Forum: United Nations Environment Programme
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Introduction to the Topic

Tsunamis. Earthquakes. Landslides. Floods. Heatwaves. These are all types of natural disasters. Wherever these natural disasters strike, they leave a trail of mass destruction, causing immense damage to the infrastructure of the location, putting the natural ecosystems in disarray, and taking the lives of many and shattering families, as well as the extreme economical damage events like these cause.

Over the past decade, an average of 45,000 deaths occur around the world due to natural disasters, with earthquakes taking the crown of being the most deadly natural disaster in the present day. This can be seen in both the Haiti earthquake in 2010 and the 2004 Indian Ocean Earthquake and Tsunami leading to 220,000 deaths ("UN Marks Anniversary of Devastating 2010 Haiti Earthquake") and 227,898 deaths ("Indian Ocean Tsunami 2004 - International Tsunami Information Center") respectively. Apart from human casualty, there is also the extreme economic damage, with natural disasters causing an average of $145 billion worth of global economic damage over the past decade with 2011 being a peak with $365.13 billion worth of damage. An aspect that has been bolstering both the frequency and impact of these events is climate change, with phenomena like erosion leading to more frequent and severe floods in regions.

A large volume of these damages tend to affect those in poverty the most heavily, with high death tolls being centered in low-to-middle income nations, considering they don't have the appropriate infrastructure in order to appropriately respond and deal with

these events, and as a result, these regions tend to have a higher death toll and are extremely vulnerable to these extreme events.

With this being such a pressing issue, development is required and for that we have seen a steep decline in the number of global deaths caused by natural disasters, thanks to developments in disaster response and resilience, as well as predictions, with meteorologists playing an essential role in this. We've had technologies like flood prevention using radars and simulations, earthquake prediction and relief technologies in the form of developing robots and drones to both drop supply packages and scan the area to analyze the scale and severity of damage.

Definition of Key Terms

Natural Disaster

A naturally occurring event that can lead to a destruction of a region, a major loss of life, a biodiversity collapse, as well as creating significant economic impact. Natural disasters include earthquakes, tsunamis, droughts, volcanic activity, floods, hurricanes, and more. One thing that distinguishes a natural hazard and natural disaster is that natural hazards are classified as disasters when they have properly impacted the region. Otherwise and before striking a place, it is referred to as a natural hazard.

Low Income Nations

Nations that have the weakest economies after an evaluation by the World Bank and tend not to have enough resources and money to support their country comfortably, as well as provide effective disaster resilience.

Climate Change

The change in temperature and weather patterns, now bolstered by human activities such as burning of fossil fuels leading to an increase of greenhouse gasses in the air that can alter patterns in climate.

Earthquakes

The shaking of the Earth's ground, occurring as a result of a disturbance deep in the Earth's crust, like an underground rock breaking, causing a rapid motion through the fault that releases seismic waves causing the ground to shake. It is the natural disaster that has led to the most deaths in the past decade.

Tsunamis

Tsunamis are caused as a result of earthquakes occurring underwater, or an undersea volcanic eruption, that leads to a series of enormous waves forming and rushing towards land, causing mass destruction to coastal settlements.

Floods

An overflow of water into land that is normally dry, is known as a flood with these occurring due to an excess of rainfall or rapid snowmelt and the problem is heightened with soil erosion, as soil is not present to absorb the excess water. Floods are the most frequent type of natural disaster.

Sustainable Development

It is the development that aims to meet the needs of the present, while making sure that needs of future generations are not compromised. This development is essential to creating a safer, more efficient, more stable, and a generally better world.

Predictive Technology

The set of equipment required for forecasting weather patterns, and changes in weather by utilizing previous records of weather patterns in the region, that can be used to predict the weather as well as possible natural disasters.

Disaster Relief Shelters

These play important roles in the aftermath of a natural disaster by providing secure places for individuals to take residence in, if they have lost their, or left, their common accommodation.

Relief Efforts

The immediate provision of basic human needs such as food, water, shelter as well as medical aid when disaster strikes with the aim of restoring quality of life to pre-disaster levels.

Key Issues

Difficulties faced by low-income countries

Although there has been development in disaster resilience technologies to help forecast and recover from natural disasters, low income countries typically do not have the necessary resources to perform efforts such as relief programs and general protection from natural disasters. Disasters tend to affect these regions more heavily, with these countries having much higher death tolls compared to more developed countries with stable economies. Over 90% of deaths that take place as a result of natural disasters are in low income countries (*Center for the Study of Traumatic Stress Disasters and Poverty: Natural Disasters Disproportionately Affect the World's Low-Income Countries*).

People living in low income countries have housing with very weak support and construction leading to collapses during earthquakes. They also lack quick response and adequate healthcare with healthcare sometimes being sub-par even before disaster strikes. Other problems such as poor physical health contribute to the death toll, as people with conditions such as malnourishment and non-immunization may not be able to withstand the physical pressure put on by a natural disaster. Furthermore, the ever present issue of political instability gets put on a spotlight when these disasters happen, that can show the

gap between the wealthy and the poor, as well as hamper response efforts. And these countries do not have enough money to recover from events like these, putting them in massive financial debt.

Economic impact of natural disasters

Apart from the massive death tolls of these events, there is also a major economic impact created as a result of natural disasters. Over the last decade, natural disasters have been causing around $100 billion a year worth of damage, with 2012 being a particularly bad year, seeing that the global damage costs of natural disasters were $364.09 billion.

Capital assets and infrastructure, like schools, housing, factories, roads, dams, and more are lost as a result of these disasters. Furthermore, the loss of human lives means that there is a loss of human capital - a loss of skilled workers, and collapse of education infrastructure that severely disrupts schooling. Apart from these, a country's natural resources may be affected, with disasters destroying forests and decreasing soil fertility. It is also possible for individuals and communities to behave in an adaptive manner in response to repeated natural disasters, resulting in further economic losses.

This is a problem for many countries, especially developing countries and low income countries, because many of these countries are already struggling with their economies and problems like these leave massive dents in their economies. They do not have the resources or money to recover from these disasters. In looking for disaster aid and support from other countries, this puts developing countries in debt, adding to their list of economic problems.

Lack of development in disaster protection and resilience infrastructure

Rapid urbanization can lead to the creation of unnecessary risk, especially when the urbanization is poorly planned, as well as occurring in a context of extreme poverty. A growing concentration of population and economic activities in many cities are seen to

overlap with areas of high risk exposure. As a result, more urban dwellers are being affected by natural disasters with consequences and damages affecting employment, housing, as well as critical infrastructure. However, in many cases, economic or political reasons outweigh risk considerations when a city expands.

It is only when there isn't adequate services and infrastructure, such as unsafe housing, inadequate/ poor health service, ineffective waste management, and so on, does a natural hazard turn into a natural disaster. Furthermore, the problem is bolstered by the creation of manmade hazards, that comes in the form of poor regulation of construction, and industrial activities in the area.

Furthermore, in investment decisions, disaster risk is rarely taken into account. Weak enforcement and regulation, of things like building codes, are linked to bigger issues of corruption, which results in the transfer of risks from construction companies to the inhabitants of the building. Those part of the most vulnerable groups tend to live in locations that not only have bad structural support but also lack critical services.

Major Parties Involved

Haiti

Haiti is an epicenter of hydrometeorological disasters, considering its geographic location is in the middle of the Atlantic hurricanes, and its steep topography, specifically the western region, the area from which all rivers flow. Furthermore, the country has frequent landslides along its river valleys, and some of its other major natural hazards include floods, droughts, cyclones, and landslides.

However, although floods are the most deadly natural hazard, Haiti has faced major calamities in the form of earthquakes, the most significant being the 2010 Haiti earthquake, a magnitude 7.0 earthquake striking the country on January 12th, 2010 which

was another calamity the country had to add to its long list of disasters with the death toll 250,000 and 300,000 injured not even mentioning the economic costs and humiliation faced by the country. More recently, Haiti experienced a magnitude 7.2 earthquake last year on August 12th.

In order to tackle this issue, Haiti participated in the Disaster Risk Management and Reconstruction Project which helped them improve disaster response capacity. This was done through strengthening the disaster risk management of the Health and Education sectors, providing training to 127 ministry officials and 1520 beneficiaries, among other things. They also enhanced the resilience of critical transport infrastructure. As a result, the 2021 earthquake's effects weren't as catastrophic as the one in 2010.

Indonesia

Many islands in Indonesia, specifically those with high population density, are the islands that are most vulnerable to climate hazards. These hazards include droughts, floods, and landslides as well as quite a few more. Furthermore, the island of Java's eastern and western regions are considered hotspots for the impact of these hazards. The hazards here tend to be geological/ hydrometeorological, which means they include hazards such as earthquakes, volcanic eruptions, landslides, and tsunamis, and puts an estimated 40% of the population in risk.

The natural disaster that has posed most of the risk to the country are floods, which threaten major urban areas including Jakarta, Medan, and Bendung, home to a combined 19 million people. 2007's Jakarta flood is one of note, with the flood causing 75% of the country to be inundated, with 75 deaths, and economic impact reaching greater than $900 million. Rising sea levels also poses a threat to the country with just a 50 cm centimeter rise able to inundate heavily populated locations in Jakarta and Bekasi, that house over 270,000 people. The country has also not recovered from the effects of El Niño, which has resulted in reduced average rainfall for the country and water storage while also exposing massive regions to drought and fire.

In order to help with recovery from disasters, Indonesia proceeded to unveil their national Disaster Risk Finance and Insurance Strategy in October 2018 during the Annual Meetings of the World Bank Group and International Monetary Fund in Bali. This strategy was made in collaboration with the World Bank with the strategy aiming to defend the state budget by using a specific mechanism to properly handle central government disaster costs, while strengthening a central-regional fiscal collaboration through proper responsibilities and roles, in order to finance disaster response and protecting nation assets through an insurance program to cover every ministry and agency. It also aimed to protect households and the poor.

The Philippines

The Philippines is another one of the nations located in SouthEast Asia that is prone to these kinds of disasters. Sitting on the Pacific Ring of Fire, the country is prone to quite a few natural disasters, with the likes of earthquakes, typhoons and cyclones, floods, and more, which results in 60% of the country's land area and 74% of its population under risk of being affected by natural hazards.

The country has seen 565 disasters since 1990, killing 70,000 people and causing $23 billion in damages. Typhoons are of note, as the strongest recorded typhoon (in recent years), Typhoon Haiyan, affected the country in 2013 killing 6,000 people while devastating 9 regions, leaving 1.1 million housings damaged, with an infrastructure and agricultural damage of $802 million. Along with Typhoons, the country has significant tectonic activity, having 22 active volcanoes. The eruption of Mount Mayon in 2018 is a clear example of the threats posed by these volcanoes, seeing as there was an evacuation of up to 90,000 people.

Following the Sendai Framework for Disaster Risk Reduction, the Philippines have followed 4 priorities. The first one is understanding disaster risk, through gathering

detailed and recent risk information, by utilizing technologies such as GIS, LiDAR, and IfSAR. The second one is strengthening disaster risk governance to manage disaster risk through updating its legal foundations, putting a focus on response-centric interventions, and disaster prevention preparedness and mitigation activities. The third one is investing in disaster risk reduction for resilience with the NEDA improving the DRR framework to address disaster risk problems. Finally, the fourth one is enhancing disaster preparedness, with a national disaster response being created and used for various hazards and danger situations, with the involvement of stakeholders (including civil societies and private sector).

Vanuatu

Being a country composed of many islands, and sitting on the Ring of Fire, Vanuatu is no stranger to natural disasters, being ranked number 1 on countries with the highest disaster risk in 2021. The country faces hazards such as cyclones, sea level rises, tsunamis, and more, with the country being affected by the second most intense tropical cyclone of the south Pacific Ocean, the Severed Tropical Cyclone Pam (in terms of sustained winds). Although only 15 people lost their lives, 166,600 people were affected, which is more than half the population of the nation. The hardest hit provinces were Shefa and Tafea. Tanna Island suffered a loss of 50% of shelters, while Erromango Island lost up to 90% of shelters

Vanuatu has received a lot of support in helping tackle this issue, with an emphasis on strengthening the education system, considering these recent crises underscoring the need for preparation. The country, along with the United Nations, has been building a resilient education system by receiving grants to accelerate funding into the education system recovery, while also working on rebuilding preschools and distributing learning resources to both teachers and students. Furthermore, there has also been establishment of water tanks, ensuring hygienic practices and keeping student health safe.

World Bank

The World Bank is the global leader in disaster risk management (DRM), supporting their client countries in evaluating danger exposure and acknowledging disaster risks. When aiding governments in improving DRM, they focus on 5 pillars. These 5 pillars are risk identification, risk reduction, risk preparedness, financial protection, and resilient reconstruction.

During FY21, the World Bank supported 85 countries in FY21, in order to make disaster risk reduction a priority, providing $26 billion to climate finance. The World Bank also accounts for over 67% of all multilateral adaptation finance to developing countries. The organization has supported countries from all around the world, including countries from Africa, such as Sierra Leone, and Burkina Faso, East Asia and the Pacific, such as Cambodia and Vietnam, Europe and Central Asia, such as Turkey and Moldova, Latin America and the Caribbean, such as Brazil and St. Vincent and the Grenadines, Middle East and North Africa, and South Asia, such as Nepal and Sri Lanka.

The World Bank also has various partners including foundations, technical and development agencies of national governments, the United Nations, and other multilateral institutions. Furthermore, the World Bank has various donors including the United States of America, Australia, European Union, Germany and more. The World Bank also works with various national organizations to take disaster risk reduction to a country level.

Development of Issue/Timeline

Date	Event	Outcome
September 1st, 1923	The Great Kanto Earthquake	It was a magnitude 7.9 earthquake that resulted in more than 140,000 deaths, with more than half of the brick buildings and a tenth of the reinforced concrete buildings in the

		region falling down. Furthermore, the shock created a tsunami that reached the perilous height of 39.5 feet at Atami on the Sagami Gulf, destroying 155 houses and killing 60 people.
June - August, 1931	Yangtze - Huai River Floods	The flood affected an area of 77,700 square km, including the cities of Wuhan and Nanjing. As a result, there were 3.7 million deaths, and 40 million people homeless. China responded to this by constructing much more effective levees (embankments built to prevent overflow of rivers).
November 12th, 1970	The Bhola Cyclone	The cyclone initially formed over the Bay of Bengal and East Pakistan on November 8th, reaching the coast of East Pakistan on November 12th, flooding the low-lying region with about 300,000 to 500,000 people being killed. The relief efforts provided by the Government of Pakistan were severely criticized, and the resulting frustration led to more support to opposition parties, culminating in a war that ultimately led to the creation of Bangladesh.
June 21st, 1990	The Manjil-Rudbar Earthquake	A 20,000 square mile area was affected with the provinces of Gilan and Zanjan being absolutely decimated. The 7.7 magnitude earthquake ended up killing about 50,000 people while injuring 135,000 people.

July - August, 2003	Summer 2003 European Heatwave	Temperatures during the European summer in this time were about 20 to 30% above the seasonal average (celcius), extending from Spain to the Czech Republic and from Germany to Italy. Extreme temperatures from 35°C to 40°C with many countries recording their hottest temperatures ever. As a result, the death toll exceeded 30,000, with elderly being the most affected along with a bad crop yield and harvest that year as well as multiple forest fires.
December 26th, 2004	Indian Ocean Earthquake and Tsunami	A magnitude 9.1 undersea earthquake off the coast of a Sumatran island triggered 100 foot waves to hit the shoreline of Banda Aceh, killing more than 100,000 people and pummeling the town into rubble. Succeeding this were numerous tsunamis striking Thailand, India, and Sri Lanka, and cleared up in South Africa leading to a combined death toll of 230,000. This warranted governments to improve disaster risk prevention and a 168 country agreement for the Hyogo Framework for Action.
January 12th, 2010	2010 Haiti Earthquake	A magnitude 7.0 earthquake struck the nation followed by 2 aftershocks of magnitude 5.9 and 5.5 and more aftershocks occurring on the following days. It resulted in about 300,000 people dead with about 3 million people (a third of the

		population) affected. There were mass collapses of buildings due to lack of reinforcement, killing or trapping occupants. Hospitals were rendered useless for the initial days after the crisis and there was the problem of lack of clean drinking water.
June - August, 2022	Pakistan Floods	The Pakistan Floods are among the worst natural disasters the country has seen, with the floods leaving about 75% of the Sindh distinct underwater, and the floods destroying more than 2,000 hospitals and health centers destroyed while resulting in the deaths of almost 1,700 people. Furthermore, the aftermath of this disaster has resulted in a malaria outbreak with 140,000 cases being reported, not accounting for the fact that many cases may still remain unreported and monitored.
July - August, 2022	2022 European Heat Waves	Once again, Europe is facing massive heat waves with countries once again reporting temperatures above 40°C, with the United Kingdom experiencing its hottest day ever with 40.3°C. A direct consequence of this is the 2,000 wildfires blazing away and rivers drying up and droughts affecting multiple countries. Another consequence is having to shift to more dirtier fuel to continue business as usual.

Previous Attempts to Solve the Issue

The Sendai Framework for Disaster Risk Reduction

The Sendai Framework for Disaster Risk Reduction 2015 - 2030 (Sendai Framework) was the first serious agreement from the post-2015 development goals, providing Member States with fixed actions to safeguard development gains from the danger of disasters. The framework also works in tandem with other 2030 Agenda agreements, including The Paris Agreement on Climate Change, the New Urban Agenda, and the Sustainable Development Goals.

The Sendai Framework has 7 Global Targets to be achieved by 2030. These targets can be split into 2 categories - Substantial Reductions and Substantial Increases. The 4 targets in substantial reductions are the reduction of global disaster mortality, reduction of the number of people affected globally, reduction of direct economic loss in relation to GDP, and reduction of disaster damage to critical infrastructure and disruption of basic services. The 3 targets in substantial increases are the increase of the number of countries with local and national disaster risk reduction strategies, substantial enhancement of international cooperation to developing countries, and increasing the availability of and access to multi-hazard early warning systems. The framework is currently and ongoing project and the expected outcome of this framework is the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

Setup of disaster relief shelters

These shelters are temporary housing for those who have been affected by the natural disasters. They are primarily made for those whose houses have been destroyed, or left their houses due to a lack of basic amenities and resources required to sustain

themselves. The shelter aims are extremely transportable, relatively large to sustain a big community, and requires minimal maintenance.

While providing a private space for victims, and in general giving a place to stay, these shelters also tend to provide a base for therapy and helping victims to cope through the trauma of going through such a calamitous event, and in general, setting the base for rehabilitation. However, DR shelters are currently not as effective as they might be, based on literature, case studies, guidance, and reports regarding their design.

Usage of radar detection and prediction software

At their core, both of these (radar detection and prediction software) are used to inform people of whether and when there will be a natural hazard striking the area. They do not assist in preventing a natural disaster from occurring, rather helping minimize the natural disasters impact, primarily through helping reduce the death toll. Radar detection, mainly radar maps, can help predict the paths of cyclones and storms and whether they would strike a certain region.

Artificial intelligence, along with the help of seismic sensors and vibration sensors, analyzes data to help predict when an earthquake can hit as well as its magnitude. There is also the possibility of analyzing previous events, however this isn't really effective. Although most of these solutions are effective in their own right, it can only really help a person who has access to this type of information i.e. devices with access to internet and this isn't really the case for LEDCs, whose citizens tend not to have these pleasures.

Possible Solutions

Creating specific disaster shelter zones for countries

The construction of permanent shelters in vulnerable countries would enable a nation to have a shelter at all times for any natural hazard. The shelters would be

extremely reinforced to the type of natural hazards the country tends to face, be it tsunamis, earthquakes, storms, and more. They would be permanent and located in an extremely accessible area, in order for residents to reach the shelter as quickly as possible. This solution would ensure less casualties and human death, as well as wouldn't place as much pressure on setting up disaster relief shelters, and would rather make the process easier.

Ensure that essential services are up and running as soon as possible

Getting back to the norm as soon as possible is the ultimate goal and as a result, restoring essential services needs to be on top of the priority list. Only once our essential services are properly restored can we see proper development. Bringing these services back to a suitable level can ensure faster recovery seeing as these are the pillars of society. The services include medical aid and hospitality, education, transport, nutrition, and housing.

Improving city infrastructure to be resilient against natural hazards.

One problem that really leads to mass damage during a natural disaster is a result of poor infrastructure of cities and towns. Improving both housing and city infrastructure can contribute to both lesser damage, and thus less economic damage to the country, as well as more efficient disaster relief. For example, placing hospitals in a city in a place where it can reach any part of the city quickly and easily in order for proper disaster response. Furthermore, the hospital should be reinforced in order to withstand natural disasters. Other improvements could include changing road layout to enable effective evacuation of the city in case a severe hazard may strike the city/town.

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