VIRTUAL TRADE DIALOGUES WITH BUSINESS – TRADE 4 CLIMATE
26 OCTOBER 2021, 14.00-17.00

Background Note

TRADE RESILIENCE IN THE FACE OF A RISING BURDEN OF NATURAL DISASTERS[1]

Key points

- There is growing evidence that climate change is a major factor in the increased occurrence and intensity of some categories of natural disasters including hydrological, meteorological and climatological events.
- Natural disasters are a threat to national and international development objectives and can have far reaching implications for trade and economic growth.
- The interdependence of the global economy and prevalence of international supply chains imply that damage to local infrastructure or productive capacity can result in diverse economic and trade impacts across sectors and borders.
- The economic impacts of disasters as well as recovery and resilience efforts depend on several factors including the type of disaster, severity of impact, prevailing economic conditions, and the level of diversification of the economy.
- A range of trade measures can be taken under WTO Agreements to strengthen countries' resilience to natural disasters and mitigate their impacts by supporting immediate response and recovery.

1 OVERVIEW

1.1. Natural disasters are an increasingly prevalent threat to national and international development objectives. Statistical data point to an upsurge in the number of disaster events on record in recent decades leading to increased recovery expenditure and significant opportunity costs. There is growing evidence that climate change is a major factor in the rising occurrence of extreme hydrological, meteorological and climatological events. Better reporting due to a collaborative global effort helps provide a more accurate picture of the impact of these events while the concentration of human activities, due to increased population, urbanisation etc., have also contributed to the trend.

1.2. The increasing frequency and intensity of natural disasters have a significant impact on economic activity and international trade. The complex nature of some disasters and the inter-connectedness of the global economy imply that a localized disaster can result in regional or even global trade impacts. The preponderance of global value chains and the multifaceted nature of today's trading systems increase the probability that a disaster felt in one region will affect the availability or pricing of a good or service in another. The diverse nature of these events and the varying levels of preparedness or resilience among countries lead to varying impacts in costs and recovery times. Building resilience is key to mitigating disaster impact at the national and international level.

1.3. Trade and trade policy in relation to the rules-based multilateral system provides one such avenue for disaster risk mitigation. Legal analysis points to a range of trade measures covered by

[1] This is an information note which represents research in progress. It provides background information for the Trade for Climate Change Dialogue. The opinions expressed in this paper are those of its authors. They are not intended to represent the positions or opinions of the WTO or its members and are without prejudice to members' rights and obligations under the WTO. Any errors are attributable to the authors. The note has been written by Esli Kim Lafeiullee, Rainer Lanz, Michael Roberts and Ankai Xu.

WTO Agreements that can support Members in building resilience and responding and recovering when a disaster strikes.

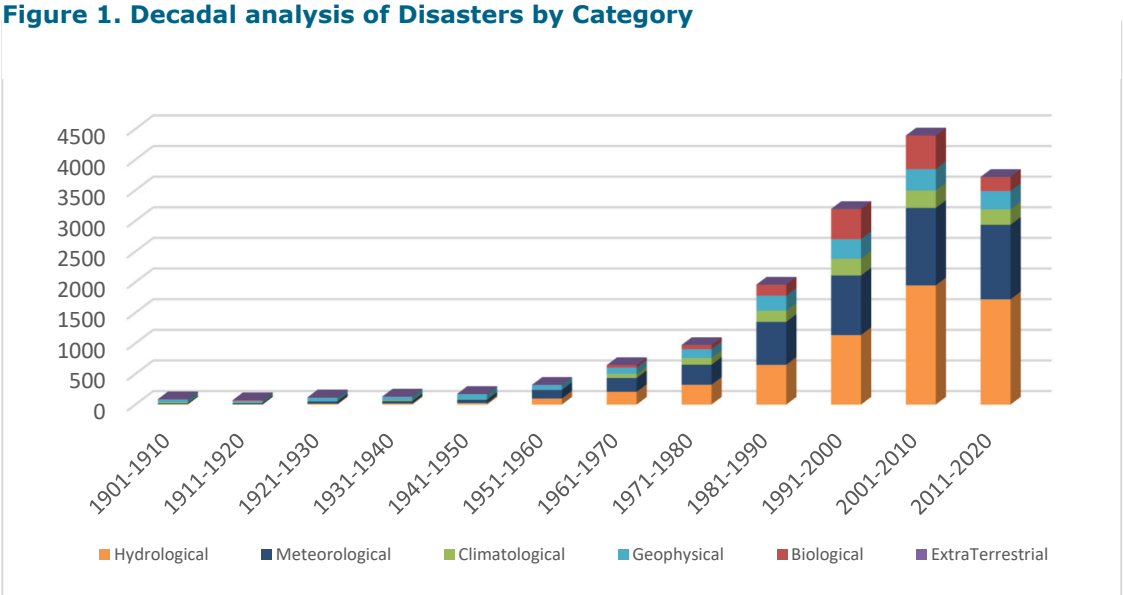
1.4. This note is structured as follows. Section 2 describes the trend towards increased occurrences of natural disasters, with climate change being a main explanation. Section 3 conceptualises and illustrates the economic impacts of natural disasters, focusing on the trade impacts as well as on sectoral and country heterogeneity of impacts. Section 4 outlines trade-related measures in the context of disaster response, recovery and resilience and their relation to WTO Agreements and Decisions. Section 5 concludes.

2 INCREASED OCCURRENCE OF NATURAL DISASTERS

2.1. Natural disasters have occurred throughout human history and have been a factor in shaping the direction of human development. Important decisions on where cities are built, how infrastructure is designed, and what industries are pursued are, in part, shaped by our experiences with these events as mankind seeks to mitigate risks and reduce their impact. However, as the number of reported events has increased measurably over the past few decades, they have been exerting an increasing economic impact on lives and livelihoods.

2.2. According to the International Disaster database (EM-DAT), the number of reported occurrences of natural disasters has increased by an average of 73% each decade from the 1950s through to the 2000s. Indeed, the number of disasters reported in the past decade (3,718) was almost four times higher than in the 1970s (973) and almost twelve times higher than in the 1950s (322). Figure 1 provides a decadal analysis among the six categories of natural disasters. Hydrological events including flash and coastal floods are the most common occurrence representing 39% of reported events since 1901, while meteorological events including storms, hurricanes and extreme temperatures have also been prevalent at 32%. Possible explanations for the rapid increase in reported occurrences of natural disasters, including climate change, higher exposure and better reporting are discussed below.

Figure 1. Decadal analysis of Disasters by Category



Source: International Disaster database (EM-DAT) - https://public.emdat.be

2.1 Increased Frequency and Intensity as a Result of Climate Change

2.3. A recent report from the UN's Intergovernmental Panel on Climate Change (IPCC) is the latest in a growing list of publications providing scientific evidence for the link between climate change and natural disasters. Human activity has increased mixed green-house gas concentrations (carbon dioxide, nitrous oxide and methane) within the earth's atmosphere and can therefore be linked to climate-change phenomena.[2] Annually, 56% of the resulting carbon dioxide emissions have been

[2] Sixth Assessment Report (ipcc.ch)

absorbed by the land and oceans over the past six decades. This has led to an accelerated rate of global warming with each successive decade from 1970 to 2010 being the warmest on record. Moreover, climate change has led to melting within the Arctic and Antarctic regions to varying degrees. There is increased certainty of warming of the global upper ocean and global acidification of the surface open ocean while further evidence suggests that oxygen levels have dropped in many upper ocean regions. Sea levels have increased at an average rate of 1.3 mm per annum between 1901 and 1971. This rate had accelerated to 1.9 mm per annum from 1971 to 2006 and nearly doubled to 3.7 mm per annum between 2006 and 2018.

2.4. Climate change has exacerbated extreme weather conditions[3] across the world including heatwaves, heavy precipitation (snow and rainfall), droughts, and tropical cyclones. Marine heatwaves have approximately doubled in frequency since the 1980s while the frequency and intensity of heavy precipitation events have increased since the 1950s over most land area. This has also contributed to increases in agricultural and ecological droughts in some regions.[4] Further, event attribution studies and physical understanding indicate that climate change increases heavy precipitation associated with tropical cyclones. Human influence has also likely increased the chance of compound extreme events including the frequency of concurrent heatwaves and droughts, fire weather (wildfires) in some regions and compound flooding in other locations. Empirical evidence points to a defined link between natural disasters (meteorological, hydrological and climatological) and global warming due to climate change.

2.2 Better Reporting and Higher Exposure

2.5. Gradual improvements in reporting over time are also a contributing factor for the higher number of reported natural disasters. Thanks to improvements in monitoring technology and increased collaboration among governments and agencies, analysts are able to collect more information from multiple sources. This helps paint a more accurate picture of the devastation caused by natural disasters even in the most remote parts of the globe, and has been a key factor in driving relevant policy shifts and in mobilizing aid.[5]

2.6. Notwithstanding advancements in reporting, a number of studies have also suggested that natural disasters may not be all that "natural" after all.[6] Rather, the increased exposure of vulnerable populations to natural hazards leads to disasters, which could be summarized as: Hazard + Exposure + Vulnerability = Disaster. The gradual increase in global population coincides with a heightened pace of infrastructural and economic development. Previously uninhabited or scarcely habited lands have now been transformed into residential and commercial areas, adding pressure to already fragile ecologies. Moreover, evidence of poorly planned development, particularly in low- and middle-income countries points to increased risk of exposure to pre-existing natural hazards. Strong population growth in coastal regions for example, exacerbates the vulnerability of coastal ecosystems to sea level rise.[7] Hazards such as floods, storms or tidal waves in these areas are therefore increased by urbanization. This is not a problem exclusively associated with developing countries, but a planning issue faced in most coastal nations.

3 TRADE AND ECONOMIC IMPACTS OF NATURAL DISASTERS

3.1. A 2019 WTO Report explains that natural disasters and trade interact in complex, and often unexpected ways. The report points to 31% of WTO Trade Policy Reviews (TPRs) during the period January 2010-September 2019 citing a natural disaster event which had a trade impact on the reviewed Member. A natural disaster generates economic damage and delivers a shock to aggregate supply. Trade, in turn cushions the effect on the economy. Increased imports in the short term are a key factor for economic stabilization. In turn, the gradual rebound of export performance helps

[3] https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf
[4] https://www.climatecentre.org/downloads/files/articles/Article%20Disasters%20Maarten.pdf
[5] The Centre for Research on the Epidemiology of Disasters (CRED) is perhaps a prime example of improved reporting. Its comprehensive database comprises information from UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies, among others.
[6] https://www.undrr.org/news/sendai-framework-6th-anniversary-time-recognize-there-no-such-thing-natural-disaster-were
[7] https://apps.who.int/iris/bitstream/handle/10665/177155/Synt_R_4.pdf?sequence=4&isAllowed=y

fuel economic recovery. This highly intricate push-and-pull factor can happen in a variety of direct and indirect ways.

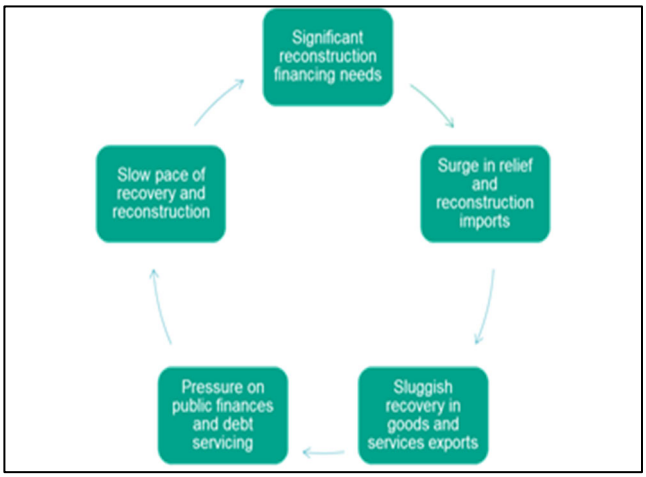
3.1 Direct Trade and Economic Impacts

3.2. Direct costs associated with natural disasters can be divided into two categories.[8] Direct market losses pertain to the loss of infrastructure, inventory and other assets of known or easily estimated market value. Direct non-market losses pertain to the loss of life, and losses to other non-marketable assets including the environment, historical or cultural artifacts etc. While various economic cost estimates can be attributed to these non-market losses, there is no agreed standard for their measurement. This note focuses on direct market losses.

3.3. Natural disasters lead to destructions to human and physical capital, inventory and infrastructure, resulting in a loss of production capacity in the affected country or region. This devastation may take many forms depending on the type of disaster and its severity as well as on the country's particular vulnerabilities. The 2015 earthquake impacting Nepal for example, caused major damage to housing and road networks necessitating an influx of construction material imports. By contrast, a severe drought impacting the East African region in 2011, led to major losses in harvest crops that not only impacted agricultural exports but also threatened domestic food security necessitating massive food imports.[9] In both these cases, the impact of these losses fuelled a rise in imports as emergency supplies of food, reconstruction material and other inputs rushed in to support rescue efforts and to re-establish stability. In tandem with this rising import bill, the affected country may experience a sudden and sometimes severe drop in exports as damage to production plants, infrastructure and value chains hinders productive output.

3.4. Over the short term, this upsurge of imports and reduction in exports places added pressure on governments' finances. Governments must meet new socio-economic costs despite experiencing a dip in tax revenues attributed to low output. For countries with already limited fiscal space, this scenario can lead to increased national debt, buoyed by a sluggish pace of recovery and reconstruction efforts. In regions such as Asia-Pacific and the Caribbean, the regular recurrence of natural disasters whether of high or low destructive intensity, has a compounding effect that impacts the potential for long-term economic and trade growth. Figure 2 illustrates this cyclical effect.

Figure 2. Trade and Economic Impact of Disasters



3.2 Indirect Trade and Economic Impacts

3.5. The complexity of calculating trade and economic impacts attributable to natural disasters becomes more apparent when considering their indirect losses.[10] These refer to all losses that are not provoked by the disaster itself, but by its consequences. These typically include business interruption costs as losses in one sector or territory inadvertently impact the productive output of another. Longer term consequences of infrastructure and capital damages must also be factored in - one example being that damage to ports and other trade infrastructure in one member may lead to inefficiencies in import and export processes in another.

3.6. The resulting increased trading costs are borne by the private sector and consumers at three levels – the impacted country, the impacted (direct) trading partner, and the third-party trading partners. Such a scenario was experienced for example in the Caribbean due to hurricane damage to Puerto Rico, an important transit point for Caribbean-bound imports and exports. The damage to

[8] Hallegatte and Przyluski (2010): The Economics of Natural Disasters : Concepts and Methods (worldbank.org)

[9] https://earthobservatory.nasa.gov/images/51411/severe-drought-causes-famine-in-east-africa

[10] Hallegatte and Przyluski (2010).

an express carrier's regional hub in Puerto Rico led to higher parcel costs as trade was re-routed elsewhere, even though the exporters in other islands had not been affected by the storm.[11]

3.2.1 Cross-sectoral Impacts

3.7. A common example of cross-sectoral impacts would be that of producers being unable to operate until electricity and water are fully restored. Similarly, value chains are disrupted if a disaster hits a sector which produces inputs for other sectors. An example of this is seen in the 2017 case study of Hurricane Maria impacting the Caribbean island of Dominica.[12] The category five storm downed many thousands of coconut trees and interrupted the domestic supply of fresh coconuts – the main raw material used in the production of coconut oil among other products. A local coconut oil processor had to cease operations as it was unable to source local supply. The alternative – import of raw coconut - was also hindered by National Authorities due to phytosanitary concerns.

3.8. Authorities decided that the potential risk of importing coconut plant diseases was too high and would set back efforts to rehabilitate the tree crop, as diseases such as lethal yellowing disease can be easily spread through coconut trade, including with neighbouring islands. In this scenario, the devastation of agriculture yield borne by farmers is seen as direct costs. However, the spill-over effect within the value chain – resulting in a manufacturer having to cease operations - can be classified as an indirect loss.

3.2.2 Cross-border Impacts

3.9. Cross-border impacts go well beyond the borders of the affected country and also create distortions among trading partners as established international value chains must adjust to the resulting fluctuations in supply and demand. A good example here is the 2010 eruption of the Eyjafjallajökull volcano in Iceland.

3.10. Studies found that the resulting airline losses ran at USD 400 million per day, with 100,000 flights cancelled and the business and tourism journeys of 1.2 million passengers disrupted. Moreover, ash from that eruption forced cancellationsof roughly half of all flights originating and/or terminating in Europe over an eight-day period. Another immediate effect of this was to lower the volume of US-bound air freight by between 10.9% and 21.8%. This also negatively impacted exports from neighbouring European countries to Japan, as data on Japanese imports reveal reductions (between 11.9% and 27.5%) in air freight bound for the Japanese market.

3.11. Another example of massive cross border impact of natural disasters would be that of Hurricane Katrina in 2005, with its devastation of the US gulf coast. This event forced the shutdown of oil and gas production in that region (direct losses), which contributed to a further increase in global oil prices, with new highs surpassing USD 70 a barrel, thereby impacting global trade (indirect losses).[13]

3.3 Heterogeneity in Impacts

3.12. No two disasters are alike. Significant strides have been made in predicting impending disasters and in advancing early warning systems. Similarly, post disaster reporting and impact analyses have improved sharply. However, the economic impact of disasters varies greatly depending on the type of disaster, the severity of impact and the economic and other conditions within the impacted country or region. This point is exemplified by the Atlantic hurricane season - the annual period from June to November in which a series of meteorological events ranging from hurricanes to tropical storms and tropical depressions etc., are anticipated to form within the Atlantic Ocean[14]. The number and severity of these events vary each year, with their impacts felt within the Latin American and Caribbean region and onward to Central and North America. Typically, one named event, e.g. a hurricane, can impact several countries, resulting however in greatly different

[11] https://www.wto.org/english/tratop_e/devel_e/study2_sympnaturaldisaster29112019_e.pdf
[12] https://www.wto.org/english/tratop_e/devel_e/study2_sympnaturaldisaster29112019_e.pdf
[13] factbook-2015-45-en.pdf (oecd-ilibrary.org)
https://www.oecd-ilibrary.org/sites/factbook-2015-45-en/index.html?itemId=/content/component/factbook-2015-45-en
[14] https://www.noaa.gov/news-release/noaa-predicts-another-active-atlantic-hurricane-season

economic and environmental effects as well as in economic recovery costs, time and efforts. This heterogeneity in impacts can be illustrated across sectors and countries.

3.3.1 Sectoral Heterogeneity

3.13. There is an uneven rate of recovery among productive economic sectors depending on the type of disaster. This is well exemplified through WTO analysis of meteorological events impacting the Caribbean region, where a stark contrast can be seen between agriculture and tourism, two of the largest economic sectors within the region.

3.14. The primary impact of meteorological disasters can often be felt in the agriculture sector with additional impacts on selected industry and services trade where agriculture production serves as vital input. For example, the agricultural sector tends to have strong linkages with the tourism sector, providing inputs to the food served in hotels and restaurants, or contributing to visitor experience by serving as destination for tourist tours. Disaster damage to agricultural assets and infrastructure causes substantial disruptions in production processes, trade flows, as well as in livelihoods and employment opportunities with some spill over effects to other sectors along the value chain.

3.15. Recovery from natural disasters tends to be slow in agriculture as production outputs such as root crops, fruit trees and livestock require time to grow. The long-lasting impact of natural disasters on agriculture can be illustrated with the case of nutmeg production in Grenada. Until 2004, Grenada was one of the world's main producers of nutmeg, which accounted for over 40% of the Member's total exports. Following the impact of Hurricane Ivan, production of this and other main crops plummeted: nutmeg production fell by over 90% between 2004 and 2005 as recorded in the 2008 TPR.[15] By the Member's 2014 TPR, the industry had been recovering although, having been also affected by crop disease, it was estimated to be only at 10% of its pre-hurricane levels.[16]

3.16. In contrast to the laboured recovery of the agricultural sector, the tourism sector has proven more buoyant in the wake of hydro-meteorological events. Again, using the case of Hurricane Ivan in Grenada (2004), the TPR conducted in 2008 indicates that the country had lost nearly 50% of its hotel room capacity with tourist arrivals declining by 26% the following year (2005). By 2006 however, over 85% of the hotel room capacity had been restored, and tourist arrivals had grown by 20.4%.

3.17. While the case of meteorological events in the Caribbean holds, the sectoral impacts may depend on the type of disaster experienced, its severity, and the prevailing socio-economic conditions within the impacted country or region. In the wake of the 2015 Earthquake in Nepal, agricultural exports fell by 24% from USD250 million to USD192 million. By 2017, total exports had rebounded to USD215 million with some crop categories even surpassing their pre-earthquake levels.[17] According to WTO's trade database, Nepal's agricultural exports, buoyed by a multitude of small-scale farms spread across various regions, surpassed USD400 Million as of 2019.[18] In the case of Nepal's 2015 earthquake, the harder hit productive sectors were those associated with infrastructure including housing and human settlements along with other tourism-related infrastructure.

3.3.2 Heterogeneity in Impacts on Countries

3.18. According to the 2019 WTO report on Trade and Natural disasters, there is evidence of "severe short-term contractions in economic output and discernible, lasting impacts on GDP growth of natural disasters". Further, empirical evidence points to these disasters having a more severe long-term impact on small economies. This is attributed to two factors: first, natural disasters are likely to have disproportionally larger immediate impacts on small economies. Second, small economies often lack means of diversification causing natural disasters to exert higher volatility on economic activities.

3.19. Table 1 below provides an analysis of various geophysical events in 2010-2011, impacting three countries at different stages of development. Haiti, a Least Developed Country (LDC) and small

[15] Grenada Trade Policy Review 2008 - Microsoft Word - 2769d.doc (wto.org)
[16] Grenada Trade Policy Review 2014 - Microsoft Word - 7786_D_04.doc (wto.org)
[17] Nepal Trade Policy Review 2018 (Agricultural trade) - directdoc.aspx (wto.org)
[18] WTO | Nepal - Member information

economy, experienced the greatest impact in terms of both death toll and relative economic damage. In comparison, Chile and New Zealand experienced greater economic damage in value terms.

Table 1. Country comparison of Geophysical Disasters - 2010

Country	Disaster Details	Epicentre	Damage Reported (USD)	Damage Reported (% of GDP)	Deaths Reported
Chile	**Earthquake & Tsunami** 8.8 Richter scale 27 February 2010	105 km North East	USD 33 billion	17%	577
New Zealand	**Earthquakes** 7.1 & 6.3 Richter scale 4 September 2010 and 22 April 2011	10 km South- East	USD 20 billion	10%	185
Haiti	**Earthquake** 7.3 Richter Scale 12 January 2010	25 km South-West	USD 9 billion	112%	220,000

Source: WTO 2019, Natural Disasters and Trade: Study I

3.20. In the case of Haiti, high population density within the affected region (363 people per square kilometre) coupled with ineffective land use policies and building standards further exacerbated vulnerabilities to pre-existing seismic hazards. The region's gradual urbanization, with population more than doubling between 1980 to 2010, was also a contributing factor. In this scenario, the relationship among contributing factors becomes apparent: Hazard (seismic activity) + Exposure (population density) + Vulnerability (poor building standards) = Disaster. An important point in Haiti's case is that given the more prevalent hazard of storms and hurricanes, Haiti's infrastructural development leaned towards the use of concrete and cinder blocks. While these are effective choices in mitigating hydro-meteorological risks, they are less resistant to geological events. This point further illustrates the difficulties that developing and least developed countries encounter in building resilience as risk factors - exposure and vulnerability - are compounded.[19]

3.21. In the case of Chile and New Zealand, better preparedness for geophysical threats in terms of policy and stringent building codes and standards translated into fewer cases of compromised infrastructure leading to a lower death toll. More advanced economies are characterised by higher infrastructural investment resulting in greater average values of economic losses. Lower levels of industrialization and a limited number of mature economic sectors point to low productivity, resulting in a disproportionally higher percentage of GDP loss in the case of Haiti.

3.22. This aspect of greater damage to GDP can be seen as a continuing trend in a historic review of natural disasters around the globe. Table 2 shows that over the period reviewed (1998 to 2017), large economies such as the United States and China have experienced the greatest economic losses in terms of absolute dollar values. This is the combined total of a series of natural disasters including Meteorological, Hydrological, Geophysical etc. to have impacted these countries over two decades.

Table 2. Monetized losses (1998-2017)

	Absolute Losses in USD billions	Damage as % GDP (2017 current USD)
USA	944.8	5%
China	492.2	4%
Japan	376.3	8%
India	79.5	3%
Germany	57.9	2%
Italy	56.6	3%
Thailand	52.4	11%
Mexico	46.5	4%

Source: Based on WTO 2019 Report and World Bank Data

[19] https://eei.fiu.edu/case_study/haiti-vs-chile/

3.23. In comparison, Table 3 shows the impact of singular events on smaller economies. While the average absolute dollar cost of these disasters is far less than in larger economies, the relative economic damage expressed as a percentage of GDP is often far greater in smaller economies.

Table 3. Losses of singular events, USD billions and as % of GDP

Member	Event (Year)	Absolute losses in USD billions	Damage as % GDP
Dominica	Tropical Storm Erika (2015)	0.6	90%
	Hurricane Maria (2017)	1.3	220%
Vanuatu	Tropical Cyclone Vania (2011)	.05	6.3%
	Tropical Cyclone Pam (2015)	0.5	64%
Nepal	Earthquake (2015)	9	33%
	Earthquake (2017)	0.9	3%
Tonga	Tropical Cyclone Ian (2014)	.05	11%
	Tropical cyclone Gita (2018)	0.2	38%

Source: Based on WTO 2019 Report and World Bank Data

3.3.3 Increased Vulnerability due to Lack of Economic Diversification

3.24. Intersecting with heterogeneity in impacts due to sectoral and country dynamics, is the economic diversification factor. Economic activity in smaller economies is typically limited to very few productive sectors contributing the bulk of total GDP. In such cases, recovery efforts are under greater strain when these key sectors are impacted by a disaster, as the proverbial "*eggs in one basket*" scenario is created. This lack of diversity is a contributing factor to vulnerability both towards natural disasters as well as other exogenous shocks. In comparison, developed economies tend to rely on a broader range of productive activity contributing to economic growth and stability. This multiplicity of mature productive sectors allows for greater resilience, as temporary losses to any one sector can be absorbed by continued production in others.

4 DISASTER MITIGATION EFFORTS THROUGH TRADE

4.1 Three Stages of Intervention

4.1. Volume II of the WTO Report on Natural Disasters and Trade analysed how measures taken in the context of disaster response, recovery and resilience relate to the rules under the multilateral trading system. The resulting analysis suggests that "a wide range of actions can be taken across a broad cross-section of WTO Agreements" and highlights how Members can tackle these issues within the context of existing WTO rules.

4.2 Phase 1 – Immediate Response

4.2. The main objectives of the disaster response phase are to provide relief to the affected populations in the immediate aftermath of a disaster while also facilitating rescue efforts to persons still in peril. This usually signifies a flurry of imports as emergency supplies are brought in to substitute ground zero losses with customs and border control processes being easily overwhelmed. Additionally, the need for trained professionals including doctors, rescue personnel etc. may require relevant authorisations in relation to trade in services. Trade measures taken by a disaster-affected country might thus include the following:

- Implementing trade-facilitating measures to address bottlenecks related to increased imports;
- *ex ante* approaches to establishing derogations from customs duties and other charges for specific goods or organizations;
- giving consideration to how WTO provisions relating to trade in goods and services can facilitate the entry and clearance/authorisation of relief items and relief personnel;

- ensuring that import licensing procedures do not result in inadvertent delays for essential relief equipment.

4.3. Actions can also be taken by trade partners to support disaster response. In the goods sector, for instance, compliance with provisions on traffic in transit can prevent unnecessary delays, as would enhanced cooperation between border agencies. Table 4 below provides a non-exhaustive list of possible trade measures that can be taken during the immediate disaster response phase.

Table 4. Disaster Response Measures and WTO Agreements and Decisions

Trade in Goods	
Trade-related measures	**WTO Agreements and decisions**
Facilitate customs processes and procedures	GATT1994, Trade Facilitation Agreement
Ensure the quality and safety of relief items	TBT and SPS Agreements
Temporary suspension of regular customs charges on the entry of relief items	GATT 1994 arts. II, VIII Members' Schedules of concessions TFA, ITA and ITA Expansion
Access to goods of primary necessity: food supplies	*International food aid*: 1994 Decision on NFIDCs; Agreement on Agriculture (export competition) *Domestic food aid*: Agreement on Agriculture, Green Box Ministerial decisions on public stockholding
Trade in Services	
Trade-related measures	**WTO Agreements and decisions**
Entry of foreign relief service providers	Members' GATS commitments, particularly on mode 4; GATS art. VI (domestic regulation)
Allocation of frequencies necessary for use of ITC equipment	Members' GATS commitments, specifically on basic telecommunication services
Access to cash aid resources	Members' GATS commitments, specifically on mode 1 for payments and monetary transmission services

4.3 Phase 2 – Recovery

4.4. In the disaster recovery phase, the overarching goal is to restore economic functionality. This is typified by efforts to rebuild critical infrastructure, while addressing the most basic socio-economic and environmental concerns. There is a need to resuscitate impacted productive sectors and to re-establish relevant industrial and commercial activity. Ideally, economic output can be brought back up to pre-disaster levels, and at the same time the necessary conditions may be established to strengthen resilience to future disasters. A major challenge during this phase is the limited fiscal space which both public and private sector stakeholders must navigate. This issue of limited fiscal space is typified by new capital investment required for recovery in the wake of diminished operational revenue. In such cases external funding is required leading to increased indebtedness by public and private sector parties. Table 5 below provides a non-exhaustive list of trade-related measures available to Members as they navigate the recovery phase.

Table 5. Disaster Recovery Measures and WTO Agreements and Decisions

Trade in Goods	
Trade-related measures	**WTO Agreements and decisions**
Financial support to enterprises to recover from damages	SCM Agreement (including Annex VII); Agreement on Agriculture, Green Box
Modification of tariff protection policies	Schedules of concessions and exception clauses under GATT 1994 Waivers under the Marrakesh Agreement
Resumption of exports	Tariff preferences by trade partners under Enabling Clause, 2008 and 2013 Ministerial decisions (LDCs) and Waivers under the Marrakesh Agreement
Ensure the quality and safety of products exported by the disaster-affected country	TBT and SPS Agreements
Trade in Services	
Trade-related measures	**WTO Agreements and decisions**
Financial support to local service suppliers	Members' GATS commitments, specifically under national treatment
Supply of services needed for reconstruction (e.g. construction services to rebuild roads and other infrastructure)	Members' GATS commitments
Public Procurement	
Trade-related measures	**WTO Agreements and decisions**
Procure goods and services needed for recovery Procurement for the purpose of providing international assistance	Revised Agreement on Public Procurement (GPA) (Plurilateral)

4.4 Phase 3 – Promoting Resilience

4.5. Disaster resilience refers to the ability of an economy to minimize its exposure to (natural) hazards and to resist, adapt to and recover from a disaster in a timely and efficient manner. Resilience therefore incorporates proactive and ongoing efforts by a country to mitigate natural disaster risks. This is exemplified in the Sendai Framework on Disaster Risk Reduction with its focus on strengthening resilience to hazards before disasters strike. On goods trade matters, disaster risk management may require the adoption of specific regulatory measures addressing customs issues that may arise in the disaster response phase aiming at ensuring "continuity management" in customs operations.

4.6. Beyond trade facilitation, resilience encompasses significant improvements in standards for infrastructure through "build back better" initiatives while also taking into consideration economic diversification. Table 6 below provides a non-exhaustive list of resilience measures and their relation to the multilateral trading system:

Table 6. Disaster Resilience Measures and WTO Agreements and Decisions

Trade in Goods	
Trade-related measures	**WTO Agreements and decisions**
Define in advance domestic customs disciplines to be implemented in the event of a disaster	Trade Facilitation Agreement
Integrate disaster risk reduction measures into construction and restoration of buildings and physical infrastructures (BBB approach)	TBT Agreement
Increase resilience of the agricultural sector	Agreement on Agriculture, Green Box
Trade in Services	
Trade-related measures	**WTO Agreements and decisions**
Ensure automatic recognition of professional qualification of foreign relief service provides	GATS provisions on recognition of qualifications (art. VII)
Encourage the supply of services needed in the event of disasters such as telecommunication services, insurance services and environmental services (e.g. the collection, processing and disposal of waste)	Members' GATS commitments
Improve the supply of weather-related services	GATS, Revised GPA (but also TRIPS Agreement)

5 CONCLUSIONS

5.1. There is a direct link between climate change and the increasing frequency and intensity of natural disasters. Scientific evidence suggests that the steady rise in global surface temperatures has a significant impact on the number, frequency and duration of natural hazards. The heightened emission of greenhouse gases, a key contributor to global warming, is one example of human contribution to hydrological events and, in particular, flooding, storms and extreme weather events. Similarly, the increased frequency of climatological events such as droughts and meteorological events, including heatwaves and storms, can also be linked to human-induced climate change.

5.2. Natural disasters are a threat to national and international development objectives and can have far reaching implications for trade and economic growth, beyond the borders of the impacted country or region. Due to production and trade linkages, the destruction of local infrastructure or productive capacity can have indirect impacts across sectors and borders. The economic impact of natural disasters furthermore differs across sectors and countries depending on the type of disaster and other factors such as a sector's ability to recover or a country's size and economic diversification. Achieving resilience in the wake of natural disasters, including improving countries' preparedness is key to reducing the economic impacts of these events.

5.3. Trade can play an important role in increasing a countries' resilience to the economic impacts of natural disasters. A range of measures can be taken under the current WTO Agreements that can help impacted countries and their trading partners to mitigate the effects of natural disasters in the context of a three phased approach – immediate response, recovery, and resilience. Findings from the 2019 WTO reports suggest that "there is significant potential to advance actions that will support preparedness in the face of specific, known hazards", and that the negative impacts of natural disasters can be mitigated through effective trade-related measures under the multilateral trading system.