Loss and Damage Costing and Financing Mechanisms: Caribbean Outlook

by Adelle Thomas, Inga Menke, and Olivia Serdeczny

Loss and damage refers to impacts of climate change that occur despite adaptation and mitigation efforts. This brief provides a background on loss and damage, its importance for the Caribbean, tools and methodologies to determine costs of loss and damage, and potential innovative financing mechanisms. The region has seen an increase in the number of recorded weather and climate hazards and resultant impacts on biophysical and human systems. As global temperatures continue to increase, Caribbean SIDS face significant levels of both economic and non-economic loss and damage.

Key Points

- The global average temperature increase has led to detrimental impacts across the spectrum of life in the Caribbean including effects on agriculture and food production, human health, ecosystems, tourism, fresh water availability, energy production, livelihoods, human productivity, critical infrastructure and economic development.
- The intense hurricane season of 2017 called attention to the severity of loss and damage that the region faces. Across the region, damages of approximately USD10 billion were estimated to have been incurred due to damages to residential and commercial infrastructure, equipment and goods from Hurricane Irma alone.
- Hurricane impacts, tourism losses and infrastructure damage from sea level rise could amount to USD22 billion per year by 2050 and USD46 billion per year by 2100, representing 10% and 22% of current regional GDP.
- Methodologies for loss and damage cost assessments vary depending on the school of thought and mostly derive from Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). CCA assesses loss and damage costs prior to a possible disaster to offer possible adaptation methods. DRR includes pre and post disaster assessments of loss and damage.
- All methodologies rely either on available data or the collection of data. Lack of access to existing data or lack of collection of detailed data prohibits robust assessment of loss and damage costs.
- Finance options for meeting the costs of loss and damage can be grouped according to the basic mechanism they apply and whether they contain an element of risk transfer or not. Bonds and specifically catastrophe bonds can be categorised as innovative approaches to financing loss and damage.

+49 (0)30 259 229 520
impact@climateanalytics.org
www.climateanalytics.org

1. What is Loss and Damage?

Loss and damage refers to impacts of climate change that occur despite adaptation and mitigation efforts. While mitigation is imperative to reduce the extent of climate change, there has already been an increase in global average temperatures since pre-industrial times. This increase of approximately 1°C has already resulted in impacts on both biophysical and human systems.[i] Adaptation is also essential in reducing the effects of climate change. However, it is widely acknowledged that there are limits to adaptation and that despite best efforts, the adaptive capacity of vulnerable systems may be surpassed and detrimental impacts will occur.[ii] As global average temperatures continue to increase, so too will loss and damage.

Climate change impacts that are permanent and irreversible are categorised as loss while damage refers to impacts where reparation or restoration is possible.[iii] Loss and damage is caused by both slow onset events (including sea level rise, ocean acidification, increasing temperatures and desertification) and extreme events (such as tropical storms, landslides, flooding and heatwaves). Loss and damage can be further categorised as either economic or non-economic as detailed in Table 1.

Table 1: Economic and Non-Economic Loss and Damage

Category of Loss and Damage	Definition	Examples
Economic	Impairment to goods and services that are traded in markets and can thus be quantified and priced	Damage to infrastructure, disruption of economic activities and livelihoods, decreased agricultural and fisheries production, decreased provision of goods and services (e.g. tourism)
Non-Economic	Impairment to things that are generally not traded in markets and are thus difficult to quantify or price	Loss of life, detrimental health effects, displacement and migration of communities, loss of terrestrial territory, decreased biodiversity, decreased ecosystem services, loss of indigenous knowledge, loss of cultural heritage, loss of sense of place, decreased social cohesion

1.1 Loss and Damage in the UNFCCC

Loss and damage has gained attention within the United Nations Framework Convention on Climate Change (UNFCCC) process as limitations of mitigation and adaptation have been increasingly acknowledged.[iv] Small Island Developing States (SIDS) led discussion of loss and damage within the UNFCCC beginning in 1991 with the Association of Small Island States (AOSIS) proposal of an international insurance pool to provide compensation to countries particularly affected by sea level rise. While the proposal was not adopted, it prompted subsequent discussions of loss and damage within the UNFCCC.[v] Significant progress on the issue was made at Conference of Parties (COP) 19 which established the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM).[vi] The WIM was mandated to facilitate support of actions to address loss and damage; improve coordination of relevant work of existing Convention bodies; convene meetings of relevant experts and stakeholders; promote the development, compilation, analysis and review of information; provide technical guidance and support; and make recommendations on how to enhance engagement under and outside of the Convention. The Executive Committee (ExCom) of the WIM was also established at COP19 and was mandated to guide implementation of the WIM's functions.[vii]

The WIM ExCom has produced a number of concrete outcomes that have progressed work on loss and damage including establishment of the Fiji Clearinghouse for Risk Transfer, a Task Force on Displacement and an expert group on non-economic losses.[viii] The ExCom has also developed knowledge products focused on organisations working on slow onset events; financial instruments to address the risk of loss and damage; and challenges, risks and lessons learned in addressing non-economic loss and damage.[ix]

The Suva Expert Dialogue is planned to take place at the May 2018 meeting of the Subsidiary Bodies and is an important advancement of loss and damage in the UNFCCC. The two-day workshop will include exploration of "a wide range of information, inputs and views on ways for facilitating the mobilisation and securing of expertise, and enhancement of support, including finance, technology and capacity-building, for averting, minimising and addressing loss and damage".[x] The dialogue presents a significant opportunity to identify support and financing needs for addressing loss and damage in developing countries; current gaps in meeting identified needs; and potential solutions to fill gaps fairly and sustainably.[xi] The findings of the dialogue will be included in the 2019 review of the WIM and may influence support and financing for loss and damage in the post-2020 context.

1.2 Key Debates

Within the UNFCCC, finance for loss and damage remains a key issue of debate. At COP 23, developing countries and groups advocated for provision of finance for incurred loss and damage and provision of adequate financing to implement the work plan of the WIM ExCom.[xii] However, pushback from developed countries resulted in lack of consensus on these issues. While concerns of Parties about the increased frequency and impacts of extreme events were

recognised, the final decision included limited consideration of these key issues.[xiii] Financing for incurred loss and damage was not included at all while financing for the WIM ExCom was only addressed through encouraging Parties "to make available sufficient resources" related to implementation of the work plan.[xiv] The lack of needs assessments and national plans to address loss and damage were viewed as one of the factors that impeded progress on loss and damage within negotiations.

Given that loss and damage is already occurring on a global scale and is expected to increase, there is some disagreement around how loss and damage should be addressed. Framing loss and damage as a national issue that should be addressed with disaster risk reduction approaches places the financial onus on national governments to bear. As loss and damage is expected to have significant ramifications for developing countries, this is a cost that many of these countries will be unable to meet and is thus an approach that is not advocated for by most developing countries.[xv] Framing loss and damage as an international issue places the matter within international policy and legal frameworks to address. This approach brings up issues related to liability (which countries or actors are responsible for driving climate change) and compensation (who should pay and how much should be paid)-subjects that developed countries are not keen to approach due to the costs associated with current and future loss and damage.[xvi]

Attribution of loss and damage is another area of contention. Attribution refers to the ability to scientifically link impacts associated with slow onset and extreme events to climate change. Most existing attribution methodologies generally require high-quality data collected over long periods of time and information on relevant socio-economic and demographic changes. However, many developing countries, particularly SIDS, lack these specific data requirements, and thus attribution is difficult for these countries using current methodologies.[xvii] If confident attribution statements remain reliant on robust data then countries without these resources would lack needed evidence to bolster loss and damage claims, thereby potentially excluding recognition of these impacts.

2. Loss and Damage in the Caribbean

Caribbean SIDS are well recognised for being particularly vulnerable to the impacts of climate change due to a number of characteristics.[1] The region has seen an increase in the number of recorded weather and climate hazards and resultant impacts on biophysical and human systems.[xviii] The approximate 1°C of global average warming since pre-industrial times has included the following regional changes[xix]:

- Increased air and ocean surface temperatures

[1] Characteristics include: small size, remoteness, reliance on industries that are dependent on natural resources, limited economies of scale, high levels of external debt per capita, concentration of population and assets in coastal zones.

- Increase in the number of very hot days and nights
- Longer and more frequent periods of drought
- Increase in extreme precipitation events
- Increases in sea level
- More intense hurricanes with increased precipitation

These changes have led to detrimental impacts across the spectrum of life in the Caribbean including effects on agriculture and food production, human health, ecosystems, tourism, fresh water availability, energy production, livelihoods, human productivity, critical infrastructure and economic development.[xx] The region has experienced direct and indirect losses of over USD3 billion due to natural disasters associated with weather and climate events between 1970 and 2000 alone.[xxi]

The intense hurricane season of 2017 called attention to the severity of loss and damage that the region faces. Across the Caribbean, damages of approximately USD10 billion were estimated to have been incurred due to impacts on residential and commercial infrastructure, equipment and goods from Hurricane Irma alone.[xxii] This includes damages of between USD120-305 million for Antigua and Barbuda[xxiii] [xxiv] and USD45-115 million for Saint Kitts and Nevis.[xxv] [xxvi] Notably these costs are still estimates as the final financial implications of the hurricane have yet to be finalised. In Dominica, Hurricane Maria caused loss and damage of approximately USD1.3 billion, more than 220% of the country's GDP.[xxvii] The majority of these impacts were concentrated in the housing, transport and education sectors, leaving the country struggling to return to normalcy with inadequate housing and electricity for months following the storm.

Potential loss and damage facing the region dwarfs the costs of the 2017 hurricane season. A study by the Caribbean Catastrophe Risk Insurance Facility (CCRIF) estimates that damages from winds, storm surge and inland flooding due to tropical storms could reach 1-9% of regional GDP by 2030.[xxviii] Another study estimates that hurricane impacts, tourism losses and infrastructure damage from sea level rise could amount to USD22 billion per year by 2050 and USD46 billion per year by 2100, representing 10% and 22% of current regional GDP.[xxix] Importantly, these estimates do not include the full range of climate hazards and also exclude consideration of non-economic loss and damage. However, these studies highlight the magnitude of loss and damage facing the region.

3. Methodologies of Assessing Loss and Damage Costs

Methodologies for loss and damage cost assessments vary depending on the school of thought. The two main directions derive from Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). CCA assesses loss and damage costs prior to a possible disaster to offer possible adaptation methods. DRR includes pre and post disaster assessments of loss and damage. DRR covers a wider range of assessments which address the disaster risk management cycle including response, recovery, mitigation and preparedness.[xxx] Both directions include quantitative and qualitative approaches. A relevant selection of models and tools with their advantages and disadvantages are presented in the following overview. They have been chosen

to specifically target or include extreme events relevant for the Caribbean such as tropical cyclones, floods, drought, storm surges, extreme precipitation and heatwaves.

3.1 Models and tools overview

Most of the presented models originate from the DRR area. Further models and tools exist, but have less relevance for cost assessment. The focus has been put on models that have been developed in or for the Caribbean or are relevant for the given hazards that the Caribbean faces. In addition, only models that actually cover costs of loss and damage either as the main output or as a part of their output have been considered. Qualitative methods such as the Australian Socioeconomic Impact Model (SEIA) assess non-economic loss and damages but do not include costs and are therefore not considered in the overview. The only non-economic model that has been added to the overview is Desinventar, a model developed in the Caribbean.

Table 2: Models and Tools to Assess Loss and Damage Costs

Methodology Type	Models/tools	Category	Hazards Covered	Costs Addressed	Methodology Details	Advantages	Disadvantages
Catastrophe risk models	**Risk Management Solutions (RMS)** used since 1988 **Applied Insurance Research (AIR)** used since 1987 See: Lloyd's (2014)[xxxi]	-CAA -pre-disaster	-hurricanes -floods -earthquakes	Actual losses over past years for goods with an insurance market	Modelling historic events provides probabilities of future losses exceeding past values. These models are well advanced for developed economies with a demand mostly by insurance companies.	Possibility to assess the risk of loss from catastrophic events, such as hurricanes	-can only generate losses using historical data -focus lies on insurable goods -without a property insurance market, values are often speculative -very limited usage in developing countries
	Hazard and Loss Modelling Framework (CCRIF model) See: ECLAC (2012)[xxxii]	-DRR -post and pre-disaster	-hurricanes -storms -earthquakes	Potential losses before an actual event	Hazard and loss are modelled for every 1km grid square. Developed to assist CCRIF with new insurance policy formulations that are based on modelled loss rather than indexed parametric loss.	Modelling of past disasters	-does not include parameters for modelling the potential impacts from rainfall

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Economic models	**Econometric models** e.g. hurricane wind damage index to estimate long-run economic impacts; impact of hurricanes on the fiscal accounts of Caribbean countries using a hurricane damage index, etc. See: ILO and IILS (n.d.)[xxxiii]	-DRR -mostly post-disaster	-All hazards, depending on the model used	Long-run economic impacts	Diverse economic models which are mainly based on observed data and employ statistical methods. Widely used in the agricultural sector.	Possibility to estimate indirect losses and macroeconomic effects (if data is available)	-only useful in situations with sufficient pre-disaster data for robust analysis -rarely used to estimate damages to physical structures due to lack of data -statistical methods applied may contain errors
	Macro-economic models e.g. Input-Output models See: Ranger et al., (2011)[xxxiv]	-DRR -post disaster	All hazards	Indirect losses following disasters	Provide inter-industry relationships that show how the output of one industry may be the input of another. The model can be used in conjunction with other models or adapted to integrate with other models.	- simple model that doesn't require high levels of experience - can be used in combination with other models	- linearity and rigid structure of models - lack of explicit resource constraints - lack of responses to price changes

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Needs Assessment methodology	Damage and Loss Assessment Methodology (DaLA) Used since 1972 See: World Bank (2010)[xxxv] ECLAC (2014)[xxxvi]	-DRR -post disaster	-earthquakes -tsunamis -landslides -flooding -mudslides -hurricanes -tornadoes -storm surges -droughts and other hydrological phenomena -slowly evolving disasters	-social and economic consequences -base for many other models such as WB or UN models	Mainly used to conduct a needs assessment in the recovery process of any disaster. Estimates the costs of the destruction of assets (damages) and of the changes (or losses) by sector. It is possible to calculate the impact of the disaster on the temporary growth of the national economy, as well as the impact on household income, livelihoods and enterprises. The methodology enables countries to calculate needed post-disaster long and short-term activities to increase resilience.	-clear and detailed catalogue of how to assess damages - social sectors such as health and education are taken into account -applicable to all countries as it uses the country's system of national accounts	-no estimation of long-term economic impact -does not take into consideration whether resources for recovery are actually available -does not capture social or psychological impacts adequately -challenge to distribute post-disaster assistance due to discrepancy between costs for actual damage and available resources for recovery

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	Post-Disaster Needs Assessment Model (PDNA) as applied by the World Bank Used since 2008 See: European Commission et al. (2013)[xxxvii]	-DRR -post disaster	-earthquakes -tsunamis -landslides -flooding -mudslides -hurricanes -tornadoes -storm surges -droughts and other hydrological phenomena -slowly evolving disasters	Damage assessment to estimate the financial, technical and human resources needed to recover from, reconstruct and manage risk after a disaster	Builds on DaLA to include Human Recovery Needs Assessment (HRNA). Includes validation of physical damages and economic losses and the identification of human recovery needs.	-improvement of DaLA methodology -identifies the recovery needs of society based -long-term implications are covered	-does not take into consideration whether resources for recovery are actually available
Risk Assessment methodology	**Catastrophe Simulation model (CATSIM)** Used since early 2000s See: IIASA (2014)[xxxviii]	-DRR -post and pre-disaster	-floods -hurricanes -weather and climate-related hazards -earthquakes	Shows costs and benefits of various financial strategies for managing risk, and implications for important indicators like economic growth or debt	Allows for calculation of the optimal mix of pre- and post-disaster measures in potential disaster situations at the national scale. Illustrates trade-offs and choices in managing economic risks resulting from	-easy to use graphic user interface -interactive tool for building capacity of policymakers who can devise and assess	-high level of expertise required

Table 2: Models and Tools to Assess Loss and Damage Costs

Methodology Type	Models/tools	Category	Hazards Covered	Costs Addressed	Methodology Details	Advantages	Disadvantages
					natural disasters. Allows users to define parameters for hazards, vulnerability, and elements exposed.	multiple disaster risk management strategies	
	Disaster Loss Assessment Guidelines by Emergency Management Australia (EMA) Used since 2002 See: EMA (2002)[xxxix]	-DRR -post and pre-disaster	-floods -hurricanes -weather and climate-related hazards -earthquakes	-economic impact of a disaster in a regional context -potential losses including total and avoidable losses	Guidelines explain the process of loss assessment and provide a step by step approach to conduct an economic assessment of potential disaster losses. Methodology is applicable to both actual and hypothetical disasters	-does not require extensive expert knowledge	- only applicable in a regional context

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Methodology Type	Models/tools	Category	Hazards Covered	Costs Addressed	Methodology Details	Advantages	Disadvantages
	Hazus-MH Hybrid Assessment Model by the United States Federal Emergency Management Agency (FEMA) used since 1997 See: FEMA (2018)[xl]	-DRR -post and pre-disaster	-floods -hurricanes -earthquakes -coastal surge	-potential losses in terms of economic losses, structural damage and indirect economic impacts	Combines the exposure for a selected area and the level or intensity of the hazard affecting the exposed area to calculate potential losses. The model is GIS based and has detailed information on rivers, elevation, rainfall, coasts etc. available.	-detailed estimates of costs -spatial visualisation of impacts - information on the impact of past hazards is stored and can be accessed	- GIS knowledge is required - for best output great level of detail is needed and may not always be available in developing countries -assumptions of the model are rather inflexible

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Methodology Type	Models/tools	Category	Hazards Covered	Costs Addressed	Methodology Details	Advantages	Disadvantages
	Central American Probabilistic Risk Assessment (CAPRA) Used since 2009 See: ECAPRA (2018)[xli] Gill (n.d.)[xlii] GFDRR (n.d.)[xliii] GFDRR (2014)[xliv]	-DRR -pre-disaster	-earthquakes -tsunamis -hurricanes -floods -landslides	-does not assess costs directly, but offers maps and graphs -includes cost/benefit analysis and the possibility to develop risk financing strategies	Multi-hazard risk assessment model based on GIS. Consists of a risk map tool, cost-benefit analysis tools for risk prevention or mitigation and programs that assist in designing risk financing strategies. It is possible to compare and aggregate expected losses from various hazards	-possibility to focus on single or multi-hazard risk -free and open source software -designed to facilitate decision making and develop risk transfer instruments	-high level of training needed

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Methodology Type	Models/tools	Category	Hazards Covered	Costs Addressed	Methodology Details	Advantages	Disadvantages
	Handbook for Estimating the Socio- economic and Environmental Effects of Disasters Used since 2003 See: ECLAC (2003)[xlv]	-DRR -post and pre-disaster	-floods -hurricanes -weather and climate-related hazards -earthquakes	Socio-economic and environmental costs	Measures in monetary terms the impact of disasters on the society, economy and environment of the affected country or region. National accounts are used as a means of valuation, supplemented with procedures for specific estimates such as environmental damages and the differential impact on women.	-improves DaLA methodology -clear steps defined in the handbook	-difficult to attach a monetary value to certain aspects such as psychological suffering
	Desinventar Used since 1994 See: Desinventar (2009)[xlvi]	-DRR -post disaster	All hazards	Mostly qualitative analysis provided	Conceptual and methodological tool for the construction of databases of loss, damage, or effects caused by emergencies or disasters.	-includes indicators for human loss, physical damage and economic loss -can handle small scale events	-high number of qualitative units -partly overlapping/ambiguity in data field definitions

3.2 Challenges of models and tools

Pre vs. post disaster assessments

The overview of models and tools provided in Table 2 includes both pre and post disaster assessments of loss and damage. Post-disaster assessments are based on data collection shortly after a given hazard. Actual data is collected on the ground during the post-humanitarian phase - a stressful environment where assessing loss and damage may not be the first priority. Long-term impacts such as psychological, social and economic growth are often not yet clear in the immediate aftermath of a disaster and should therefore be gathered and updated at a later stage. The goal of assessing the total damage to estimate the costs of the recovery disregards which resources are actually available for recovery.[xlvii]

Pre-disaster assessments rely on historical data of past disasters which are not available in the desired resolution for all regions and events. With the respective data, different future scenarios can be calculated to assess loss and damage. Variables are defined by each model and need to be well-defined to ensure relevant outputs.[xlviii]

Data availability

All methodologies rely either on available data or the collection of data. The base for each assessment is information on the climatic hazard, vulnerability and exposure.[xlix] In some cases, access to existing data is not available to those who conduct loss and damage assessments.[l] In other cases, detailed data needed to conduct loss and damage assessments does not exist at the needed level of detail. To assess actual loss and damage it is helpful to have baseline data available to use as a reference. A baseline also gives references to compare models against each other. With baseline data, it would be possible to compare the damage estimates of different model outputs for the same disaster.[li]

Available expertise

Technical knowledge and skills are necessary to conduct assessments adequately. Users of different methodologies need to be informed about limitations and uncertainties and also need skills to interpret outcomes.[lii]

Estimation of likely vs. actual damage

Most models and tools rely on some type of estimation of total damages rather than collecting data on actual damages. Using estimations increases the probability of inaccuracy. Due to the absence of information on actual losses it is not possible to verify some of the hypotheses included in models.[liii] DaLA is the most profound in basing its results on actual gathered data.

Comparison of different models

One challenge regarding the accuracy of different models is the difficulty in comparing them. Models often take different elements and variables into account, making comparison very challenging.[liv]

Timeframe for delivery of reliable information

The difference between how quickly after a disaster reliable information is needed versus when it is actually available is relevant, particularly for post disaster assessments. Reliable outputs are needed shortly after disasters occur to enable countries to estimate costs and possibly request international support. However, many models, particularly econometric models, only offer suitable information years after the disaster occurred.[lv]

Quantifying the value of a human life

The quantification of the value of a human life is not considered by any model as there is no acceptable methodology. The loss of human life can however have significant impacts on national economies.[lvi]

Absence of social and psychological impacts

Most models that estimate costs focus on areas where a market exists. A market gives a certain value to a specific damage, facilitating the calculation of loss and damage. Social and psychological impacts need to be assessed with qualitative indicators and are hard to quantify into costs. Therefore, many models choose not to address this matter.[lvii]

4. Innovative Financing Instruments for Loss and Damage

Finance options for meeting the costs of loss and damage have been suggested in various Party submissions to the WIM ExCom.[lviii] These instruments can be grouped according to the basic mechanism they apply and whether they contain an element of risk transfer or not. Table 3 provides a summary of various proposed finance instruments.[lix] Most of the instruments listed are part of standard risk management approaches that can be taken by national governments or individuals. From these instruments, bonds and specifically catastrophe bonds can be categorised as innovative.

Table 3: National-level Finance Instruments Proposed for Loss and Damage

	Humanitarian/ Bilateral Aid	Savings	Debt	Insurance
No risk transfer	Micro grants	-Disaster relief/ contingency fund -Micro savings	-Contingent credit/loan -Micro credit -Ex-post bonds -Climate bonds	N/A
Risk transfer			-Catastrophe bonds	-Insurance, including risk pools

Micro grants: Small non-repayable grants are disbursed to individuals for investments into resilience-increasing technologies (e.g. agricultural technologies). Recipients contribute in kind through labour input or materials.

Disaster relief/contingency fund: Public resources of at-risk countries are set aside in a disaster relief or contingency fund so that resources are available in the event of a disaster.

Micro savings: Through coordinated loan groups, low-income people join efforts in saving money and lend to each other in the event of need.

Contingent credit/loan: Credits or loans are issued to countries affected by disaster. The credit or loan is contingent on the recipient country having implemented measures to increase resilience.

Micro credits: Small repayable credits are issued to individuals who do not usually have access to credits.

Insurance: The insurance holder pays a premium to an insurer and receives pay-outs in the event of loss.

Bonds: Issuing a bond is akin to taking a loan from an investor and agreeing to pay it back after a predefined period of time, with interest. [lx] Typically, bonds are issued by governments or corporations and are sold to raise funds for projects that turn profits, from which they can pay interest and/or repay the principal. A particular challenge for bonds in the context of loss and damage is that loss and damage responses do not necessarily generate revenues from which the bond and interest payment could be repaid. Particularly in situations where a country has suffered loss and damage, the country might not be in a situation to repay debts. One solution to this problem are catastrophe bonds. However, given that under climate change the risk of climate-related disasters will increase, it needs to be expected that the costs associated with catastrophe bonds will also increase.

- Ex-post bonds can be issued after a disaster in order to finance recovery.
- Climate bonds are where the issuer guarantees that the resources will be used for climate-friendly investments.
- Catastrophe bonds are issued to investors, but the debt is deferred, reduced or cancelled if a predefined event affects the bond-issuer. For example, in the event of a natural catastrophe, the bond or parts of it do not have to be repaid. Such trigger events can be actual losses experienced (indemnity), industry-wide losses beyond a critical point (industry loss trigger) or a weather or disaster index (parametric index trigger).[lxi]

Challenges

Finance instruments that do not transfer risk means that the burden of loss and damage stays with affected countries. For Caribbean SIDS that have negligible contributions to the drivers of

climate change along with limited national financial resources, retention of risk is not an optimal solution. Transfer of risk provides some relief by spreading risk among a larger group of actors. However, as risks increase due to climate change, premium payments associated with insurance or interest rates associated with bonds will also increase. Therefore, at some point, risk transfer instruments will become unaffordable or potentially unavailable.

Rather than placing the onus of financing loss and damage on countries experiencing impacts, there must be an international approach that leverages much needed funding to address impacts experienced by developing countries. International tax based systems where those that contribute the most to climate change contribute to addressing the funding needs of loss and damage in developing countries has been proposed as a potentially equitable financing solution.[lxii]

Another option may be consideration of debt for loss and damage swaps. Debt for loss and damage swaps can be conceived of as debt relief following disasters and have, to our knowledge, not yet been proposed. Two broad challenges can be identified that complicate their implementation: (i) investors might fear that writing off debts following disasters would create a disincentive to increase resilience and reduce risks, and (ii) following disasters, affected countries are in need of additional resources. While debt relief would buffer against the longer-term negative economic effects of climate-related disasters, it would in itself not address immediate needs.

A conceivable approach would be to integrate a mechanism similar to catastrophe bonds in loans. Within such an approach, loans issued to vulnerable countries would turn from repayable loans to non-repayable grants following predefined disaster thresholds. Such approaches would rely on the willingness of donors to take on a large portion of climate-related risks.

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+49 (0)30 259 229 520
impact@climateanalytics.org
www.climateanalytics.org

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impact@climateanalytics.org
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