



CLIMATE CHANGE AND FLASH FLOODS: HOW GLOBAL ENVIRONMENTAL LAWS CAN PROTECT COMMUNITIES

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ABSTRACT

As a result of a rise in the frequency and intensity of extreme weather events, such as flash floods, climate change has become one of the most serious concerns facing the planet, especially for communities who are already vulnerable. There are a number of factors that might lead to flash floods, including deforestation, unexpected rainfall, and melting glaciers. These factors, in turn, can cause substantial damage to infrastructure, displacement of people, and deaths. It is imperative that prompt action be taken to enhance international environmental laws, build effective climate governance, and form international agreements that are cooperative in order to mitigate the impact of climate-related disasters. In spite of the fact that current frameworks such as the Paris Agreement, the Kyoto Protocol, and the United Nations Sustainable Development Goals (SDGs) underline the need of decreasing emissions, controlling disaster risks, and developing resilient communities, there are still many sectors that do not have adequate enforcement and accountability. In order to protect vulnerable people, it is essential to reinforce environmental regulations that extend across international boundaries, make climate pledges that are legally binding, and increase disaster preparedness via the use of institutional and legal procedures. Incorporating principles of climate justice, sustainable development, and human rights into global environmental policy is one way to ensure that disadvantaged people get enough protection and aid in adapting to climate change. It is possible for us to transform climate change into an opportunity for sustainable development if we work together to prioritize the establishment of legal frameworks for adaptation, mitigation, and the development of resilience. It is necessary to have global environmental standards that are all-encompassing, strictly implemented, and geared toward equality in order to protect communities from the disastrous effects of flash floods that are induced by climate change.

Keywords: Climate change, flash floods, global environmental laws, climate governance, Paris Agreement, disaster risk management

INTRODUCTION

Flooding is the single most lethal natural catastrophe, with more people losing their lives than any other single incident (UNISDR, 2015). According to the Intergovernmental Panel on Climate Change (IPCC), the effects of climate change, as well as social and economic shifts, are causing different risk patterns and exposures, which is causing risk levels to increase in many regions of the world. Especially for many low-

lying parts of the world, the flood hazard seems to be insurmountable due to the combination of increasing sea levels, altering rainfall patterns, and continuing development in areas that are prone to flooding. Many towns are increasingly concerned about surface water flooding, which happens when heavy rains create difficulties with the drainage systems that are already in place, as well as rain-induced landslides and flash floods. This is in addition to the more frequent 'hot spots' that are located around rivers and coasts. As a reaction to these threats, it is required to make a transition from a "protect and defend" mentality to a more comprehensive "resilience" strategy. This new approach should incorporate, among other things, strategies for managing natural flood risk, land-use planning, and spatial planning. It is of the utmost importance to take precautionary steps and adapt to shifting weather patterns in order to better prepare for the consequences of climate change and other long-term calamities. Everyone, including individuals, businesses, and governments, is affected by this. There is a compelling economic case in favor of taking preventative measures to manage existing risks and avoiding the emergence of new dangers. It is of the utmost importance to include climate resilience into both current and future development plans in order to avoid the erasure of previous achievements in terms of reducing poverty and enjoying economic prosperity due to the adverse consequences of climate change. Consider the Sendai Framework developed by the United Nations Office for Disaster Risk Reduction (UNISDR), Rockefeller's 100 Resilient Cities, or the Coalition for Climate Resilient Investments. These are just a few examples of major public and private programs that have lately given resilience a lot of attention from the public and private sectors. A number of various definitions of the concept of resilience have been proposed, ranging from "bounce back" to "bounce forward," and the question of how to measure it has also been the topic of a great deal of discussion in the academic literature.

With that being said, it is not quite clear whether or not the existing regulatory approaches to flood risk management are being adjusted or extended in order to include a resilience plan that takes into account the future. The concept of resilience is gaining popularity among decision-makers; nevertheless, the strategy that is currently being taken to manage flood risk is reactive, with an emphasis on activism after the fact rather than proactive, long-term planning. The influence of legislation on flood risk management (FRM), and more especially, the ability to strengthen flood resilience in light of climate change, is a subject that has gotten relatively little attention from scholars. It is the intention of this essay to provide light on the manner in which national flood laws control and develop community resilience in the face of current and future flood dangers.

OBJECTIVE

1. To investigate how global environmental laws address flash floods brought on by climate change.
2. To suggest legislative measures to enhance community resilience and climate justice.

MATERIALS AND METHOD

"Agricultural conditions, groundwater quality, aquatic biota, micro-invertebrates, the conditions of livestock and wildlife, means of nutrient dispersal and pollutant spreader." Floods are measured in this manner to determine their impact on the environment.

RESULTS

Impacts of flood on the environment

There is a possibility that floods may have both positive and negative effects, depending on a number of criteria such as location, size, depth, and intensity. Floods have repercussions that are felt not just by people but also by communities. Floods have an impact on a variety of contexts, including the environment, society, and the economy. As a result of the flood, the following environmental consequences were observed:

Effects of flood on the agricultural conditions

There are a number of countries where agriculture serves as the foundation of the economy and the everyday lives of the people. Flooding may cause agricultural land that was once productive to become less fruitful or sterile. This is because soil erosion and sedimentation are the causes of this phenomenon. As the floods move quickly, they remove the top layer of the rich soil from the area that is suitable for agriculture. These types of agricultural lands have a forty percent decline in yield. In the event that water is able to permeate the saturated ground, the extra moisture will make it more difficult for winter crops to mature well. A nutritional shortage may emerge as a result of the impact that floods have on the nutrients content of the soil. Without nitrogen, the defense mechanism of a plant is unable to operate properly. Since the fertilizers are washed away, the plants are unable to access the nitrogen, which leaves them vulnerable to attacks from insects and lowers the amount of food that can be harvested from agricultural land. Static floodwater may also kill plants by weakening them to the point that they are unable to even stand erect. This is another method that floodwater can kill plants. In light of this, it is necessary to devise an appropriate plan in order to forestall the flood's impact on land that is productive.



Figure 1. The submerged agricultural land of Malkapuram.

Impacts of flood on groundwater quality

Groundwater plays a significant role in the natural cycles that occur in geology. Groundwater travels via aquifers, which are underground channels below the surface of the earth. It is from these aquifers that the vast majority of the world's drinkable water is extracted. Flooding is the primary factor that leads to the contamination of groundwater. Drinking water that is contaminated with dangerous bacteria is the most common cause of water-borne diseases such as cholera, typhoid fever, and diarrhea. These infections are transmitted via water. Water is composed of the chemical elements oxygen and hydrogen, which are the most fundamental components. The continuous existence of every kind of life is contingent upon the presence of water. When floods mobilize and dump hazardous chemicals like pesticides, illnesses, and other poisonous compounds, rivers, ponds, streams, and groundwater become unsafe for human consumption. This is because these places are contaminated with these substances. During times of flooding, lakes, ponds, rivers, and even underground water sources become more hazardous due to the amount of chemical runoff that originates from farms and enterprises.

Effects of flood on aquatic biota

Floods have a significant impact on the ecologies of watery environments. There is a possibility that natural disasters and tragedies may interfere with the services that the aquatic environment provides. Floods are directly responsible for the damage that is done to the aquatic system and all of the processes that are depending on it. It is becoming more likely that floods will occur as a consequence of climate change and other natural changes that are occurring in the water cycle. There are a variety of ways in which floods may impact aquatic ecosystems and the aquatic species that lives inside them.

The geomorphology of the river is changed as a result of extreme flooding. The quantity of aquatic life and the quality of that life are both determined by the geomorphology of rivers. The alterations in geomorphology that rivers go through are much more destructive to aquatic life than floods themselves. Those animals who make their home in water are particularly vulnerable to the devastation that floods cause. It is possible that they will be forced to abandon their houses and look for new ones if the water consumes them.

Floods have an effect on the purity of the water, the concentration of oxygen, and the pH of the water, which in turn leads to a drop in the primary production of freshwater. One of the reasons for the low productivity of the aquatic system is the mobilization of the contents of the nutrients and minerals. Due to the fact that floods are the primary contributors to biodiversity, they have a stronger impact on the ecosystems of aquatic environments. It is necessary for the aquatic environment to experience floods in order to have an increase in primary production and to provide a habitat that is unique for new species.



Figure 2. Stony Clove Creek for surveying fish.

Impacts of flood on the microinvertebrates

It is common practice to overlook the lotic ecosystem, despite the fact that it is a vital part of the ecology of the Earth. It is possible to divide microinvertebrates into three primary categories: those that graze, those that hunt, and those that shred. Microinvertebrates include all types of insects, including those that live on land and afloat in water. These macroinvertebrates, which are essential to the continuation of the food chain, are responsible for the formation of the basic links in the chain. The two categories of producers, primary and secondary, are connected by them. Initially, they consume the garbage that is floating in the water, and then birds come after them.

In the event of natural calamities like as floods and droughts, the lotic ecosystem is susceptible to the disturbance of microinvertebrates, which may bring about this disruption. Indirectly, a little shift in hydraulic flow may have an effect on the density of the population of macroinvertebrates, which in turn has an effect on the food chain. In the event of extreme flooding, microinvertebrates are severely impacted, which ultimately results in the dominance of macroinvertebrates, which are less stable and less well-adapted to the environment.

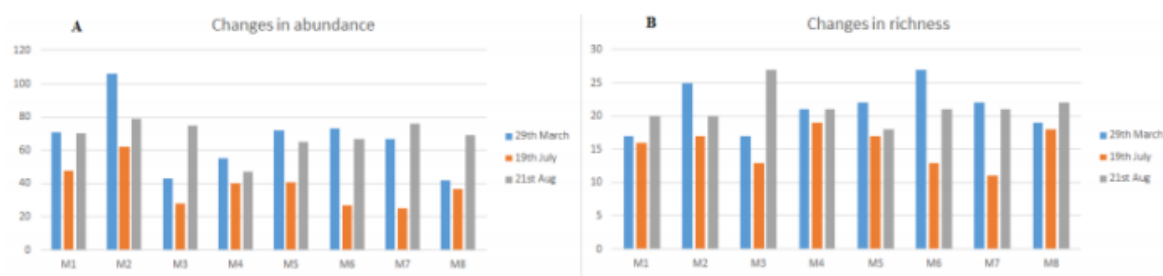


Figure 3. Benthic macroinvertebrate abundance and richness following flood (A, B).

Affecting the health conditions of livestock and wildlife

Flooding has the potential to cause damage to livestock and other animals. The usage of an excessive amount of water might be detrimental to natural activities, ranching, and agriculture. As a result of the catastrophic floods, thousands of animals used in agriculture are killed. Since there is no means of transportation, these animals are either frightened to death or swept away by water since they cannot be transported to higher ground sites. Both of these outcomes are considered to be catastrophic.

Extreme and catastrophic flooding has the potential to destroy whole ecosystems and all kinds of life that are contained inside them. Due to the catastrophic effects that these influences have had on the food supply, habitat potential, and biodiversity of the ecosystem, there will be long-term repercussions for the species that are still there.

Means of nutrient dispersal and pollutant spreader

It is possible to find trash, toxins, and even nutrients in floodwater. It is possible for objects like trees, silt, cement blocks, and even construction waste, pathogens, and pesticides to travel great distances in floodwater. These are just some of the things that may be transported. Blooms of algae and phytoplankton, which are caused by sedimentation and turbidity, have the potential to put the quality of the water at risk.

There is a possibility that the spread of important nutrients and mineral deposits by flood water may help stimulate the development of plants and an overall healthy environment. The nutrients, organic matter, and silt that floods transport and pile up over time will contribute to an increase in the fertility of the agricultural land.

Need of a natural flood management policy

Determining the most efficient areas to undertake interventions based on hydrological processes in the watershed of a river or along a shoreline is the objective of natural flood control. This is done with the intention of increasing the capacity to retain water. The rerouting of rivers to their native floodplains and the redesigning of coastal areas to better accommodate natural flows are two examples of efforts that fall under this category. Because they serve as a reservoir for floodwaters, the preservation of wetland areas will "slow the flow" of floodwaters. The purpose of agricultural reservoirs is to store water in the event of large storms; yet, some reservoirs are also very significant natural sites in their own right. The concept of urban green infrastructure encompasses elements such as parks and gardens, in addition to environmentally responsible urban drainage systems.

There have been long-standing benefits associated with using a more natural approach to flood management. These benefits include a reduction in the chance of harm being caused to people, property, companies, and the environment.



Figure 4. Great Fen depicting new ponds and woods.

DISCUSSION

The growing frequency and intensity of flash floods caused by climate change presents new difficulties for both developed and developing countries. These disasters, which put people's lives in jeopardy, ruin infrastructure, and disrupt ecosystems, are often brought on by a variety of factors, including the melting of glaciers, unpredictable precipitation, and environmental degradation. When it comes to lowering emissions, mitigating the risks of natural disasters, and adjusting to the effects of climate change, international environmental treaties and regulations, such as the Paris Agreement, are absolutely necessary. Inadequate funding, uneven engagement across countries, and a lack of enforcement mechanisms that are enforceable continue to put vulnerable communities in a precarious position. We need more powerful international accountability institutions and partnerships in order to reduce the gap that exists between the promises that are made and the actual fulfillment of those commitments.

Given the ongoing growth of legal frameworks, it is imperative that climate justice, equality, and human rights be included into global environmental governance responsibilities. Although disadvantaged groups make the lowest contributions to global emissions, they are the ones that suffer the most from climate-related disasters. This is particularly true in regions of the Global South that are prone to flooding. You may help improve resilience by strengthening environmental regulations so that resources are divided equitably, by giving financial assistance for adaptation, and by integrating local people in decision-making. Also, you can help enhance resilience by providing financial assistance for adaptation. In addition, by combining the goals of sustainable development with international law, it is possible to produce a holistic plan that targets both the protection of human health and the environment, as well as the protection of

short-term flash floods. It is thus possible that international environmental legislation may develop from idealistic blueprints into efficient weapons for protecting communities from the mounting hazards posed by climate change.

CONCLUSION

The increasing risk of flash floods due to climate change to human health, ecosystems, and global wealth makes it imperative that we move swiftly to fortify international environmental regulations. In order for the existing international arrangements, such as the Paris Agreement, to be effective, it is vital to have stronger enforcement, more accountability, and equitable implementation across all nations. It is essential to have robust legal mechanisms, but policy frameworks should also include climate justice, catastrophe planning, and resilience-building in order to safeguard individuals who are vulnerable. It is possible to accomplish the goal of reducing the risks associated with flash floods and ensuring long-term sustainability via the transformative power of international environmental laws. These laws encourage global cooperation, pledges that are enforceable, and governance that is inclusive. A concentrated effort that is legally binding is the only strategy that can be guaranteed to safeguard both the present generation and future generations from the negative consequences of climate change that are becoming worse.

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