
Tanzania	0.548%	0.549%	0.843%
Thailand	-0.022%	-0.075%	0.312%
Timor-Leste	0.002%	0.002%	0.015%
Togo	0.091%	0.082%	0.107%
Tonga	0.001%	0.000%	0.001%
Trinidad and Tobago	-0.049%	-0.050%	-0.041%
Tunisia	0.053%	0.023%	0.103%
Türkiye	-0.020%	0.190%	-0.059%
Turkmenistan	-0.256%	-0.294%	-0.099%
Tuvalu	0.000%	0.000%	0.000%
Uganda	0.517%	0.676%	0.631%
Ukraine	-0.087%	0.062%	0.168%
United Arab Emirates	-0.450%	-0.477%	-1.215%

United Kingdom	-0.607%	-0.574%	-1.324%
United States of America	-8.709%	-9.418%	-26.489%
Uruguay	-0.056%	-0.054%	-0.041%
Uzbekistan	0.004%	-0.131%	0.269%
Vanuatu	0.003%	0.002%	0.004%
Venezuela	-0.357%	-0.410%	-0.051%
Viet Nam	0.552%	0.226%	1.037%
Yemen	0.432%	0.699%	0.478%
Zambia	0.033%	0.036%	0.205%
Zimbabwe	-0.041%	-0.052%	0.189%

Table 37: Comparison of the results of all three overall formulae for each country.

Emergency Funding

The funding described above will mostly be preventative in that it will be allocated to varying countries at a predetermined time depending on the Fund's replenishment cycle, not necessarily depending on the current climate disasters. This money will be best for the slow-onset impacts of climate change such as sea level rise that will displace people over time and can be predicted through models. But what happens when a sudden climate disaster occurs, such as the flooding in Pakistan that occurred in 2022? The flood damages and economic losses in Pakistan amounted to over US$ 30 billion and reconstruction needs of over US$ 16 billion (World Bank, "Pakistan"). For recovery, the country was reliant on donations from international resources to raise funds with no true guarantee of sufficient funding to recover. To ensure climate events have a more reliable and efficient response, the Loss and Damage Fund should be split into two parts, scheduled disbursements as well as emergency resources, with the emergency fund allocated at the discretion of whomever is in charge. The next questions this prompts are: how do we decide how much this fund will have, and how do we calibrate how extreme an emergency needs to be to receive this part of the fund?

In these cases, it is imperative to have immediate funds on hand that can be distributed when needed in addition to the funding that is allocated at replenishments. The true success of the Fund lies in its ability to effectively and efficiently deliver finance to those most in need in these emergency situations. A report from the London School of Economics points out that a "mosaic of solutions" is necessary to provide easy and fast finance for rehabilitation and recovery following-climate related disaster events (Stuart-Watt).

Who gets this money, how, and why?

There are several calamities that can be classified as global climate change related disasters to fall under this Fund. These include rain related storms such as hurricanes, extreme drought, and wildfires. But it would not include disasters that are not climate related such as earthquakes. Relating this back to the Pakistan example, there were immediate, extreme stressors on food security, health systems, damaged infrastructure and more that were exacerbated by the climate-related flooding. Thirty-three million people, about 15 percent of the population, were affected and a third of the country was under water. The World Health Organization (WHO) classified it as a grade 3 emergency, its highest classification (Devi).

The committee in charge of the Fund should have a head person or group of people that determines if a disaster meets the qualifications to receive funding and how much funding they should receive. Many aspects should be considered, and there should be previously established objective criteria applied when deciding this. For example, WHO grading of disasters, a proven and consensus metric, should be taken into account to examine the toll it has on the country. The amount of people impacted must be acknowledged as well to determine how much money per person impacted is to be allocated. The damage to infrastructure, the damage to the environment, and food insecurity are additional important factors to acknowledge. Each of these things and other factors deemed important should be put into a brief by a representative from the country and submitted to the Loss and Damage Fund committee. With this, there should be a swift and efficient response in deciding if the emergency is extreme enough to qualify for funding.

The next aspect is to determine how much money should be distributed. There must be a limit on compensation to individuals which should be done on a purchasing power parity (PPP) basis. PPPs are the rates of currency conversion that equalize the purchasing power of different currencies by eliminating the differences in price levels between countries. The amount per person depending on the emergency would then be distributed to the country to aid in the climate disaster as the Loss and Damage committee deems fit. There is also the case of a country's representative claiming every person in the country was impacted. It is up to a committee as mentioned prior to determine if this is true and decide what is realistic.

How much money is in the Emergency Fund?

As mentioned in prior chapters, there are several funding opportunities beyond assessed contributions from developed nations (Stuart-Watt). Notably, the international airline passenger adaptation levy (IAPAL) has the potential to generate US$ 8-10 billion annually. This is calculated from US$ 6 per economy trip and $62 per business/first class trip. The global demand for flights is not affected significantly by small price increases, making the raised funds predictable (Abeysinghe and Chambwera 7). Additionally, the International Institute for Environment and Development (IIED) states that the IAPAL stands out as the most adaptation-focused innovative financing instrument. While not being able to fund the total US$ 46 billion losses to Pakistan, this is a significant step towards filling this needed pool of money.

Other options to fill these needs include putting a certain amount or percentage from the assessed contributions in the emergency pool. For example, if US$ 340 billion is contributed through assessed contributions by countries, US$ 300 billion could be

allocated to different countries for preventive and mitigation measures, and the other US$ 40 billion may go into this emergency fund. In addition to the IAPAL funds, about $50 billion will thus have been raised for the emergency adaptation fund.

If there is a good year, or there are not many climate disasters, the money will add into the next emergency fund and will be an additional source of funding. The most important consideration is to ensure the fund does not shrink and that there are consistent and predictable means to replenish appropriated amounts.

Concluding Remarks

Tackling a problem as controversial as losses and damages has tasked the Transitional Committee with a great challenge. They must create a fund that is accepted by countries globally, that is efficient in delivering climate finance and results, and that provides adequate amounts of money to the places that need it most. The losses and damages that are being accrued by developing countries is indisputable, yet how to address this issue is highly debatable. For too long developing countries such as Pakistan and Nigeria have been put on the front lines of fighting climate change despite contributing so little to its change. Developed countries such as the United States that have emitted significant amounts of carbon emissions have been hesitant in agreeing to a loss and damage mechanism for fear of admission of liability. This thesis takes many approaches to provide many formulae, criteria, and recommendations for an efficient and largely accepted Loss and Damage Fund.

The most viable option presented here is formula 2 from the overall formulae section that calculates the share of the burden and allocation of funding for each country. It addresses those most vulnerable to the ability to fight climate change, current climate emissions, and population to give a comprehensive overview of who is at fault and who is deserving of funding.

There are many more aspects of the Fund that must be addressed, such as ensuring representation of developing countries in the Transitional Committee, options in case of an immediate disaster such as the flooding of Pakistan, and how often the fund will be replenished.

Looking ahead to COP28, occurring from November 20 to December 12 later this year, negotiations regarding climate finance will once again be a central focus. The overwhelming amount of climate finance put forth thus far has been towards mitigation, with the need for a renewed approach that also focuses on adaptation. The gap between finance being provided and finance needed is continuing to widen, extreme weather events are becoming more commonplace, and the burden put on poorer, developing countries is only increasing.

There is a lot of pressure mounting on the Transitional Committee and countries such as the United States and United Kingdom that have been the biggest holdouts in agreeing to provide finance for losses and damages. The key to their agreement and the finance being passed in, for example, the United States Congress is a viable formula that includes many dimensions to acknowledge contributions to climate change, capacity to pay, vulnerability, and population. There are a number of different criteria that can determine each of these metrics, many of which are mentioned throughout this thesis.

Additionally, achieving a consensus among all countries will be difficult, especially with likely holdouts from the United States and EU countries. Specifically, when it comes to the inclusion of China in the share of the burden. As an overall recommendation to the Transitional Committee, I strongly recommend using formula 2 of the overall formulae because it gives the most comprehensive overview of the most important criteria

Sources

Abbasi, Maryam Shabbir. “Loss and Damage Established. What Now?: Special Report.” *Thenews*, TNS, 27 Nov. 2022, https://www.thenews.com.pk/tns/detail/1013694-loss-and-damage-established-what-now.

Abeysinghe, Achala, and Muyeye Chambwera. “International Air Passenger Adaptation Levy (IAPAL) - UNFCCC.” *Unfccc.int*, 8 Dec. 2018, https://unfccc.int/sites/default/files/resource/iapal.pdf.

“About.” *V20: The Vulnerable Twenty Group*, 3 June 2022, https://www.v-20.org/about.

Bakhtaoui, Ines, and Zoha Shawoo. *Operationalizing Finance for Loss and Damage: from Principles to Modalities*. Stockholm Environmental Institute, Nov. 2022, https://us.boell.org/sites/default/files/2022-11/221102a-pr150-davis-shawoo-loss-and-damage-2210g.pdf.

Bhandari, Preety, et al. “What Is ‘Loss and Damage’ from Climate Change? 8 Key Questions, Answered.” *World Resources Institute*, 14 Dec. 2022, https://www.wri.org/insights/loss-damage-climate-change.

Berwyn, Bob, and Zoha Tunio. “At COP27, an 11th-Hour Deal Comes Together as the US Reverses Course on 'Loss and Damage'.” *Inside Climate News*, 21 Nov. 2022, https://insideclimatenews.org/news/19112022/at-cop27-an-11th-hour-deal-climate-reparations/.

Boyd, Emily, et al. “Loss and Damage from Climate Change: A New Climate Justice Agenda.” *One Earth*, Cell Press, 22 Oct. 2021, https://www.sciencedirect.com/science/article/pii/S2590332221005376.

Chen et al. *University of Notre Dame Global Adaptation Index Country Index Technical Report*. Nov. 2015, https://gain.nd.edu/assets/254377/nd_gain_technical_document_2015.pdf.

Curtis, Paige, and Tatum McConnell. "'Humanity Has a Choice': A Roundup of Some of the Best Speeches at COP27." *Sierra Club*, 13 Nov. 2022, https://www.sierraclub.org/sierra/humanity-has-choice-roundup-some-best-speeches-cop27#:~:text=Secretary%2DGeneral%20Guterres%20plainly%20stated,climate%20justice%20through%20loss%20and.

Clement, Viviane, et al. "Groundswell Part 2." *Open Knowledge Repository*, World Bank, Washington, DC, 13 Sep. 2021, https://openknowledge.worldbank.org/entities/publication/2c9150df-52c3-58ed-9075-d78ea56c3267.

Dahiya, Bharar, and Mahesti Okitasari. "Accessing the Loss and Damage Climate Fund | Science." *Science*, 22 Dec. 2022, https://www.science.org/doi/10.1126/science.adf9670.

DCF Alliance. "The Devolved Climate Finance Mechanism: Principles, Implementation and Lessons from Four Semi-Arid Countries." *International Institute for Environment and Development*, Sept. 2019, https://www.iied.org/sites/default/files/pdfs/migrate/G04424.pdf.

Devi, Sharmila. "Pakistan Floods: Impact on Food Security and Health Systems." The Lancet, Elsevier, 10 Sep. 2022, https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01732-9/fulltext.

Dixon, Hugo. "How to Design a Formula to Pay for Climate Loss." *Reuters*, Thomson Reuters, 28 Nov. 2022, https://www.reuters.com/business/cop/how-design-formula-pay-climate-loss-2022-11-28/.

European Commission. "INFORM Risk Results and Data." *INFORM Risk - Results and Data*, 2023, https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Results-and-data/moduleId/1782/id/453/controller/Admin/action/Results.

"The EVI in Summary." *Environmental Vulnerability Index (EVI)*, http://gsd.spc.int/sopac/evi/index.htm.

Franczak, Michael. "Options for a Loss and Damage Financial Mechanism - Ipinst.org." *Options for a Loss and Damage Financial Mechanism*, Oct. 2022, https://www.ipinst.org/wp-content/uploads/2022/10/2210_Options-for-a-Loss-and-Damage-Financial-Mechanism.pdf.

Green Climate Fund. "Project Cycle." *Green Climate Fund*, Green Climate Fund, 4 July 2022, https://www.greenclimate.fund/project-cycle.

Global Carbon Atlas. "CO2 Emissions ." *Global Carbon Atlas*, http://www.globalcarbonatlas.org/en/CO2-emissions.

Holmlund, Marcus, and Vijayendra Rao. "Where and When Is Community-Driven Development (CDD) Effective?" *World Bank Blogs*, 26 Oct. 2021, https://blogs.worldbank.org/impactevaluations/where-and-when-community-driven-development-cdd-effective.

Independent Evaluation Office. "2021 Program Evaluation of the Special Climate Change Fund (SCCF)." *Unfccc.int*, Global Environmental Facility, Dec. 2021, https://unfccc.int/topics/climate-finance/resources/reports-of-the-special-climate-change-fund.

IPCC a. "Summary for Policymakers." *Global Warming of 1.5 ºC*, IPCC, 2018, https://www.ipcc.ch/sr15/chapter/spm/.

Liao, Cynthia, et al. "What Is Loss and Damage?" *Chatham House – International Affairs Think Tank*, 6 Dec. 2022, https://www.chathamhouse.org/2022/08/what-loss-and-damage.

Lo, Joe. "Who Should Pay for Loss and Damage? Spoiler: Not China." *Climate Home News*, Climate Home, 5 Dec. 2022, https://www.climatechangenews.com/2022/11/29/who-should-pay-for-loss-and-damage-spoiler-not-china/.

Marin-Ferrer, M, et al. “Methodology.” *Inform Risk*, 2017, https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Methodology.

Nishi, Andrea. “Unpacking the Liability Argument against Loss and Damage Funding.” *Climate Law Blog*, 24 Feb. 2023, https://blogs.law.columbia.edu/climatechange/2022/11/07/unpacking-the-liability-argument-against-loss-and-damage-funding/.

Plant, Mark. “Can SDRs Be Used for Loss and Damage Finance?” *Center For Global Development | Ideas to Action*, 10 Jan. 2023, https://www.cgdev.org/blog/can-sdrs-be-used-loss-and-damage-finance.

OECD. “Official Development Assistance (ODA).” *OECD*, https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/official-development-assistance.htm.

OECD. “Other Official Providers Not Reporting to the OECD.” *Development Co-Operation Profiles*, https://www.oecd-ilibrary.org/sites/18b00a44-en/index.html?itemId=%2Fcontent%2Fcomponent%2F18b00a44-en.

Roberts, J. Timmons, et al. “Rebooting a Failed Promise of Climate Finance.” *Nature News*, Nature Publishing Group, 18 Feb. 2021, https://www.nature.com/articles/s41558-021-00990-2.

Stuart-Watt, Adeline. “Why COP27 Will Be Remembered as the Loss and Damage Cop and What to Expect Next.” *Grantham Research Institute on Climate Change and the Environment*, 28 Nov. 2022, https://www.lse.ac.uk/granthaminstitute/news/why-cop27-will-be-remembered-as-the-loss-and-damage-cop-and-what-to-expect-next/.

Thow, A, et al. “D., INFORM Climate Change Quantifying the Impacts of Climate and Socio-Economic Trends on the Risk of Future Humanitarian Crises and Disasters.”

INFORM, 2022, https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Climate-Change.

United Nations. “Developing Countries Could Face Annual Adaptation Costs of $300 Billion by 2030, Secretary-General Warns in Message to Climate Vulnerable Finance Summit | UN Press.” *United Nations*, United Nations, 8 July 2021, https://press.un.org/en/2021/sgsm20816.doc.htm .

United Nations. “Loss and Damage: A Moral Imperative to Act.” *United Nations*, United Nations, 2022, https://www.un.org/en/climatechange/adelle-thomas-loss-and-damage.

UNEP. “COP27 Ends with Announcement of Historic Loss and Damage Fund.” *UNEP*, 22 Nov. 2022, https://www.unep.org/news-and-stories/story/cop27-ends-announcement-historic-loss-and-damage-fund.

UNEP. *Too Little, Too Slow - Climate Adaptation Failure Puts World at Risk*. 2021, https://wedocs.unep.org/bitstream/handle/20.500.11822/41079/AGR2022_ESEN.pdf.

UNFCCC. “Adaptation Fund.” *United Nations Climate Change*, https://unfccc.int/Adaptation-Fund.

UNFCCC. “Climate Finance in the Negotiations.” *Unfccc.int*, 2022, https://unfccc.int/topics/climate-finance/the-big-picture/climate-finance-in-the-negotiations

UNFCCC . “The Katowice Climate Package: Making The Paris Agreement Work For All.” *Unfccc.int*, https://unfccc.int/process-and-meetings/the-paris-agreement/katowice-climate-package.

UNFCCC. “Least Developed Countries (LDC) Fund.” *Unfccc.int*, https://unfccc.int/process-and-meetings/bodies/funds-and-financial-entities/least-developed-countries-ldc-fund.

UNFCCC. “Parties and Observers.” *Unfccc.int*, https://unfccc.int/parties-observers.

UNFCCC. *Summary Report on the First Meeting on the Second Periodic Review of the Structured Expert Dialogue of the Long Term Global Goal under the Convention and of Overall Progress towards Achieving It*. 8 Dec. 2021, https://unfccc.int/sites/default/files/resource/Summary%20report_SED1.pdf.

United Nations. “LDCs at a Glance | Department of Economic and Social Affairs.” *LDCs at a Glance*, United Nations, 2021, https://www.un.org/development/desa/dpad/least-developed-country-category/ldcs-at-a-glance.html.

University of Notre Dame. “Rankings // Notre Dame Global Adaptation Initiative // University of Notre Dame.” *Notre Dame Global Adaptation Initiative*, 2020, https://gain.nd.edu/our-work/country-index/rankings/.

“V20 And G7 Jointly Launch Global Shield against Climate Risks at COP27.” *V20: The Vulnerable Twenty Group*, 15 Nov. 2022, https://www.v-20.org/v20-and-g7-jointly-launch-global-shield-against-climate-risks-at-cop27.

World Bank. “Pakistan: Flood Damages and Economic Losses over USD 30 Billion and Reconstruction Needs over USD 16 Billion - New Assessment.” *World Bank Group*, 28 Oct. 2022, https://www.worldbank.org/en/news/press-release/2022/10/28/pakistan-flood-damages-and-economic-losses-over-usd-30-billion-and-reconstruction-needs-over-usd-16-billion-new-assessme.

World Bank. “CO2 Emissions (Metric Tons per Capita).” *The World Bank*, https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?most_recent_value_desc=false.

World Bank. “GNI per Capita, Atlas Method (Current US$).” *The World Bank*, https://data.worldbank.org/indicator/NY.GNP.PCAP.CD.

World Bank. “GNI (Current US$).” *The World Bank*, https://data.worldbank.org/indicator/NY.GNP.MKTP.CD

World Bank. “CO2 Emissions (kt)” *The World Bank*, https://data.worldbank.org/indicator/EN.ATM.CO2E.KT