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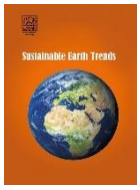

Linking environmental crimes and extreme weather conditions: a systematic review on the climate change issues of Bangladesh

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ABSTRACT

Climate change and extreme environmental conditions are pressing threats to the planet. Environmental crimes further complicate these issues. This study uses a qualitative exploratory method to explore and describe the connection between climate change and the extreme environment and environmental crimes. The data are collected from secondary sources and presented thematically to understand the connection between climate change and the extreme environment with environmental crimes. This study found several environmental crimes including deforestation, illegal timber trafficking, waste mismanagement, marine ecosystem crimes, and wildlife trafficking directly and indirectly led to climate change which ultimately causes extreme impacts on weather and climate such as heatwaves, heavy rainfall, shifting in seasons, droughts, wildfires, flash floods etc. in many places. Bangladesh has also been affected by these environmental crimes and extreme weather conditions. There are several laws, rules, regulations, and international treaties regarding these issues but enforcement is currently in a very vulnerable situation. Comprehensive legal and developmental framework and participation in preventing such crimes by all stakeholders through the green police model can make a way forward in this situation.

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1. Introduction

Climate change has been a major problem for some decades now. Overpopulation, urbanization, industrialization led to major changes in climates over the years. For some times now, world has seen so many extreme calamities that hit hard. Bangladesh is no exception as it also went through many extreme events in recent years. Also, the seasons are getting irregular and all the population facing challenges coping with these kinds of new situations. A major cause behind these climate change issues and extreme climate event is environmental crimes (Veer, 2024). There are so many laws, rules, regulations and international treaties are in place to protect the environment so that a balance can be maintained. But several environmental crimes posing challenges to the environment and weather and the climate has been getting extreme (Mustajib, 2024). Climate change has been occurred by several factors, with environmental crime being one of them. The consequences of climate change include irregular timing of seasons, extreme weather patterns, and other severe calamities affect livelihoods and food security of the living. In various regions, severe events have been caused by climate change resulting from environmental crimes. Calamities such as desertification, droughts, flash floods, cyclones, and severe

storms are significantly affecting certain areas of the world. Furthermore, the lack of law enforcement and inadequate supervision have contributed to negligence in adhering to environmental laws (Alam, 2022; UNODC, 2022).

In recent years, Bangladesh has faced several flash floods that was not been projected before. Most of these flash floods are the outcome of the uneven water distribution among the neighboring countries of Bangladesh, which clearly violates international treaties (Palma and Roy, 2024). These irregularities and environmental crimes are not being properly addressed in Bangladesh. Lack of proper law enforcement response is making people do these crimes as they don't have to face any kind of penalty or punishment. Some laws and regulations exist, but they are not utilized properly (Sharif and Uddin, 2023).

Addressing environmental crimes, climate change and extreme weather is a big challenge for countries like Bangladesh. These kinds of lower middle-income countries are already dealing with several societal and developmental issues (Seddiky et al., 2024). Dealing with these environmental issues are kind of pressure for these states. Also, the law enforcement agencies are quite caught up with the traditional response to crime. So, focusing especially on the environmental crime is not feasible for them. Addressing these issues has been a significant limitation in Bangladesh. Law enforcement agencies and the responsible stakeholders lack proper guidelines to address the climate and environmental issues. Challenges such as insufficient manpower, inadequate planning, and lack of supervision are being challenges in addressing climate change and environmental crimes (Asian Development Bank, 2020).

At present, nearly half of the global population faces extreme water shortage during at least months of the year. The impacts of environmental crimes are extreme like ocean warming and acidification of water. These issues are threatening marine ecosystems and livelihoods and soil erosion and desertification complicates food security. These processes also complicate public health issues, as communities are increasingly exposed to extreme weather events, such as heatwaves, cyclones, and other climate-induced disasters. Moreover, these interconnected challenges led the urgent need for sustainable environmental supervision and comprehensive solutions (Chazalnoel and Randall, 2022). Several researches have been conducted on these issues. But they explain climate change, extreme weather and environmental crimes as separate discourse. They lack comprehensiveness as they do not explain these issues altogether. However, establishing a comprehensive connection among climate change, extreme weather events, and environmental crimes is vital to properly address these challenges. This study aims to address all these issues and propose potential solutions to mitigate them.

The main objective of this study is to explore, describe and connect the environmental crimes, climate change and extreme weather from the world and Bangladesh perspectives. The issues of climate change and extreme weather are posing greater threat to the environment, human livelihoods, food security and disrupt the whole ecological balance. Environmental crime is one of the main causes behind these issues. Connecting climate change and extreme weather with environmental crimes can provide the understanding to address climate change and extreme weather from a unique point of view. Moreover, this study will provide valuable understanding on climate change and extreme weather from the perspective of environmental crimes.

2. Material and methods

This study employs a qualitative research method with exploratory research design to fulfill the objectives. In this research, secondary sources of data including peer-reviewed articles, books, reports, and newspaper reports are used to establish a clear understanding of the connections among climate change, extreme weather, and environmental crime from a unique perspective.

Google Scholar for peer-reviewed articles and Google Search for the news of events were used based on the keywords of the study. A total of 74 pieces of literature including peer-reviewed articles, news and reports has been identified using the keywords: Climate Change, Extreme Weather, Environmental Crime, Climate Vulnerabilities, and Environmental Law Enforcement. Following the review of the abstracts, 22 pieces of literature has been excluded as they were irrelevant to the present study. The remaining 52 literatures were used to present the findings.

To analyze the data, systematic literature review has been conducted for finding the relationship of environmental crimes with climate change, and extreme weather. The findings from this review led to the identification of several sub-themes, which subsequently developed some themes within the study. These themes are presented in the findings section to address the research objectives.

3. Results and discussion

3.1. Nature and response to environmental crimes

According to UNODC (2021), there are several crimes which are directly contributing to the climate change process. These crimes are quite serious and occurred by the powerful people for commercial gain. There are two kinds of environmental crimes exist includes soft environmental crimes and hard environmental crimes. The hard ones mainly contribute to climate change as they have a far-reaching impact. Some of the hard crimes are as Table 1:

Table 1. Nature and response to environmental crimes.

Nature of Crimes		Description
Crimes Related Marine Ecosystem	Marine Pollution from Dumping Land Waste	Land-based pollution, is one of the causes of marine pollution. This cause excessive pollution into water bodies, leading eutrophication, a process that depletes oxygen levels and creates big "dead zones" in oceans. The **UN Convention on the Law of the Sea (UNCLOS)** suggests all the nations to control all sources of marine pollution, the enforcement of this convention differs among countries (Lycan & Buskirk, 2021). Internally, the laws regulating dumping waste are becoming stricter, with higher punishments. Although comprehensive regulations are essential to safeguard marine ecosystems which includes both national and international waterbodies.
	Ship-Source Fuel Pollution	The shipping industry contributes about 3% of global emissions through burning several kinds of fuels. Regulations like **MARPOL Annex VI** have criminalized intense emissions of sulfur oxides, and supports the use of cleaner fuels like hydrogen (Georgoulias et al., 2020). But nitrous oxide emissions which is a more potent greenhouse gas responsible for 10% of global emissions, still now poorly regulated. This lack of balance needs further steps to control all harmful pollutants emitted by ships (Hausfather & Forster, 2023).
	Ship Water Dumping	Ships produce large amounts of bilge water, mixed with oil and other pollutants. The regulations mandate depollutes this water before disposal, illegal practices like bypassing treatment systems ("magic pipes") happens a lot which ultimately harm marine life (The Maritime Executive, 2019). More regulated enforcement has shown results as, bilge water incidents in EU Mediterranean waters dropped significantly from 2007 to 2017 due to improved detection and penalties. Consistent law enforcement remains key to combating such kind of crimes (Office of Public Affairs, 2024).
	Other Pollutants	According to Walker et al. (2018), Large ships often burn cheap bunker fuel, leaving intense toxic waste. To decrease disposal costs, some ships illegally dump these pollutants, along with bilge water. This damages ecosystems and create imbalance in natural carbon recycling processes. International regulations require proper disposal, but enforcement isn't efficient enough. In this case enforcement is critical to minimize harm.
Crimes Related to Forests	Bottom Trawling	Bottom trawling, a fishing method using heavy nets dragged along the sea ground, create imbalances in marine ecosystems by releasing stored carbon. This process destroys habitats like coral reefs, and harm biodiversity. This method also produces excessive catch, much of which is discarded after. Some countries are increasingly banning or restricting bottom trawling, as it is a threat to marine ecosystems and climate (Atwood et al., 2020).
	Illegal Fishing	Illegal, unreported, and unregulated (IUU) fishing leads to decreasing fish stocks, harms biodiversity, and hinders sustainable practices, particularly in Marine Protected Areas (MPAs). MPAs cover 7% of the ocean and are critical for biodiversity and marine carbon balances (Sala & Giakoumi, 2017). But these crimes, in many countries, is poorly regulated. Strengthening enforcement rules to prevent IUU fishing and addressing organized crime in fisheries is crucial to ensuring ocean biodiversity and sustainability (Hastings & Botsford, 1999).
	Illegal Deforestation	Cutting forests for agriculture is a major cause of deforestation and ecosystem degradation. Land settlements often overlap with illegal activities, including deforestation in protected areas. Laws like France's Duty of Vigilance and the EU's deforestation-free supply chain regulations aim to decrease this kind of actions (Cox et al., 2013). However, the effectiveness of these actions depends on strengthening enforcement and avoiding the legalization of harmful practices.
	Illegal Logging and Timber Trafficking	Illegal logging, cause up to 90% of forestry activities in some tropical areas, intensifying the risk to biodiversity and contributes to climate change by reducing forests' ability to sequester carbon. It often involves corruption, human rights abuses, and unsustainable practices (Piabuo et al., 2021). Global collaboration to enforce sustainability standards is vital to combat this issue and promoting sustainability.
	Illegal Mining	Illegal mining of valuable metals and stones accelerates deforestation and often involves human rights abuses against several communities. Without proper oversight, such illegal mining causes pollution and destroys ecosystems. Addressing this requires robust regulation and enforcement to mitigate environmental and social harm (UNODC, 2021).

Crimes Related to Waste	Wildlife Trafficking	Wildlife trafficking, a form of structured organized crime, is a big threat to countless species which are essential for ecosystem health. Combating this crime involves strengthening justice systems, reducing demand, and supporting local livelihoods to protect biodiversity effectively (UNODC, 2021).
	Associated Crimes	Corruption, document fraud, and related crimes further led to forest destruction, wildlife trafficking, and illegal mining. Addressing these crimes is crucial for improving governance and reducing environmental damage (Piabuo et al., 2021).
	Waste Mismanagement	Illegally trafficked waste often ends up in some illegal lands or and burned openly, releasing methane and harmful pollutants. Open burning most of the time increases carbon emissions, far exceeding the impact of proper waste management. Addressing waste mismanagements requires global cooperation to enforce safe disposal practices and reduce greenhouse gas emissions (UNEP, 2015).
	Plastic Waste Mismanagement	With global plastic production increasing day by day, waste management struggles to keep pace. Illicit practices, such as mixing recyclable and non-recyclable plastics or misrepresenting origins cause plastic waste mismanagement with bypassing enforcement. Regulations under the **Basel Convention** aim to control plastic waste trading which is not enough (Reyna-Bensusan et al., 2019). So, stronger measures are needed to address the environmental and health impacts of plastic pollution.
	CFC/HFC Mismanagement	Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HFCs) are synthetic gases with high global warming potential, were banned under the **Montreal Protocol** and **Kigali Amendment** due to their ozone-depleting effects. Even after these bans, illicit trafficking of these gases is occurring frequently. Combating and preventing this issue needs better enforcement and encouraging sustainable alternatives to ensure compliance with international agreements (UNODC, 2021).

Crimes against the environment, whether in marine ecosystems, forests, or waste management, have some far-reaching impacts on biodiversity, climate, and human health. Properly addressing these crimes requires comprehensive international cooperation, proper enforcement of existing laws, and creative solutions to promote sustainability. Focusing on prevention and accountability, all the stakeholders can mitigate these environmental threats and protect the future of the world.

3.2. The impact of environmental crimes on climate change

According to UNODC (2023), Environmental crimes, such as illegal deforestation, marine pollution, wildlife trafficking, and illicit activities in waste, mining, and fisheries, are increasing ecosystem degradation. These actions are not only harming the biodiversity but also reducing ecosystems' ability to adapt with climate change, releasing significant amounts of carbon dioxide and other harmful gases. Illegal waste trafficking further affects this issue by introducing unmanaged waste into public space, illicit dumping, and open-air pollution. Such practices contribute to approximately 3% of global greenhouse gas emissions, including methane. Similarly, illegal mining for critical minerals like lithium, nickel, cobalt, and rare earth elements is creating carbon imbalance, degrading the quality of air and water, and harming natural habitats. The increasing global demand for these resources, essential for the transition to green energy, which is fostering corruption and organized crime, especially in regions with weak law enforcement and compliance frameworks.

As the world population has been growing significantly the more resources are needed to fulfill the demand of this huge population. So, overusing of every resource is common that pose threat to sustainability to the resources of earth. Overusing includes illegal mining of resources which led to adverse climate as the resources has already used up which may be vital for keeping the environment and climate natural. Illegal activities which are described in previous part has critical impact on environment. All these environmental crimes are happening for a long period of time which has ultimately degrades the nature and environment, which increasingly led to climate change (UNODC, 2022).

3.3. The impact of environmental crimes on extreme weather conditions

Agricultural degradation and food insecurity are particularly extreme in some regions like

Central America's "Dry Corridor". These conditions have contributed to irregular migration flows to the United States, often through routes which are very dangerous with risks of violence and exploitation by migrant smugglers. Beyond migration, food insecurity has adverse effect on public health, negatively impacting women. As example, recent intense drought in Ethiopia threatens to reverse progress in maternal and newborn health, underscoring the fragility of such gains in the face of environmental crises (UNODC, 2022).

Human actions which are whether illegal or neglectful can contribute to extreme weather events like droughts, desertification, floods, and disease outbreaks, ultimately accelerating climate change (Europol, 2022). Climate change has intensely impacted human beings over the years, which happens through both sudden-onset events and slow-onset processes. These issues are often caused by someone or increased by climate changing factors. The climate changing factors includes be global warming and rising sea levels, as well as non-climate changing factors, including unsustainable or unlawful environmental management practices. Moreover, these causes are interconnected. For example, which regions experiencing increased sea-level rise (a slow-onset process) are more vulnerable to flash floods (a sudden-onset event) (Portner, 2022).

The prediction about climate-related can't be made beforehand. In developed states like Australia and Spain, continuous droughts as Australia's 1995–2009 drought and Spain's 2008 dry spell did not lead to widespread food insecurity. On the other hand, droughts in Kenya, Ethiopia, and Somalia have had devastating effects on rural populations, whose livelihoods depend heavily on weather-dependent activities like pastoralism and farming (Reisen, 2019).

The situation has intensified by the industrial activities, particularly resource gathering processes like large-scale infrastructure projects and intensive agriculture. Environmental crimes, such as illegal pollution, deforestation, and improper waste disposal also complicate the challenges and increase the adverse effects (UNODC, 2022).

3.4. Environmental crimes, climate change and extreme weather in Bangladesh

Bangladesh is the seventh most climate-vulnerable country in the world, with its population and ecosystems enduring both sudden and slow climate-related impacts (Eckstein, 2021). These changes have caused significant losses to life, property, and livelihoods. This condition intensified by rising average temperatures, increasing sea levels, and shifting climate. Over the next 30 years, such changes are expected to increase cyclones and flood-affected regions by up to 20% (Asian Development Bank, 2020). Industrial development which has been providing employment opportunities, has further led to over usage of critical resources like water and air. Over usage of these resources are critically increasing the environmental vulnerabilities.

3.4.1. Environmental crimes and natural defenses

Human interventions, including dam construction and intentional saltwater flooding, have increased salinity levels in freshwater ponds and rivers. It's not only affecting the crops and fish but also reduces access to safe drinking water. The Sundarbans mangrove forest, home to centuries old Sundari trees, serves as a critical natural defense against extreme weather. But salinity intrusion, illegal logging, and subsequent flooding have severely compromised the whole ecosystem. The loss of trees led to flooding in the land portions and sudden storms are creating a vicious cycle of environmental change, reducing sustainability and increasing vulnerability (Aziz & Paul, 2015; Bangladesh Forest Department, 2016).

3.4.2. Extreme weather events in Bangladesh for environmental crimes

Bangladesh is facing challenges of climate change, migration, and exploitation which require a comprehensive and combines responses from all the stakeholders. While migration provides economic lifelines for the people, it also exposes communities to exploitation (Alam, 2022). Extreme weather conditions are leading to several complexities. The following Table 2 is presenting the condition and risk of Extreme Weather Events in Bangladesh.

Table 2. Extreme weather events in Bangladesh.

Events	Description
Drought and Flood	Heatwaves, flash floods, heavy rainfall, irregular rainfall etc. are hitting hard in recent times. Uneven water distribution between India and Bangladesh, which is also violation of international treaties. Such kinds of environmental crimes led to lack of water flow in the summertime and overflowing of water in the rainy season (Hossain, 2024; UNB, 2024). This conditions ultimately lead to droughts in summer and flash floods in monsoon.
Sea Level Rising	Bangladesh, a low-lying state situated within the broad Ganges-Brahmaputra-Meghna (GBM) Delta, faces severe vulnerability to the growing threats of climate change. Most of the country is situated in less than 10 meters above sea level and the coastal belt situated below 3 meters. This region is particularly vulnerable to rising sea levels (Huq & Rabbani, 2011). Covering 19 districts and home to over 35 million people, this coastal area accounts for nearly a third of Bangladesh's area and is at the potential risk (Khan et al., 2000). Local sea level is rising significantly in most of the countries and Bangladesh is no exception. A study has predicted by 2100, parts of the GBM Delta could experience a rise of 85 to 140 centimeters which is double than the earlier estimates which may cause increased erosion, salinity, and flood risks (Becker et al., 2020).
Flash Flood	Flooding is already a common phenomenon of Bangladesh's geography and climate. Almost 80% of the territory of this nation have the risk of floods. Annually, 22–30% of the land has to face floods with some extreme events, such as the 1998 floods, submerging up to 70% of the country (Ayeb-Karlsson et al., 2016). Over the past two decades, flooding has become more frequent and severe, increasing riverbank erosion and reducing home of thousands. Climate change led by environmental crimes complicates these challenges (Rahman et al., 2007). On the other hand, melting ice from the Himalayas, caused by rising temperatures, intensifies water flow through the GBM river system, complicating flooding in central Bangladesh. By 2070, it is estimated that 1.5 million people live in the coastal cities alone could face severe flooding impacts (Schellnhuber et al., 2013).
Cyclone and Storm	Bangladesh is facing extreme weather events, including cyclones and severe storms, which strike every three years on average. While cyclone has reportedly declined over the last 50 years, their intensity has risen due to the comprehensive effects of sea level rising and global warming caused by environmental crimes (Saha & Khan, 2014). These storms cause severe destruction, cause harm to critical infrastructure, pose risk to agriculture, and threaten the livelihoods and security of millions of people who are already trying hard to adapt with climate issues.

3.4.3. Migration and displacement are being risky

Both internal and international migration has become significant. Many Bangladeshis who are currently facing climate related challenges are migrating for adaptation. At least 7.8 million Bangladeshis currently live abroad, with remittances playing an important role in household and national economies (UNDESA Population Division, 2020). But the journey often comes at a heavy cost, including exploitation and trafficking. Districts like Bagerhat, Jashore, Khulna, and Satkhira have become the hotspot of trafficking, transit, and destination for migrants. The recent opening of the Padma Bridge has reduced travel time to Dhaka, increasing economic opportunities and restructuring these dynamics based on the capital Dhaka (BMET, 2022). Male labor migration to Gulf Cooperation Council countries and East Asia which has led to "chain migration," creating villages nicknamed "mini-Malaysia" and "mini-Kuwait." But such migration often led to vulnerable conditions in abroad (European Commission, 2016).

3.4.4. Adapting the extreme changes sudden- and slow-onset events

Most of the time, Bangladesh experiences sudden-onset disasters, such as Cyclone *Amphan* and the devastating monsoon "super floods" of 2020. These incidents led to widespread destruction of land, homes, and livestock. Several researches show scaring information of such risks, with 96% of households in Satkhira district and 85% in Bagerhat district are facing threats of severe storms. Flooding and waterlogging, increased by cyclones and heavy rainfall, have similarly affected these regions (Eskander et al., 2022). Women and girls are especially vulnerable in such calamities, often face increased risks of trafficking due to lack of protection. On the other hand, slow-onset changes, like increasing salinity, deforestation, and shifting seasonal timing, have badly affected traditional livelihoods in agriculture, fishing, and forestry. For example, heavy rainfall has forced many farmers to falling into debt cycles after not getting good crop yielding. Such challenges have led the farmer go toward land-based aquaculture, as example shrimp farming (UN RC Bangladesh, 2022).

3.5. Extreme weathers as the impact of environmental crimes on global events

Climate change and extreme weather events are continuously affecting the planet, further complicating existing issues and creating new challenges. Some of such kinds of extreme weather conditions around the world are as Table 3:

Table 3. Extreme weathers on global events.

Events	Description
Deforestation in the Amazon Rainforest	The Amazon rainforest, also referred to as the "lungs of the planet," plays a leading role in global climate. Deforestation, primarily driven by agricultural expansion and logging, significantly contributes to climate change. The loss of these forests increase carbon emission, releases more carbon dioxide, and make imbalance in rainfall patterns (Arias et al., 2021). This can ultimately lead to more and severe droughts, heatwaves, and wildfires, further increasing the speed of climate change.
Illegal Poaching and its Effects in Africa	Illegal poaching, specifically targeting species like elephants and rhinos, has far-reaching ecological threat. The loss of these prime species can create imbalances in ecosystems and can lead to dangerous effects. For example, the decline of elephants can change vegetation patterns, reducing water availability and increasing soil erosion. Moreover, poaching often involves the use of destructive methods, as example setting fires to move out the animals, which can lead to wildfires and contribute to carbon emissions (Mkuburo et al., 2020).
Industrial Pollution in Developing Nations	Rapid industrialization in developing nations has led to increased air and water pollution. The release of greenhouse gases, such as carbon dioxide and methane, from industrial activities contribute to global warming (UNODC, 2024). Air pollution can also lead to respiratory illnesses and other health problems. Water pollution can degrade ecosystems and impact water availability. These factors can exacerbate the impacts of climate change, such as heatwaves, floods, and droughts (Arias et al., 2021).
Wildfires in Australia and California	Climate change has increased the frequency and intensity of wildfires in regions like Australia and California. Warmer temperatures, prolonged droughts, and changes in wind patterns are combinedly creating ideal conditions for wildfires to spread rapidly. These fires release large amounts of greenhouse gases, which led to air pollution, and imbalance the ecosystems. The loss of vegetation also increases carbon emission and can increase soil erosion (Colvin et al., 2020).
Heatwaves in Europe	Heatwaves have become more frequent and more intense in Europe due to climate change. These extreme weather events can lead to illnesses related to heat like heatstroke which led to increased mortality rate. Also, heatwaves lead to disruptions to agriculture and infrastructure. Moreover, heatwaves can increase air pollution, as higher temperatures can lead to increased ground-level ozone formation (WMO, 2024).
Flooding in South Asia and Africa	Climate change is shifting the weather patterns which lead to more heavy rainfall events and flooding in regions like South Asia and Africa. These floods can cause widespread damage to infrastructure, displacement of communities, and loss of life. They can also contaminate water supplies, leading to waterborne diseases. Moreover, flooding can lead to soil erosion and damage agricultural land, impacting food security (Arias et al., 2021).

3.6. National and international legal framework to combat environmental crimes and extreme weather

Bangladesh has developed a comprehensive legal and regulatory framework to address environmental and climate challenges. This framework not only includes the laws and regulations for protecting the environment but also to combat and prevent environmental crimes. Protecting environment is a big issue and for that the laws include The Bangladesh Environment Conservation Act, 1995 (Amended in 2010); Bangladesh Environmental Conservation Rules, 1997; Bangladesh Water Act, 2013; The Groundwater Management Ordinance, 1985; The Forest Act, 1927 (Amended in 2000); Bangladesh Biodiversity Act, 2017; Wildlife Conservation and Security Act, 2012 etc.

Preventing and combating environmental crimes also get prioritized in this framework to protect and stabilize environment, and maintain balances in weather and climates. Such acts and regulations include Protection and Conservation of Fish Act, 1950 (Amended in 1982); Natural Water Reservoir Conservation Act, 2000; E-Waste Management Rules, 2021; The Ship Breaking and Ship Recycling Rules, 2011; Medical Waste (Management and Processing) Rules, 2008; The Brick Manufacturing and Kiln Establishment (Control) Act, 2013; The Building Construction Act, 1952; Environmental Impact Assessment (EIA) Guidelines for Industries, 2021 etc.

Disaster Management Act, 2012 was made to immediately response to any calamities to protect people and environment in a structured manner. Also, Standing Orders on Disaster (SOD) passed in 2019 to make people aware of disaster and teach them how to combat the situations during disasters. The legislative authority also initiated some policy to mandate overall protection to nature, environment and public health, safety which includes National Policy for Safe Water Supply and Sanitation 1998; The National Environmental Policy, 1992; Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009; National Adaptation Programme of Action (NAPA), 2005; Bangladesh Delta Plan 2100; Bangladesh Renewable Energy Policy, 2008; National Biodiversity Strategy and Action Plan (NBSAP), 2016; Energy Efficiency and Conservation Master Plan up to 2030 etc. Lastly The Environment Court Act, 2000 (Amended in 2010) was made for taking cognizance of environmental crimes separately. This court only arrange the trials for environmental crimes so that these kinds of

crimes can get special attention and get settled immediately. This way the environmental crimes can get addressed steadily than the other traditional crimes.

Bangladesh has ratified several international treaties includes International Convention for the Prevention of Pollution of the Sea by Oil, 1981; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989; Plant Protection Agreement for the South East Asia and Pacific Region, 1974; Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water, 1985; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973; Vienna Convention for the Protection of the Ozone Layer, 1985; Montreal Protocol on Substances that Deplete the Ozone Layer, 1987; The London Amendment to the Montreal Protocol, 1990; Convention on Wetlands of International Importance Specially Waterfowl Habitats (the Ramsar Convention); International Framework Convention on Climate Change, 1992; Convention on Biological Diversity, 1992 and Convention to Combat Desertification (United Nations, 1996).

Bangladesh has a structured legal framework but the enforcement strategies are insufficient. The law enforcement agencies always get busy with other traditional and violent crimes. For that reason, the environmental crimes get less attention in the term of enforcement.

3.7. A way forward

Addressing these climate related challenges requires proper strategies which not only respond to immediate risks but also the long-term ones. Initiatives such as National Adaptation Plans (NAPs), introduced under the Cancun Adaptation Framework, provide a foundation for government-led actions in less developed countries. These plans include measures ranging from disaster risk reduction to governance reforms. Even these frameworks are essential, they are not sufficient on their own. Vulnerable populations, particularly women and those living in poverty, will need to continuously adapt and rebuild. They also need to mitigate the caused damage to their lives and livelihoods impacted by adverse climate-related events. This highlights the urgent need for targeted support and inclusive approaches to build resilient and sustainable environment (UNFCCC, 2012).

3.7.1. Green police model to combat and prevent environmental crimes

Several strategies can be taken to combat and prevent the environmental crimes in the root level. For that 'Green Police Model' can be very effective as it combines "uniformed force" and "social force" together to combat and prevent environmental crimes (Fig. 1).

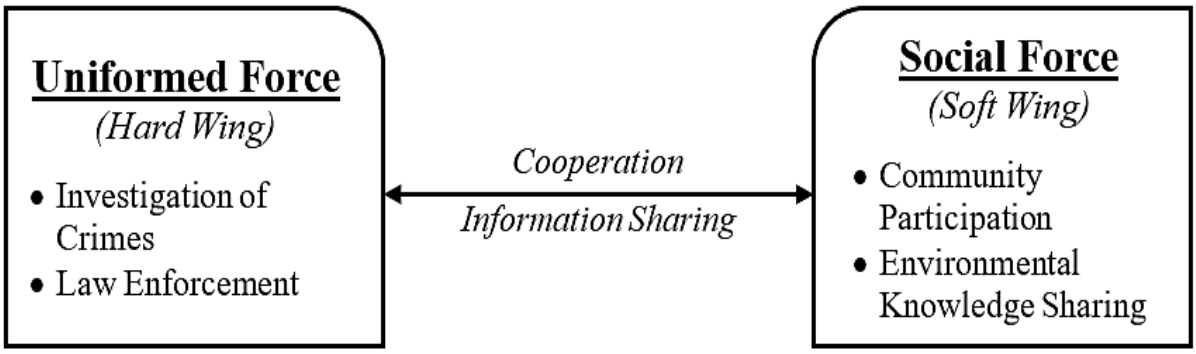

Fig. 1. Green policing model (Source: Sharif and Uddin, 2023)

Sharif and Uddin (2023) in their study, proposed Green Police model for Bangladesh as a central environmental management task force. This force includes "hard" and "soft" wings. The "soft" wing would be the social forces such as the Bangladesh National Cadet Core (BNCC), Scouts, and other groups involving students, activists, teachers, community workers, and young people. These forces would engage in raising awareness and

sharing environmental knowledge to prevent environmental crimes. On the other hand, the "hard" wing would include a specialized law enforcement team which includes senior criminal investigators, analysts, prosecutors, forensic experts, and officers from police, customs, and environmental agencies. Collaboration should be made between these forces for comprehensively combat and prevent environmental crimes. The model signifies community participation, with skilled environmental police investigating environmental crimes and arresting offenders. The community members will promote environment awareness. This dual structure can work together to address knowledge gaps and enhance environmental crime prevention. However, significant challenges must be neutralized for proper implementation of this model. Political affiliations of criminals, lack of political commitment, weak institutional structure, bureaucratic complexities, and insufficient environmental ethics among the population should be addressed to form a proper 'Green Police Model'. Moreover, this model can reform environmental governance from the perception of green criminology to improve existing mechanisms through a collaborative effort.

Implementing proper environmental policies and sustainable practices is critical to combat these crimes, preserving ecosystems, and addressing climate change. Addressing these climate related issues through proper waste management and adopting comprehensive economy principles can help reduce emissions and support climate mitigation (UNHCR, 2024).

4. Conclusion

The climate of the whole world is being changed day by day. Without taking proper initiatives when we have time, there awaits an unwanted future for our next generations. Environmental crimes can directly or indirectly cause extreme weather conditions and climate change. There have to be proper framework for addressing and mitigating these issues. The response of law enforcement and relevant agencies are not that satisfactory. In many incidents the root cause of environmental crimes indicates as corruption, lack of transparency and integrity. These kinds of root issues also need to be properly addressed to mitigate environmental crimes from the root. Sustainable adaptation strategies, investment in resilient infrastructure, and enhanced protective mechanisms for vulnerable communities, particularly women and children, are essential to combat these environmental challenges. Moreover, addressing the root causes of environmental crime and extreme weather will be critical to build a more secure and equitable future for the nation (UNODC, 2022). Reforestation and other restoration policies should be taken to prevent or slow down the climate change process which is ongoing rapidly. The practice of sustainability and resilience can further improve the climate issue scenarios. Comprehensive legal and developmental framework should be initiated to cope with the present climate change issues. Climate resilient infrastructure can be made to make up the harm we did to the environment. The enforcement of environmental laws and treaties should be prioritized as the existence of human race is at risk for these issues. Community based adaptation and participating all the stakeholders in the improvement process of climate change can make change. The government and regional organization like UN, SAARC, EU have to make sure the trans-border cooperation and collaboration among countries as climate change is the common problems for the whole world. Development of more academic discourse on this area can grab the attention of all the stakeholders. This study mainly addresses the whole situation through exploring the connection of climate change, extreme weather with environmental crimes. Further academic study needed with the primary data sources to explore further on this study area. Its high time to make people aware and catch attention of all the stakeholders with proper addressing of climate change, extreme weather with environmental crimes to make this planet more resilient and sustainable.

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