**Forum:** United Nations Environment Programme

**Issue:** Measures to combat the impacts of the hurricane in affected areas in the United States

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**Introduction**

Annually, the United States of America (USA) is affected by one or more tropical storms, or more commonly known in the region as hurricanes. The most intense hurricanes often lead to catastrophic damage to everything in its path, leading to economic despair, destruction of buildings and property, injury, and arguably the worst of all, death. Through collaboration and dialogue, solutions can be formed in order to minimize the devastating effect of hurricanes throughout the United States.

 The United Nations Environment Programme (UNEP) recognizes the severity of such natural disasters, and recognizes the environmental and socio-economic repercussions of hurricanes. This research report is designed to provide delegates with a comprehensive overview of the measures implemented to combat the impacts of hurricanes in affected areas of the United States.

 Past attempts to mitigate the effects are the Hurricane & Storm Damage Risk Reduction System (HSDRRS), which became fully operational in 2011 after the failure of levees and floodwalls during 2005’s Hurricane Katrina. The project involved a $14 billion investment, and comprises 350 miles of levees and floodwalls, offering a 100-year period of risk reduction against storm surges. However, outside of the Greater New Orleans area, the HSDRRS has no effect, and its development hugely altered ecosystems such as wetlands and natural habitats, potentially reducing the number of natural storm buffers.

 In 2024 alone, Hurricanes Milton and Helene resulted in damages costing an estimated $500 billion, causing widespread destruction in the state of Florida, and leaving large amounts of debris in its wake.

 Despite the daunting challenge of tackling these hurricanes, it is important that members of the United Nations Environment Programme participate in essential dialogue and collaboration in order to assist the United States of America in trying times such as those mentioned above.

**Definition of Key Terms**

**Hurricane**

A storm with a violent wind, originating in the Atlantic Basin, which includes the Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico, the eastern North Pacific Ocean, and, less frequently, the central North Pacific Ocean.

**Storm Surge**

A rising of the sea as a result of atmospheric pressure changes and wind associated with a storm.

**Floodplain**

An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

**Climate Resilience**

The capacity to recover quickly from difficulties; toughness, especially in the context of adapting to climate-related impacts.

**Levee**

An embankment built to prevent the overflow of a river.

**Disaster Mitigation**

The action of reducing the severity, seriousness, or painfulness of something, especially disasters.

**Infrastructure**

The basic physical and organizational structures and facilities needed for the operation of a society or enterprise.

**Wetland**

Land consisting of marshes or swamps; saturated land.

**Sustainability**

The ability to be maintained at a certain rate or level; avoiding the depletion of natural resources to maintain ecological balance.

**Ecosystem**

A biological community of interacting organisms and their physical environment.

**Storm Barrier**

 A physical structure designed to protect areas from storm surges and rising waters during a hurricane or storm.

**Flood Mitigation**

 Measures or actions taken to reduce or prevent the harmful effects of flooding, such as building levees or improving drainage systems.

**Coastal Erosion**

 The gradual destruction of land along coastlines, often exacerbated by hurricanes and rising sea levels.

**Evacuation Plan**

 A prearranged and practiced strategy for safely relocating people from dangerous areas to safer locations during hurricanes or other emergencies.

**Background Information**

**Hurricanes and their formation**

Hurricanes, also known as tropical storms, form all over the world. They are powerful storms which are characterized by their strong winds, heavy rainfall, and low atmospheric pressure. These storms usually form over warm areas of the ocean, where areas of low pressure cause the mass movement of wind, and are driven by the energy released from the warm sea surface temperatures. In the US, Southeastern states, and states located in the Gulf Coast regions are extremely vulnerable to hurricanes.

***The hurricane’s characteristics***

Hurricanes form when ocean waters reach temperatures around 26.5 degrees Celsius, which is a temperature at which there is enough energy to fuel the storm through the evaporation of water into the atmosphere. Warm, moist air rises, condensing in the clouds, releasing latent heat, which further fuels the storm and causes more air to rise. Low-pressure areas form as warm air rises, which causes air to rush in to replace it. As the storm gathers heat and moisture, it gets more intense, and begins to develop stronger winds and forms an “eye” in the center. Tropical storms’ intensities can be measured via a scale known as the Saffir-Simpson Hurricane Wind scale, which is a 1-5 rating based solely on a hurricane’s maximum sustained wind speed.

***Possible human contributions to the formations of hurricanes***

 Due to hurricanes’ reliance on warm temperatures, it can easily be deduced that global warming is a key player in making the formation of hurricanes more frequent. As the ocean’s temperatures rise, the atmosphere gains more adequate conditions for the formation of a hurricane, therefore increasing the likelihood of one’s formation. The United Nations Environment Programme believes that by combatting the level of greenhouse gas emissions, the frequency of hurricanes could decrease following a significant enough decrease in global temperatures.

**Hurricanes’ effects in the USA**

Hurricanes have been known to ravage the United States for around 400 years, the earliest recording of a hurricane striking the mainland US dating back to the 17th century. From the 20th century to present day, frequent recordings of hurricanes and their effects have been recorded, which can be credited to the advancement of technology which monitors the atmosphere.

 ***Hurricane Katrina***

One of the most notorious hurricanes to affect the United States was known as Katrina. Making landfall on the 25th of August, 2005, Katrina first struck the state of Florida, after which it entered the Gulf of Mexico and rapidly intensified, strengthening to the highest intensity level, Category 5. The hurricane then made landfall on the 29th of August over southeastern Louisiana and Mississippi, as a Category 3 hurricane. Katrina proceeded to destroy transportation and communication facilities in New Orleans, leaving tens of thousands of people without access to food or shelter. Overall, the hurricane took around 1400 lives, and left 652 people missing. 80% of the city of New Orleans was flooded, and caused around $125 billion in damages.

***Environmental impact***

The environmental damage caused by hurricanes is immense, especially in areas along the coasts. The strength in storm surges causes erosion to the coastline; hence, loss of vital land and habitats is experienced. More so, hurricane flooding contributes to the pollutants in water, thus making good water scarce among the affected communities.

Besides the immediate devastation, hurricanes leave long-lasting changes to ecosystems: Wetlands, forests, and coral reefs get destroyed through flooding, soil erosion, and debris, all of which disrupt the local wildlife and flora. This heavy erosion has been seen this season along the Gulf Coast as a result of the storms in 2024, hence affecting local biodiversity and fisheries. Furthermore, damage to protective coastal features such as mangroves and dunes means reduction of the natural defenses that may remain to the region against future storms.

***The role of vulnerable populations in disaster impact***

 Vulnerable populations are disproportionately affected by hurricanes, often suffering more significant losses and enduring longer recovery periods. Low-income communities are commonly the most at risk because of inadequate housing, lack of resources to evacuate, and inability to afford flood insurance. People with disabilities also face additional challenges in evacuation and sheltering due to the incompatibility of many disaster plans with their needs.

Moreover, the usual lot of racial and ethnic minorities fall into places of higher risks: floodplains or low-elevation coastal zones, making them more prone to damage caused by hurricanes. The inequities have also been accentuated by Hurricane Katrina through increased displacement in African American communities of low income with limited recovery resources. The same happened in 2024-areas with very high population concentrations of socioeconomically disadvantaged residents had higher percent impacts.

**Current strategies and measures to combat hurricane impact**

With the effect of climate change making hurricanes more frequent and powerful, many ways have been utilized by the United States to diminish the effects of such catastrophes. These strategies have run from improving infrastructure, technological solutions to community based preparedness programs in order to minimize lives lost and property damage while strengthening resilience within hurricane prone communities. It has invested in everything from storm surge barriers to the development of more robust early warning systems both near and long term measures to better protect its citizens and economic interests from hurricane damages. However, while that has significantly heightened the responsiveness to the emergence of storms at the national level, the challenging effort of dealing with the evolving climate change risks certainly remains ongoing.

***Storm surge barriers, levees, and flood control systems***

 Setting up storm surge barriers, levees, and other flood control systems is one of the most important ways to mitigate hurricanes. These physical barriers will provide protection for the easily destroyed parts of the coast from the ravages of storm surges that cause heavy flooding and destruction.

The Hurricane & Storm Damage Risk Reduction System in New Orleans is exemplary of such infrastructure. This $14.5 billion system, finished in 2011, includes levees, floodwalls, pumps, and surge barriers built to withstand a 100-year storm; it greatly improves flood protection for the Greater New Orleans area. Other coastal areas, like those in Florida and Texas, also use similar systems to protect against flooding by hurricanes.

While these steps go a long way toward affording significant protection, challenges remain: climate change and increased sea levels raise the specter of even more extreme storms, while upkeep of such systems requires continued investment and innovation.

***Preparedness and Evacuation Plans***

 Preparedness and evacuation plans are the most important aspects of saving lives during hurricanes. In the United States, the Federal Emergency Management Agency, or FEMA, is a key player in disaster response, working with state and local governments to prepare for hurricanes and other natural disasters.

FEMA funds the development, guidance, and training of evacuation plans where necessary to keep the citizens on safe grounds before and during hurricanes. Emergency notifications are well organized, as are shelters and evacuation corridors for timely and efficient movement of people from especially dangerous areas. Activities such as Community Rating System development incentivize communities to adopt precautionary measures that enable them to be ready or to quickly evacuate when need be.

Despite these, the vulnerable population is still hard to reach, and large-scale evacuations are logistically cumbersome and expensive. Growing frequency and strength of hurricanes put additional pressures on existing systems, and adjustments are continuously called for.

***Climate resilience strategies***

Climate resilience strategies are planned to reduce the potential long-term effects of hurricanes through better preparation of infrastructure and communities to extreme events. Other measures involve reviewing building codes, upgrading floodplain management, and updating drainage systems of cities in regard to stormwater.

Building codes have been updated in hurricane-prone areas like Florida and Texas to reflect the ability of new construction to withstand hurricane-force winds and flooding. This may include reinforced roofs, elevated foundations, and storm-resistant windows for homes in high-risk areas.

It follows with floodplain management for flood hazard reduction: from restriction on new building development on flood-prone areas, to acting for restoration that may bring wetland or natural mangrove resources-these diverse strategies are those which could strengthen both community resiliency and give important natural resources towards the mitigation of hurricane disaster outcomes.

While there is progress on enhancing climate resilience, further attention will be needed to adapt to the increased frequency and severity of hurricanes, especially as climate change amplifies the risks.

***Technological advancements in prediction and early warning systems***

Great advances with technology have brought major improvement to predicting and warning about hurricanes and allow for the preparation and responses that save countless numbers of people. Satellites, weather radar, and computer modeling have revolutionized the monitoring and tracking of hurricanes, feeding meteorologists current information to better forecast storm tracks, strengths, and landfall times.

These tools are utilized by the National Hurricane Center and the National Oceanic and Atmospheric Administration (NOAA) in issuing early warnings to communities for possible evacuations or to take necessary precautions in advance of the storm. Moreover, with enhanced storm surge modeling, it enables the local government to focus on pinpointing the most vulnerable areas for prioritized evacuation and infrastructure protection.

Furthermore, mobile apps and social media developments have expanded the reach of hurricane warnings to more people. These tools enable residents to make informed decisions on when to evacuate or take other measures to protect their homes. However, ensuring timely warnings reach all populations, especially those without reliable access to the internet or mobile devices, remains a challenge.

**Climate change and the future of hurricanes**

As the world continues to experience the effects of climate change, its impact on the frequency, intensity, and behavior of hurricanes has become increasingly evident. Warmer ocean temperatures, rising sea levels, and changing atmospheric conditions are contributing to more powerful and unpredictable storms. In the United States, these shifts in hurricane patterns pose significant challenges for communities, economies, and infrastructure, particularly in coastal and low-lying areas. Understanding the link between climate change and hurricane activity is essential for developing effective strategies to reduce the damage caused by these extreme weather events and to better prepare for the future. This section explores the influence of climate change on hurricanes, the risks posed by rising sea levels, and the challenges and opportunities in adapting to an era of more severe storms.

 ***How climate change influences hurricane frequency and intensity***

 Climate change has an important role in influencing the frequency and intensity of hurricanes. The increase in global temperatures is heating up the ocean waters, and when hurricanes pass over them, they take that energy and become more powerful and possibly destructive. Warmer sea surface temperatures also contribute to increased moisture in the atmosphere, which can lead to heavier rainfall during storms, hence severe flooding.

Whereas many studies have shown an increased number of extremely strong hurricanes-that is, those ranked Category 4 and 5 in the last few decades, especially within the Atlantic hurricane basin, this is not necessarily because of the general increase in their numbers. More intense storms exist now more than ever before. Longer hurricane seasons, a consequence of climate change, put more risk in regions of the United States that would normally be susceptible to these events.

***Rising sea levels and their contribution to storm surges***

Probably one of the most dangerous of all the impacts induced by climate change is that sea-level rise increases storm surges from hurricanes. When the Earth's temperature increases, polar ice melts more and more, and thermal expansion causes the seawater to expand and thereby raise sea levels. As sea levels go higher, so does the baseline level of flooding or even storm surges from hurricanes start higher in coastal areas.

When making landfall, a hurricane has the potential to push immense volumes of water onto the coast, flooding streets, homes, and infrastructure. With higher seas, the reach of these storm surges widens to flood areas that may have been safe in the past. It is for this reason that places like Miami, New Orleans, and other low-lying coastal regions face an increasing danger with the rise in sea levels and stronger hurricanes, both to human life and property.

**Major Countries and Organizations Involved**

**United States of America**

The United States is considered one of the countries in the world that are most prone to hurricanes; it is also at the forefront in response to hurricane impacts and devising strategies for future resilience. To date, federal agencies like FEMA (Federal Emergency Management Agency) and the National Oceanic and Atmospheric Administration (NOAA) have played a great role in coordinating disaster preparedness, response, and recovery efforts. FEMA takes the frontline in disaster response, whereas the critical task for NOAA relates to hurricane observation through satellite imagery, as well as meteorological study.

State and local governments also invest a lot in hurricane preparedness and response, as states like Florida, Texas, Louisiana, and North Carolina are considered prone to hurricane strikes. The U.S. is investing heavily in building storm surge barriers, flood protection systems, and early warning infrastructure to safeguard communities, and climate resilience programs to reduce long-run risks from climate change.

**United Nations (UN)**

 The United Nations is always in the forefront of coordinating international responses in the aftermath of natural disasters, including hurricanes. The UN, through agencies such as the United Nations Office for Disaster Risk Reduction and the United Nations Environment Programme, facilitates globally the efforts geared toward reducing disaster risks and promoting climate resilience. One such example is the Sendai Framework for Disaster Risk Reduction, adopted in 2015, which reaffirmed global commitment to enhancing preparedness for and resilience against disasters, including better understanding and addressing the implications of climate change on extreme weather events such as hurricanes.

**World Meteorological Organization (WMO)**

 Another major international player in the improvement of hurricane forecasting and response is the World Meteorological Organization. Under the United Nations, WMO enables world collaboration in weather research, information sharing, and early warning. The regional centers of WMO, like the Regional Specialized Meteorological Centers (RSMCs), play an important role in providing essential information to the countries in hurricane-prone regions of the world in order for them to get ready or respond to a storm.

**Timeline of Events**

| **Date** | **Description of Event** |
| --- | --- |
| September 8, 1900 | Galveston Hurricane (Category 4) |
| 1920s-1930s | Establishment of the U.S. Weather Bureau (now NOAA) and the first hurricane tracking system. |
| August 1960 |  The first weather satellite, TIROS-1, is launched. |
| August 24, 1992 | Hurricane Andrew (Category 5). |
| August 29, 2005 | Hurricane Katrina becomes one of the deadliest and most costly hurricanes in U.S. history. |
| March 18, 2015 | The Sendai Framework for Disaster Risk Reduction is adopted by the United Nations. |
| August 2017 | Hurricane Harvey makes landfall in Texas. |
| October 2018 |  The Global Commission on Adaptation calls for global investments in climate resilience and adaptation strategies. |
| April 2021 | The United States commits to investing in climate resilience as part of its climate change action plans. |
| 2024 | As part of the ongoing response to increasing hurricane intensity, U.S. coastal cities like Miami, New Orleans, and Houston continue to implement updated building codes, storm surge barriers, and flood control measures. |

**Relevant UN Treaties and Events**

The devastation inflicted by natural disasters such as hurricanes has been recognized by the United Nations as a global concern for a significant amount of time. Therefore, the appropriate frameworks and policies have been developed to combat these issues. Although there are not any specific treaties that deal with hurricanes, there are multiple global initiatives and agreements in place that aim to support resilience against climate change and reduce disaster risk:

* Sendai Framework for Disaster Risk Reduction: adopted at the Third United Nations World Conference in Sendai Japan in March 2015, it aims at drastically reducing the disaster risks as well as the fatalities, loss of livelihood, and health care. It stresses the importance of understanding risks involved with natural disasters for governance, investment in the reduction of, and preparing for risk response and recovery effectively.
* International Strategy for Disaster Reduction (ISDR): builds enduring nations and communities by guiding and coordinating global efforts to reduce disaster losses significantly. It was established in 1999.

**Previous Attempts to solve the Issue**

 There have been numerous steps taken over the years to control the effects that hurricanes can have on the United States. One of the strongest responses, with the most significant impact, was the development of the Hurricane & Storm Damage Risk Reduction System (HSDRRS) which was formed after the damages left by Hurricane Katrina in 2005. This system became fully operational in 2011, and was developed over an investment of $14 billion. In total, this team built 350 miles worth of levees and floodwalls intended to provide protection at a 100 year risk reduction level. While this system has positively impacted flood protection in the New Orleans region, it has also received propelled criticisms for putting the wetlands at risk, which act as a natural storm defense.

Furthermore, it's important to note that the Federal Emergency Management Agency (FEMA) has been integral when it comes to responding and preparing for disasters in the US. From programs such as the National Flood Insurance Program (NFIP) and even providing financial aid, FEMA has made it easy for communities to bounce back and reconstruct after a hurricane. Nonetheless, there is still progress to be made in securing appropriate finances, acting fast to emergencies, and putting in place an overall risk mitigation plan.

**Possible Solutions**

 One possible solution is the expansion to natural infrastructure, including restoration and conservation of coastal wetlands, mangroves, and barrier islands. These natural barriers can absorb storm surges and lessen the effects of hurricanes on coastal settlements. There should be policies that enhance land use and conservation of these natural buffers at the federal and state levels.

Another possible solution is strengthening early warning systems and disaster preparedness programs. New technology such as AI and satellite monitoring can upgrade hurricane forecasts and responses, enhancing accuracy to enable quicker evacuations. Regular disaster preparedness drills and community education campaigns can also make sure that if a hurricane does happen, individuals will be ready to act quickly.

A third solution is strengthening building codes and improving infrastructure resilience. Stricter standards on building designs that withstand hurricanes can reduce property damages and loss of life. There should be cutbacks for households and businesses that need to alter their buildings to withstand these conditions.

**Guiding Questions**

1. How is your delegation affected by this?
2. What exactly are you trying to achieve?
3. What existing measures does your delegation already have in place to combat this issue? and how to improve them?
4. What are the primary obstacles delaying progress on this issue?
5. What resources are required to implement such solutions?
6. What's your delegation's political and historical context/stance on this issue?
7. What are possible long term effects to this problem?

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