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FOREWORD

At the outset, it gives me great pleasure to present this Volume of the *Journal of the Centre for Environmental Law*, dedicated to the theme "Climate Change in the Post-Covid Era." The Journal, along with its forthcoming issues, seeks to engage with a wide range of perspectives on this pressing subject, exploring diverse and interdisciplinary dimensions of climate change.

We were delighted to receive an overwhelming number of insightful and cross-sectoral contributions from scholars and practitioners. I extend my sincere gratitude to all the authors for their valuable work and to the editorial team for their dedication and rigorous efforts in bringing this Volume to fruition.

It is our hope that this and the subsequent issues of the Journal will serve as meaningful contributions to the growing body of literature on climate change and related concerns, and will provide useful insights to researchers, policymakers, and all those invested in the discourse on environmental law.

Prof. (Dr.) Madhuri Parikh

Patron-in-Chief

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A Comparative Analysis on Gender-based Economic Disparities in Climate Change Adaptation Strategies

Abstract

Climate change intensifies pre-existing socio-economic inequalities, disproportionately impacting vulnerable populations, especially women and marginalized genders. This research paper offers a comparative examination of gender-based economic differences in climate change adaptation strategies across various regions. While climate adaptation policies are designed to enhance resilience, economic obstacles such as restricted access to financial resources, land ownership, and job opportunities impede women's capacity to adequately respond to environmental changes. The study investigates how these differences appear in both developing and developed economies, emphasizing the structural and institutional factors that lead to unequal access to adaptation resources. Through an analysis of current literature, case studies, and policy assessments, the research points out key challenges and disparities in adaptation strategies embraced by different genders. It assesses how cultural norms, legal frameworks, and economic limitations influence adaptive capacities and decision-making authority in climate-affected communities. The paper additionally addresses the significance of microfinance, government initiatives, and community-led efforts in tackling gendered economic disparities in climate adaptation. Moreover, it reviews global policies and international agreements, including the Paris Agreement and the Sustainable Development Goals (SDGs), to evaluate their efficacy in advancing gender-inclusive climate resilience. By comparing various adaptation models, the research highlights the necessity for gender-sensitive economic policies that guarantee fair access to climate financing, sustainable livelihoods, and resilience-building initiatives. The insights aim to enrich the conversation on climate justice, stressing the critical need to weave gender equity into climate adaptation frameworks. The study wraps up with policy suggestions that support inclusive financial systems, capacity-building initiatives, and collaborative decision-making processes to empower all genders in effectively adapting to climate change. Through this comparative lens, the paper aspires to offer perspectives on narrowing economic disparities and cultivating a more equitable and sustainable climate adaptation framework.

Keywords: *Climate change, Disparities, women, gender-based, economic, world bank*

I. Introduction

One of the most significant issues confronting the globe today is climate change, and its effects vary depending on the individual. Even though environmental deterioration, extreme weather, and natural disasters impact whole communities, vulnerable groups—especially women and gender minorities—frequently bear the brunt of the economic fallout. Understanding the economic differences between genders in climate change adaptation techniques is the main goal of this study. The actions done by people, groups, and governments to lessen the adverse consequences of climate change and increase resilience are referred to as climate adaptation. However, it is more difficult for women and other marginalized groups to adjust successfully due to economic obstacles such unequal access to financial resources, land, and job opportunities. Social traditions and gender roles restrict women's ability to be financially independent in many regions of the world. For instance, women are frequently in charge of agriculture and running the home in rural areas of developing nations, yet they might not have the same access to technology, financing, or property ownership as males. Because of this, they find it challenging to make investments in insurance, climate-resilient farming methods, or alternate sources of income in the event that droughts or floods destroy their crops. Similar to this, women may find it difficult to recover from climate-related disruptions like heatwaves, rising living expenses, and displacement from natural catastrophes in metropolitan areas due to economic disparities in earnings and employment possibilities.

The absence of gender-sensitive climate policies is a major obstacle to resolving these discrepancies. Many climate adaptation initiatives fail to take into account the unique financial challenges faced by different genders, which results in solutions that disproportionately benefit those with financial clout. For example, government funding for climate adaptation frequently benefits large corporations or industries with a preponderance of men, while small firms run by women and unorganized labours are neglected. This emphasizes the necessity of inclusive policies that guarantee everyone, regardless of gender, has access to financial resources, education, and support networks.

Comparing the approaches used by various nations and areas to gender-inclusive climate adaptation is crucial to comprehending these differences. While some countries have proposed legal reforms to increase women's land rights, others have put in place microfinance programs to assist women in launching climate-resilient businesses. In the meanwhile, policies like equal pay programs and gender-responsive budgeting help lower the cost of climate adaption in

industrialized nations. Through an analysis of these many approaches, this study seeks to pinpoint best practices and offer fixes for closing the financial divide in climate adaptation. The function of global frameworks like the Paris Agreement and the Sustainable Development Goals (SDGs) of the UN is another crucial component of this research. Although the significance of gender equality in climate action is acknowledged by these international programs, there are significant differences in how they are implemented. While some nations have made strides in incorporating gender issues into their national climate policy, others continue to face financial and enforcement challenges. Policymakers can create more equitable and successful plans for assisting vulnerable groups by taking these distinctions into consideration.

This study emphasizes how urgently gender-inclusive economic policies are needed in the fight against climate change. Governments, corporations, and communities can guarantee that everyone has the resources to develop resilience against climate change by identifying and resolving financial imbalances. The study's conclusions will add to the larger discussion on gender equality and climate justice by highlighting the significance of economic empowerment as a crucial element of successful climate adaption plans.

II. Research Methodology

This study follows a qualitative and comparative approach, integrating literature review, case studies, and policy analysis to examine gender-based economic disparities in climate change adaptation strategies. The study employs secondary data collection from scholarly articles, reports from international organizations such as the UNDP, FAO, and World Bank, and national policy documents to identify structural economic barriers affecting women's climate resilience. A comparative analysis of different regions, particularly focusing on developing and developed economies, highlights variations in financial inclusion, land ownership, employment opportunities, and access to climate adaptation resources. Case studies of Bangladesh and Kenya provide empirical insights into real-world gender disparities in agriculture, energy access, and disaster recovery. Policy assessments explore the effectiveness of international frameworks like the Paris Agreement and SDGs in promoting gender-inclusive adaptation measures. The study's findings are synthesized to propose policy recommendations that enhance financial accessibility, equitable climate governance, and economic empowerment for women, ensuring a gender-responsive approach to climate resilience.

III. Literature Review

The literature highlights significant gender-based economic disparities in climate change adaptation, particularly in access to financial resources, employment, and land ownership. According to the [1]UNDP, women constitute 70% of the global poor, making them more vulnerable to climate-induced economic shocks such as food insecurity and displacement. Studies show that women earn only 77 cents for every dollar earned by men (World Economic Forum, 2024),[2] limiting their ability to invest in climate-resilient infrastructure, adaptive agricultural practices, and insurance.

Employment disparities further deepen economic inequality, as women are overrepresented in informal, low-paying sectors like small-scale farming and domestic work (ILO, 2024)[3]. These sectors lack financial protections, making women more susceptible to income loss from extreme weather events. For example, in sub-Saharan Africa, 90% of women work in informal agriculture, yet only 10% receive agricultural financing, restricting their adoption of climate-smart practices.

Access to financial services remains unequal, with only 63% of women having bank accounts compared to 72% of men (World Bank, 2025[4]). Limited financial inclusion, coupled with restrictive inheritance laws, prevents women from obtaining credit to invest in climate adaptation strategies. Land ownership disparities also hinder women's economic resilience—despite contributing nearly half of the agricultural labour force, women hold just 13% of agricultural land globally (FAO, 2023).[5]

Global frameworks like the Paris Agreement and SDGs recognize gender equity, yet implementation gaps persist. Case studies from Bangladesh and Kenya reveal how structural barriers prevent women from accessing climate adaptation resources, despite their central role

[1]United Nations Development Programme, *Women, Resilience and Climate Change* (2025) https://www.undp.org/sites/g/files/zskgke326/files/2025-04/women_resilience_and_climate_change_march_2025.pdf

[2]World Economic Forum, *Global Gender Gap Report 2024* (2024) https://www3.weforum.org/docs/WEF_GGGR_2024.pdf

[3] International Labour Organization, *World Employment and Social Outlook: Trends 2024* (2024) https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@inst/documents/publication/wcms_908142.pdf

[4]World Bank, *The Global Findex Database 2025: Financial Inclusion and Digital Connectivity* (2025) https://www.worldbank.org/en/publication/globalfindex/report

[5]Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture 2023: Women in Agriculture – Closing the Gender Gap* (Rome, 2023) https://openknowledge.fao.org/server/api/core/bitstreams/5aac5078-625d-4b94-b964-bea40493016c/content

in sustaining communities. The literature underscores the urgent need for gender-sensitive policies, equitable financial systems, and inclusive decision-making processes to close the gender gap in climate resilience.

IV. Gender-based Economic Disparities in Climate Change Adaptation

People's economic status, access to resources, and financial stability all have a big impact on their capacity to adapt to climate change. However, women frequently confront greater economic risks than males in climate adaptation due to systematic gender-based disparities. Significant economic barriers for women are caused by structural differences in financial access, employment possibilities, property ownership, and wealth distribution, especially in developing countries.

Women make up 70% of the world's poor, according to the United Nations Development Programme (UNDP), which means that they are disproportionately vulnerable to climate-related economic issues such food insecurity, loss of livelihood, and displacement from extreme weather events. Their limited economic independence also makes it more difficult for them to put effective climate adaption plans into action. Additionally, according to data from the World Economic Forum (2023), women make 77 cents for every dollar earned by males on average. Their ability to invest in resilience strategies like enhanced agricultural technologies, climate insurance, and adaptive infrastructure is likewise hampered by this pay disparity, which therefore limits their financial independence. Long-term socioeconomic instability results from women's economic disadvantages, which increase their vulnerability to climate change hazards.

Income and Employment Disparities:

Employment and income inequality are among the most important gender-based economic inequities in climate change adaptation. Due to sociocultural norms, occupational segregation, and restricted access to high-paying industries, women's labour market involvement is frequently constrained. Women find it more difficult to invest in adaption strategies and recover economically from climate shocks as a result of these disparities. The International Labour Organization (ILO) claims that women are overrepresented in low-wage, unorganized occupations like small-scale trading, domestic work, and subsistence farming. These sectors provide less financial safeguards like insurance, social security, or government assistance, making them extremely susceptible to climatic variability.

For example, 90% of women in sub-Saharan Africa work in the informal sector, where incomes are erratic and jobs heavily rely on climate-sensitive industries like fishing and agriculture. Extreme weather occurrences like floods, droughts, and other natural disasters can have a direct effect on their income, further impoverishing them. On the other hand, men are more likely to work in sectors like large-scale manufacturing, energy, and construction that have systems for climate resilience and structured financial protections, which lowers their financial exposure to climate risks.

Furthermore, according to the ILO's 2022 Gender Employment Report, women in climate-affected industries make 20–30% less than males, even in formal sectors. This further restricts their capacity to invest, save, or obtain financial protection from climate shocks.

Access to Financial Resources and Credit Facilities:

Access to financial resources, including as credit, savings, insurance, and financial literacy, is crucial for making investments in climate-resilient infrastructure and technologies. However, long-standing gender discrimination in banking institutions, restrictive inheritance laws, and a lack of collateral for loan acquisition provide major financial obstacles for women worldwide. The gender gap in financial inclusion is still 9 percentage points, with 72% of men and 63% of women having bank accounts, according to the World Bank's Global Findex Database (2021). In rural and poor areas, where women have very limited access to formal banking services, the gap is much more noticeable.

Women's access to loans, investments in climate-resilient agricultural inputs, insurance, and sustainable livelihood transitions are all hampered by a lack of financial inclusion. In South Asia, for instance, only 27% of women have access to credit, compared to 44% of men. This hinders their adoption of climate-smart storage facilities, irrigation systems, and seeds resistant to drought. Additionally, because women are less likely than men to own real estate, financial institutions frequently require land ownership or other tangible assets as collateral for loans, severely disadvantages them. Without financial security, women remain economically dependent, diminishing their decision-making authority in climate adaption planning.

Property Rights and Land Ownership:

For both climate adaption and economic stability, secure land and property ownership are essential. People with land tenure are able to put long-term climate adaptation techniques like irrigation, soil conservation, and agroforestry into practice. However, gender differences in

land ownership exacerbate economic inequality and hinder women's capacity to successfully adapt to climate change.

Despite being approximately 50% of the agricultural labour in many developing nations, women only make about 13% of agricultural landholders worldwide, according to the Food and Agriculture Organization (FAO, 2022). Due to institutional, cultural, and legal hurdles, women are unable to obtain land rights, which results in less investment in adaptable farming practices and financial instability.

For instance; in India inheritance laws have historically favoured male heirs, women own fewer pieces of land, which restricts their access to government agricultural programs and financing.

Even though they produce more than 80% of the food in Kenya's rural areas, women only possess 1% of the country's titled land. They are unable to take part in land-based climate adaption initiatives, obtain loans, or receive subsidies without official ownership.

Although women's property rights have been enhanced in Latin America by legal reforms, their participation in climate resilience planning is still limited due to cultural and administrative barriers that still prohibit equitable land distribution.

Women's bargaining power in local climate adaptation decisions is further impacted by their lack of property ownership, which keeps them out of important community planning projects. Their ability to recover from climatic shocks and put long-term sustainability plans into action is still severely constrained in the absence of economic security in land resources.

V. Sector-wise Comparative Analysis of Gender Disparities in Climate Change Adaptation

Different economic sectors are impacted by climate change in different ways, and how people adjust within these sectors is influenced by gender-based economic inequities. Systemic hurdles restrict women's access to financial resources, technology, and policy-making opportunities, especially in developing nations. This sectoral analysis demonstrates the ways in which gender-based economic inequities appear in important domains including disaster risk management, energy, and agriculture.

Agriculture and Food Security: Gendered Barriers to Climate Adaptation

One of the industries most impacted by climate change is agriculture, which is directly impacted by extreme weather events, rising temperatures, erratic rainfall, and degraded soil. Women make up a large share of the agricultural workforce, especially in underdeveloped

nations, where women are responsible for food production, livestock management, and household nutrition. However, women's capacity to adjust to climate-related disruptions in agriculture is constrained by gender-based economic disparities.

Gender Disparities in Agricultural Productivity and Resource Access:

Despite playing a crucial role in the production of food, women farmers encounter institutional and financial obstacles that restrict their ability to adapt. Food poverty may be reduced by 12–17% and global farm yields could rise by 20–30% if women had equal access to agricultural resources as males, according to the Food and Agriculture Organization (FAO).[6] However, women's attempts at adapting are hampered by the following economic disparities:

Limited Access to Agricultural Inputs:

Due to financial limitations and restricted land ownership laws, women frequently do not have access to high-yield seeds, drought-resistant crops, fertilizers, and irrigation systems. (Women farmers in sub-Saharan Africa are unable to invest in climate-resilient farming practices since they receive less than 10% of all agricultural finance.)

Gender Disparities in Land Ownership: Only 13% of agricultural landholders globally are women, despite the fact that secure land tenure is essential for long-term investment in climate adaption methods. (Women's access to credit and financial stability are diminished in many nations due to customary laws and inheritance traditions that prohibit them from purchasing land.)

Exclusion from Agricultural Extension Services:

Understanding new farming methods, weather forecasting, and sustainable land management approaches are all necessary for climate adaptation. (Studies indicate that only 5% of female farmers receive agricultural training, compared to 20% of male farmers, indicating that women are frequently left out of government-led agricultural extension programs (World Bank, 2021)).

Energy Sector: Economic Barriers to Women's Participation in the Clean Energy Transition:

A key component of climate adaptation is the switch to sustainable and renewable energy. However, women's access to clean energy is restricted by gender norms and economic

[6]Food and Agriculture Organization of the United Nations, *The Status of Women in Agrifood Systems* (Rome, FAO 2023) https://openknowledge.fao.org/server/api/core/bitstreams/e7689bf7-00f0-465b-ad03-e0c56ffb14b1/content

inequality, which also affects their capacity to embrace sustainable alternatives and take advantage of jobs in the energy sector.

Limited Access to Clean Energy Solutions:

Women are exposed to health risks, financial hardships, and environmental degradation since they mostly rely on biomass fuels (charcoal, firewood, and animal waste) for cooking and heating, especially in rural and low-income areas. According to the International Energy Agency (IEA), [7]women are disproportionately affected by the 2.3 billion people who lack access to clean cooking options.

High Cost of Clean Energy: Because of their lower incomes and lack of financial support, women are sometimes unable to make the upfront investments necessary to make the switch to solar, biogas, or electric cooking options. (Only 17% of women and 32% of men in sub-Saharan Africa, the region with the worst rates of energy poverty, have access to electricity).

Gendered Financial Exclusion in Energy Investments: Women are unable to install solar panels, adopt better cooking practices, or invest in energy-efficient technologies because they have less access to loans and subsidies for the adoption of renewable energy. (Despite being the main users and managers of household energy, women only receive 10% of financial aid connected to climate change, according to a 2021 UNDP assessment.)

Employment and Economic Participation in the Energy Sector:

The renewable energy sector offers economic opportunities for climate adaptation, but women are significantly underrepresented due to gender biases in hiring, financial restrictions, and skill gaps. Compared to 40% in other industries, women only make up 22% of the workforce in the renewable energy sector (IRENA, 2023). Economic obstacles keep women out of the clean energy market, such as a shortage of capital for women-led enterprises.

Disaster Risk Management and Climate Resilience: Unequal Economic Losses and Recovery:

Floods, storms, droughts, and wildfires are examples of climate-related disasters that generate significant economic losses. However, because of their lower incomes, lack of savings, and exclusion from disaster recovery programs, women bear a disproportionately greater financial cost.

[7]International Energy Agency, *World Energy Outlook 2024* (Paris, IEA 2024) https://iea.blob.core.windows.net/assets/c036b390-ba9c-4132-870b-ffb455148b63/WorldEnergyOutlook2024.pdf

Economic Impact of Climate Disasters on Women:

According to studies, women's income declines considerably more than men's following climate-related disasters, making recovery more difficult for them:

According to the UN Women Report (2022)[8]:After severe weather, women's income drops by almost 50%, while men's income drops by 30%. (In Bangladesh, 70% of women lost their main source of income after the 2017 monsoon floods, whereas just 25% of men experienced the same financial hardships.)

Limited Financial Resilience and Savings:

Due to their lower financial resources, women find it more challenging to relocate or reestablish companies following climate-related displacement. (Only 15% of women in disaster-prone areas have savings or financial insurance, compared to 35% of males, according to a World Bank report from 2021.)

Gendered Responsibilities Increase Economic Hardship:

Women are primarily responsible for managing the home and providing care, which restricts their participation in initiatives aimed at economic rehabilitation. (Women frequently put feeding young children and elderly family members first during post-disaster food shortages, which raises their risk of malnutrition and financial hardship.)

VI. Case Study: – A Comparative Analysis of Bangladesh and Kenya

Due to societal injustices, restricted access to financial resources, and economic restrictions, women are disproportionately impacted by climate change. Adapting to the effects of climate change is more difficult for women than for males in the fields of agriculture, energy access, and disaster recovery. In order to draw attention to the economic differences between men and women in climate adaptation, this case study looks at two climate-vulnerable nations, Kenya and Bangladesh.

Existing gender gaps in economic resilience have been made worse by climate change, especially in nations like Bangladesh and Kenya where women are economically underprivileged despite playing vital roles in agriculture, energy, and disaster relief. Though they encounter structural obstacles to land ownership, financial resources, and contemporary

[8]UN Women, *Women, Peace, Security and Resilience Annual Report 2022* (UN Women 2024) https://www.unwomen.org/en/digital-library/publications/2024/03/women-peace-security-and-resilience-annual-report-2022

agricultural technologies, women in both nations make substantial contributions to small-scale farming, animal management, and food production. Due to cultural norms and restrictive inheritance laws, women only possess 10% of Bangladesh's agricultural land, despite the fact that over 60% of the country's rural population is employed in agriculture. This makes them extremely vulnerable to droughts and floods brought on by climate change because it restricts their access to loans, government subsidies, and crop insurance.90% of the female farmers who lost their crops during the 2017 monsoon floods lacked the funds to reinvest in climate-resilient seeds and irrigation systems, which pushed many of them into low-paying informal professions or forced them to migrate. Male farmers, on the other hand, recovered more rapidly because they had easier access to government assistance funding. Similarly, because traditional land tenure rules in Kenya promote male inheritance, barely 1% of the country's 75% female agricultural labour owns land. Because of this, they are unable to obtain bank financing and implement climate-smart farming methods. According to research by the International Food Policy Research Institute (IFPRI),[9] male farmers were twice as likely as female farmers to obtain government drought relief payments in 2019 after severe droughts in Kenya affected over 2 million people and caused food insecurity. While men had more access to financial aid and water conservation initiatives, women were frequently compelled to sell cattle at reduced prices or cut back on food consumption.

Gender-based economic disparities extend beyond agriculture to the renewable energy transition and energy access. Women spend an average of four hours a day gathering firewood and biomass in rural Bangladesh, where 45% of families lack access to clean cooking technologies. This increases their financial risk by limiting their capacity to participate in activities that generate revenue. Only 25% of women have benefited from government investments in solar household systems, mostly because of the high costs and restricted credit availability. Men, on the other hand, have greater access to training and jobs in renewable energy, and they profit from positions installing and maintaining solar panels. Women have found it difficult to gain from renewable energy projects in Kenya, although clean energy sources provide 75% of the nation's electricity. Only 18% of the loans for solar installations were granted to female entrepreneurs, despite the Kenya Off-Grid Solar Access Project's

[9] International Food Policy Research Institute, *Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change* (IFPRI 2022) https://www.ifpri.org/project/grassroots-women-information-on-adaptation/m

(KOSAP) [10]goal of increasing rural access to solar electricity. Despite being the main consumers of household energy, women were 30% less likely than males to obtain funding for clean energy investments, according to a World Bank [11]study. Furthermore, just 20% of Kenya's solar industry's workforce is female, despite the fact that the sector employs over 10,000 people. This limits women's economic potential in climate adaptation and clean energy growth.

Gender differences in financial resilience are further highlighted by the economic effects of climate-related calamities. Floods and cyclones are common in Bangladesh, and women are disproportionately affected. Women's income decreased by 60% after Cyclone Amphan (2020),[12] while men's income decreased by 30%. Furthermore, more than 70% of women who worked in non-formal occupations (including housework and street hawking) lost their main sources of income. In order to repair their houses and businesses, many households led by women had to take out high-interest loans because they got less financial recovery assistance. In 2018, more than 10,000 homes were devastated by flash floods in Kenya, forcing thousands of families to relocate.

The systemic obstacles that impede women's financial resilience in climate change adaptation are exemplified by the economic difficulties that women encounter in Bangladesh, Kenya, and in agriculture, energy access, and disaster recovery. Women are more vulnerable to climate-related economic losses because of their limited land ownership, financial isolation, and lack of access to government relief money, climate-smart technologies, and sustainable energy programs. Gender-responsive financial policies, fair access to resources for climate adaptation, and more government backing for women-led projects in renewable energy, agriculture, and disaster resilience are all necessary to address these inequities. Inclusive policies that acknowledge and address the economic obstacles encountered by women in developing nations are necessary to achieve climate resilience for vulnerable populations.

[10] Kenya Ministry of Energy, *Kenya Off-Grid Solar Access Project: Environmental and Social Management Framework* (MoE 2017) https://www.kplc.co.ke/storage/01JBV00EXPN41YEAQBZEMH61ZV.pdf

[11] World Bank, *Kenya's Economic Recovery Remains Strong, Although Slowed by Drought and Inflation* (World Bank 2022) https://www.worldbank.org/en/news/press-release/2022/12/08/kenya-s-economic-recovery-remains-strong-although-slowed-by-drought-and-inflation

[12] UN Women, *Rapid Gender Analysis: Cyclone Amphan Emergency Response in 2020* (UN Women 2020) https://asiapacific.unwomen.org/sites/default/files/Field%20Office%20ESEAsia/Docs/Publications/2020/06/RGA%20Cyclone%20Amphan%20Bangladesh%20revised%20%28002%29.pdf

VII. Government Policies and Institutional Frameworks

In order to address gender gaps in climate adaptation, institutional structures and governmental policies play a critical role. In order to ensure that women, who are disproportionately impacted by climate change, receive sufficient support, a number of international accords and state legislation seek to incorporate gender perspectives into climate action. The success of these activities is still constrained, though, by issues including structural discrimination, a lack of money, and gaps in policy implementation.

International Frameworks and Agreements:

The necessity of gender-inclusive climate policies is emphasized in a number of international accords and programs. The Paris Agreement (2015), [13]which acknowledges the significance of gender equality in climate action and adaptation plans, is among the most important frameworks. The importance of gender-responsive strategies in boosting resilience and lowering vulnerabilities is particularly highlighted in Article 7 of the Agreement. In order to encourage women's involvement in climate decision-making, financial inclusion, and access to climate adaptation technologies, the UNFCCC [14]has also created Gender Action Plans (GAPs).

Another key initiative is the United Nations Development Programme (UNDP) Gender and Climate Change Strategy (2023-2026). This strategy aims to:

- Increasing the number of women in climate discussions and policymaking will help to strengthen their leadership in climate governance.
- Ensure that women in climate adaptation programs have equitable access to funds for projects that increase resilience.
- Promote female-led innovation in disaster resilience initiatives, renewable energy, and climate-smart agriculture.

Although these frameworks lay the groundwork for gender-responsive climate action, their success hinges on how motivated and able national governments are to put them into practice locally.

[13]*Paris Agreement*, opened for signature 22 April 2016, entered into force 4 November 2016, UNTS No I-54113, art 7.
[14]United Nations Framework Convention on Climate Change, *Enhanced Lima Work Programme and Gender Action Plan* (UNFCCC, 2019) https://unfccc.int/topics/gender/workstreams/the-gender-action-plan

Country-Specific Policies and Programs:

A number of nations have implemented particular policies and initiatives to empower women in climate adaptation, agriculture, and financial resilience in recognition of the gendered effects of climate change.

1. *India: Mahila Kisan Sashaktikaran Pariyojana (MKSP)*

   - The National Rural Livelihoods Mission (NRLM) launched the Mahila Kisan Sashaktikaran Pariyojana (MKSP) [15]to increase the economic empowerment of women farmers in India, where women comprise 75% of the rural labour. The program's main objectives are:
     - Supplying funding so that female farmers can get better seeds, irrigation systems, and organic farming methods.
     - Training women water-saving and climate-resilient farming practices like agroforestry.
     - Establishing self-help groups (SHGs) that give women access to loans and microfinance for investments in climate adaptation.
   - MKSP has benefited over 3.2 million women farmers across India by improving their economic security and climate resilience.

2. *Kenya: Women's Climate Centres International (WCCI)*

   - In Kenya, where women face economic barriers in land ownership, agricultural investment, and clean energy access, the Women's Climate Centres International (WCCI) [16]was launched to provide:
     - Women can invest in climate-resilient farming and renewable energy companies with the help of financial literacy training and entrepreneurial assistance.
     - Microfinance initiatives that give female farmers access to climate-smart equipment like drought-tolerant seedlings and solar irrigation pumps.
     - Initiatives for community-based disaster resilience that train women in emergency response techniques, food storage, and flood preparedness.

[15]Ministry of Rural Development (India), *Mahila Kisan Sashaktikaran Pariyojana: Guidelines* (MoRD 2017) https://msrls.nic.in/sites/default/files/mksp-agriculture-guidelines.pdf

[16] Women's Climate Centres International, *Impact Report 2022* (WCCI 2022) https://www.shechangesclimate.org/scc-resources/impact-report-2022

- By strengthening their economic resilience, this program has assisted thousands of rural Kenyan women in adapting to climate change. The full potential of these gender-focused climate adaption programs is, however, hampered by issues including inadequate funding, male-dominated land tenure systems, and delays in policy implementation, much as in India.

VIII. Recommendations for bridging Gender-based Economic Disparities in Climate Adaptation

Targeted financial inclusion, legislative changes, and increased female involvement in climate governance are necessary to address gender-based economic gaps in climate adaption. Women are less resilient to the effects of climate change because of systemic restrictions that restrict their access to capital, land, and decision-making platforms. In order to overcome these obstacles and guarantee fair climate adaptation for all, governments, financial institutions, and international organizations must put inclusive policies and economic empowerment initiatives into place.

Strengthening Financial Inclusion for Women:

Women's restricted access to financial resources is one of the biggest obstacles to their adaptation to climate change. Rural women frequently face obstacles when trying to obtain loans, insurance, or government funding for climate adaption projects. To address these concerns, microfinance services and climate-specific financial aid can be expanded by:

Offering grants and low-interest loans to women-led climate adaption initiatives, including eco-friendly businesses, renewable energy companies, and climate-resilient agribusiness.

Promoting collaborations between the public and commercial sectors to create gender-responsive financial initiatives that give women's involvement in sustainable industries top priority.

To ensure that funding reaches those most at risk from climate change, national climate adaptation programs should set aside a certain proportion of their resources for projects led by women.

In Bangladesh, for instance, the Grameen Bank [17]has effectively given microloans to thousands of female company owners, enabling them to make investments in sustainable enterprises and climate-smart agriculture. By extending these models worldwide, women's economic resilience in climate adaption can be enhanced.

Policy Interventions for Equitable Adaptation Strategies:

Gender-specific issues are not well addressed by many national climate policies, which frequently ignore the financial obstacles that women encounter when trying to get land, funds, and adaption technology. To address this disparity, governments need to:

Create gender-responsive climate policies that specifically address financial assistance, job openings, and leadership positions for women.

Make sure that the needs of women are given top priority in climate adaption plans, especially in the areas of energy transitions, agriculture, and disaster risk reduction.

Policymakers will be able to monitor and assess the economic effects of climate change on women if gender-disaggregated data collection is mandated.

For instance, gender-responsive measures have been successfully incorporated into Rwanda's National Strategy for Climate Change and Low Carbon Development, guaranteeing that women receive funding for climate adaption initiatives. Global adoption of comparable frameworks is necessary to lessen economic inequalities in climate adaption initiatives.

Enhancing Women's Participation in Climate Governance:

Due to their frequent exclusion from climate governance and policymaking, women have less power to affect financial allocations, economic policies, and adaption plans. In order to strengthen women's leadership in climate governance, it is necessary to:

Quotas for the proportion of women in national and international bodies that make climate policy.

Programs for developing leaders that teach women financial management, policy advocacy, and climate governance.

[17] Grameen Foundation and Oxfam America, *Climate Change and Microfinance* (Oxfam America 2025) https://www.oxfamamerica.org/press/grameen-foundation-and-oxfam-america-release-new-report-on-climate-change-and-microfinance/

Financing for climate organizations run by women, guaranteeing that their opinions are heard during policy debates and decision-making.

Countries like Norway and Canada have successfully improved women's representation in climate governance, resulting in more inclusive and effective adaptation plans. This strategy should be adopted by other countries to guarantee that plans for climate change sufficiently reflect the economic requirements of women.

IX. Conclusion

In conclusion, Building inclusive and resilient communities in the face of climate change requires addressing gender-based economic gaps in climate adaptation. Women encounter structural obstacles such restricted land ownership, limited access to financing, and exclusion from climate governance, especially in the fields of agriculture, energy access, and disaster recovery. Case studies from Bangladesh and Kenya show how these inequalities increase women's susceptibility to economic losses brought on by climate change, but they also show how women-led initiatives can propel sustainable solutions. Women can be empowered to fully engage in climate-smart agricultural, renewable energy, and disaster resilience initiatives by bolstering financial inclusion, legal frameworks, and policy actions. Furthermore, fostering gender-responsive climate policy, investing in education, and guaranteeing women's involvement in climate governance would all contribute to reducing current disparities and opening up economic opportunities for women in climate adaptation. Governments and organizations may unleash women's potential as important drivers of economic sustainability and climate resilience by incorporating gender-sensitive approaches into national and international climate initiatives. This will promote a more just and adaptable future for everybody.

LEGAL MECHANISMS FOR CLIMATE CHANGE ENFORCEMENT: HARMONISING ENVIRONMENTAL PROTECTION WITH CONSTITUTIONAL RIGHTS

"Conservation is a state of harmony between men and land."-Aldo Leopold

ABSTRACT

A worldwide phenomenon, urbanization, has shaped communities for ages. Urbanization is a continuous trend that has altered the social, economic, and political stability of many nations. It has undoubtedly given people all around the world a wealth of opportunities, but has also presented serious threats to the stability of the environment. One of the main concerns at the moment is uncontrollable climate change brought on by the global urbanization and associated urban developments. Climate change is a worldwide problem with extensive environmental, economic, and social repercussions that is primarily caused by haphazard human activities. Extreme weather conditions and rising temperatures brought on by drastic climate change have had an unimaginably negative impact on people's lives. States have ratified regional agreements, laws, policies, and constitutions that guarantee everyone the human right to a safe, clean, healthy, and sustainable environment. A safe and stable climate, the preservation of ecosystems and biodiversity, a pollution free environment and access to justice in environmental concerns are all necessary to uphold this Constitutional right. Legal frameworks must evolve, as climate change intensify, to effectively address its challenges and consequences. This paper analyses the contribution of legal mechanisms in enforcing climate change policies, focusing on how constitutional rights can be balanced with the need for robust environmental protection. By understanding the connection between climate justice and constitutional obligations of states, this research paper also discusses about the evolving role of the judiciary in enforcing climate laws in alignment with the provisions of the Constitution.

Keywords: *Urbanisation, Climate Change, Constitutional Rights, Environmental Protection, Climate Justice, Human Rights*

I. Introduction

Every region of the world has seen great growth and changes in every way over the last few decades. These changes, driven by rapid urbanization, has led to numerous developments, particularly in the urban areas. In order to accommodate the expanding population and meet their endless needs, cities have undergone fast development and expansion. Urbanization is a worldwide phenomenon that has undoubtedly given people many socioeconomic opportunities, but it has also regrettably affected environmental stability. Numerous activities involved in the process of building and expanding cities have had an unimaginably negative impact on the environment, making it more difficult to create a sustainable and healthy environment. Severe global climate change is one of the main adverse effects of unchecked urbanization. Climate change and urban development are closely related. With serious ramifications for economic stability, environmental sustainability, and human rights, it is one of the biggest worldwide issues of the twenty-first century. Numerous elements of the human environment are influenced by climate change. The consequences of environmental changes have been made more complex and pronounced by human-induced climate change. Droughts, wildfires, floods, landslides, and severe heat waves and harsh winter storms are just a few of the severe hazards it has brought about globally. Climate change can have an impact at different levels and throughout different time periods.[1]

A significant amount of the world's greenhouse gas emissions originate from urban areas, mostly from waste generation, transportation, uncontrollable energy use, and numerous industrial activities. The unmanageable urban sprawl has put ecological balance under extreme stress and created an unprecedented demand for natural resources. Urban Heat Island is a concept that emerged as a result of extreme climate change. Because of the Urban Heat Island, urban dwellers are more vulnerable to heat stress than their rural counterparts. Specifically, in low-income nations with limited ability to adjust to rising temperatures, the combined effects of urban developments and climate change could significantly affect future urban temperatures and worsen already-existing heat stress.[2]

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[1] Xingzhi Mara Chen, Andrew Sharma, Hua Liu, 'The Impact of Climate Change on Environmental Sustainability and Human Mortality' (2023) 10(10) Environments <https://www.mdpi.com/2076-3298/10/10/165> accessed 10 January 2025

[2] Sarah Chapman and others, 'The Impact of Urbanization and Climate Change on Urban Temperatures: A Systematic Review' (2017) 32(6) Landscape Ecology <https://2024.scihub.st/6521/685dd0f37e5aac981c1a84fa68be3589/chapman2017.pdf > accessed 10 January 2025

The current state of environmental degradation is so severe that it could harm future generations irreversibly if left unchecked. Both nationally and internationally, environmental deterioration and its associated issues have been addressed. Undoubtedly, environmental regulatory frameworks have evolved significantly over time to lessen the effects and issues that are just now becoming apparent. To ensure that everyone has the basic access to a secure, healthy, and sustainable environment, States all over the globe have ratified regional laws, policies, and constitutions of their own. Similarly, India is also one of the early pioneers to have an environmental regulatory regime. A nation's Constitution has a significant influence on how its environmental regulations are created and upheld. Constitution of India have also played a significant role by providing the foundation for numerous environmental protection laws. In addition to outlining the government's responsibilities and guaranteeing people's rights to a healthy environment, the Indian Constitution also gave the judiciary the authority to hold both the government and individuals responsible for environmental damage. Given the current state of environmental degradation, one would wonder why there isn't enough management in place despite the existence of numerous national and international environmental rules.

Effectively enforcing climate change laws without violating people's rights is a moral and legal conundrum. Courts worldwide are being asked more and more to interpret Constitutional provisions in ways that would accommodate both climate change enforcement and the safeguard individual rights. It is crucial to realize how constitutional rights are construed in relation to climate change legislation. A successful implementation of climate change policies and strategies depends on the creation of legal frameworks that respect rights and guarantee sustainability and accountability. Effective environmental governance and climate change enforcement requires understanding how the legal mechanisms can harmonize the urgent need for climate action with the protection of Constitutional provisions.

II. Environmental Protection vs. Constitutional Rights: An Ongoing Dilemma

Global climate change has led to several environmental risks worldwide. Uncontrollable urban developments and urban sprawl has unimaginably disrupted the ecological balance and sustainability of the environment. Urbanization is the idea of improving metropolitan areas through development, yet it has resulted in a number of environmental issues, some of which may never be resolved. Increasing population density in cities and growth of the urban areas, has brought significant economic and social advantages and better lifestyle facilities for all. However, it has also created numerous environmental issues leading to widespread

environmental damage. The ecosystem and natural resources are under constant and tremendous strain as more people are rapidly moving to the cities in search of opportunities and a more suitable living.

Development and expansion of the cities is an inevitable process but such process should not hamper the ecosystem's natural ability to sustain itself. In the recent times, maintaining the balance between protection of environment and urban progression has become a serious issue in India and as well as all over the globe. India, being one of the rapidly advancing countries in the world, industrialization, urbanization and various unplanned and haphazard activities of men have severely contributed to environmental degradation eventually disrupting the global environment of all the countries.[3] Cities tend to absorb and retain more heat resulting into a situation known as urban heat island effect. Due to excessive and uncontrolled industrial emissions, vehicular exhaust, ongoing fossil fuel combustion, and uncontrolled incineration, India is recognized to contribute significantly to global carbon emissions.

The effects of global warming are becoming more noticeable with rising sea levels, harsh weather conditions, and disturbed ecosystems. It demands equal cooperation of governments, businesses, and individuals to mitigate and adapt to its consequences. In order to accomplish this, strong legal frameworks are necessary to control climate change activities and uphold environmental safeguards. The legal system governing climate change must be more comprehensive, upholding both strong environmental protections and core constitutional rights. Legal mechanisms for climate change enforcement encompass a vast array of instruments ranging from international treaties and conventions to domestic laws and policies, and from executive regulations to judicial activisms. At the national level, every nation's legal system is founded on a supreme authority that serves as the source of all other laws. The Constitution of India is that supreme authority, and it serves as the foundation for all current laws. Protection and preservation of environment has been expressly incorporated in the Constitution by the framers and every other legislation enacted in India must be in compliance with the provisions incorporated in the Constitution.

Both international legal frameworks and the Constitutions of many nations explicitly respect the basic right to a healthy and clean environment. As there is an increasing unanimity on the significance of environmental preservation, more than 100 nations have incorporated this right

[3] Ashwani Pant, Santosh Kumar, 'Environmental Law Enforcement and Need for Reforming the Liability Regime in India: An Agenda to Revisit' [2018] DLR 41

to live in clean and healthy environment, into their national constitutions. This right has also been acknowledged globally by the UN Human Rights Council as a part of the right to life. Despite these advancements, environmental enforcement mechanisms seem to be frequently poor, as in many countries a range of other factors take precedence over environmental and human rights deliberations.[4]

Climate change impacts different section of people in differing degrees, depending on several variables like geographical territory, socio economic status, resource accessibility, gender and many more. Certain group of population are disproportionately exposed to the consequences of change in climate, particularly low-income communities, indigenous people, and residents in climate-sensitive areas. Every individual, regardless of status, has been granted specific constitutional and human rights, and national policymaking must not interfere with these protections when implementing climate change policies. The development of a justice discourse in the study of climate change is necessary due to the disproportionate effects of the phenomenon. In its most basic sense, concept of justice incorporates two principles i.e. "fairness" and "equity."[5] A great deal of importance should be placed on climate justice since it offers a framework for promoting just and human rights-abiding policies. Therefore, policy responses to climate change must acknowledge the unequal distribution of damages, coping mechanisms, and causal culpability across various populations and prioritize fostering just and equitable results by checking any Constitutional rights violation. Achieving a successful climate change enforcement requires taking into account the human rights perspective along with environmental reformation, making it more sensitive towards justice and equitable concerns.

Given the disparities between various groups of people, their unequal involvement in decision-making, and the varying impacts of climate change, it is clear that it is vital to approach climate change from an equality and justice standpoint. Since many people's human rights are at risk due to climate change, justice and equity should be kept at the forefront in any environmental policy making and governance. It is essential to address how climate change sustains injustice before delving into the idea of climate justice. Legal mechanism for enforcement of climate

[4] Tanay Shrivastava, 'Protecting People and Planet: Integrating Human Rights with Environmental Law,' (*Manupatra*, 13 September, 2024) < https://articles.manupatra.com/article-details/Protecting-People-and-Planet-Integrating-Human-Rights-with-Environmental-Law> accessed 12 January 2025

[5] Richa Chauhan, 'Climate Change: An Issue of Equity, Justice and Human Rights' [2019] ILI Law Review 13

change mitigation measures must be carefully crafted in order to address the urgency of environmental damage while also respecting the constitutional rights.

III. Environmental Regulatory Framework

From the past few decades people have witnessed the effects of ecological imbalance. As the world is becoming hotter, drier, and more severely being affected by extreme weather events, it is upsetting livelihoods, causing displacement and migration, intensifying natural resource shortages which seems to fuel violence and conflict among people. These uncontrollable environmental changes are putting extreme pressure on state-citizen relations and capacity of the State to advance development.[6]

India's legal framework and mechanism has developed throughout time. As environmental concerns have grown and gained concern, India has made significant progress in its environmental regulatory framework over the time making it more extensive and stronger. A variety of laws, rules, policies, and organizations make up the environmental regulatory framework, which is designed to protect the environment, promote sustainable development, and deal with all the environmental issues. Indian society has always been deeply rooted in environmental consciousness, which is intertwined throughout its history, culture, and customs. India's Fourth Five Year Plan (1969–1974) was the first to explicitly state environmental protection as a crucial component of development. Environmental policymaking in India was substantially put into motion. India addressed the environmental effects of urbanization and industrialization at the first-ever United Nations conference on the human environment in Stockholm.[7]

The Constitution of India, despite its primary focus on government and individual rights, has also incorporated a number of provisions that explicitly and implicitly addresses environmental matters. 42nd amendment to the Constitution, incorporated two new measures under Article 48A and 51A (g) that require both the State and its citizens to conserve and improve the environment. Another extremely important right guaranteed by Article 21 of the Constitution, the right to life and personal liberty, which has construed to encompass the right to a clean and

[6] 'Climate Justice: A Rule of Law Approach for Transformative Climate Action' (International Development Law Organization, 28 October 2021) <https://www.idlo.int/sites/default/files/pdfs/publications/climate_justice_policy_paper_-_climate_action_-_final.pdf> accessed 12 January 2025

[7] Rama Mohana R Turaga, Anish Sugathan, 'Environmental Regulations in India' (ResearchGate, June 2020) <https://www.researchgate.net/publication/342623724_Environmental_Regulations_in_India> accessed 14 January 2025

healthy environment. The evolution of Indian environmental jurisprudence has been greatly aided by this seminal interpretation. Since environmental deterioration has a direct impact on person's quality of life and well-being, the Supreme Court of India has connected environmental challenges to the right to life in many decisions. Apart from these constitutional safeguards and duties, Indian environmental regulatory framework also includes a profusion of other laws that have played a significant role in this area. As an obligation of the Stockholm Declaration, the Water Act was enacted in 1974 which laid down framework for a machinery to regulate pollution and established the concept of Pollution Control Boards.[8] In addition to this, we also have acts to regulate other forms of pollution. The tragedy of the Bhopal Gas leak in 1984 marked a significant turning point in Indian history and put the country's environmental regulatory framework to the ultimate test. In response to this catastrophe, the legislature passed the Environment Protection Act of 1986, which serves as a comprehensive environmental law that gives the government broad authority to enforce environmental regulations.[9] However the most important factor is that, the functioning and implementation of these acts should always align with the Constitutional rights guaranteed to the citizens. Laws are undoubtedly made for everyone's benefit, yet some policies and how they are implemented appear to affect many people's rights. The need of the hour is to establish a legal system that can settle conflicts pertaining to climate change while defending people's and communities' environmental rights, and those of upcoming generations.

IV. Climate Justice and Equity in Legal Mechanism

Human rights and climate change have a complex link that requires greater attention right now. As an outcome of the disproportionate effects of global climate challenges, a fair and just discourse in climate change enforcement and mitigation is very necessary. The impacts of climate change may be different even within the same nation because of systemic differences based on economic level, gender, race etc. People who have been suffering from age long discrimination, marginalization and stigmatisation are the ones who are more exposed to the impacts of environmental change. A large population of India comprises of underprivileged communities, especially those in rural and isolated locations that are more susceptible to climate change. Indigenous populations, which make up a significant portion of the global population, are frequently the targets of environmental problems. Since they rely heavily on

[8] ibid 5
[9] ibid

the natural environment for their survival, climate change has caused them to face numerous challenges.

Existing gender inequality is another significant problem that makes it difficult to achieve sustainable development. Women are frequently the ones who suffer the most, from dealing with increased health risks and financial losses to bearing the brunt of extreme weather disasters like draught, floods climate change etc. Women are still underrepresented in mainstream decision-making processes, despite their increased vulnerability to climate hazards and their enormous capacity to contribute to constructive climate action. Their vulnerability arises because of existing social and economic inequality as well as their limited access to resources and information. These factors narrow down their ability to prepare for, respond to, and recover from climate change impacts. Along with women, young people and children, who are considered to make the least contribution to climate change, bear the brunt of its effects. These disadvantaged and marginalized segments of society have always been disproportionately affected by climate change in numerous ways leading to infringement of their constitutional rights. Efforts should have been made to tackle these disparities but in addition to these, violations of rights are also evident in the way different climate change mitigation strategies are implemented. Although efforts to combat climate change have changed and evolved in recent years, there still appear to be significant gaps in their successful application.

The current disparities and unequal effects of climate change policy implementation demands the application of a justice perspective. Climate change policy enforcement requires the infusion of the principles of climate justice for a more equal and equitable mitigation and adaptation. The term "climate justice" refers to a broad range of legislative and policy strategies for combating climate change. It means that responding to climate change must include addressing issues of justice. Climate justice necessitates transformative climate action grounded in the rule of law to address disparities among people and guarantee that climate policies prioritize the most climate-vulnerable individuals, supporting them in defending their environmental rights and participating in policymaking.[10] While addressing the issue of climate change, the policy makers should take into account their responsibilities towards protecting constitutional rights such as the right to life, the rights of indigenous communities, migrants,

[10] 'Climate Justice: A Rule of Law Approach for Transformative Climate Action' (n 6)

children etc. Policies pertaining to climate adaptation and mitigation must be viewed through the prisms of equity and justice.

V. Harmonising Constitutional Rights and Environmental Protection

India has indeed formulated policies to mitigate climate change and adapt to its far-reaching impacts. However, the effectiveness of policies in addressing environmental deterioration is sometimes diminished by the gap between their design and execution. Some key challenges in the path of just enforcement include inadequate enforcement, lack of inclusivity, and insufficient equity considerations. A nation's enforcement system provides the foundation for turning theoretical plans and legal frameworks into practical outcomes, encouraging accountability, and furthering the goals of the legislation. When developing and implementing policies and initiatives to address the problems of climate change, constitutional rights must never be infringed. India undoubtedly committed to international agreements to prevent and adapt to climate change, but the process of putting those accords into effect must not violate the citizens' constitutional rights.

One significant issue that has been covered practically at every Conference of Parties and that still requires attention at the national level, is the lack of inclusion in the formulation and application of policies. Despite efforts to address the issue, gender disparity still exists in India. Examining the stigmatization and discrimination these women have experienced whenever they attempt to speak up about environmental issues reveals that the right to equality, which is granted to all people, is not being adequately upheld. Examining the stigmatization and discrimination these women have experienced whenever they attempt to speak up about environmental issues reveals that the right to equality, which is guaranteed to all people, is not being adequately upheld. Many women environmental activists have faced death threats and abusive treatments, which is often ignored. Various instances show that when women are involved in decision making process about how to manage land and natural resources, the process becomes more inclusive and sensitive to the needs of others. But our patriarchal society is not ready to see women as leaders. Gender inequality in policy making and policy implementation programmes is a sheer violation of women’s constitutional rights that guarantees equal rights and equal protection before law.

Indigenous people, who rely primarily on natural resources for their subsistence and have the least ability to respond and adapt to environmental dangers, make up an important portion of the global population. However, they frequently lack the opportunity to advocate for their rights

and interests and often not included in national and state decision-making processes.[11] Climate change policies typically emphasize more on technologically advanced solutions, and large-scale initiatives that put environmental objectives ahead of indigenous rights preservation. Public participation in environmental policy formulation and implementation in India remains extremely limited. A combination of inadequate public engagement, weak political will, and in some case, extreme political influence has contributed to the development of environmental policies that often neglect the interests of local communities. It appears that, since 2014, government decisions have significantly influenced the direction of India's environmental policies and discourse. Notably, India lacks a structured public forum that allows citizens to directly contribute to environmental policy design, except when draft policies are occasionally made available on the Ministry of Environment's website for public comments and opinions. Even then, only a small portion of the population, having enough access to it, is able to engage with the policy formulation process, and the central government is not obligated to incorporate public feedback. The 2020 draft Environmental Impact Assessment (EIA) notification further weakened public participation mechanisms and was criticized for prioritizing ease of doing business over environmental safeguards.[12]

As a requirement of the national policy to resist climate change, the Indian government has made significant investments in huge renewable energy projects, such as wind and solar farms. However, these projects are frequently situated on territory that indigenous groups have historically occupied or has been uses for farming by the marginalised communities.[13] Large-scale renewable energy initiatives and afforestation campaigns are some of the climate policies that have frequently and disproportionately affected marginalized populations, such as economically disadvantaged areas and tribal communities. These communities have been uprooted from regions, which have been their settlement and livelihood, due to land acquisitions for establishing huge wind farms and solar power projects. Numerous climate initiatives have a direct influence on livelihoods by causing forced relocation and the loss of access to grazing grounds, forests, and agricultural lands. These acts are a clear infringement of Article 21 of Constitution which also encompasses the right to a livelihood. This 2020

[11] 'Climate Justice: A Rule of Law Approach for Transformative Climate Action' (n 6) 10

[12] Tajendra Pratap Gautam, Ashank Desai, 'The Politics of Environmental Impact Assessment in India' (*Centre for Global Development* 13 Feb 2025) <https://cgd.leeds.ac.uk/2025/02/13/the-politics-of-environmental-impact-assessment-in-india/> accessed 15 January 20205

[13] Gaurika Chugh, Gopal K Sarangi, 'India's green energy goals have a land paucity problem' *Deccan Herald* (India, 24 April, 2025) <https://www.deccanherald.com/opinion/indias-green-energy-goals-have-a-land-paucity-problem-3508137> accessed 20 July, 2025

amendment to the Environment Impact Assessment (EIA) Rules, has exempted highway projects of strategic and defence importance located within 100 kilometres of the Line of Control (LoC), among other regions, from requiring prior environmental clearance before construction. The EIA process is designed to evaluate and analyse the potential environmental consequences of proposed projects, including their effects on ecosystems, biodiversity, human health, and the socio-economic well-being of local communities. However, this exemption undermines the very purpose of the EIA framework and raises serious constitutional concerns. It potentially violates fundamental rights guaranteed under the Indian Constitution.[14] By bypassing such environmental scrutiny, the amendment jeopardizes environmental quality including public health and livelihood, which is a sheer violation of Article 21 of Constitution of India. This action, of not incorporating such highway projects, not only impacts environment but also destroys the habitat of some communities, living in such exempted regions, as they are denied the safeguards and participatory mechanisms available to others elsewhere, leading to unequal treatment and violation of Article 14.

Everyone is well aware about Adani Green Energy, one of the biggest solar power developers in the world. In order to change the nation's power sector from a costly system based on fossil fuels to a low-cost, dependable, and less-emitting system based on renewable energy, calls for the development of huge amount of renewable energy by 2027. Given the global climate issue, Adani has been praised for its significant investment in solar energy production. However, there are some unpleasant realities hidden behind Adani Green's dazzling success. These solar installations were made in the lands occupied and used by farmers and local villagers for agricultural farming, as a result alienating them from their only existing possessions.[15] According to studies, extensive solar energy projects are being installed on lands that are significant to local communities as well as natural ecosystems having high biodiversity values, eventually resulting into conflicts. Since 2017, at least 15 instances of disputes involving solar and wind energy projects have been reported in India.[16] These conflicts, impacting thousands

[14] 'EIA rules amended: projects near LoC, those of strategic value won't need green nod' *The Indian Express* (India, 19 July, 2022) <https://indianexpress.com/article/india/environment-ministry-amends-eia-rules-exempts-highways-strategic-importance> accessed 17 January 2025)

[15] Geoff Law, 'The Ugly Side of Adani's Solar Success Story,' (*Adani Watch,* 8 December 2020) <https://www.adaniwatch.org/the_ugly_side_of_adani_s_solar_success_story> accessed 17 January 2025

[16] Shivaprakash K. Nagaraju, 'Degraded lands can aid achieve four times India's 2030 renewable energy targets', (TNC- The Nature Conservancy Centre India, 16 August 2022) < https://www.tncindia.in/what-we-do/our-insights/stories-in-india/renewableenergy> accessed 20 January 2025

of people's livelihoods by improper displacement and relocation, show how constitutional right are being disrespected.

Places like Thar and Kutch, in India, are said to be the best places to produce renewable energy sources like wind and solar. The national government of India has consequently approved the development of a large number of projects in these two regions. However, some of these locations are the natural habitat of the Great Indian Bustard, which is a severely endangered species as well as many other birds. The construction of lengthy overhead power line corridors in these areas to transport electricity has put the bird's survival in jeopardy. The Great Indian Bustard particularly, has suffered numerous fatalities as a result of collisions with or electrocution from overhead electricity lines.[17] To preserve and protect the natural environment including the flora and fauna, is a fundamental duty mentioned in the Constitution. However, instances indicate a completely different reality. An audit by the Comptroller and Auditor General, released a detailed report on August 8, 2022, where it revealed about widespread violations of Coastal Regulation Zone (CRZ) norms across several projects in India. This report, focussing on the conservation of coastal ecosystems, also highlighted the non-compliance with the CRZ Notification, 2019. It shows how Union Ministry of Environment, Forest and Climate Change had approved several projects without proper vetting by accredited environmental impact assessment (EIA) consultants. Additionally, pre-audit inspections uncovered instances of illegal construction and the discharge of industrial and agricultural effluents into coastal areas.[18]

Where environmental degradation and human rights challenges often intersect, judiciary has played a crucial and progressive role in safeguarding both the environment and the rights of individuals, particularly in a country like India. Despite the challenges in the functioning of laws and policies, the courts in India have taken a proactive approach in preserving both constitutional rights and the environment by striking a balance between the two. The Indian courts have played a major role in maintaining the values of environmental justice and human rights by interpreting the law, engaging in judicial activism, and bringing public interest

[17] Ayashkant Das, 'Weakening of rules protecting endangered Indian bird will benefit Adani' (*Adani Watch*, 24 March 2023) <https://www.adaniwatch.org/weakening_of_rules_protecting_endangered_indian_bird_will_benefit_adani> accessed 20 January 2025

[18] Suchita Jha, 'Coastal area projects got Centre's nod without proper environmental impact assessment, finds CAG' (Down To Earth, 2022) <https://www.downtoearth.org.in/governance/coastal-area-projects> accessed 27 January 2025

litigations. The Dehradun Quarrying Case[19] was the first Supreme Court case that highlighted the tension between conservation and growth. In this instance, the Apex Court underlined the necessity of bringing the two ideas together for the greater good of society. The principles established in this case were also applied in other cases where the court noted that there might not be any true economic growth or prosperity in the end if industrial growth is sought through careless mining that results in property loss, loss of life, loss of amenities like water supplies, and the creation of ecological imbalance. In the case of Vellore Citizens Welfare Forum v. Union of India[20], Supreme Court accepted the idea of sustainable development as a balancing factor. By developing and applying various other doctrines like precautionary principle, polluter pays principle, judiciary has significantly contributed towards protecting constitutional rights as well as the environment.[21]

As environmental challenges escalate worldwide, the judicial system has increasingly been called upon to interpret and enforce laws that balance economic development with the need for sustainable environmental practices while safeguarding citizens' rights. Numerous citizens and organizations have brought legal actions against governments for violating their citizens' rights by not taking adequate action to deal with the severe climate crisis and failing to meet their climate commitments. In addition to this, judiciary have also protected rights of many indigenous groups and made sure that their land rights and knowledge are not infringed in environmental problems and policy enforcement. In numerous rulings, the Court has previously acknowledged the access to a clean environment as a right that falls under the purview of the right to life. Very recently, Supreme Court of India in a landmark judgement[22] has held that the people have a right to be free from the adverse effects of climate change within the ambit of fundamental rights. This recognition has paved a way for legal accountability for activities that jeopardize fulfilling climate targets, making a big impact on India's jurisprudence regarding climate governance.

VI. Conclusion: Towards a Balanced Approach to Environmental Governance

Climate change has become a serious issue at present that is creating difficulties at all the levels. Every nation has made several efforts to tackle the issue of environmental damage and also

[19] *Rural Litigation & Entitlement Kendra v State Of U.P* [1985] AIR 652 SCC 431
[20] AIR 1996 SC 2715
[21] Boregowda S.B., 'The Role of Indian Judiciary in Protection of Environment in India' (2024) 4 (2) IJARSCT, < https://ijarsct.co.in/Paper15782.pdf> accessed 22 January 2025
[22] M. K. Ranjitsinh & Ors. v. Union of India & Ors (2024) 3 SCR 1320

developed a strong legal framework over the time. But, the ongoing impacts of environmental degradation clearly shows the gap in the enforcement of the policies. As climate change continues to pose a significant threat worldwide, the main challenge lies in creating legal frameworks that not only compel action to mitigate its effects but also respect and uphold individual freedoms and rights. It is clear from the research that, even when climate change policies are well-planned, their execution can occasionally interfere with many people's constitutional rights, which are frequently overlooked.

Balancing constitutional rights and climate change policy enforcement requires some innovative approaches, such as enshrining environmental rights in constitutional law, ensuring accountability of governments, businesses and corporations and promoting global collaboration on climate policies. While implementing climate change mitigation policy is crucial to achieve the global goal of sustainable development, it's also critical to acknowledge and respect the Constitutional rights of the citizens in the process of enforcement of policies. A number of elements must be taken into account in order to achieve long-term environmental sustainability. Both adaptation and mitigation of climate change entail a number of factors that need to be equally recognized.

It is crucial to stress on the necessity of finding a balance between constitutional rights, such as the right to life, right to equality, right against discrimination etc. and the obligation to protect the environment for current and upcoming generations. In the light of the current circumstances, comprehensive legislation is required to support the development and strengthening of enforcement mechanisms that would both address the pressing issue of climate change and uphold people's fundamental rights. Climate change is known to disproportionately impact many people but the impacts done by improper enforcement of climate change is often given less importance. The Paris Agreement's preamble itself recognizes and requires states to uphold, advance, and take into account their responsibility to ensure right to health and safeguard human rights, including the rights of children, migrants, indigenous peoples and communities, people with disabilities. As an obligation to these international agreements, Indian legislative framework and enforcement mechanisms should also properly apply these obligations in their functioning.

Another crucial component of just and sustainable development and policy enforcement is adopting an equal inclusive framework for policymaking. Women and indigenous people have always played a very crucial role in protecting environment and conserving natural resources.

Women are known to be the saviours and from time immemorial, they have always stood at the forefront in raising voices against the actions that would harm the environment. Indigenous people are considered to be a part of the nature. Forests have been their lives and livelihoods. They have always sought to preserve the ecological balance and have embraced a variety of environmentally beneficial techniques. Their inclusion in the environment policy making and enforcement appears to be very helpful as they have better knowledge regarding sustainable practices as compared to others. There is no specific law that encourages and supports their inclusion in the decision making. Paris agreement has also highlighted the importance of gender equality, empowerment of women and intergenerational equity. Developing policies and initiatives aimed at upholding human rights, are all part of a human rights-based perspective to climate change. Since it poses the greatest threat to human rights and our survival, it is imperative that climate justice be incorporated into both adaptation and mitigation efforts.

Judiciary has utilised its full potential in interpreting constitutional protections while considering environmental protection, but still somewhere there is a gap which needs to be fulfilled. It is very important to enhance the contribution of the judiciary in policy enforcement by ensuring courts have the authority to address climate-related disputes and hold governments or corporations accountable for non-compliance with environmental regulations and constitutional provisions.

Law and policymakers must make sure that the land areas, chosen for implementing various renewable energy and climate mitigation projects, don't endanger biodiversity, natural ecosystems, land rights and livelihoods of communities. An early environmental risk assessment of the lands, selected for wind energy, solar energy and other advancement projects should be part of the process to achieve this goal. Before any development or mitigation and adaptation projects are considered for a land, this kind of strict screening should be done.

In order to make our economy and society resilient and sustainable, India urgently needs a single, strong climate law that not only forbids infringement of individual rights but also upholds real environmental progress. There is a concerning inconsistency in India's present climate change legislation. Although there are many laws and programs aimed at protecting the environment, there is a glaring lack of a more effective policy framework that can adequately address the scope of climate emergency.

NAVIGATING THE INTERSECTION OF CLIMATE CHANGE, NUCLEAR ENERGY, AND LEGAL GOVERNANCE FRAMEWORK

ABSTRACT

This article will focus on the critical nexus of climate change, the management of nuclear energy and the law, policy and governance that accompany each. It emphasizes the need for robust regulatory measures in order to avoid such catastrophes in the future, demonstrating how governance can mitigate the effects of a nuclear disaster, and the need for legal frameworks that uphold public health and environmental safety.

International bodies, especially the International Atomic Energy Agency (IAEA) and the World Health Organization (WHO), have a leading role in the formulation of policies related to nuclear safety and emergency response. The paper analyses legislative initiatives in some selected states such as India, using as examples the Atomic Energy Act and the Civil Liability for Nuclear Damage Act, noting the incoherence of policies in development of energy alongside the concern for the environment. Also, it underlines the importance of international agreements which deal with the regulation of the use of nuclear energy for the purpose of fostering greater cooperation in dealing with climate issues. The paper examines these questions in order to support more effective governance.

Keywords: *Climate Change, Nuclear Energy Governance, International Cooperation, Environmental Safety*

I. Introduction

Radioactivity is an occurrence of a natural phenomenon that has been into existence since the formation of our planet Earth. Various radioactive elements present inside the crust of Earth includes, air, water, and also in our own bodies.[1] Ionizing radiation is a kind of radiation that has potential to strip electrons from atoms, which poses high risk of health to living organisms as it can damage their tissue, genes, and DNA.[2] Whereas all of us are exposed to low levels of ionizing radiation every day, excessive exposure to this radiation may adversely affect our health and cause serious life taking diseases like acute radiation syndrome, cancer, etc.[3]

Major Sources of Radiation Exposure in our day-to-day life:

Firstly, we all must understand the source as to where we are receiving our daily dose of radiation exposure to ultimately minimize the risks that are complimentary with it. These sources can be classified into two categories which include natural and man-made sources. Radiation that occurs organically includes radon, an element which is a radioactive gas that is produced by the decay of radium[4]. It is present in almost all kinds of soils and rocks. Terrestrial radiation from the Earth's crust, internal radiation from radioactive materials in the body and cosmic radiation from space are some other sources of radiation that occur naturally.

One of the most popular sources of Man-made radiation includes medical procedures, such as CT scans and X-rays. Not to forget the technological devices and nuclear accidents. It is said that medical radiation is the largest source of radiation exposure that is artificially made, it accounts for 48% of the total radiation exposure in the United States. The usage of radiation in medical proceedings has significantly rise in recent years, with the statistics of CT scans performed in the United States increasing by 20% between 2012 and 2016. This rise of medical radiation has led to concerns about the potential toss connected with excessive exposure.

It is very much understood that radiation is important during medical procedures, diagnosing multiple conditions and curing various diseases but we also need to understand that it is now a necessity to make sure that the pros of radiation exposure should outweigh its cons.

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[1] Radiation in Everyday Life", By International Atomic Energy Agency (IAEA)

[2] Radiation in medicine: Origins, risks and aspirations", By National Library of Medicine (National Centre for Biotechnology Information)

[3] "Radiation and Health", By World Health Organization (WHO)

[4] "Accidents at Nuclear Power Plants and Cancer Risk", By National Cancer Institute (NCI)

The use of radiation in medical procedures is essential for diagnosing and treating various conditions, but it is crucial to ensure that the benefits of radiation exposure outweigh the risks. The use of radiation in medical procedures has increased significantly in recent years, with the number of CT scans performed in the United States increasing by 20% between 2012 and 2016. The increased use of medical radiation has led to potential risks associated with excessive exposure.

Effects and threats to health from Radiation Exposure:

There are intense health effects of a nuclear breakdown. One getting exposed to high dosage of radiation results in acute radiation sickness causing symptoms like vomiting, nausea, or even on spot death. If the duration of the exposure is long it has high risk of causing life taking diseases like cancer, genetic mutations etc for public living in the contaminated area[5].

Nuclear breakdown has substantive economic consequences. The contaminated region may face long term consequence to decontaminate the affected region as health care cost will significantly increase, its effect on environment and surrounding will loss agricultural productivity as well. The tourism industry of the nation may get a shock due to precautionary measures. The communities of the affected area and nearby places need to migrate, creating psychological trauma to individuals and social disruption. The blemish that comes along with living in a contaminated zone has an ever-lasting effects on the mental health of people residing there[6].

Global implications, especially in affiliation of nuclear proliferation and international relations, raises concerns about the security and safety of nuclear accommodation around the world. This may increase scrutiny and regulation of the nuclear industry[7]. The health hazards affiliated to exposure of radiation depends on several elements, for instance, the kind of radiation, the nature of the affected tissues and organs, whether it is sensitive or not, the route and duration of exposure, the radioactive isotopes involved, and the individual characteristics of the exposed person.

Higher duration or dosage of radiation exposure shows its acute symptoms like feeling nauseous, vomiting, skin redness, hair loss, and even death for that matter. Category of children

[5] "Nuclear Weapons Tests and Environmental Consequences: A Global Perspective", By National Library of Medicine (National Centre for Biotechnology Information)
[6] "Health Risks Due to the Use of Nuclear Energy for Electric Power Generation", By Miss Tubiana (IAEA
[7] "Advantages and Challenges of Nuclear Energy", March 29, 2021, By Office of Nuclear Energy

and adolescents are at high risk to the cancer-causing effects of ionizing radiation that causes to rapidly divide cells and longer lifespans[8].

II. Impact of Nuclear Energy on the Environment

According to several Life Cycle Analyses, the carbon emissions from nuclear energy per MWh can be as low as hydroelectric energy[9]. As per the IAEA report, "nuclear energy has prevented the spread of 60 billion tons of CO2 since 1970 after assuming that 2400 TWh of this energy was produced by non-renewable energy or fossil fuels.[10]" Nuclear Energy can help in tackling climate change and reduce greenhouse gas emissions due to its ability to decarbonize and reduce dependence on fossil fuels. With an increased demand for energy in the future and nuclear energy's project as the largest low-carbon energy producer, "it is estimated that it will contribute approximately 17% to global energy by 2050.[11]" However, it is extremely advantageous to use nuclear energy, it also poses a significant threat to the environment and safety risks. Nuclear power is risky in its own right, as the Chernobyl catastrophe reminds us. Spurred on by the poor nuclear design of the reactor, the 'xenon-poisoning' of the reactor led to explosive increases in power and a subsequent reactor meltdown, aggravated by flawed safety procedures. The environmental contamination, health risks, and forced relocations of impacted populations were immense. Following the Chernobyl disaster, '5300 PBq radionuclides were released from this site, causing approximately 7,000 cases of thyroid cancer'[12]. Although it did not receive as much international attention, the environmental damage caused by the Chernobyl accident was devastating. Trees linked to the areas of greatest contamination died, earning the area the nickname, the Red Forest[13]. Furthermore, radioactive pollution of the Pripyat River resulted in dangerously high levels of radioactivity in fish, and because radiation poisoning takes time to manifest, it is still impossible to determine the long-term effects on human health, including cancer and other disorders. These catastrophic

[8] "Radiation and Health", By World Health Organization (WHO)

[9] Nuclear Energy and the Environment (Chinese Academy of Engineering, the National Academy of Technologies of France, and the French Academy of Science) 5

[10] Faiq Faishal, Palupi Lindiasari Samputra, Impact of Nuclear Energy on The Environment (Journal of Strategic and Global Studies, Volume 7, Number 1 (2024))2

[11] Faiq Faishal, Palupi Lindiasari Samputra, Impact of Nuclear Energy on The Environment (Journal of Strategic and Global Studies, Volume 7, Number 1 (2024))2

[12] Högberg, L. (2013). Root causes and impacts of severe accidents at large nuclear power plants. In Ambio (Vol. 42, Issue 3) pg. 267–284

[13] Nuclear Energy, National Geographic Education

consequences of such tragedy highlight the need to address risks associated with harnessing nuclear energy through legislation and rules.

International Organisations dealing with Radiation Exposure:

The International Commission on Radiological Protection (ICRP) has set up some protocols for radiation protection on the basis of the notion of "As Low As Reasonably Achievable" (ALARA). The maxim of ALARA targets to minimize exposure of radiation to individuals at the best extent while still allowing them to get all the possible medical benefits.

If we look at the health effects of radiation exposure it can be split into two major sections:

1. *Stochastic*

   Stochastic effects occurs when there is a low dosage of radiation which is purely random in nature but has a risk of its effect increasing along with the dosage received. The most evident stochastic effect of exposure to radiation is the increased risk of diseases like cancer[14].

2. *Deterministic*

   Deterministic effects occurs when one is exposed to high dosage of radiation, and the severity of the effect is directly proportional to the dosage received. Radiation sickness, cataracts, and skin damage are such examples of the deterministic effects caused due to exposure.

Similarly, as a redressal to these concerns, the American College of Radiology (ACR) has formed guidelines for appropriate test performance, minimizing radiation yet providing health benefits. It also recommends that practitioners to use medical radiation only, when necessary, that to at the lowest possible dose to achieve the desired therapeutic or diagnostic result. It is also recommended that medical professionals should take it into consideration that alternative imaging techniques, for instance ultrasound or magnetic resonance imaging (MRI), are available and are of low-risk nature. when appropriate. These mentioned imaging techniques do not use radiation in the procedure and can answer similar diagnostic queries in many medical examinations. Using protective shields, lead aprons to protect sensitive organs, and gonadal shielding to protect the reproductive organs, should be taken seriously.

[14] "Accidents at Nuclear Power Plants and Cancer Risk", By National Cancer Institute (NCI)

In order to reduce health hazards and risks that comes along with the radiation exposure in medical conditions, patient protection, evidence-based decision-making and appropriate test performance, are essential. According to scientific research the most effective and efficient way to minimize risks of patients in radiological examinations is through conduct of appropriate test performance, this is a primary responsibility of all the nuclear medicine clinician, including the health physicist, and the radiologist as well. This might help reduce the risk in a long run.

The World Health Organization (WHO) has pledged to diminish the exposure to radiation and provide life-saving healthcare services to the population that is affected in the event of radiological and radiation emergencies. The WHO has also developed guidelines for radiation emergencies, this includes measures to protection of public, in particular to evacuation, sheltering, and the use of stable iodine to prevent thyroid cancer.[15] In case of a radiation emergency, it is extremely crucial to follow safety instruction manual provided by the local and national authorities staying connected to receive the latest updates and seeking medical attention if necessary. The public can also take several initiatives to reduce their own exposure to radiation, by avoiding unnecessary medical radiation, limiting their exposure to radon, and taking all available precautions during such nuclear accidents.

III. National Strategies for Sustainable Nuclear Energy

India aims to adopt safe, secure, and environmentally responsible energy generation. The three primary legislations governing nuclear energy in India are as follows:

The Atomic Energy Act, 1962: "This act was enacted for the development, control, and use of atomic energy for the welfare of Indians and other peaceful purposes. It authorises the Atomic Energy Regulatory Board to oversee nuclear safety and radiation protection measures."

The Civil Liability for Nuclear Damage Act, 2010: As per this act, "the liability for any accident taking place at a nuclear power plant belongs with the plant operator, the suppliers of the nuclear energy, and the government.[16]"

The National Nuclear Energy Policy, 2008: "This policy is aimed at enhancing energy security and decarbonizing our energy mix. It also lays out India's plans for building its nuclear energy program in the longer term.[17]"

[15] "Radiation and Health", By World Health Organization (WHO)
[16] The Civil Liability for Nuclear Damage Act 2010
[17] The National Nuclear Energy Policy 2008

While India's nuclear policies demonstrate its commitment to sustainability. However, these could not be implemented efficiently due to the limited supply of nuclear reactors and huge reliance on imports. Addressing these challenges requires a strict commitment to international treaties and cooperation among countries at international levels.

IV. Conclusion:

Even though getting exposed to radiation is a natural part of our day-to-day life, excessive exposure can adversely affect our health, causing life taking diseases like cancer[18]. Therefore, to minimize the risks in association with radiation exposure, it is extremely necessary to find out the most common sources of radiation exposure near us, follow safety rules and regulations, and take measures accordingly to protect ourselves and others. The medical usage of radiation is essential for diagnosing and treating various conditions, but at the same time it is important to make sure that the benefits outweigh the risks, minimizing its adverse effects.

The safe and sustainable use of nuclear energy requires all countries to cooperate and follow international regulations. Treaties such as the Vienna Convention on Civil Liability for Nuclear Damage, the CNS, and the Joint Convention on Spent Fuel and Radioactive Waste must be strictly enforced. It is crucial to develop new technological innovations, increase public knowledge and engagement, and promote openness in atomic energy governance to encourage the responsible use of nuclear energy for a sustainable future and avoid dangers.

[18] "Accidents at Nuclear Power Plants and Cancer Risk", By National Cancer Institute (NCI)

CLIMATE-DRIVEN DISPLACEMENT AND ARMED CONFLICTS: ASSESSING THE LEGAL GAPS IN PROTECTING CLIMATE REFUGEES IN WAR-TORN REGIONS

ABSTRACT

Climate change has become a major driver of displacement, especially in areas already affected by armed conflicts. Climate change-related environmental degradation, including droughts, sea-level rise, and scarcity of resources, tends to exacerbate underlying tensions, leading to increased violence and displacement of people. Yet, international refugee law, which is largely regulated by the 1951 Refugee Convention, does not acknowledge climate-related displacement as a valid reason for asylum. This gap in the law puts people displaced by both environmental disasters and war in a precarious position, without formal protection under current legal regimes.

The essay investigates the nexus between climate change, forced migration, and armed conflict. Using conflict-affected contexts such as Syria and Sudan, the paper seeks to enhance the understanding of displaced persons' increased vulnerabilities. It further analyses the gaps in existing international legal protections by examining the limited scope of the 1951 Refugee Convention, the lack of consistency across regional frameworks, and the operational difficulties in ensuring effective humanitarian aid in conflict-ridden regions.

The study highlights the urgent need for legal reforms and international cooperation to bridge the protection gap for climate refugees. It recommends a broadening of the refugee definition, elaboration of a binding international agreement acknowledging climate displacement, and the integration of more robust climate concerns into conflict resolution approaches. Addressing these shortcomings will allow the international community to advance toward a more equitable and inclusive protection framework for displaced communities experiencing both natural and man-made disasters.

Keywords: *Climate change, Forced displacement, Armed conflict, Refugee law, Climate refugees, Legal gaps, Humanitarian aid, Resource scarcity*.

I. Research Methodology

The qualitative, doctrinal research method was used in this research paper to examine secondary legal sources for the intersection of climate change, conflict, and refugee protection. Primary international treaties like the 1951 Refugee Convention and the Geneva Conventions were considered in conjunction with regional ones like the Kampala Convention. Organizational reports from the UNHCR, IPCC, and UNEP were used to provide empirical information on climate-related displacement and areas of conflict. Case studies of Sudan, Syria, and the Rohingya crisis were examined to demonstrate the actual-world effect of legal loopholes. The paper also incorporates policy documents, academic articles, and soft law instruments to assess existing frameworks and suggest implementable reforms for protecting climate refugees in conflict zones.

II. Literature Review

This research draws upon a range of scholarly works, legal instruments, and authoritative reports to assess the legal gaps in protecting climate refugees in conflict zones. The [1]1951 Refugee Convention and the [2]Geneva Conventions serve as foundational texts, outlining the protections for war refugees while exposing the absence of climate displacement provisions. Reports from the [3]United Nations High Commissioner for Refugees (UNHCR) and the [4]Intergovernmental Panel on Climate Change (IPCC) provide statistical data, including the displacement of 21.5 million people annually due to climate events. The [5]United Nations Environment Programme (UNEP) report on Darfur highlights the link between resource scarcity and conflict, while case studies from Syria and Sudan illustrate the conflict-amplifying effects of droughts. The Rohingya crisis, analyzed through [6]humanitarian reports, demonstrates the compounded vulnerability of displaced populations facing both persecution and

[1] *Convention Relating to the Status of Refugees* (adopted 28 July 1951, entered into force 22 April 1954) 189 UNTS 137.
[2] *Geneva Convention relative to the Protection of Civilian Persons in Time of War* (adopted 12 August 1949, entered into force 21 October 1950) 75 UNTS 287.
[3] United Nations High Commissioner for Refugees (UNHCR), *Global Trends: Forced Displacement in 2023* (UNHCR 2024) https://www.unhcr.org/globaltrends.html accessed 4 August 2025.
[4] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2023: Impacts, Adaptation and Vulnerability* (IPCC 2023) https://www.ipcc.ch/report/ar6/wg2/ accessed 4 August 2025.
[5] United Nations Environment Programme (UNEP), *Rebuilding Relationships Over Natural Resources in Darfur* (UNEP 2021) https://www.unep.org/news-and-stories/story/rebuilding-relationships-over-natural-resources-darfur accessed 4 August 2025.
[6] United Nations Office for the Coordination of Humanitarian Affairs (OCHA), *Joint Response Plan for Rohingya Humanitarian Crisis in Bangladesh 2024* (OCHA 2024) https://data.unhcr.org/en/documents/details/108254 accessed 4 August 2025

environmental degradation. Regional instruments, like the [7]African Union's Kampala Convention, showcase progressive steps in recognizing internally displaced persons but reveal geographic limitations. These sources collectively inform the paper's analysis of existing frameworks, legal voids, and the need for policy reforms.

III. Introduction

Climate change has come to pose an acute threat to world stability, not just the natural environment, but also human security and international politics. The escalating number and magnitude of climate-related disasters such as droughts, floods, rising sea levels, and severe weather conditions have driven millions of people from their homes globally. Based on data provided by the [8]Internal Displacement Monitoring Centre (IDMC), a total of about 21.6 million people are displaced each year because of climate-related disasters. In politically fragile states, where governance is poor and resources are limited, environmental pressures reinforce underlying tensions, fuelling conflicts and destabilizing already vulnerable areas.

One of the main effects of climate change is its impact on resource availability. Droughts and water shortages, for instance, have been linked to increased competition over vital resources, which can escalate into armed conflicts. According to a report by the [9]United Nations Environment Programme (UNEP) on Darfur, Sudan, years of drought and desertification contributed significantly to clashes between farming and pastoralist communities, making it one of the earliest examples of climate-related conflict. Research published in the [10]*Proceedings of the National Academy of Sciences* further indicates that Syria's severe drought from 2006 to 2011 played a critical role in rural displacement and rising social tensions, factors that contributed to the outbreak of the Syrian civil war.

In spite of the evident connection between climate change and conflict, international refugee law is still lacking in terms of addressing the specific vulnerabilities of those displaced by

[7]African Union, *Convention for the Protection and Assistance of Internally Displaced Persons in Africa (Kampala Convention)*, adopted 23 October 2009, entered into force 6 December 2012.
[8]Internal Displacement Monitoring Centre (IDMC), *Global Report on Internal Displacement 2024* (IDMC 2024) https://www.internal-displacement.org/global-report/grid2024/ accessed 4 August 2025.
[9]United Nations Environment Programme (UNEP), *Rebuilding Relationships Over Natural Resources in Darfur* (UNEP 2021) https://www.unep.org/news-and-stories/story/rebuilding-relationships-over-natural-resources-darfur accessed 4 August 2025.
[10]Colin P Kelley et al, 'Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought' (2015) 112 *Proceedings of the National Academy of Sciences* 3241 https://www.pnas.org/doi/10.1073/pnas.1421533112 accessed 4 August 2025.

environmental reasons, especially in areas of conflict. [11]The 1951 Refugee Convention and its [12] 1967 Protocol, which are the foundation of international refugee protection, define a refugee as an individual who is fleeing persecution on grounds of race, religion, nationality, membership of a specific social group, or political opinion. This definition excludes those displaced by climate-induced disasters, leaving them outside the legal framework of international protection.

In climate refugees who find themselves displaced due to wars in their country of origin, such a lack in law compounds two crises, a crisis of displacement and that of insecurity. Cycles of violence entrap these displaced communities who are increasingly subject to confinement as they become worse off to humanitarian access. Binding legal provisions dealing with such a new situation where climate change increases the displaced masses are, however, absent.

This article attempts to examine the intricate nexus between climate change, conflict, and forced displacement. It will examine the shortcomings of current international legal frameworks, review the cumulative vulnerabilities of climate refugees living in areas of conflict, and suggest possible avenues for augmenting legal protection. In this analysis, the research hopes to bring into focus the compelling imperative for a more responsive and inclusive international legal system that effectively safeguards individuals displaced by both environmental and man-made emergencies.

IV. The Concept of Climate Refugees

Climate change has become a major cause of forced displacement, but the displaced people by environmental catastrophes fall beyond the protection umbrella of international refugee law. The current legal regime, mostly guided by the [13]1951 Refugee Convention and its 1967 Protocol, fails to provide for those displaced by life-endangering environmental conditions, thereby depriving climate-displaced groups of official legal status and protection.

[11]Convention relating to the Status of Refugees, 28 July 1951, 189 UNTS 150 (entered into force 22 April 1954) art 1(A)(2).
[12] Protocol relating to the Status of Refugees, 31 January 1967, 606 UNTS 267 (entered into force 4 October 1967).
[13]Refugee Convention (n 2)

Conceptual Gaps in International Law

The [14]1951 Refugee Convention provides that a refugee is an individual who possesses a well-founded fear of persecution on the grounds of race, religion, nationality, membership in a specific social group, or political opinion, and who is unwilling or unable to return to his/her country of origin. The definition does not include displacement resulting from environmental degradation or natural disasters associated with climate change, for example, rising sea levels, droughts, or natural disasters.

While increased awareness of climate displacement exists, there is no binding international treaty specifically safeguarding climate refugees. The [15]UN Human Rights Committee has recognized that states ought not to send people back to states where climate change creates life-threatening dangers, but this is a non-binding suggestion. In the absence of a framework of law, climate refugees find themselves in limbo, unable to access asylum or permanent protection under existing international law.

Climate Displacement: Data and Realities

As per the [16]United Nations High Commissioner for Refugees (UNHCR), 21.5 million individuals are displaced on average every year as a result of climate-related events. They include floods, storms, and wildfires that destroy homes, livelihoods, and vital infrastructure. For instance, sea-level rise has already started displacing communities in Pacific Island countries, while desertification and water shortages in sub-Saharan Africa continue to propel mass internal and cross-border migration.[17]

The Internal Displacement Monitoring Centre (IDMC) has reported that in 2022 alone, 32.6 million new displacements were caused by disasters, and climate change was a primary driver. Most of these displacements took place in areas that were already witnessing armed conflict, exacerbating vulnerabilities and generating cycles of instability.[18]

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[14] Convention relating to the Status of Refugees, 28 July 1951, 189 UNTS 150 (entered into force 22 April 1954) art 1(A)(2).

[15]UN Human Rights Committee, 'General Comment No. 36: Article 6 (Right to Life)' (2018) CCPR/C/GC/36, paras 28–29 https://undocs.org/CCPR/C/GC/36 accessed 4 August 2025.

[16]United Nations High Commissioner for Refugees, *Global Trends: Forced Displacement in 2022* (UNHCR, 2023) https://www.unhcr.org/ accessed 24 February 2025

[17]United Nations High Commissioner for Refugees (UNHCR), *Climate Change and Disaster Displacement* (UNHCR 2021) https://www.unhcr.org/climate-change-and-disasters.html accessed 4 August 2025; see also Internal Displacement Monitoring Centre (IDMC), *Global Report on Internal Displacement 2023* (IDMC 2023) https://www.internal-displacement.org/global-report/grid2023/ accessed 4 August 2025.

[18] Internal Displacement Monitoring Centre (n 1)

The Intersection of Climate Displacement and Armed Conflict

Climate displacement heightens tensions in affected areas. Displacing populations from environmental disasters settle in resource-scarce areas, sparking competition and increasing the likelihood of violence. For example, drought-displaced communities in Somalia have displaced to urban centers where conflict is already ongoing, resulting in overcrowded camps, escalated armed group recruitment, and worsening security contexts.

Likewise, in Bangladesh, repeated flooding and river erosion have displaced millions, who move to border regions where resource scarcity and political tensions continue. These displaced people are not given legal recognition or international protection and suffer from extreme human rights abuses, such as exploitation, trafficking, and violence.

This intricate intersection of climate change, displacement, and conflict points to the need for immediate legal reform. The lack of legal status for climate refugees not only denies them their basic rights but also deprives host states and humanitarian actors of clear directives for protection and assistance.

V. Climate Change: A Catalyst for Conflict

Climate change has increasingly been seen as a driver of geopolitical instability, especially in areas that are already conflict-prone. Environmental degradation fuels underlying social, economic, and political tensions, triggering violence, forced displacement, and humanitarian emergencies. This section discusses how climate-driven resource scarcity leads to armed conflicts, aggravates forced migration, and increases the vulnerabilities of affected populations, with an emphasis on conflict-affected areas such as Sudan and Syria.[19]

Resource Scarcity and Violence

Climate change-related environmental degradation, such as desertification, increased drought periods, and declining water supplies, fuels competition over meager natural resources. In many cases, competition is manifest as violent conflicts, particularly within unstable states in which institutional capacities are low, and governing arrangements fail to mitigate clashes.

[19] United Nations Environment Programme (UNEP), *Global Environmental Outlook 6* (UNEP 2019) https://www.unep.org/resources/global-environment-outlook-6 accessed 4 August 2025; Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2023: Impacts, Adaptation and Vulnerability* (IPCC 2023) https://www.ipcc.ch/report/ar6/wg2/ accessed 4 August 2025; The World Bank, *Climate Change and Conflict* (The World Bank 2018) https://openknowledge.worldbank.org/handle/10986/28358 accessed 4 August 2025.

For instance, the Darfur, Sudan conflict has been well documented as one of the first instances where climate change acted as a catalyst that intensified existing drivers of conflict. A [20]2007 United Nations Environment Programme (UNEP) report noted that environmental conditions, including desertification and declining water resources, heightened underlying ethnic tensions and competition for resources between nomadic and settled groups. The report determined that environmental degradation was a key factor in igniting the armed conflict that broke out in 2003, leading to the displacement of more than 2.7 million individuals and causing an estimated 300,000 deaths.

Similarly, reduced water resources through climate variability in the [21]Lake Chad Basin have sharpened local-level conflicts and given rise to such extremist groups as Boko Haram. As people reliant on fishery and agricultural livelihoods had their livelihoods stripped away from them, entry into armed factions was a strategy of survival that gave rise to ongoing cycles of violence and displacement.

Climate-Induced Migration

Climate change not only instigates violence but also leads to mass migration, usually displacing populations into war zones or areas of existing tension. Climate change-related disasters displaced 21.5 million people on average per year between 2008 and 2020, the [22]Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (2022) reports. Though most of them migrate within their own borders, cross-border migration tends to result in conflict with host populations, adding further tension.

In Syria, for example, [23]a severe drought between 2006 and 2010 ruined agricultural livelihoods, triggering an estimated 1.5 million rural to urban migrants. Scholars, as seen in the

[20]United Nations Environment Programme, *Sudan: Post-Conflict Environmental Assessment* (UNEP, 2007) https://www.unep.org/ accessed 24 February 2025

[21]Refugees International, *Climate-Fueled Violence and Displacement in the Lake Chad Basin: Focus on Chad and Cameroon* (Refugees International 2023) https://www.refugeesinternational.org/reports-briefs/climate-fueled-violence-and-displacement-in-the-lake-chad-basin-focus-on-chad-and-cameroon/ accessed 4 August 2025; US Marine Corps University Press, *Lake Chad: Changing Hydrography, Violent Extremism, and Climate* (MCUP 2020) https://www.usmcu.edu/Outreach/Marine-Corps-University-Press/Expeditions-with-MCUP-digital-journal/Lake-Chad/ accessed 4 August 2025.

[22]Intergovernmental Panel on Climate Change, *Sixth Assessment Report* (IPCC, 2022) https://www.ipcc.ch/ accessed 24 February 2025

[23]Colin P Kelley and others, 'Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought' (2015) 112(11) *PNAS* 3241 https://www.pnas.org/doi/10.1073/pnas.1421533112 accessed 4 August 2025; Center for Climate and Security, *The Arab Spring and Climate Change* (2012) https://climateandsecurity.org/2012/02/the-arab-spring-and-climate-change/ accessed 4 August 2025.

research found in the [24]Proceedings of the National Academy of Sciences (PNAS), have postulated that this mass internal displacement intensified social tension and led to heightened social unrest that contributed to the eruption of the Syrian civil war in 2011. Environmental stress, along with political instability, brought together a highly charged situation, under which displaced communities were highly exposed to violence and exploitation.

Case Studies: Sudan and Syria

The Sudan and Syria cases depict the complicated dynamic between climate change and conflict. In Sudan, the environmental degradation of the Darfur region amplified competition over resources, which in turn increased ethnic tensions and fuelled one of the deadliest conflicts of the early 21st century. International agencies, such as the [25]UNHCR, have documented that continued environmental pressure continues to fuel displacement, with refugees pouring into neighbouring nations such as Chad, further destabilizing the region.

In Syria, the two-way interaction between conflict and climate change was also devastating. The drought that preceded the conflict devastated up to 75% of crops and 85% of livestock in certain areas, as reported by the UN [26]Food and Agriculture Organization (FAO). While the rural population moved to urban areas for survival, government apathy and increasing inequalities fueled popular resentment, eventually leading to the outbreak of civil war. The conflict in Syria has already displaced more than 13 million individuals, with several refugees currently living in the precarious state in neighbouring nations such as Lebanon, Jordan, and Turkey.

These case studies show that climate change is not an abstract environmental phenomenon but an immediate and tangible driver of displacement and conflict. Neglecting the underlying environmental drivers of violence pushes displaced populations into uncertainty, since refugee law does not sufficiently account for the two threats posed by climate change and armed conflict.

[24]Colin P Kelley and others, 'Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought' (2015) 112(11) *Proceedings of the National Academy of Sciences* 3241.
[25]UNHCR, *Chad | Influx of Refugees from Sudan (as of 16 March 2025)* (17 March 2025) https://data.unhcr.org/en/documents/details/115187 accessed 4 August 2025.
[26]Food and Agriculture Organization of the United Nations, *FAO in the Syrian Arab Republic* (FAO, 2021) https://www.fao.org/ accessed 24 February 2025

VI. International Legal Frameworks and Their Limitations

Despite the increasing role of climate change in contributing to forced displacement, the existing international legal regime remains inadequate. Existing legal frameworks protect those fleeing conflict and persecution but fail to extend comparable safeguards to individuals displaced by environmental factors. This vacuum in laws positions climate refugees in a vulnerable situation with no binding international protections or paths towards durable solutions.

Geneva Convention and Refugee Law

The pillar of global refugee protection, [27]the 1951 Geneva Convention Relating to the Status of Refugees and its 1967 Protocol, specifies refugees as those who have crossed an international border because of a well-founded fear of persecution on grounds of race, religion, nationality, membership in a specific social group, or political opinion. It does not cover displacement resulting from environmental degradation or climate-related disasters, such as rising sea levels, hurricanes, or extended droughts.

While those displaced due to conflict can invoke the protection of the Geneva Convention, those migrating due to environmental crises in the absence of active persecution are outside the purview of the Convention. For instance, residents of small island nations threatened with extinction due to sea-level rise cannot invoke grounds for asylum under international refugee law even though their homelands are in imminent danger of being destroyed.

Human Rights Law and Soft Law Instruments

Human rights law offers some indirect protection for displaced persons, but enforcement is uneven. The [28]Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) recognizes the necessity of responding to climate-induced displacement and created the Task Force on Displacement. This acknowledgment, however, is not underpinned by binding obligations or tangible mechanisms for protecting displaced persons, making it largely aspirational.

The UN Human Rights Committee has held that states can contravene international human rights law by deporting people to states where climate change presents life-threatening dangers,

[27]*Geneva Convention relative to the Protection of Civilian Persons in Time of War* (adopted 12 August 1949, entered into force 21 October 1950) 75 UNTS 287 (Geneva Convention IV).
[28]*Paris Agreement* (adopted 12 December 2015, entered into force 4 November 2016) UNTS Registration No. 54113

such as in [29]Teitiota v. New Zealand. Yet, this ruling, though historic, remains short of creating a binding precedent for universal refugee protection.

Regional Instruments: Limited Progress and Geographic Constraints

Some regional mechanisms have moved in progressive directions towards the acceptance of displacement by environmental means. The [30]Kampala Convention, ratified by the African Union in 2009, is the very first legally binding instrument that ensures the protection of internally displaced people (IDPs) against natural disasters, such as those provoked by climate change. [31]Article 5(4) of the Convention binds the states to prevent displacement resulting from natural disasters and reduce its consequences.

Although the Kampala Convention is a valuable step, it is geographically confined to African Union member countries and protects internal displacement alone, leaving cross-border climate refugees without legal protection. In Latin America, the [32]Cartagena Declaration broadens the definition of refugees to encompass individuals who are fleeing generalized violence or human rights abuses but like the Kampala Convention also fails to include environmental displacement as a basis for refugee status.

The disjointed character of these frameworks underscores the necessity for an integrated, binding international instrument that specifically deals with climate-induced displacement. Lacking such reform, millions of environmentally displaced persons are legally invisible, trapped in a gap where neither refugee law nor human rights law provides adequate protection.

VII. Double Vulnerability: Climate Refugees in War Zones

Climate refugees in war zones experience a double burden of insecurity and environmental disintegration, exacerbating their exposure and weakening their access to protection and humanitarian assistance. The combination of climate-related displacement with ongoing

[29] *Ioane Teitiota v New Zealand* (2019) CCPR/C/127/D/2728/2016 (UN Human Rights Committee).
[30]*African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa* (adopted 23 October 2009, entered into force 6 December 2012) (Kampala Convention).

[31]African Union, *Convention for the Protection and Assistance of Internally Displaced Persons in Africa (Kampala Convention)* (2009) art 5(4) https://au.int/en/treaties/convention-protection-and-assistance-internally-displaced-persons-africa accessed 4 August 2025.
[32] Cartagena Declaration on Refugees (1984) (Latin America), *Colloquium on the International Protection of Refugees in Central America, Mexico and Panama*, 22 November 1984 https://www.refworld.org/docid/3ae6b36ec.html accessed 4 August 2025.

conflict escalates the challenges to affected populations, subjecting them to structural protection failures, fragmented aid delivery, and extended human suffering.

Protection Failures for Internally Displaced Persons (IDPs)

Internally displaced persons (IDPs) who escape environmental crises usually become stranded in war zones, where vulnerability and instability exacerbate their displacement. In contrast to refugees who cross international borders, IDPs remain in their home country and are subject to domestic jurisdiction where state authorities can be unwilling or incapable of offering protection, especially in war zones.

For instance, in South Sudan, repeated floods displace thousands every year, but most of these displaced people stay in territory held by armed groups, with increased exposure to violence, exploitation, and militia recruitment. The [33]Internal Displacement Monitoring Centre (IDMC) reported that more than 2.2 million individuals in South Sudan were displaced due to conflict in 2023, with climate-related disasters exacerbating displacement trends and leaving numerous people without a safe place to go.

Obstructed Access to Humanitarian Aid

Armed conflict hinders the delivery of humanitarian relief, thereby aggravating the suffering of climate refugees. Humanitarian corridors are usually blocked in areas under war, and aid workers have far-reaching threats to their lives, further inhibiting the access to critical services such as food, water, and healthcare.

Yemen is an extreme case in point, as protracted fighting has been matched with intense drought and flooding. In 2023, the [34]United Nations Office for the Coordination of Humanitarian Affairs (OCHA) found that 17.3 million Yemenis experienced food insecurity, with the natural environment exacerbating the crisis. Nevertheless, access to assistance remains severely impeded, with parties to the fighting imposing sieges and shelling convoys delivering relief supplies, keeping vital assistance from reaching the climate and conflict-displaced.

[33]Internal Displacement Monitoring Centre (n 1)
[34]United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 'Yemen Humanitarian Needs Overview 2023' (December 2022) https://reliefweb.int/report/yemen/yemen-humanitarian-needs-overview-2023-december-2022-enar accessed 4 August 2025.

Case Study: The Rohingya Crisis

The Rohingya crisis provides an example of the intricate relationship between climate displacement and persecution based on conflict. The Rohingya, Myanmar's stateless ethnic minority, were subjected to systematic violence and persecution which drove them in masses to Bangladesh. Yet, environmental factors further worsened their exposure — with [35]Cox's Bazar refugee camps open to cyclones, heavy monsoon rains, and rising sea levels.

As the [36]United Nations High Commissioner for Refugees (UNHCR) describes, close to 1 million Rohingya refugees live in unstable, flood-swept camps, where severe weather events habitually wreck shelters and interrupt access to services. The intersection of systematic violence and environmental risk leaves the Rohingya stuck in a cycle of displacement with no lasting solutions on the horizon and no legal status as climate refugees under the law of nations.

This twin vulnerability highlights the imperative for an integrated protection regime that accounts for the synergistic risks of climate refugees in war zones. Without that protection, displaced persons are trapped in a cycle of violence, ecological uncertainty, and structural disregard.

VIII. Proposed Solutions & Policy Recommendations

The treatment of climate refugees in conflict-ridden areas demands a comprehensive and holistic approach in closing legal gaps, enhancing cooperation on the world stage, and developing community resistance. Such proposals have to find roots in global law, principles of humanitarian action, and consideration of the intersecting relationship between climate change and geopolitics in crisis.

Legal Reform: Expanding International Protections

One of the most urgent requirements is broadening international legal systems to clearly acknowledge climate-related displacement. The [37]1951 Refugee Convention and the [38]1967 Protocol thereto establish refugees as persons fleeing persecution on account of race, religion,

[35]United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 'Bangladesh: Cyclone Hamoon Ravages Cox's Bazar as a Severe Cyclonic Storm, Affecting Over 450,000 Lives and Damaging 13 IRC Learning Centres' (October 2023) https://reliefweb.int/report/bangladesh/bangladesh-cyclone-hamoon-ravages-coxs-bazar-severe-cyclonic-storm-affecting-over-450000-lives-and-damaging-13-irc-learning-centres accessed 4 August 2025.
[36]UNHCR (n 8)
[37] Convention relating to the Status of Refugees, 28 July 1951, 189 UNTS 150 (entered into force 22 April 1954).
[38] Protocol relating to the Status of Refugees, 31 January 1967, 606 UNTS 267 (entered into force 4 October 1967).

nationality, political opinion, or membership in a specific social group. This definition does not cover environmental displacement, which leaves climate refugees without binding international protection.

Human rights experts and humanitarian actors, such as the United Nations High Commissioner for Refugees (UNHCR), have promoted either reform of the Refugee Convention or the creation of a new treaty that addresses environmental displacement. For example, the [39]Global Compact on Refugees (2018) recognizes climate change as a driver of displacement but is not legally binding. A binding convention, patterned after the Refugee Convention, would provide legal recognition, rights, and resettlement channels for climate refugees, guaranteeing their protection even in war-torn areas.

Global Cooperation: Strengthening Institutional Responses

Enhanced international cooperation is necessary to close the legal and humanitarian gaps that plague climate refugees. Global organizations such as the UNHCR, IOM, and UNEP are pivotal in tracking patterns of displacement, campaigning for policy shifts, and facilitating humanitarian relief efforts.

For instance, the [40]UNHCR has initiated the "Strategic Framework for Climate Action," which seeks to mainstream climate resilience into refugee protection policies. Likewise, the [41]IOM's "Migration, Environment, and Climate Change" unit assists governments in formulating policies to respond to climate-induced displacement. Enhancing these organizations' mandates, funding, and coordination capacities would increase their capacity to protect climate refugees, especially in fragile, conflict-affected areas.

Climate Adaptation & Peacebuilding: Building Community Resilience

Pre-emptive investment in community-based resilience schemes is needed to avert displacement and conflict intensification. Climate adaptation measures like green water management, afforestation, and climate-resilient agriculture can diminish resource scarcity and thereby its likelihood to fuel violence. The [42]United Nations Development Programme (UNDP)

[39]United Nations General Assembly, *Global Compact on Refugees* (17 December 2018) UN Doc A/RES/73/151.
[40]UNHCR, *Strategic Framework for Climate Action* (UNHCR, 2021) https://www.unhcr.org/ accessed 24 February 2025
[41]International Organization for Migration, *Migration, Environment and Climate Change: Training Manual* (IOM, 2022) https://www.iom.int/ accessed 24 February 2025
[42]United Nations Development Programme, *Community-Based Adaptation to Climate Change* (UNDP, 2020) https://www.undp.org/ accessed **24 February 2025**

reports that community-based adaptation schemes in conflict hotspot regions of the Sahel reduced local tensions through enhanced access to vital resources.

Peacebuilding initiatives have to incorporate climate factors as well. For example, the [43]UNEP-supported "Environmental Peacebuilding" initiative in Sudan cooperates with indigenous communities to solve resource conflicts exacerbated by desertification and drought. Such programs, linking environmental renewal with conflict mediation, can prevent the vicious cycle of displacement driven by climate change and armed conflict.

These policy suggestions, taken as a whole, offer a way forward to a more equitable and sustainable approach to climate displacement. Through the transformation of international law, the strengthening of institutional cooperation, and the promotion of local resilience, the world can more effectively defend those trapped at the nexus of ecological disaster and state violence.

IX. Conclusion

The nexus of climate change and conflict has exposed displaced communities to a dual vulnerability: environmental breakdown and violent instability. As climate-related disasters intensify, fragile states experience heightened competition over scarce resources, fuelling or exacerbating conflict, as seen in regions like Darfur and Syria. Despite the growing scale of climate-induced displacement, international law remains ill-equipped to address the complex realities faced by climate refugees, especially those in conflict zones.

While the 1951 Refugee Convention[44] remains foundational, it excludes environmental displacement as grounds for asylum, leaving millions without legally binding protection. Regional instruments such as the [45] Kampala Convention provide important frameworks but are territorially limited. Moreover, although human rights laws and international agreements like the [46] Paris Accord recognize climate displacement, their non-binding nature perpetuates a significant protection gap. This regulatory vacuum disproportionately affects internally

[43]United Nations Environment Programme, *Environmental Peacebuilding: Managing Natural Resources for Peace* (UNEP, 2021) https://www.unep.org/ accessed **24 February 2025**

[44] Convention relating to the Status of Refugees, 28 July 1951, 189 UNTS 150 (entered into force 22 April 1954).

[45]African Union, Convention for the Protection and Assistance of Internally Displaced Persons in Africa (Kampala Convention), 22 October 2009, entered into force 6 December 2012 https://au.int/en/treaties/convention-protection-and-assistance-internally-displaced-persons-africa accessed 4 August 2025.

[46]United Nations Framework Convention on Climate Change (UNFCCC), Paris Agreement, 12 December 2015, entered into force 4 November 2016 https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement accessed 4 August 2025.

displaced persons and cross-border migrants in conflict-affected areas, where restricted humanitarian access further jeopardizes survival.

Addressing this multidimensional crisis demands urgent legal and policy reforms. Expanding international refugee law to explicitly include climate displacement, or adopting a dedicated treaty, is imperative to establish binding protections, including rights to asylum and durable solutions. Enhanced international cooperation, led by agencies such as UNHCR and IOM, must close existing legal gaps and improve humanitarian aid delivery in conflict zones. Concurrently, integrating climate adaptation with peacebuilding initiatives at the community level can bolster resilience and help prevent conflict escalation.

Ultimately, protecting climate refugees caught in conflict requires a concerted global response. Recognizing climate displacement as a legitimate basis for international protection is both a legal necessity and a moral imperative—one that upholds the dignity, security, and fundamental rights of some of the world's most vulnerable populations.

Prosperity in the face of growing global challenges. Sustainable businesses integrate environmental and social considerations into their core business strategies, prioritise circular economy principles, engage stakeholders, uphold ethical governance practices, collaborate with partners, foster innovation, and support global sustainability initiatives. By embracing sustainability as a guiding principle, businesses can create value for society, reduce environmental impacts, enhance resilience, and drive positive change towards a more sustainable and equitable future."[1]

[1] "Ashok A. Desai, Environmental Jurisprudence in India 98 (LexisNexis, 2017)."

MITIGATING THE ADVERSE IMPACT OF CLIMATE CHANGE THROUGH PUBLIC & PRIVATE PARTICIPATION

ABSTRACT

Climate change is the most ongoing global challenge and requires a pluralist approach with the participation of both public governance and innovation from the private sector.[1] When formulating policies, enacting regulations, and encouraging international agreements that also set the basis for climate-oriented mitigation, governments bear this responsibility.[2] At the same time, corporations and private entities commit to making these types of investments in sustainable technologies and renewable energy and in carbon reduction strategies, as they tend to respond to regulatory frameworks, economic incentives, and consumer demands.[3] The emergence of public-private partnerships (PPPs) has advanced so many key avenues to climate actions[4], where there is a shared responsibility and solutions through the alliance of both sectors' strengths.

This research paper investigates the role of public and private sector initiatives in addressing climate change mitigation with a particular attention to the case of financial mechanisms, policy framework, and the lessons learnt about successful collaborations. The development of green solutions has been influenced by the private sector, efforts in green innovation, corporate sustainability, and climate finance, as well as government policies such as carbon pricing, emissions trading schemes, and international agreements. It also evaluates the difficulties these initiatives face, including legislative obstacles, greenwashing, and differences in climate funding between industrialized and emerging nations.

The concluding remark of the paper suggests strategies to establish a unified global response, with the joining of government policies, corporate innovation, and financial mechanisms for climate resilience.

Keywords: *Climate Change, Public-Private Partnerships, Sustainability, Carbon Pricing, Green Innovation, Climate Finance, Emissions Reduction, Paris Agreement*.

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[1] Intergovernmental Panel on Climate Change (IPCC), 'AR6 Climate Change 2021: The Physical Science Basis' (2021) <https://www.ipcc.ch/report/ar6/wg1/> accessed 19 July 2025.

[2] UNFCCC, 'The Paris Agreement' (12 December 2015) <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> accessed 19 July 2025.

[3] OECD, 'Effective Carbon Rates 2021' (21 September 2021) <https://www.oecd.org/tax/tax-policy/effective-carbon-rates-2021-brochure.pdf> accessed 19 July 2025.

[4] UNEP, 'Public-Private Partnerships for Sustainable Development' (2015) <https://www.unepfi.org/publications/public-private-partnerships/> accessed 19 July 2025.

I. Introduction

Climate change's impacts are not only environmental, the change affects economies, societies even goes as far as affecting geopolitics. In order to protect the planet from the growing frequency of extreme weather events, lower global temperatures, and stop biodiversity loss, coordinated climate action is required. The Intergovernmental Panel on Climate Change (IPCC) states that scientists have a limited amount of time to bring global warming down to 1.5 degrees Celsius over preindustrial levels.[5] This window is urgent, significant, and essential. But to solve this crisis, governments, corporations, financial institutions, and civil society all needed to address the issue. The fact that climate-induced natural disasters are happening with increasingly greater frequency, sea levels are rising[6], and that all this suffuses up the global supply chains-disrupting our food security, jeopardizing our supply of clean, usable water, and making it less and less possible for us to function as a nation or as a piece of the broader global economy solely wage labour, is making the urgency of the moment clearer than ever before.

Policing is an extremely important role for governments to fulfil in terms of climate action, such as carbon taxes, caps on emissions, or the subsidization of renewable energy.[7] Finally, the ETS and the Inflation Reduction Act (as of 2022 took effect)[8] can be cited as policy frameworks that advocated emission reduction goals that could spur emission reduction and accelerate the transition to sustainable practice. Regulatory mechanisms, including the Carbon Border Adjustment Mechanism (CBAM)[9], also help to restrict carbon leakage from the industries of the world by forcing them to comply with strict climate policies and inducing a global tendency towards sustainability.

At the same time, the private sector is able to support technological innovations, corporate sustainability programmes, and market-driven climate solutions. Among these corporations, there are Tesla, Microsoft, and Unilever, which have promised to achieve net zero emissions

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[5] IPCC (n 1).

[6] IPCC, 'Climate Change 2022: Impacts, Adaptation and Vulnerability' (2022) <https://www.ipcc.ch/report/ar6/wg2/> accessed 19 July 2025.

[7] World Bank, 'State and Trends of Carbon Pricing 2023' (23 May 2023) <https://www.worldbank.org/en/programs/pricing-carbon> accessed 19 July 2025.

[8] European Commission, 'EU Emissions Trading System (EU ETS)' (2023) https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en accessed 19 July 2025; US Congress, 'Inflation Reduction Act of 2022' (Public Law No 117-169, 16 August 2022) https://www.congress.gov/bill/117th-congress/house-bill/5376/text accessed 19 July 2025.

[9] European Commission, 'Carbon Border Adjustment Mechanism' (2023) <https://climate.ec.europa.eu/eu-action/carbon-border-adjustment-mechanism_en> accessed 19 July 2025.

through investments in carbon offset projects or in renewable energy infrastructure.[10] The financial sector is also crucial, with banks and investment firms directing more capital to green bonds, as well as climate-focused funds that focus on sustainable efforts.

Public-Private partnerships (PPPs) have emerged as a start that enhances climate action by helping to balance regulatory oversight with the capabilities of the private sector to deliver efficiency and financial investment. An example is the Green Climate Fund (GCF)[11], part of the UN Framework Convention on Climate Change (UNFCCC), which works with private investors to finance huge sustainability projects in developing countries. Climate Investment Funds (CIF)[12] help to mobilize public and private sector financing to the tune of 17 billion dollars annually to drive meaningful climate projects, in particular in developing economies where development of investment capacity is still widely required.

Both public institutions and businesses are encouraged in global agreements such as the Paris Agreement (2015) to understand the need to work with other stakeholders on the way to achieving regional and global climate commitments.[13] But advances in corporate greenwashing, regulatory failures, and pressing the Rio Summit down the road of the first 2000 years are formidable.

The Investigative Paper explores the respective roles of the public and private sectors for climate mitigation policies; key policy, financial mechanisms, and a case study of successful initiatives. This research aims to analyse the synergies between government actions and corporate strategies to reorient the most plausible paths towards a sustainable and climate-resilient future.

II. Public Sector Initiatives

Governments around the world have implemented a range of laws and regulations to reduce the effects of climate change. The measures include carbon pricing mechanisms, international agreements for emissions control, subsidies for renewable energy, severe emissions

[10] Tesla, 'Impact Report 2022' (2023) <https://www.tesla.com/ns_videos/2022-tesla-impact-report.pdf> accessed 19 July 2025; Microsoft, 'Sustainability Report 2022' (2022) <https://www.microsoft.com/en-us/sustainability/emissions-impact-dashboard> accessed 19 July 2025; Unilever, 'Climate Transition Action Plan' (2021) <https://www.unilever.com/planet-and-society/climate-action/> accessed 19 July 2025.

[11] Green Climate Fund, 'About the Fund' (2024) <https://www.greenclimate.fund/about> accessed 19 July 2025.

[12] Climate Investment Funds, 'About Us' (2024) <https://www.climateinvestmentfunds.org/about> accessed 19 July 2025.

[13] UNFCCC (n 2).

regulations, etc. Incorporating public sector initiatives and initiatives that successfully establish legal and financial structures that promote sustainable practice across industries is vital.

Carbon Pricing Mechanisms

Carbon pricing, which includes carbon taxes and emissions trading systems (ETS), is one of the most effective ways to reduce carbon emissions.[14] It is a prime example: the European Union's Emissions Trading System (ETS[15]), setting a cap-and-trade future for companies to arrange the purchase and sale of emission allowances. Thus, this mechanism acts as an incentive to businesses to reduce their carbon footprint or invest in cleaner technologies.

Canada also employs carbon pricing, a price on carbon emissions that companies will be forced to curb by switching to sustainable options[16]. Countries like Sweden have managed to implement carbon taxes and have done so without being a hurdle to economic growth. For example, the carbon tax in Sweden is the highest globally and is equal to $137 per ton of CO_2, and the country has managed to reduce emissions while continuing to develop economically.[17]

The launch of China's National Carbon Market in 2021 is considered the world's largest carbon trading system that covers power generation plants that produce more than 40% of China's emissions.[18] It is a system that is intended to release industrial emissions more strictly and to promote greener energy sources by businesses.

Renewable Energy Policies and Subsidies

Subsidies and tax incentives have been introduced by governments around the world to ease the transition to renewable energy sources. Tax credits to produce solar, wind, and electric cars

[14] World Bank, 'State and Trends of Carbon Pricing 2023' (23 May 2023) <https://www.worldbank.org/en/programs/pricing-carbon> accessed 19 July 2025.

[15] European Commission, 'EU Emissions Trading System (EU ETS)' (2023) <https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en> accessed 19 July 2025.

[16] Government of Canada, 'Carbon Pricing' (2023) <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work.html> accessed 19 July 2025.

[17] Ministry of Finance (Sweden), 'Sweden's Carbon Tax' (2023) <https://www.government.se/articles/2021/06/swedens-carbon-tax/> accessed 19 July 2025.

[18] International Carbon Action Partnership (ICAP), 'China National ETS' (2023) <https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=55> accessed 19 July 2025.

are included in the United States' Inflation Reduction Act (2022). The $369 billion in climate investments is a historic amount for the United States.[19]

India's National Solar Mission has brought the country's solar power capacity to a large capacity of solar energy producers globally. The pioneer of this initiative includes installing 100 GW of solar capacity by 2030 to reduce the dependence on coal and other fossil fuels.[20]

However, this has been in the context of developed country Germany's Energiewende (Energy Transition) policy, which has given rise to large-scale investment in wind and solar power, a global leader in the adoption of renewables.[21] The approach of Germany is a good illustration of how to transition away from fossil fuels, as over 50% of its energy demand is met by renewables.

International Climate Agreements

International collaboration is necessary for effective climate action. The Paris Agreement, which was signed by 196 nations in 2015, aims to keep global warming well below 2C, with each nation establishing carbon reduction goals.[22] Without this agreement, the nations would be submitting Nationally Determined Contributions (NDCs) – outlined climate goals – which form part of this agreement.

The Glasgow Climate Pact (2021) brought about the reduction of coal use and an increase in climate finance for developing nations.[23] This agreement recognized that the industrialized nations had historical responsibility and called on wealthier countries to provide economic and technological support to vulnerable economies.

Global emission reduction commitments were first established in the Kyoto Protocol (1997): the developed countries were forced to adopt legally binding targets.[24] Although deposed by the Paris Agreement, Kyoto established carbon offsets that now have a great influence on global climate policy.

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[19] US Congress, 'Inflation Reduction Act of 2022' (Public Law No 117-169, 16 August 2022) <https://www.congress.gov/bill/117th-congress/house-bill/5376/text> accessed 19 July 2025.

[20] Government of India, Ministry of New and Renewable Energy, 'Jawaharlal Nehru National Solar Mission' (2023) <https://mnre.gov.in/national-solar-mission/> accessed 19 July 2025.

[21] Federal Ministry for Economic Affairs and Climate Action (Germany), 'The Energy Transition' (2023) <https://www.bmwk.de/Redaktion/EN/Dossier/energy-transition.html> accessed 19 July 2025.

[22] UNFCCC (n 2)

[23] UNFCCC, 'Glasgow Climate Pact' (13 November 2021) <https://unfccc.int/documents/310497> accessed 19 July 2025.

[24] UNFCCC, 'Kyoto Protocol' (11 December 1997) <https://unfccc.int/kyoto_protocol> accessed 19 July 2025.

Climate Finance and Green Bonds

Climate adaptation and mitigation projects are relying on much of their public sector funding. A large part of the amounts invested in climate resilience initiatives are allocated by governments and international financial institutions such as the World Bank and the International Monetary Fund (IMF).

These are green bonds, loaned by the government or financial institutions to governments and financial institutions only to invest in climate-related projects such as renewable energy, sustainable infrastructure and forestation. The European Investment Bank (EIB) is a pioneer in green bond issuance and has been funding large-scale sustainability projects all around the globe.[25]

Climate adaptation funds are channelled through the Adaptation Fund or the Global Environment Facility (GEF) to developing nations that are generally most vulnerable to climate change, thus enabling access to finances for sustainable development.[26] In order to increase resilience against climate-related disasters, the Green Climate Fund gathered over $10 billion, which was then invested in projects in developing nations.[27]

Regulatory Policies and Emission Standards

Pollution is controlled by forcing the industries to follow strict emission regulations, which are enforced by the government. It is part of the European Green Deal, which provides a roadmap to reach climate neutrality by 2050, and harsh targets for emissions towards different sectors. Emissions reduction is enforced to 55% by 2030 while also promoting sustainable industries.[28]

Similarly, China has also introduced its own national emissions trading scheme that includes power generation and high-emission industries[29]. China's policies on climate are important in the fight to reach global emission reduction targets, as it is the world's largest emitter of them.

[25] European Investment Bank, 'Green Bonds' (2023) <https://www.eib.org/en/investor_relations/green-bonds/index.htm> accessed 19 July 2025.
[26] Adaptation Fund, 'About the Fund' (2023) <https://www.adaptation-fund.org/about/> accessed 19 July 2025; Global Environment Facility, 'About Us' (2023) <https://www.thegef.org/about-us> accessed 19 July 2025.
[27] Green Climate Fund (n 11)
[28] European Commission, 'A European Green Deal' (2023) <https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en> accessed 19 July 2025.
[29] ICAP (n 18)

The Clean Air Act has established emission reduction standards in the United States: power plants and industrial emissions. Fuel efficiency standards and reductions in methane emissions have increased with the Biden administration's EPA.[30]

Public Infrastructure and Sustainable Urban Planning

Furthermore, governments are funding sustainable urban development. The C40 Cities Initiative is a network of 97 major cities that prioritizes policies such as low-emission zones, climate-resilient infrastructure, and green transportation[31]. Cities like Singapore, Copenhagen, and Amsterdam have smart energy grids, electrified public transport, and robust cycling infrastructure to reduce emissions.

A public programme that is extremely new and matches the overall strategy of China's Sponge City Initiative, Green Infrastructure is integrated within China's Sponge City Initiative to respond to issues related to flood risk in cities.[32] Their initiative extends climate resilience to rapidly urbanizing areas by implementing permeable pavements, green roofs, and wetland conservation.

The Smart Cities Mission aims to develop a sustainable urban atmosphere with green transportation and renewable energy projects in India.[33] Pune and Bangalore have taken serious steps toward reducing the emissions of the cities by means of large-scale solar energy projects and electric bus fleets.

Disaster Preparedness and Climate Resilience

At the same time, governments have also used climate adaptation strategies to protect communities from extreme weather events. National governments' implementation of disaster resilient infrastructure, early warning systems, and emergency response strategies, using the United Nations Office for Disaster Risk Reduction (UNDRR)[34] to assist.

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[30] US Environmental Protection Agency (EPA), 'Summary of the Clean Air Act' (2023) <https://www.epa.gov/laws-regulations/summary-clean-air-act> accessed 19 July 2025.

[31] C40 Cities, 'About C40' (2023) <https://www.c40.org/about/> accessed 19 July 2025.

[32] World Resources Institute (WRI), 'How China's Sponge Cities Are Preparing for Climate Change' (14 March 2023) <https://www.wri.org/insights/how-china-s-sponge-cities-are-preparing-climate-change> accessed 19 July 2025.

[33] Government of India, Ministry of Housing and Urban Affairs, 'Smart Cities Mission' (2023) <https://smartcities.gov.in/> accessed 19 July 2025.

[34] United Nations Office for Disaster Risk Reduction (UNDRR), 'About UNDRR' (2023) <https://www.undrr.org/about-undrr> accessed 19 July 2025.

One of the most extreme flood protection systems in the world is the Delta Works of the Netherlands[35], which is a showcase of the potential that government investment in infrastructure has to save populations from the rampaging power of climate. It greatly reduced the risk of flooding in a country, half of which lies below sea level.

Like Japan, the country has taken proactive steps to prevent tsunamis and typhoons, such as earthquake-resistant buildings, coastal embankments, and early warning systems, and is showing that, therefore, proactive strategies for climate adaptation are also critical.

Challenges in Public Sector Climate Policies

Even though great progress has been made, implementing and enforcing the public sector efforts are still a challenge. Yet, many developing nations are poor and cannot afford or develop the necessary technological capabilities to implement large-scale climate measures. Political resistance, lobbying by the sectors of the fossil fuel industries, and inconsistent policy enforcement constantly slow down the process.

Greenwashing, when governments or corporations overstate their climate pledges without taking meaningful action, is the other significant issue.[36] For example, some of the countries are advancing fossil fuel projects while still having net-zero commitments, raising the contradiction between practice and policy.

Additionally, climate finance inequalities are an immense problem. Despite their commitment to provide a total of $100 billion a year to support climate mitigation in developing countries, actual financial flows are short of promises.[37]

III. Private Sector Contributions

The private sector may play a vital role in combating climate change through innovation, investment, and corporate sustainability. Many of the corporations have a net-zero target, investing in renewable energy, and taking their suppliers' supply chains into consideration. With businesses understanding the dangers of climate change as regards the economy, attention

[35] Government of the Netherlands, 'Flood Protection – Delta Works' (2023) <https://www.government.nl/topics/water-management/delta-works> accessed 19 July 2025.

[36] OECD, 'Climate Change and Greenwashing' (2022) <https://www.oecd.org/climate-action/greenwashing/> accessed 19 July 2025.

[37] UNFCCC, 'Climate Finance in the Paris Agreement' (2023) <https://unfccc.int/topics/climate-finance/the-big-picture/climate-finance-in-the-negotiations/climate-finance-in-the-paris-agreement> accessed 19 July 2025.

has shifted towards investing in the climate, green finance, and technological innovations to have lower carbon footprints.

Corporate Sustainability Commitments

Environmental, Social, and Governance (ESG) criteria are integrated into the business strategies of the leading multinational corporations.[38] Companies are developing science-based targets for the reduction of emissions, increased efficiency of energy, and minimizing their ecological footprint.

Apple is dedicated to decreasing emissions from the production of its products, increasing the recyclability of its products, and switching to 100% renewable energy by 2030 in order to eradicate emissions from its whole supply chain.[39]

In fact, in 2017, Google's global operations were running on 100 percent renewable energy, and today the company is aiming to become carbon-free by 2030 through access to clean energy sources all the time.[40]

Microsoft has promised to do things one step further and go beyond carbon neutrality by 2030, to become carbon negative with a greater amount of carbon removed than emitted.[41] In addition to this, Microsoft wants to have removed all the carbon it has produced since its inception in 1975 by 2050.

These corporate commitments are important as they send a message to other businesses to get in on low-carbon technology and sustainable business model action.

Renewable Energy Investments

It has been private companies that have played the key role in pushing for the transition to renewable energy. Investments from large tech and energy companies have reduced the cost of solar and wind energy significantly and have increased the cost of renewables less expensive than fossil fuels.

[38] UN Principles for Responsible Investment (UN PRI), 'What is ESG?' (2023) <https://www.unpri.org/esg-issues/esg> accessed 19 July 2025.
[39] Apple Inc, '2023 Environmental Progress Report' (2023) <https://www.apple.com/environment/> accessed 19 July 2025.
[40] Google, '2023 Environmental Report' (2023) <https://sustainability.google/progress/> accessed 19 July 2025.
[41] Microsoft (n 10)

Elon Musk's Tesla is revolutionizing clean energy and has done it by powering the world with affordable solar panels and battery storage solutions.[42] The Powerwall and Megapack energy storage systems from Tesla store excess solar energy for later use so that people living in households and businesses no longer depend on fossil fuels.

Amazon is the world's biggest corporate buyer of renewable energy, with 100 or so solar and wind projects across the world helping in achieving the aim of being net-zero carbon by 2040.[43]

To become climate positive by 2030, IKEA has set a target to mitigate more greenhouse gas emissions than the company produces. Hoping to lead in the California Energy Commission Executive Order, the company has invested in thousands of winds and solar farms, with more than 700,000 solar panels installed in its stores and warehouses.[44]

Worldwide, businesses purchase and invest in renewable energy, which is driving global demand, helping clean energy to become more accessible and cheaper for customers.

Sustainable Supply Chains and Circular Economy Initiatives

The traditional supply chains are getting rewritten by many businesses as they are looking to reduce emissions, minimize waste, and promote resource efficiency. During the pursuit of a circular economy (those products designed for recycling, reuse, and lifespan extensions), there is an increasing momentum.

The plastic packaging that Unilever uses will be brought to recyclability, reuse, or compostability by 2025. To achieve net zero in the supply chain by 2039, the company is also going for it.

Nike's ways to achieve sustainability are through its Move to Zero initiative, which involves using recycled materials in their products, like the Nike Air shoes, which have 50% recycled content.[45]

Such as organic cotton, recycled polyester, and other sustainable fabrics found in H&M's Conscious Collection. By 2030, the company aims to only source the materials sustainably.[46]

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[42] Tesla (n 10)

[43] Amazon, 'Sustainability Report 2023' (2023) <https://sustainability.aboutamazon.com/> accessed 19 July 2025.

[44] IKEA, 'Sustainability Report FY22' (2023) <https://about.ikea.com/en/sustainability> accessed 19 July 2025.

[45] Nike Inc, 'Move to Zero' (2023) <https://purpose.nike.com/move-to-zero> accessed 19 July 2025.

[46] H&M Group, 'Sustainability Performance Report 2022' (2023) <https://hmgroup.com/sustainability/> accessed 19 July 2025.

Businesses redesign their supply and production chain and decrease their environmental impacts under an environmental and economic profitability.

Green Finance and Sustainable Investments

Green investments that are aligned with such climate goals are getting more and more prioritized by the financial sector. Investment banks, asset and hedge managers, as well as investment firms, are pouring money into projects that help create renewable energy, clean technology, and climate resilience.

As the world's largest asset manager, BlackRock has made sustainability absolutely critical to its decisions on where to invest. The firm is exiting from fossil fuel investments on the path to favouring ESG-compliant companies.

By 2030, Goldman Sachs intends to invest $750 billion in sustainable finance initiatives, such as climate adaptation and green infrastructure.[47]

More than $1 trillion is being issued in the Green Bond Market globally. These bonds finance projects, programs of renewable energy and sustainable infrastructure, and climate resilience.[48]

As the financial institutions channel money into sustainability, businesses are being pushed to modify their business practices to be greener, leading to a chain reaction in other industries.

Carbon Offsetting and Nature-Based Solutions

There are many companies that are investing in carbon offset programs in order to neutralize their emissions. Broadly, these are reforestation, afforestation, and carbon capture technologies, which seek to balance out corporate carbon footprints.

British Airways and Delta have both started carbon offset programs to allow customers to pay for forest projects that absorb CO_2 from flights.[49]

Microsoft and Shopify are investing in direct air capture (DAC) technologies in which CO_2 is removed directly from the air and buried underground.[50]

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[47] Goldman Sachs, 'Sustainable Finance Commitment' (2023) <https://www.goldmansachs.com/our-commitments/sustainability/> accessed 19 July 2025.

[48] Climate Bonds Initiative, 'Green Bond Market Summary Q1 2023' (2023) <https://www.climatebonds.net/resources/reports/green-bond-market-summary-q1-2023> accessed 19 July 2025.

[49] British Airways, 'Carbon Offsetting' (2023) <https://www.britishairways.com/en-gb/information/environment/carbon-offsetting> accessed 19 July 2025; Delta Air Lines, 'Sustainability' (2023) <https://news.delta.com/sustainability> accessed 19 July 2025.

[50] Microsoft (n 10)

The Amazon Rainforest Protection Program is funded by a slew of multinational corporations, which provide financial support for reforestation as well as sustainable land use in vulnerable ecosystems.[51]

Carbon offsets are not a substitute for emission reductions, but they constitute another way to diminish climate change.

Technological Innovations for Climate Action

Private sector innovation is driving breakthroughs in clean energy, sustainable materials, and climate adaptation technology.

Electric Vehicles (EVs): Tesla, Rivian, and all other auto makers from Ford and General Motors and beyond are shelling out billions in EV technology as they aim to phase out gas vehicles.

Carbon Capture and Storage (CCS): This technology stores CO_2 underground after capturing it from the atmosphere. Clime Works and Carbon Engineering are two of the few up-and-coming businesses creating the most advanced carbon removal technologies.[52]

Plants and Lab Grown: The food industry is going towards plant-based and lab-grown meat for environmental reasons to reduce the environmental damage that livestock farming causes. The companies leading the way in creating sustainable food alternatives are Beyond Meat, Impossible Foods, and Eat Just.

These technological solutions show the private sector's ability to come up with something that will reduce emissions, but satisfy consumer demand.

Challenges in Private Sector Climate Action

Despite significant progress, the private sector faces challenges in fully implementing climate-friendly business models:

Greenwashing: Some companies exaggerate their sustainability efforts without making substantial changes. For example, oil companies are promoting small-scale renewable energy projects while continuing to expand fossil fuel extraction.[53]

[51] Amazon Watch, 'Protecting the Amazon Rainforest' (2023) <https://amazonwatch.org/> accessed 19 July 2025.
[52] Climeworks, 'Direct Air Capture' (2023) <https://climeworks.com/> accessed 19 July 2025; Carbon Engineering, 'Our Direct Air Capture Technology' (2023) <https://carbonengineering.com/> accessed 19 July 2025.
[53] ClientEarth, 'What is Greenwashing?' (2023) <https://www.clientearth.org/latest/latest-updates/stories/what-is-greenwashing/> accessed 19 July 2025.

Short-Term Profit Goals vs. Long-Term Sustainability: Many businesses prioritize quarterly profits, making long-term sustainability investments less appealing to shareholders.

Regulatory Barriers: Inconsistent environmental regulations across countries create uncertainty for businesses investing in clean technology.

Supply Chain Complexity: Many companies rely on global supply chains, making it difficult to track and reduce emissions across all levels of production.

The Future of Private Sector Climate Action

Businesses need to perform science-based target setting alongside transparency measures in sustainability reporting while working with governments and NGOs.[54] Corporate accountability can be enhanced by making verified carbon footprint disclosure requirements, since it ensures meaningful transformation from climate pledges.

Climate change transformation is powered by private sector innovativeness through capital investment combined with sustainable business operations. Main companies have established detailed goals to minimize emissions while they dedicate their funds to reduce pollution and their business networks to operate sustainably. Progress toward sustainable goals requires solutions to greenwashing issues and government policy obstacles, which need to be solved in order to make a real impact. The collective sustainable actions initiated by businesses will serve as essential components to achieve worldwide climate targets, together with reaching the future vision of a low-carbon ecosystem.

IV. Challenges & Criticism

Multiple obstacles still exist despite the progress achieved by the public and private sectors when it comes to climate change mitigation. The shortcomings create barriers that disrupt the whole process of climate regulation, as well as sustainable financial strategies and corporate environmental actions. Climate action receives criticism about how it is executed and its fairness as well as its total effects. The following section analyses critical problems and criticisms linked to climate change mitigation approaches.

[54] Science Based Targets Initiative (SBTi), 'About Us' (2023) <https://sciencebasedtargets.org/about-us> accessed 19 July 2025.

Policy Gaps and Enforcement Issues

Contemporary governments throughout the world have developed climate policies but lack sufficient enforcement capacity to properly enforce them. The regulatory bodies in numerous nations face insufficient authority and funding to execute their responsibilities in compliance with emission reduction targets. The Paris Agreement (2015) is based on voluntary national commitments through Nationally Determined Contributions, yet fails to create any enforceable obligations.[55] The United States, along with Brazil, has received public criticism because it adopted policies to weaken environmental protection measures and did not fulfil its climate objectives[56]. The constant changes in political leadership frequently result in environmental policies becoming disfavoured for prioritizing economic growth.

Financial Constraints and Climate Inequality

Climate action faces significant difficulties because of the limitations in climate financial support. Completed climate funding commitments from developed nations toward developing countries have failed to reach sufficient levels. Under the Copenhagen Accord (2009), nations that had developed economies made financial promises totalling $100 billion annually for helping vulnerable nations elsewhere.[57] Records suggest that the distributed funds arrived below planned levels, while most financial support takes the form of loans instead of grants. Developing economies must handle the financial strain because they already deal with debt issues.

The principle of climate justice receives inadequate recognition in most circumstances. Nations possessing elevated economic grounds that emitted the greatest amount of greenhouse gases throughout history establish rigorous environmental regulations that impact industrial operations within developing countries. The European Union implements a Carbon Border Adjustment Mechanism through trade barriers that tax external imports and negatively burden developing nations' environmental policies.[58] Financial limitations, together with trade obstacles, create obstacles to achieving climate equality in terms of actions.

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[55] UNFCCC (n 2)

[56] Harvard Environmental Law Review, 'US Climate Policy Rollbacks and Impacts' (2022) <https://harvardelr.com/> accessed 19 July 2025; Climate Action Tracker, 'Brazil' (2023) <https://climateactiontracker.org/countries/brazil/> accessed 19 July 2025.

[57] UNFCCC, 'Copenhagen Accord' (18 December 2009) <https://unfccc.int/process/conferences/pastconferences/copenhagen-climate-change-conference-december-2009/cop-15> accessed 19 July 2025.

[58] European Commission CBAM (n 28)

Corporate Greenwashing and Lack of Accountability

Climate mitigation efforts from private companies suffer from greenwashing because companies create misleading marketing about their eco-friendly activities without meaningful changes. Major oil companies, including BP and Shell, receive public criticism since they create renewable energy branding yet continue expanding their fossil fuel operations.[59] Multinational brands face allegations of deceptive sustainability practices, which occur specifically in the fields of fashion and the consumer goods industries.

This problem develops because corporate sustainability reporting lacks consistency through a unified framework. Corporate transparency receives support from TCFD and GRI, yet businesses maintain the freedom to decide whether or not to comply.[60] Businesses currently function outside regulated standards, which allows them to alter data, giving false sustainability indications to consumers and investors.

Global Power Imbalance in Climate Governance

Nations tend to be critical of international climate policies because they are maintained by powerful nation-states, which leave less powerful countries with little say in decision-making. Small island states and less developed countries have lamented that the United Nations Framework Convention on Climate Change (UNFCCC) is unfairly favouring the interests of industrialized countries and lacks adequate representation.[61]

An example would be that of the Kyoto Protocol (1997), which contravened itself and laid legally binding emission targets on developed countries, but not on emerging economies like China and India[62]. On the other hand, the Paris Agreement (2015) was a more inclusive tent, only to leave it up to the richer nations to set their rate of emissions reduction, which can sometimes be delayed.

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[59] Greenpeace, 'Big Oil's Climate Claims Exposed' (2023) <https://www.greenpeace.org/international/story/54407/big-oil-climate-claims-exposed/> accessed 19 July 2025.

[60] Task Force on Climate-related Financial Disclosures (TCFD), 'About' (2023) <https://www.fsb-tcfd.org/> accessed 19 July 2025; Global Reporting Initiative (GRI), 'About GRI' (2023) <https://www.globalreporting.org/about-gri/> accessed 19 July 2025.

[61] Alliance of Small Island States (AOSIS), 'About AOSIS' (2023) <https://www.aosis.org/about/> accessed 19 July 2025.

[62] UNFCCC Kyoto (n 24)

Resistance from Fossil Fuel Industries and Political Lobbies

Climate action faces substantial obstacles because of the industry based on fossil fuels. The oil and gas, and coal industries spend their money to support lobbying activities that aim to delay or diminish climate regulations. The American Petroleum Institute (API), together with comparable entities, officially stands against carbon tax implementation and strengthened emission control measures because of economic reasons. Saudi Arabia and Russia, together with other fossil fuel exporting nations, fight against ambitious climate targets while appearing at international climate conferences.[63]

Resource-dependent political leaders resist adopting tough climate policy measures because influential business entities oppose them. Countries including India, Australia, and the United States demonstrate economic as well as political difficulties when attempting to end their dependence on coal yet transition to low-carbon systems.

Public Awareness and Behavioural Barriers

Although comprehensive scientific evidence proves climate change exists, multiple forms of false information preserve public doubt, which slows down climate agenda development. Various governments reject climate change policies mainly because fossil fuel corporations support denial movements.[64] Climate change serves as a highly controversial political subject in the United States because it shapes national legislative choices.

The choices that customers make throughout their daily lives influence environmental action efforts considerably. People find it difficult to change their behaviour to make sustainable choices, which include plant-based eating and lower energy use and waste generation, because of how habitual their actions are.[65] Human beings require additional educational initiatives and stronger incentives from governments and private groups to sustain practices that protect the environment.

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[63] Climate Home News, 'Saudi Arabia and Russia Undermining Climate Talks' (2023) <https://www.climatechangenews.com/> accessed 19 July 2025.

[64] Union of Concerned Scientists, 'The Climate Deception Dossiers' (2023) <https://www.ucsusa.org/resources/climate-deception-dossiers> accessed 19 July 2025.

[65] UNEP, 'Changing Consumer Behaviour for Climate Action' (2022) <https://www.unep.org/resources/publication/changing-consumer-behaviour-climate-action> accessed 19 July 2025.

V. Future Strategies & Recommendations

Making a lasting, effective response to climate change demands organized governance frameworks with supported funding and new technology development, along with public education initiatives. A sustainable future needs advanced actions and complete systemic reform, even though significant achievements emerged from official regulations and business programs.

Implementing strict controls on climate policies

International climate agreements face an important obstacle due to insufficient enforcement practices. Government entities across many nations make emission reduction promises while taking weak actual steps due to economic and political interests. Binding commitments in the Paris Agreement, along with complementary frameworks, need to have stronger legal force to maintain compliance.

A global carbon pricing mechanism applying carbon taxes and emissions trading systems needs expansion into the major economies through financial support from richer nations. The annual substantial financial support for fossil fuels could be optimized for clean energy investments through complete subsidy elimination.

Governments need to introduce enhanced environmental regulations that corporations and industries must follow at the national level. Guaranteed emissions boundaries should accompany sustainability examination requirements, and stiff punishments must be enforced against all organizations that fail to comply with regulations.

Increasing Climate Finance & Investment in Green Technologies

Financial backing stands as a central requirement for advanced nations as well as nations in development to execute climate management approaches properly. The progress of reaching the $100 billion annual climate finance target under UNFCCC remains slow, although concentrated investment in green energy projects together with infrastructure development can speed up sustainable changes.[66]

Global private sector investments will be activated through expanding green bonds and climate funds.[67] Nations facing environmental disasters should obtain easier access to climate financial

[66] UNFCCC Climate Finance (n 2)
[67] Climate Bonds Initiative (n 48)

support through the collaboration of financial institutions like the World Bank and the IMF, and regional development banks.

Public entities support green investment by giving tax benefits and providing cheap financing and payment support to organizations that advance clean energy innovation. The funding needs of extensive sustainable development projects depend heavily on enhanced public-private partnership development initiatives.

Sustainable business practices linked with corporate responsibility need more strength

Business organizations participate at a central level by either exacerbating global warming impacts or reducing their effects on the environment. Companies do more CSR work today, yet significant numbers of businesses perform artificial green initiatives that disguise their actual environmental progress. All organizations should provide sustainable reporting information through enforced regulations that enhance transparency about their environmental activities.

Businesses that set specific sustainability targets for carbon neutrality within the 2030 and 2050 frameworks should receive tax breaks and monetary support from the government. Multinational enterprises must face worldwide sustainability protocols designed to stop them from sending their pollution to less-regulated nations.

Efforts to boost renewable energy adoption and invention must occur at increased speed.

Renewable energy has increased its presence, but fossil fuels remain the primary source of worldwide energy consumption. Governments need to increase renewable energy production through direct financial support and development grants with steady performance rewards. The future growth of electric vehicles, smart grids, and battery storage systems will boost clean energy adoption throughout societies.

CCS technologies and hydrogen energy, and biofuels need funding as investments to decrease fossil fuel dependence. Cleaning the energy supply requires directing resources from research grants and university partnerships with industry incentives to advance innovative clean energy solutions.

Climate Education & Public Awareness

Public engagement is very crucial in any climate action. But this can be changed through increasing investments in climate literacy programmes, environmental education, and public

awareness campaigns that can affect consumer behaviour, voting patterns.[68] Climate science and sustainability education should be taught in classrooms and spoken about in the media. Schools, universities, and media outlets carry the responsibility to incorporate climate science and sustainability education into their curriculum and their talk.

Further, governments must also provide support to community-led climate initiatives for which local participation in sustainable practices, like afforestation, waste management, and water saving, is encouraged. Bans on single-use plastic and incentives for eco-friendly products would promote sustainable lifestyles by driving a shift in a stronger policy on sustainable consumption.

VI. Conclusion

Climate change is among the most pressing global crises of the times, and the problem is borne by each nation, economy, and individual. While progress and public awareness have been made when it comes to climate agreements, technological advances, and increasing awareness of global warming, it is not enough to stop things from getting worse. But bold policies, a big level of investments, and collective responsibility on the part of governments, companies, and people alike are necessary for the future of our planet.

So far, the takeaway from the climate actions for this is that just rhetoric is no longer good; you have to have a mechanism that holds people and countries accountable to the sustainability goals that they set. Both financial and policy-driven incentives must be matured to accelerate our transition to renewable energy, to shed our reliance on fossil fuel, and to promote good business practice. The mobilization of resources for both developed and developing nations to put in effective solutions will be facilitated by green finance, which covers climate funds and carbon pricing.

As corporations are the largest contributors of greenhouse gas emissions, there is a particularly big responsibility needed in terms of addressing climate change. Although lots of businesses have promised to decrease their carbon footprint, greenwashing still represents a significant concern, and therefore, more robust sustainability reports and venture responsibilities are essential. Environment audits must be compulsory for all governments, stricter regulations

[68] UNESCO, 'Education for Sustainable Development' (2023) <https://en.unesco.org/themes/education-sustainable-development> accessed 19 July 2025.

should be enforced on companies that genuinely care about the environment, and incentives and rewards should also be given to these industries.

Nevertheless, the involvement of people in this matter is not enough if policy and regulation are not presented as a sole strategy. There must be a societal shift in attitudes towards consumption, usage of energy, and environmental responsibility. It will educate schoolchildren to strengthen climate education and advance community-based initiatives, thereby increasing people's capabilities to live a sustainable life and to demand stronger policies from their governments on climate change. In addition, clean energy, carbon capture technologies, as well as eco-friendly infrastructure innovations, are going to be crucial to the long-term solution of climate change.

In spite of the scale of the task, the way forward presents itself in a straightforward path: determined action, new ways of solving problems, and shared commitment. As a social, economic, and moral problem caused by climate change, the world must awaken and realize that it's not just an environmental problem. The more time is wasted, the greater the risk of damage that cannot be undone. A sustainable, low-carbon future with a liveable planet for future generations can succeed only with a global, unified effort.

APPLICATION OF WATER (PREVENTION AND POLLUTION) ACT, 1974 ON THE STATE OF WEST BENGAL THROUGH STATE BOARDS

ABSTRACT

This paper details the various ways through which the Water (Prevention & Pollution) Act, 1974 is being implemented upon the State of West Bengal through the State Boards i.e. through West Bengal Pollution Control Boards. There firstly the two main ways mentioned which are adopted for these implementations i.e. investigation and categorization, where investigations done on the basis of generality and complaints have been discussed. Followed by classification of industries on the basis of red, orange, green & white is being detailed here. That is its conceptions and related to real life examples with an analysis has been mentioned here. Then some real-life case laws have been mentioned where the application of the concerned act has been presented in positivity as well as in negativity, with detailed analysis of it. Lastly some probable recommendations given for the same.

Key Words: *Water (Prevention and Control of Pollution) Act, 1974, West Bengal Pollution Control Board, Industrial Categorisation*

I. Introduction

West Bengal is regarded to be one of the most fertile states in the country. And here fertility is totally referable to the soil it has. And the soul reason of the same is because of in numerous lakes and rivers present here. They with their alluvial makes the soil fertile. Not only that through the process of irrigation also the same is added to its fertility. Hence this results on lot many crops to be grown, leading to an indirect contribution of water in the economy of the state. Apart from that with regard to urbanization and development, we see that the state is also very enriched. The rapid development of industries is very vibrant in the particular state. Now here the question lies e these two mechanisms going parallelly in a smooth way. Is the fact really not that where the intense development of industrial sector is causing the native primary mode of economy, by hampering the water resources. Are the water resources, not appearing to be a mode of exploitation for these entities, is the actual question. And for that the regulations proposed are adequate enough or not is also to be tried. Such has been detailed in the paper.

II. Riverine Geology of West Bengal

If we analyse the entire characteristics of the sate we find out that the same is enthralled with various river wetlands, estuaries, reservoirs present. It is one of the most enriched states when comes to encompassment of water bodies, of it on several parts. If we have an over view of it, then first comes the Ganga, which is the largest river of the country, covering almost the eastern part of the state. This river contributes to the economy of the state up to a great extent. And such is inclusive of irrigation as well as hydro-electric projects, nutrition, etc. holistically in the entire state of Bengal, mainly in the eastern part of the same. Even within the river, there are certain tributaries of the same, namely the Ganges, Padma, Ganga, jalangi, Ichhamati, churni whose most of the part is covered by the sides of Bengal. After that comes the river Subarnarekha . This covers the western part of the state, i.e. the mainly the plateau side of the place, having covered the district of Purulia, in the most of its part. Kangsabati is also another river on such side of Bengal. This is also contributory in various irrigations as well as in hydroelectric projects. Coming to the northern part of the state we find the rivers like Teesta, Torsha and Raichowk having covered the majority stretch of it. Coming to the wetlands, part, it is seen that here even the state is having its enrichment. And majority of its part is mainly of East Kolkata wet-lands, Sundarbans mangrove wetlands. The first is covering the southern part of the West Bengal, i.e. the major part of the Sundarbans. And the other is in the eastern most

tip of the state, i.e. in the Ramsar Site i.e. 12,500 hectares east of Kolkata. The wetlands in their respective places mostly contribute to the sewage, drainage and other facilities there. [1]

III. Mechanism of West Bengal Pollution Control Board

Now the main problem which arose with these water bodies are that due to their widespread ambit of utilities, there arises the scene of competition, based upon the commercial value of the same. Now in that pace arises the management. The sole purpose of the same is to avoid the excess exploitation of the water resources of the country, which will not only have an effect upon the water body of the country as a whole, but also to the various parts of the society. The statute which looks after the particular issue is the Water (prevention and Control) Act, 1974. And according to section 4 of the Act, various state Boards are established among them one is the West Bengal Pollution Control Board.

Hence firstly coming to the efficacies of West Bengal Pollution Control Board (WBPCP). Here we find that the particular body is there to fulfil two main objectives, which are classifies as

a) Mechanism on the basis of consent and, b) Mechanism on the basis of categorization of various industries.

IV. Inspection Procedure

Firstly, coming upon the procedure of inspection mechanism. Here according to the rules by the West Bengal Control Board, it is found that the entire process of inspection is divided into two forms: 1. General Inspection and, 2. Inspection on the basis of complaint.

General Investigation

We find out that the former form of inspection entails to the normal mode of inspection, where annually, half yearly as well as quarterly inspection is made for the water resources. It is derived from section 14 of the Water Act, 1974. Here certain equipment which are actually found to be set by the State Boards, followed by, checked whether they are working in good conditions, are used to see whether their functioning system is at any angle detrimental to preservation of water resources. And the entire process involves various sub mechanisms within the same. And thus, the procedure of utilization of the water, the sewage system, the amount of water utilized, the amount of water drawn at an instance, whether the application of machinery over the water

[1] https://www.researchgate.net River systems and water resources in West Bengal
https://wbnhc.in Fluvial Geomorphologogical Heritage of India, West Bengal

flow, has any detrimental effect upon the flow of the river etc. All these tests are made on the basis of the basic standards mentioned for pollution of the water resources there.[2]

Inspection on the Basis of Complaint

Then coming to the concept of investigation on the basis of complaint i.e. mentioned in sec 17 of the Water Act. Here the entire procedure of investigation is accomplished through a particular complaint registered upon a particular industry or industries, to have caused pollution in the various environmental resources. Now the entire game of registering the complaint has various types. It can be in any police station interpreting the connected sections of BNS. And since it is not a manual complain, it would be communicated to the WBPCD, who would in turn take the respective steps. Another mode of complaint would be through helpline portal, and other online portals available. They are the various websites where parties can communicate their grievances digitally. That are the domestic platforms of the WBCPD itself. After registering their complain they contact the respective complainant to know, the detailing of the matters. If they are found to be satisfied in its truthfulness, then only the process of investigation initiates. Apart from that another very important way to register the complaints are through communicating the same to various NGOs. The main objective of an NGO is to address the various issues of the society may it be the problem of have nots, or the hazards faced in the regular days by all through the aid of various governmental agencies. Here in this case the resort is always the WBPCD. The NGOs on presenting detailed analysis of the problem, and they being the esteemed panel for the government, the investigation begins.

Then comes the process of analysing the potential harm to be caused. It actually checks the clarity of the seriousness of the issue. Thus, post to that it evaluates the nature of the problem. Here it tries to assess whether the pollution is domestic, industrial, or agricultural. To that, mere nomination would not suffice; rather, a particular condition must be met for bringing the matter into issue. Followed by that, it must also be checked in what quantum the risk has been created. What kind of impact does it bring before the government, which must also be calculated. When all such efficacies are accomplished, the entire process of investigation initiates. Firstly, notice is given to the concerned industry, against whom the complaint has been lodged. There, the grounds for investigation would be mentioned with the respective dates for the same.

[2] https://wbocmms.nic.in WBCP
https://ocmms.nic.in WEST BENGAL POLLUTION CONTROL BOARD Paribesh

Acknowledging the particular notice does not affect the happening of the investigation. Then, within the investigation procedure comes the sample collection process.

Sample collection would also commence through a particular process. This would be done by a laboratory appointed by the board. Firstly, the rules are that the collection of the samples must be accomplished in the presence of the occupier and its agent. But the presence of the same is not regarded to be inevitable. Firstly, a notice will be served to communicate the fact of the collection of samples to the respective parties. But if it is seen that there has been no communication of acceptance to the matter, then in such a situation, it would be regarded as if they are deemed to be present. After the collection of the sample from the laboratory, to acknowledge it as a witness, there is a necessity of the collector to sign. And if they refuse to do the same, then it would be accomplished by the collector itself. Then the checking of the sample initiates. Upon being proven that the sample has been subjected to contamination, the results are photocopied in three copies. And out of them, one of the copies would be given to the occupier and the agent of him /her. The other copy would be sent to the court as evidence for filing the case, and the other copy, i.e. the last one, is to be kept by the laboratory authority itself.

Apart from writing a comprehensive report, there can also be other ways to design a report. It can be done through the detection of various elements creating contamination, and clicking pictures of such and producing evidence on the basis of the same would work. And that would be inclusive of CODs, BODs, TSSs, heavy metals, etc.

Apart from that, various video evidence can also be presented where it is to be showing that how these particular materials are contaminating these water resources. That is also regarded to be very comprehensive evidence. Sometimes the audio and video clippings of various suffrages are also held as proof.[3]

Thus, from here it can be analysed that there is no proper clarity regarding the preventive measures. It says that a written document, photographic, video, or any evidence can be made before the court to initiate the case. But a written document cannot be a proper substitute for a photographic or video graphic entity. The latter brings up more clarity to the stand. A written document to the contrary does not have that amount of proof. On the other hand, the

[3] https://wbcomms.nic.in Online Consent Management & monitoring system
https://wbcomms.nic.in Inspection – frequency – ORDER
http://emis.wbpcb.gov.in Environmental Mangement Information Systems

photographic and video graphic evidences needs written demonstrations to pinpoint the particular cause. All the evidence in its individuality cannot be treated as evidence. Hence, such issues must be addressed.

V. Categorisation of Industries

Followed by this comes the categorization of various industries, which is once again a very prominent role player in eradicating the concept of air pollution. For that particular reason, the industries are found to have been categorized into various stages, on the basis of the emissions, which are put, and accordingly, measures are also being taken. This method is a very comprehensive form to detect and clinic these environmental issues, specifically. Hence accordingly divided into the Red category, Orange category, Green category, and the white category industries, which are designed in the hierarchy of the amount of emissions they cause, in an ascending order.

Red Industries

The red category industries are regarded to be one of the most pollution-causing industries. It is found to be such industries that emit the maximum contaminant substances, within the water of the same. It is found that these industries. The sewage system of these industries is so intensely toxic, creating intense hazards to the water system of the pool. Hence, to that cause, they are demarcated as red.

The types of emissions, which are actually classified into two main parts.

- Toxic pollutants, which contain various liquids in to form of chemicals, and gases
- Utilizing the water bodies for the entire sewage system.

The main course of their pollution is the involvement of various chemicals, namely nitrogen dioxide, sulphur-di-oxide, and Nitrous acid. The utilisation of these substances results in to unused end product being swayed into various waterbodies. These acids, in reaction to the hydrogen component of the water, affect adversely its dehydrated capacity. The various chemicals, which are put into the water, increase the oxidizing capacity, and thus inclining it against the actual capacity of the water. Apart from that, they are also into depositing various dyes which also act similarly as to chemicals. Apart from that, these particular industries are involved in the usage of various types of machinery, and post to that the dump of the same creates a huge pollution over the water.

And as a result, the consequence of the same is having created various life-harming diseases in the country. And one of them is cancer. We find it is the same water that is being polluted is being refined for water. But the fact is the pollution, which is caused due to it, are actually found to have altered its chemical component, and thus this water, when used by humans, has an oxidizing effect that causes divisions of cells leading to cancer. On the other hand, the same is also found to affect the respiratory system of the body, leading to related problems associated with the same. [4]

Not only that, but they are also found to have caused devastation to the aquatic beings present there. This highly impact on the economy as well as the health of the beings there. Based on economy, we find that the most affected part is the fisheries, as their deterioration in quality as well as in effect not only creates a ruckus in the fishing market, which is one of the most prominent forms of market in the state, but also deprives the people of utilizing its nutritional capacity.

Hence, WBCPD is detecting these particular industries as the red industries, which are trying to intensify their problem in much more effective way. Hence, there are some real-life case studies, which would elude the particular fact.

Here lies below various petrochemical industries detected as red industries, creating huge pollution to the water level of the same, and WBCPD is on its way to resolve the issues.

Case of Kolkata Leather Complex, Bantala

Firstly, coming to the case of Kolkata Leather Complex, i.e., in Bantala. It is the only leather tanning industry in the state of West Bengal. And the industry is banked by the Kunti as well as Bidyadhari rivers. It is found that the various chemicals which the same used for the manufacture of leather, i.e. the chromium, lead, etc., after making the end product, are being dumped into the rivers as water material to the rivers. It is seen that this way, the quantum of the same has been increased day by day. And as result from the contemporary perspective it has become highly detrimental for usage of the same in agricultural as well as for drainage purposes. As a result, WBCPD has machineries namely the Common Effluent Treatment Plants, CFTPS which through various technical means trying to treat the water, making it separated from the harmful components, through the chemical process of reduction. The various machineries, which are used are availing the process are having are being ratified by

[4] https://www.wbcp.gov.in RED CTEGORY
https://cpcb.in Red category of Industrial

the State Government. And also the same has been checked to have working at good conditions. The not only treat the contaminated water but also have a strict vigilance upon the entire sewage to have caused upon it. But still it appears to have not resolved with the entire issue. It is fund that still there are not able to control, the spilling of waters, over the same. While having tested the particular water, instances of vibrancy of chemicals are found to be detected. [5]

Case of Haldia Petrochemicals & oil refineries

Another very important case is case of Haldia petrochemicals & oil refineries, which is located in Haldia. They were also demarcated as the red industries. They are found to have contaminated the water, by spilling various chemicals and oils, greases to the Ganga River flown by. The sewage system of the industry, was not found to be organized as a result, it used ganga river, for such source. Though the board observed strict procedures in that regard, but the objective was yet not fulfilled. [6]

Steel factory Industry of Durgapur & Asansol

Lastly it is also to be mentioned that Steel factory of Durgapur & Asansol , is also an important agent, through which the water pollution is actually found to have caused. Then entire manufacture of steel involved lead, calcium iron, manganese etc. Hence it is found that the waste parts of the same are being dumped to the Damodar river, hence leaving it to be a terribly devastating place to occur The ingredients, on being dumped to the water, are found to be totally mixed with the essence of the same, which is also expressed in the same. Hence in such situation, it is also reducing the oxidation capacity of the same, resulting in having non usage of the same for drinking purposes. Apart from that excessive contamination of the water leads to having spread various diseases from the particular water body. It is actually through an indirect way, where the particular water body results in the spread of various insects, which in turn creates various kinds of diseases.

Analysis - It is still ends up with scarcity, in spite of having such a thorough protection mechanism against the water pollution by the WBPCB. It can mainly happen because of two reasons.

[5] https://greentribunal.gov.in Ankur Sharma vs State of West Bengal
[6] https://haldiapetrochemicals.com Env. Safety FY 2021 – 22
https://sciencedirect,in polluted area, haldia

One can be through the various tie ups made with the governments, by these companies catering to the political interests as well as agenda of the various parties. And that way it is suffering the local people, But the fact is that such suffrage has all the assumptions to have affected the various other sectors of the economy. And that can some way or the other lead to the downfall of the government.

The other probable reason for the same is that there has been also the lack of proper investigation procedures against these particular acts. The mechanism of the particular industries is not being thoroughly checked. There has not been any proper form of investigation, all around the industry. A constant vigilance is also required, which is found to be lacking here. And also, there is the need of inspection on the working of various mechanisms, which would make clear the utilization of all the resources from the beginning to the very end. [7]

Orange Industries

Orange industries are such form of industries, which are having a moderate effect of pollution over the water resources present there. This means the contamination or the pollution which the same cause to the water through its usage, is not having an immediate, serious threat to the water sources and accordingly the society, but aids in contributing to it, which in the long run may results in the severe pollution over these resources.

For such industries even, equally strict actions are being implemented by WBCPD, where it is seen that the particular body as it's end results are nowhere less to that of red industries. These industries, are mainly the various food product industries, namely dairy, bakery, poultry industries, along with the other forms namely, the pharmaceuticals, the small-scale engineering, rubber goods etc. The WBCPD, even here found to have implemented strict reforms, so that the practice gets checked at the very ground level. The regulations of WBPCB has been illustrated in the upcoming case studies. [8]

Cases of Food processing and Diary Industries of Murshidabad

Firstly, coming to the case of Food processing & Diary industry located in Murshidabad & Malda. The food processing industries of that particular place mainly work with various types of fruits and vegetables present there, among them among is one of the most prominent. Here

[7] https://www.sciencedrect.com Some industrials effluents in Durgapur and their impact on the Damodar River https://allstudiesjournal.com Env. Pollution in Durgapur
[8] https://www.wbpcb.gov.in ORANGE CATEGORY

theses fruits and vegetables are rich in various organic substances, which are leading to creation of various kinds of derivative foods to be grown from there, which boost up to a great extent for both society as well as economy. Hence, it is very well assumable that such a thing to be brought out, leads to intense processing. And that not only involves mechanisms within the same, but also various other raw ingredients. Hence, the entire process takes a huge amount of time. And the same thing also applies to dairy farming. As a result of intense use of fats, organic waste animal proteins, to be sewage in the pond, on the mixture with water creates a new compound named Biochemical Oxygen. And as a result, it was found that the same leads to the increment of the oxidizing capacity of the water, which results in the growth of various bacterial elements, pesticides, and insecticides to be borne out of water, which not only making the river contaminated but also creates infections on the surrounding areas. Here to such contamination, the water, is easily treated in comparison to the contamination through red industries. But still, the WBPCB has taken strict measures against this to regulate the entire sewage system. It has brought up a new system of identification of the waste, i.e., before the disposal of the same to the water, the same is functional in checking whether the same has any kind of chemical compound within it which will oxidize the hydrating capacity of the water. But still, the objective of the same does not have meted its goal, and the soul reason for the same is that it the process of checking varies from different products. [9]

Cases on the Automobile Industries in West Bengal

Then, another very vibrant issue in this regard is the automobile repair and workshop. They are actually hug in number, in place of catering to serve the maximum people, with districts, and subdivisions, even though there are innumerable such industries. And many are aside to various water bodies. Hence as usual, water bodies are to be used as the maximum disposal of all related products of industries namely oil, petroleum, diesels etc. Thus, the only devastating impact of such industries is that they destroy marine life to a great extent. Hence, WBPCB, has tried it's best in bringing out various separate disposal areas especially for oils to be sewage, and strict surveillance on its follow up is also monitored. [10]

Hence, from here it can be very well analysed regarding the fact that there has been a lack of regulation of law with that to technology. Technical gadgets are not implemented in the processing of AAW, and as a result, these scarcities are found to have arisen. The rapid

[9] https://www.researchgate.in case study of Murshidabad, West Bengal
https://www.sciencedorect.com Pollution index and health risk assessment of arsenic
[10]

enforcement of technology is very imperative here to solve the problem, but such is not incorporated in law. And also on the other hand, thorough outcome studies for all the products are not being made before the regulation of the technology. As a result, proper enforcement procedures are not found to be implemented in this course. All these matters must be addressed.

Lastly, coming to green industries as well as white industries, which mainly include the industries that constitute their work without creating any kind of pollution to any natural resources, inclusive of water bodies. They have some commonalities within the same. Their usage hardly involves any kind of metallurgical or chemical substances. It is totally nil for white industries, while very less for green industries. Apart from that, regarding the sewage system, pre doing that it also adheres to wastewater management as well as recycling methods. This ensures full protection of water in that regard.

VI. Case Laws relating to Water Pollution in West Bengal

Followed by that, coming to various case laws, which are also very instrumental in representation, that is how the act is made applicable.

Firstly, coming to the case of *Hindustan Coca-Cola Beverages Pvt. Ltd. vs West Bengal Pollution Control Board*. Here, in the particular case, it is seen that the plaintiff company is involved in the making of various beverages. Here, the man's allegation, which was brought against the plaintiff company, was that the same is unable to have that while making the particular products, the style of manufacture of the same does not meet the standards set for manufacture by the Board. On the other the defendant denied the fact, rather affirmed to have maintained the standard. Hence to the Apex court of the country declared that to attain clarity, there is a need of having a joint sitting for the analysis of the particular standard.

But once again, the question that arises in that regard is whether the joint sitting would resolve the actual dispute or not. There are a lot of ambiguities here. If the entire process is not found to be recorded, then how clarity regarding the particular matter would be devised is the question. There still can be a problem in the long run. Even on the joint sitting of being tested, there may arises several disputes may arise, which may create many cases on false grounds. Not only that, but also other problems may also arise, where this becomes like a precedent, then in such situations it may lead to the formulation of various negotiations between the industry and the government owing to varied political parties having different interests. Not

only that, but also, there can be non-clarity regarding the various mechanisms used to generate the particular test, which also confuses, creating false grounds for cases. [11]

Another very disappointing case regarding the part judiciary on the application of the Water Act is *People's United for Living Better in Calcutta vs State of West Bengal*. There it was seen that the Judiciary did not favour the plaintiff, i.e., WBCP, in its case against Salt Lake Development Plan, who are claimed to have been diminishing water bodies, for the sake of development. Here, the court declared that development is inevitable, which surpasses the need for conservation of water resources.

Hence, we find out it is a great fallacy on the part of the judiciary to have not taken actual steps against the particular system. It has failed to maintain a proper ecological balance, having facilitated the ecological balance. Here, the main objective of the Act is found to have been breached where the environmental resources are not preserved in parity with the initiation of the development. It is seen that if the water bodies are being sacrificed in such a way, on the other hand, urbanization is increased, then in such a situation, there would surely be arisen a scarcity of water. Apart from that, constitutional rights are found to have been breached. We see here that Article 21 is breached. And that is actually inclusive of the Right to life & personal liberty. Here right to live actually means the right to live with dignity, and that means living in a clean and green environment. [12]

Lastly, another case which also has prominence in this regard is *Subhas Dutta on behalf of Howrah Ganatantrik Nagarik vs State of West Bengal.*

In this particular case, it was shown that the plaintiff did access against the defendant as previously mentioned for wrongfully filling up the tanks. The Green Tribunal of Calcutta High Court favoured the plaintiff and also ordered the municipal corporation to list up the endangered ponds in this regard, to get the proper protection[13].

Here, the question arises regarding the clarity of the long-term significance of the judgment. Whether giving an order without having appropriate grounds for it measures, really protects

[11] https://www.scconline.com Hindustan Coco cola Beverages Pvt. Ltd. Vs West Bengal Pollution Control Board. https://www.indiakanoon.com Hindustan Coco cola Beverages Pvt. Ltd. Vs West Bengal Pollution Control Board.
[12] https://www.scconline.com People's United for living better in Calcutta vs State of West Bengal https://www.indiakanoon.com People's United for living better in Calcutta vs State of West Bengal
[13] https://www.scconline.com Subhas Dutta on behalf of Howrah Ganatantrik Nagarik vs State of West Bengal https://www.indiakanoon.com Subhas Dutta on behalf of Howrah Ganatantrik Nagarik vs State of West Bengal

the water bodies from the clutches of the government. And if the grounds are not clear, then the government may again attempt to fill up he tanks, showing a very different form of cause.

VII. Probable Recommendations

Firstly, the law must be having a proper portal for having registering the complains of water pollution to the WBPCB. There should be an universal portal, where all the complaints, should actually be registered. It would be preferable to be done through online portals. But e platforms are not accessible to the maximum folks of the people. Hence there should be any authoritative entity, where such complaint must be registered, with the grounds mentioned properly, so that to facilitate the investigation procedure with much clarity.

Secondly, the procedures of general investigation must also be very rigorous as well and much broader in ambit. There should be daily investigations into various industries. And the investigation technique must not be on a uniform basis. Rather, it may be subject to variability, owing to the variability of the technology.

With regard to this extension, it must also be seen that the laws would be rather more inclined to curativeness, rather than prevention. That would somehow or other help in preventing damage to the suffrages.

There should be more incorporation and spreading of awareness programs in relation to water pollution. If it is found any industry, factory, or any related development is built, which has the probability to erode the water, there should be posters fixed by the government to raise awareness of the same. And if it is really possible, then also signing the affidavit of not causing any pollution to water must also be signed thereafter.

Then there should be implementation of stricter penalizations of offences under the Water Act, to what is there in the present, so that the strong precedents have a better preventive effect upon society.

VIII. Conclusion

It is seen that the WBCP is actually trying its level best in bringing out the regulations against water pollution in the particular state, but still, from the case laws we are seeing that the objectives are not being met. There are still ongoing instances of prohibited practices. And that is only because of certain gaps that are there in the legal procedure. Once they are addressed, these issues can be resolved in a much better state.

STATE OF HIMACHAL PRADESH V. YOGENDRA MOHAN SENGUPTA

ABSTRACT

The case of *State of Himachal Pradesh & Ors. v. Yogendra Mohan Sengupta & Anr.* revolves around a jurisdictional conflict between the National Green Tribunal (NGT) and the State of Himachal Pradesh regarding urban planning and environmental conservation in the Shimla Planning Area. The Supreme Court of India, in its 2024 judgment, examined the extent of NGT's powers under the National Green Tribunal Act, 2010, in light of the constitutional principles of separation of powers and federalism. The dispute stemmed from NGT's orders in 2017 and 2022, which imposed stringent restrictions on construction in Shimla's green belts to protect the fragile environment. The State challenged these orders, arguing that urban planning falls exclusively within its legislative domain under the Himachal Pradesh Town and Country Planning Act, 1977.

The Supreme Court ruled that the NGT had exceeded its jurisdiction by encroaching upon state legislative functions, thereby reaffirming the constitutional boundaries of delegated powers. While recognizing the significance of environmental conservation, the Court emphasized that regulatory interventions must align with constitutional mandates. This ruling serves as a landmark precedent in environmental and urban planning jurisprudence, reinforcing the need for harmonization between sustainable development and state autonomy. The judgment also highlights the ongoing tension between environmental governance and legislative prerogatives, shaping future discourse on institutional jurisdiction and sustainable urban policy in India.

Keywords- *Jurisdictional Conflict, Environmental Governance, Sustainable Development, State Autonomy*.

I. Introduction

A conflict arose between The National Green Tribunal (NGT) and the State of Himachal Pradesh over urban planning and environmental conservation within the Shimla Planning area. This dispute originated from the NGT's orders in 2017 and 2022, which imposed stringent restrictions on construction in Shimla's green belts, stating environmental fragility and that there was a need for sustainable urban development. These two orders given by the National Green Tribunal were challenged by the state on the ground that urban planning is a quasi-legislative function which is exclusively reserved for state authorities under the Himachal Pradesh Town and Country Planning Act, 1977[1] (TCP act) and does not fall within the jurisdiction of NGT.

The Supreme court of India dealt with this critical dispute and rendered a landmark decision on 11th January 2024. The pressing issues in this case included those about- the extent of NGT's power under the National Green Tribunal Act, 2010[2], the principle of separation of powers, and the need for balance between ecological preservation and developmental autonomy. The Supreme court in this case ruled that the NGT had overstepped its jurisdiction and through this judgement the court also reinforced the constitutional boundaries of delegated legislative powers. There was also an emphasis placed on the need for careful harmonization of environmental concerns with developmental initiatives. This judgement would serve as a judicial precedent for urban planning in India and environmental jurisprudence.

II. Facts of the Case

The case involved multiple parties and was taken an interest in by various stakeholders. The principal appellant in the case was the state of Himachal Pradesh, represented by the advocate general and senior counsels. The Shimla Municipal Corporation despite not being the principal appellant was a significant appellant as the NGT's restrictions on urban planning and construction had directly affected its ability to manage or regulate the development within the Shimla Planning area. The key respondent to this case was Yogendra Mohan Sengupta who is an environmental advocate and had initiated the original application before the NGT to protect Shimla's ecology, raising concerns over- landslides, deforestation, and urban overcrowding.

There were others such as the stakeholders in Shimla's Green Belt who challenged the NGT's restrictions arguing that these infringed upon their property rights under Article 300A of the

[1] Himachal Pradesh Town and Country Planning Act, No. 12 of 1977, India Code (1977).
[2] National Green Tribunal Act, No. 19 of 2010, India Code (2010).

Indian Constitution. The NGT was not a party to the dispute, but its orders were central to the dispute making it a stakeholder in the case along with various other committees either under the NGT or the Himachal Pradesh government as they had also played a role in drafting or reviewing the development plan which had become a subject of litigation.

To delve into the core facts, it is important to understand its background, the urban planning and development within the state of Himachal Pradesh is governed by The Himachal Pradesh Town and Country Planning Act, 1977[3]. The Shimla Planning Area was also established under the same act to oversee development while ensuring ecological preservation. There were various construction activities over the years in Shimla's Green Belt and had raised concerns about environmental degradation and had led to multiple suits being filed.

The NGT issued 2 orders, one in 2017 and the second in 2022. The first order banned new constructions in Green Belt areas and restricted the height of buildings across the Shimla Planning area. It also directed the state to finalize the development plan while adhering to the guidelines provided by the NGT. In the second order the implementation of draft plan for Shimla Planning area was put on hold highlighting that the previous order was not complied with.

This led the appellants to file a writ petition in the Himachal High Court challenging NGT's orders and during its pendency the supreme court transferred the case to itself in 2022. The Civil Appeal Nos. 5348-5349 of 2019 were appeals to the orders passed by the NGT, these appeals were consolidated with the transferred writ petition by the Supreme court.

III. Issues Raised

There were various issued raised in the case of *State of Himachal Pradesh & Ors. v. Yogendra Mohan Sengupta & Anr.*[4], upon the jurisdiction of the NGT, need for striking balance between environmental concerns and legislative autonomy, separation of powers and the impact on property rights. The core issues are as follows:-

1. Whether the National Green Tribunal (NGT) had the jurisdiction to impose restrictions and directives related to urban planning and development under the TCP Act.

[3] Himachal Pradesh Town and Country Planning Act, 1977.
[4] State of Himachal Pradesh & Ors. v. Yogendra Mohan Sengupta & Anr., (2024) SCC OnLine SC 36 (India).

2. Whether the orders issued by the NGT, restricting construction and mandating changes to the draft development plan constituted an encroachment on the legislative powers of the state government.
3. Whether the NGT could legally dictate legislative functions or mandate changes to the development plan and do these directions align with the constitutional principle of separation of powers.
4. Whether the NGT's blanket restrictions on construction activities in the Green Belt areas were violative of property owner's rights under Article 300A of the Constitution.
5. To what extent do environmental concerns justify judicial intervention in state legislative processes.
6. How to balance the developmental needs of the growing population of Shimla with the imperative of ecological preservation and disaster mitigation.

IV. Arguments Raised

Arguments by the appellants- State of Himachal Pradesh and Ors.

The appellants in the case contended that the NGT had overgone its jurisdiction as the urban planning matters fall under the Himachal Pradesh Town and Country Planning Act, 1977[5] (TCP Act). It was submitted to the court that Schedule I of the NGT Act, which specifies the environmental laws under the tribunal's jurisdiction does not include the TCP Act and hence, the NGT Act does not grant the tribunal powers over town planning.

An emphasis was also placed on the preparation and implementation of development plans, stating that they being quasi-legislative functions are beyond the jurisdiction of the NGT. Therefore, the NGT dictating legislative and executive powers was violative of the principle of separation of powers. The state had also argued that several environmental safeguards had already been incorporated while preparing the draft development plan to balance the need for urban development and ecological preservation. A few regulations that were pointed out were- the restrictions on building heights, zoning, prohibition of tree felling in the Green Belt areas.

Another contention of the appellants was the unnecessary hardship that was caused to the citizens after the NGT's orders which led to halting even the essential construction activities. This also included a halt on reconstruction of old buildings which are important for public

[5] Himachal Pradesh Town and Country Planning Act, 1977.

safety and urban maintenance. The tribunal's directives had disrupted the planning process and undermined the state's constitutional and statutory responsibilities.

Arguments by the respondents- Yogendra Mohan Sengupta & Anr.

The respondents highlighted that Shimla was ecologically sensitive and emphasized that unregulated construction posed risks which included landslides, deforestation, and water scarcity. Their argument was that NGT's intervention was necessary due to the fragility of environment and mitigate disasters in the region. They also defended the orders by NGT stating that they were consistent with the precautionary principle of environment law and mandate proactive measures to prevent harm to the environment. Their claim was that the development plan proposed by the state ignored critical ecological concerns that were raised by expert committees.

The respondents claimed that the NGT has the power under the NGT Act to address important environmental issues, even if these overlap with other laws, and supported this by referring to past cases that confirmed the tribunal's authority to give binding orders for environmental protection. They also argued that uncontrolled urban development could cause severe damage to the environment, putting future generations at risk, and urged the court to uphold the NGT's orders to ensure sustainable development.

V. Conclusion

The case of *State of Himachal Pradesh & Ors. v. Yogendra Mohan Sengupta & Anr.*[6] underscores the ongoing challenge of balancing environmental protection with the legislative and administrative powers of the state. The Supreme Court held that the National Green Tribunal exceeded its jurisdiction by interfering in the preparation and implementation of the state's urban planning policies. This judgment reinforces the constitutional principle of separation of powers, safeguarding the state's legislative authority while maintaining that environmental concerns must still be addressed responsibly.

The decision serves as a significant precedent, clarifying the limits of the NGT's powers under the NGT Act and ensuring that such bodies respect the scope of state legislation. At the same time, it highlights the need for state governments to incorporate sustainable development practices into urban planning to avoid unnecessary conflicts with environmental mandates. The case also reflects the broader tension between rapid urbanization and the need for ecological

[6] (2024) SCC OnLine SC 36 (India).

preservation, reminding all stakeholders of their shared responsibility in achieving long-term environmental and developmental goals.

In reaffirming the state's autonomy, the judgment ensures that governance in India remains grounded in constitutional principles while addressing the growing importance of environmental sustainability in the country's development framework.

AESTHETICS AND ETHICS OF ENVIRONMENTAL JUSTICE: CULTIVATING CONSERVATIONIST IMPETUS THROUGH PEDAGOGICAL PRACTICES AND EXTENSION ACTIVITIES

ABSTRACT

The paper investigates how aesthetic and ethical impulses surrounding the beauty and enigma of nature can be channelled for strategies of ecological conservation and environmental and species justice through pedagogical interventions and extension activities. The study draws insights from a pedagogical experiment conducted at the Institute of Law, Nirma University by including texts and teaching approaches in the English Communication and Literature Courses for promoting environmental consciousness, species justice, and conservation. This pedagogical approach is intended to address the shortcomings of the anthropocentric approach to conservation, which views the natural environment merely as a resource necessary for human life. The dominant discourse surrounding ecological conservation is limited to concerns about human survival and extinction, making it oblivious to justice and welfare for other species and inanimate beings. In this discourse, human connection to the natural environment is motivated by practical and selfish instrumentality in which nature is considered indispensable for providing safe and sustainable existence for homo sapiens as a species. Moving away from this anthropocentric notion of conservation, the select texts in the course explored the possibility of a culture of aesthetic and philosophical appreciation of nature leading to a deeper commitment to conservation. The experimental course took its inspiration from *On Beauty and Being Just,* an iconic work by Elaine Scarry, and incorporated studying the role of philosophical traditions, theological or metaphysical approaches to nature, art practices, and literary movements like romanticism and transcendentalism from across the globe in establishing a commitment to environmental and species justice. The course aspired to be a motivation for actions for conservation through pedagogical practices and interventions through extension activities.

The approach in the course was interdisciplinary. While studying specific literary texts, the course also brought into classroom discussion and research projects, several forms of art and schools of philosophy. The course examined the ongoing art/ sculpture project titled ‘Ghosts of Gone Birds.’ Other art experiments discussed in the course were Malavika Sarukkai’s dance tribute to Thimmaka, a woman from rural Karnataka who planted numerous banyan trees and cared for them, and performance practices for environmentalism including theatre. The course also brought in philosophical traditions such as the Upanishads to motivate students to environmental conservation and justice and encouraged the students to be part of extension

activities for environmentalism. Considering the course as an academic experiment, this study proposes that discourses and artistic traditions highlighting sacred, ecological, philosophical, and aesthetic perspectives about nature should be made available to the population in general, and especially to the students through their curriculum and activities in schools, colleges, and universities.

Keywords: *Ecological conservation, environmental justice, philosophies of nature, conservationist impetus and aesthetics, art for environmental justice*

I. Introduction

This study recommends integrating philosophy, literature, visual arts, and performative traditions in the curriculum and extensional activities to promote the conservation of the environment and ecosystems and justice for all animate and inanimate beings. This recommendation is founded on teaching a few specific segments in the English Communication and Literature courses in the B.A and B.Com LLB Hons Programs at the Institute of Law, Nirma University. The paper emphasizes being mindful of nature's aesthetics and philosophical teachings built around nature as two trajectories for enabling environmentalism, focusing on conservation and justice, since such an approach acknowledges nature's innate worth.

Using the pedagogical experiment incorporated into English for Communication and Literature courses taught at the Institute of Law as an example, the paper investigates how aesthetic and ethical impulses surrounding the beauty and enigma of nature can be channelled for ecological conservation and environmental as well as species justice. The pedagogical experiment started on the premise that how humans perceive non-human nature, including animate and inanimate beings and natural forces determines their attitude to ecological conservation and environmental justice. Besides, the commitment to ecological conservation and environmental justice cannot be separated from larger concerns of species justice and social justice. The course emphasized that the following perceptions about nature with the potential to reinforce a commitment to environmental justice need to be promoted: the sacred (attributing sacredness and divinity to nature), the epistemic (nature as a source of superior learning), the aesthetic (the beauty of nature as a source of joy and artistic inspiration), the kinship ties (all animate and inanimate beings are one family and hence our kith and kin), and the interdependence view (nature as indispensable for human survival) to suggest a few. When a predominantly utilitarian and exploitative idea of nature as a resource overshadowed the sacred, epistemic, aesthetic, kinship, and interdependence views, we witnessed the erosion of ethical approaches to ecological conservation and species and environmental justice.

The texts and method of teaching in the course pointed out that the perception of nature as a resource has paved the way to mindless destruction of ecosystems and biodiversity. Exploiting nature for human self-interest has deprived humanity of an inclusive and considerate notion of coexistence with other species. It also generated an egocentric view of development and well-being for humans exclusively. The students were made aware of why limiting the concerns about conservation to human survival and the fear of extinction is potentially dangerous to nature and other living beings. In the survivalist framework, the human connection to the

natural environment is motivated by anthropocentric and utilitarian instrumentality in which nature is considered indispensable for providing conditions for life for homo sapiens as a species. Humans are driven to protect and conserve the natural environment for selfish means advantageous only for their species while being completely indifferent to the welfare of nature and other living beings.

The fear of human extinction generating the urge for environmental conservation is a familiar notion devoid of any noble sentiments. Besides its inability to attribute any intrinsic worth to nature, the approach fails to promote an appreciation of nature's beauty or marvel at nature's mysteries. Moreover, in this perspective, phenomena like climate change and natural disasters arising from it may be read in a limited way as warning signs given by nature, revealing its ferocious and sublime side. We understand nature as both sublime and beautiful, as there are moments of awe-inspiring might and destructive ferociousness in nature and an abundance of calm vitality and beauty. In the journey of environmental conservation, the path of the sublime is predominantly recognized, meaning, we wake up to the presence of nature when it threatens to destroy our lives and property through calamities like floods, landslides, earthquakes, or tsunamis. As opposed to this approach, the course explored the possibility of a culture of aesthetic and philosophical appreciation of nature leading to a deeper commitment to ecological conservation and justice for other species of life and the natural environment in general. To cultivate the habit of appreciation of beauty and the mysteriousness of nature, certain pedagogical experiments were be put to use. The following insights are based on the pedagogical experiment carried out at the Institute of Law, Nirma University.

II. Aesthetic Education for Environmental Justice through English Communication and Literature Courses: A Case Study from the Institute of Law, Nirma University

The Institute of Law, Nirma University has English Communication and Literature as part of the First Year BA and B. Com LLB Hons. Program. Founded on politic-legal concepts and committed to justice education, parts of these courses engage with environmental justice. To train the students in persuasive speaking and oratory, we make them listen to several iconic speeches, and Carl Sagan's "A Pale Blue Dot" is part of the repertoire.[1] "A Pale Blue Dot" is an example of how well Aristotle's rhetorical strategies of ethos (ethics and credibility of the speaker and ideas), logos (logical development of argument), pathos (weaving powerful

[1] Carl Sagan, 'Pale Blue Dot' (*The Planetary Society*, 14 February 1994) < https://www.planetary.org/worlds/pale-blue-dot> accessed 1 May 2024.

emotions into the narration), and Kairos (making the most of a historical moment) are used by the speaker. Carl Sagan delivered "A Pale Blue Dot" on Valentine's Day of 1990, releasing the images clicked by the satellite, Voyager. In these images, our plant appeared to be a speck of light, a pale blue dot so insignificant and minuscule against the varied and massive cosmic drama. "The Pale Blue Dot" is an excellent example of persuasive speaking, in which Sagan used the technique of 'contrast.' While he emphasizes the insignificance of planet Earth in comparison to the enormity and magnificence of the cosmos, he reminds the people inhabiting this 'Pale Blue Dot' how important it is for them as it is their only home. 'Home' is a sentiment employed by Sagan to introduce feelings of love, a sense of belonging and security, and kinship with all animate and inanimate beings. While teaching this speech, I bring in multiple references that discuss the idea of kinship and symbiotic existence with other beings as a meaningful approach to environmental conservation. The students read excerpts from Chief Seattle's works, and texts from literary and philosophical traditions celebrating nature and engage with art movements simultaneously with Sagan's speech. They also watch select documentaries, films, and plays about environmental destruction and climate change. As one of the assignments for continuous evaluation, the students are required to make formal presentations on topics relevant to environmental conservation and justice, conceptualize campaigns with a set of events targeting awareness and action for environmental justice, design information materials like brochures and posters for environmental conservation and species justice or write reflective notes, research papers or blogs on the same theme. This activity requires thinking, research, imagination, and teamwork.

In the English Literature Course, through the life, writings, and activism of Ken Saro-Wiwa for racial and environmental justice, the students are made aware of the environmental racism involved in the operations of multinational ventures, especially oil companies that may eventually lead to 'omnicide' or death of everything. Saro-Wiwa's poem prescribed in the course, "Keep Out of Prison" is short and written as a response to a friend's advice to not upset the autocratic government of Nigeria under Sani Abacha with his resistance movement against environmental destruction and exploitation:

'Keep out of prison,' he wrote
'Don't get arrested anymore.'
But while the land is ravaged
And our pure air poisoned
When streams choke with pollution

Silence would be treason Punishable by a term in prison."[2]

Being a poet, novelist, and television producer Ken Saro-Wiwa knew that his presence and voice as an intellectual-activist mattered for speaking truth to power. He was committed to protecting the Ogoni land, known for its biodiversity and rich cultural heritage of the Ogoni tribe. The operations of a multinational oil company in the region were making the lives of the Ogoni people miserable and ruining the land and its flora and fauna. The nexus of the autocratic government of Nigeria and the multinational oil company was wary of the impact of Ken Saro-Wiwa's interventions through literature, television shows, and the Movement for the Survival of the Ogoni People (MOSOP). Saro-Wiwa was falsely accused of conspiracy and murder, imprisoned, and eventually, after a farcical trial, he was sentenced to death. The martyrdom of Ken Saro-Wiwa became an inspiration for the Ogoni people to fight a winning legal battle against the mighty oil company and the autocratic political regime in Nigeria. The students are encouraged to go through the details of this significant legal battle in which a poor and uneducated tribal community won. In their research assignments, the students are required to compare this incident with similar movements and cases for environmental justice in India and the Global South. Comparing movements against environmental racism and neo-imperialism facilitated by globalization and understanding the roles of governments, organizations, and grassroots movements in resisting environmental racism is part of the assignment. Learning the poems of Ken Saro-Wiwa and knowing about his struggles for environmental and racial justice allow the students to explore the power of literature as a form of social critique, a relentless striving for social justice, and a transformative force goading a society towards ethics.

I also propose juxtaposing pedagogy with Extension Activities through clubs, committees, and other institutional facilities. The Literary Committee has organized poetry, essay, and story-writing activities and painting and poster-making competitions about ecological conservation and environmental justice. The theatre, music, and dance committees have conceptualized events that engage with environmental issues. The University can start nature clubs and facilitate activities promoting ecological conservation and afforestation. So far, the components I offer in the course that discuss environmentalism have not had a fieldwork component. Students can visit the forest and tribal lands, help people in their legal struggles by focusing on

[2] 'Keep out of Prison' (*Twenty-Four Poems by Ken Saro-Wiwa,* 10 January 2020) < https://repository.dri.ie/catalog/95941327b> accessed 1 May 2024.

matters like displacement and the right to livelihood, and also effectively contribute through NSS and other institutional facilities for various causes of environmental justice.

III. Responsiveness and Responsibility to Nature's Beauty and Environmental Justice

This pedagogical intervention is inspired by *On Beauty and Being Just,* an iconic work by Elaine Scarry. Scarry unravels a life-sustaining possibility implicit in aesthetic appreciation of beings, things, and phenomena. In her view, aesthetic engagements highlight the aliveness of the thing of beauty and the one who appreciates it. Interlacing this idea with human beings' aesthetic relationship with nature, Scarry points to the mutuality of life-affirming potential such a connection evokes. In her own words in *On Beauty and Being Just*: "Beauty is, then, a compact, or contract between the beautiful being…and the perceiver. As the beautiful being confers on the perceiver the gift of life, so the perceiver confers on the beautiful being the gift of life." (90). She argues further how the ethical commitment to beauty and the desire for it, including the beauty of nature, lead to an attitude of caring and conservation. Opening one's eye to nature's beauty creates a desire to preserve and perpetuate it. In other words, responsiveness to the beauty of nature endows one with a responsibility to sustain it and therefore, it is necessary to cultivate responsiveness to beauty through multiple pedagogic strategies and artistic practices.

A text that I discuss is Diotima's Speech in Plato's *Symposium*, which takes us to a similar intersection between the love for beauty, artistic creation such as poetry inspired by nature's beauty, and the ethical urge to conserve art-inspiring beauty. [3]Diotima avers that love has a life beyond the appreciation of the beauty of the object of love and beauty should be the pathway to virtue and joy. Love inspires us to perceive beauty in all forms and beauty thus perceived through the eyes of love attributes ethical dimensions to love, with its inclination towards virtue and accountability. The idea of 'procreating' is interpreted as beauty begetting beauty lovingly in this conceptual framework of Diotima. If this framework is transposed to the realm of conservation, it could mean the following: Once we start appreciating the beauty of nature as a source of joy and inspiration guiding toward artistic creation, our appreciation generates an instinctual accountability to preserve and proliferate that beauty. For revealing and highlighting the beauty of nature and developing in humans an aptitude for appreciating and conserving it, aesthetics and philosophical traditions can play a crucial role.

[3] Plato, *Symposium,* (Trans. W. Hamilton, Penguin 1997) 76-92.

Engagement with various forms of art is an integral part of the pedagogical method in the course. Using art forms to celebrate the beauty or mysteries of nature or to bring to light the unjust practices that destroy the natural environment promotes a sense of ecological connectivity. Such aesthetic interventions have the potential to create a network of like-minded artists, performers, and activists from different parts of the world devoted to ideals of environmental conservation and justice. Aesthetic and philosophical education focusing on ecological conservation and environmental and species justice should not be confined to classrooms. Educational institutions can ensure that by bringing the world into the classrooms and taking the classrooms out into the world through clinical exercises, field visits, and extension activities, students actively participate in the joint missions of conservation and justice.

IV. Cultures of Aesthetic and Philosophical Appreciation of Nature

The pedagogical intervention used at the Institute of Law looks beyond Scarry's recommendation for tapping into the possibilities of aesthetics as an impetus for environmental justice. The content for discussion and research-based projects undertaken by the students includes a survey of philosophical traditions, theological or metaphysical approaches to nature, and literary movements like romanticism and transcendentalism in establishing a commitment to environmental justice through artistic and epistemic means. This section of the paper discusses the possibilities of reinforcing through education the understanding of nature as *sacred*, a source of *aesthetic* pleasure leading to artistic expressions, a treasure trove of knowledge and wisdom as suggested by the *epistemic* view, and a home for animate and inanimate beings bound by *kinship* and *interdependence* with an implicit faith that such approaches will have an enabling impact on environmentalism.

The ancient belief that nature and elemental forces of nature are sacred was an enabling stimulus for environmental conservation and justice. By this, I did not mean we should worship nature and consider certain animals as sacred. However, sacredness attaches a sense of inviolability to nature. As evident in the pantheistic ritual practices of ancient Greek, Roman, Egyptian, and Asian traditions, reverence for nature makes humans recognize an intrinsic worth in landscapes, creatures, and the elements. In these belief systems, divinity is synonymous with such forces of nature as thunder, oceans, moon, and sun. The forces of nature like wind, fire, water, air, and soil are looked up to as gods and worshipped. Be it Indra or Zeus symbolizing thunder or Varuna and Poseidon as the water/ ocean gods, the awe and reverence for them also meant a certain veneration for the forces of nature they represented. The gods and goddesses

of the ancient religious practices have animals as their companions. Be it the owl companion of goddesses Athena, Minerva, and Lakshmi or the rat, tiger, lion, bull, and elephant who are portrayed as the vehicles of Ganapati, Goddesses, Shiva, and Indra respectively the connections the mythological divine beings had with animals raised the latter onto a higher pedestal of respect and care. When humans venerate nature, they tend not to destroy it overly. Even though perceiving divinity in nature is not an alien idea, this sentiment did not directly contribute to enabling environmentalism. For example, there is a popular shloka celebrating Prithvi, the earth goddess, and seeking her forgiveness for stepping on her with our feet: 'Samudra-Vasane Devi Parvata-Stana-Mannddale/ Vissnnu-Patni Namas-Tubhyam Paada-Sparsham Kshamasva-Me' (Oh, Goddess who drapes the ocean as her attire and has mountains as her breasts, I bow down to you, the consort of Vishnu; forgive me for touching your holy body with my feet) which attributes divinity to oceans, mountains and the earth. The irony is that neither the oceans nor the mountains got saved because of this noble consciousness. We commit worse atrocities than touching the earth with our feet and do not even feel the urge to seek forgiveness. Making ideas travel from scripture and ritual to practice is a major challenge and thoughtful pedagogical efforts could help us in that.

The course relied on the conviction that cultures of aesthetic appreciation of nature can be fostered through artistic expressions like literature, performance, and visual arts (painting, sculpture, photography, and the like). Art forms inspired by or focused on interpreting nature may have the untapped potential for generating a commitment to conservation and environmental justice if used strategically. One may observe that the aesthetics and epistemic domains overlap and influence each other. Philosophical schools that promote learning with or from nature such as the Upanishadic tradition, folklore, and fables cultivate respect and love for nature paired with an appreciation of nature's beauty. The writings of Ralph Waldo Emerson, Henry David Thoreau, and several other expressions of transcendentalism and romanticism, and schools of pantheism endow an innate worth to nature and natural environments. All these approaches towards nature could be highlighted and made accessible to students for an increased commitment to environmentalism.

Through select sections in the literature course, I tried to promote a wholesome and holistic aesthetic view of nature. A holistic aesthetic view of nature or seeing nature as a source of joy and wisdom was a trope in ancient poetic traditions such as epics, works of Kalidasa, and later on, in romanticism, and transcendentalism. This aspect is elaborated and assigned as a research topic for the projects. The complex ecologies of the epics such as *Ramayana*, *Mahabharata,*

Iliad, Odyssey, *Aeneid,* and *Gilgamesh* have a certain grandeur. The overlapping and intermingling of the human and non-human universes in these works contain layers of signification. The kavya traditions of ancient India contain an aesthetic-philosophical vision of natural environments. Be it *Ritusamharam* in which the poet strings together a garland of seasons with an earnest appreciation of nature's variety and beauty, *Abhijnana Shakuntalam* exploring the deeper interconnections of humans with the lives of flora and fauna and elemental forces, or *Meghadutam* that personifies nature as a companion, Kalidasa sensed the organicity of coexistence for human and non-human beings. Texts that represent nature as a site of profound learning and camaraderie include epics from ancient civilizations, the *Upanishads*, especially the *Brihadaranyaka Upanishad*, *Jataka Tales*, and Fables from different parts of the world. Parables that are integral to religions are a good example of how nature is seen as a source of profound life lessons. Most of Jesus Christ's parables are inspired by nature and natural phenomena, and insights from agriculture and caring for animals. Sages of the *Upanishads* and Buddha used nature as a backdrop, metaphor, or allegoric significator to make complex teachings comprehensible to people.

Considering the vast realm of romantic poetry, one may realize the diverse possibilities of how beauty and sublime manifested in nature could inspire William Blake, Wordsworth, Coleridge, Shelley, and Keats to create poems and philosophical insights. William Blake's poems and works of visual art tie together the beautiful and the sublime. His approach to nature is in alignment with the sacred, the aesthetic, and the epistemic perspectives. The lamb and the tiger exemplify the variety in god's creation and also reflect divine gentleness and wrath. Nature is filled with unfathomable knowledge. In "Auguries of Innocence," Blake suggests:

> *"To see a World in a Grain of Sand*
> *And a Heaven in a Wild Flower*
> *Hold Infinity in the palm of your hand*
> *And Eternity in an hour"*[4]

In the same poem, the poet also reminds humanity of the necessity to be kind and compassionate to other living beings, as both heaven and hell watch in rage our ill-treatment of other creatures. This message for compassion and kindness is not merely a moral problem, it turns into a grave political problem as we can see:

> *"A Robin Redbreast in a Cage*
> *Puts all Heaven in a Rage*
> *A Dove house fill'd with Doves and Pigeons*

[4] *The Complete Poetry and Prose of William Blake (*Ed. David V. Erdman, Anchor Books, 1997) 490

Shudders Hell thro' all its regions
A Dog starv'd at his Master's Gate
Predicts the ruin of the State."[5]

The works of William Wordsworth, P.B. Shelley, John Keats, and other British Romantic poets exemplify how literature can discover connections between nature's beauty and ferociousness, aesthetic joy, and wisdom. In "The Tables Turned" Wordsworth maps such an interface:

"One impulse from a vernal wood
May teach you more of man,
Of moral evil and of good,
Than all the sages can."[6]

The students realized why Nature was a multidimensional and mighty presence for the British Romantic poets. Wordsworth, Coleridge, and other poets who moved to the scenic Lake District were inspired by the beauty and mystery of nature and could create a poetic realm that was full of joy and lessons from nature. Romanticism imbibed a pantheistic outlook from diverse traditions and the poets, especially Wordsworth could locate divinity everywhere. The notion of all-pervasive divinity is present in *Ishavasya Upanishad*, in its very first shloka itself: "Īśāvāsyamidaṃ sarvaṃ yatkiñca jagatyāṃ jagat |tena tyaktena bhuñjīthā mā gṛdhaḥ kasya sviddhanam"|| The Shloka means God is omnipresent and pervades/ inhabits everything. While asking us to enjoy the riches of nature created by god, the shloka also warns us against greed and attachment, reminding us to not covet the wealth of others.

This notion also has its roots firmly planted in the pantheistic Greco-Roman traditions that provided the philosophical fodder for British Romanticism. Romanticism and certain spiritual traditions of Asia inspired transcendentalism, which was mindful of the aesthetic joy, ethical teaching, or moral lessons from nature and the infinite wisdom that one can derive from being close to nature. Emerson and Thoreau celebrated the innate divinity in nature which makes it a source of happiness, wisdom, and creativity. Emerson's essay, "Nature" interprets 'divinity' as tangible as it manifests through nature. Thoreau's *Walden* captures the experience of living close to nature, beside the Walden Pond. Thoreau's account of how being on the lap of Mother Nature liberated him from greed and urged him to lead a life of simplicity, self-reliance, and creativity has been an inspirational possibility of living one's life meaningfully and intensely in close spiritual proximity for readers.

[5] *Ibid*.
[6] 'The Tables Turned' (*The Collected Poems of William Wordsworth* Wordsworth Editions 1994) 594.

Literary and philosophical movements that layer joy, wisdom, and love arising from nature have informed forms of visual art and performative traditions. I have shown the students several paintings from the Hudson River School of Painting. The Hudson River School and Luminism, significant art movements in America, were influenced by Romanticism and Transcendentalism. As a philosophical and literary movement partly inspired by the pantheistic traditions of Asia, Transcendentalism views nature as a source of beauty and knowledge, and that quality endows a unique preciousness to nature, making it worthy of conservation. For transcendentalists like Emerson, Thoreau, and Pierce, the Beauty of nature is interconnected with Truth and Virtue, paving the way to a higher sense of justice.

A similar thought about aesthetic wisdom can be found in the British romantic poet, John Keats who suggested a convergence of Truth and Beauty leading to a state of transcendental Joy - an insight that attaches an innate worth to nature. In his "Ode on a Grecian Urn" Keats makes the following observation: "Beauty is truth, truth beauty,—that is all/ Ye know on earth, and all ye need to know."[7] Written in 1819, "Ode on a Grecian Urn" celebrates the immortality of aesthetic beauty as it is eternal truth and a source of supreme joy. These strands of thinking weaving Beauty, Wisdom, aesthetic pleasure, spiritual joy, and Virtue create a tapestry in which aesthetics and philosophy form the warp and weft. Consider the interconnectedness of Satyam, Shivam (vitality, aliveness), and Sundaram (beauty) as suggested by the *Shvetashvatara Upanishad*. Such a comparison of diverse literary, artistic, and philosophical traditions was a fruitful classroom exercise.

Traditions and practices that celebrate the interrelation or kinship and interdependence of all animate and inanimate beings in nature enriched how people approached conservation and environmental justice. Keeping this in mind, the students were introduced to ecological schools of thought such as the great chain of being and the web of life. These notions are founded on the interconnectedness and interdependence of humans, other living beings, inanimate beings, and elements like wind and water. The great chain of being originating from a mystical Christian tradition, suggests a hierarchical arrangement in which god reigns supreme and his grace percolates through the human, the crown of creation, into all creatures. Humans are given the right to use nature for their needs while exercising stewardship or being the caretakers responsible for the sustenance of flora and fauna, as suggested in the story of Noah and his

[7] *John Keats: Selected Poems* (Ed. John Barnard, Penguin 2007) 191-92.

ark.[8] The web of life presents an equal and equitable picture of the interconnectedness and interdependence of all living beings. A similar insight can be seen in the aboriginal and tribal philosophical insights and ways of life everywhere wherein the environment and humans establish a symbiotic relationship based on love, protectiveness, and cooperation. The tribal communities interact with nature with a sense of kinship and belonging as forests become their home; the soil, the rivers, the birds, the plants, and the animals are their kith and kin. A verse from the *Maha Upanishad* engraved at the entrance of the Parliament of India contains the expression, "Vasudhaiva Kudumbakam," meaning the earth is one family, suggesting the noble idea of kinship and similar expressions are part of the *Rigveda* and *Hitopadesa*. Francis of Assisi recognized god as a parent figure, which makes us all siblings to the creatures of earth and also to 'brother sun,' 'brother wind' 'sister river,' and 'sister moon.' His poem "Canticle of the Sun"[9] addresses the flora, fauna, planets, stars, natural forces, and elements as either brother or sister, reminding the readers that these are all children of god, like humans. Written in 1225, "Canticles of the Sun" is a powerful affirmation of the kinship of all living beings and forces of nature. Towards the conclusion of the poem, St. Francis refers to the Earth as our 'mother' further reinforcing the kinship view. For St. Francis of Assisi and the Franciscans, environmental conservation was a divine responsibility as all living beings are children of god and therefore, related to one another.

The students are introduced to traditions that worship nature, view it with fear and awe because of its ferociousness, see possibilities of kinship and belonging, and approach it for solace and wisdom. These approaches should be revived and promoted through pedagogical interventions because these traditions value nature for what it is.

V. Aesthetics as Action and Activism for Conservation and Justice: Some Examples

Weaving awareness about aesthetic practices in the discussion of literary texts creates more interest and engagement. Using audio-visual aids, various kinds of art forms that appreciate and interpret nature aesthetically are brought into the classroom. Students get an opportunity to view a wide variety of paintings and sculptures. From the days of pre-historic cave paintings, the attempts to represent landscapes, animals, activities connected to nature, and human beings' relation to the natural environment through visual arts have been in vogue. Landscape and

[8] 'The Book of Genesis' (Old Testament of the *Bible*, Chapters 5-9)

[9] St. Francis of Assisi, 'Canticles of the Sun' (*The Franciscan Friars)* < https://franciscanfriarscresson.org/the-canticle-of-the-sun/> accessed 1 March 2024.

wildlife paintings, sculpture, and photography that capture the colours, moods, and textures of nature, and the presence of animate and inanimate beings are ways to strengthen the vibrant aesthetic and philosophical ties between human beings and their environments. Landscape and wildlife art is not limited to aesthetically appealing or awe-inspiring visual representations. Visual arts with nature as its subject and inspiration can accommodate deeper spiritual and philosophical meanings, as we see in the American Hudson River School of Painting. Inspired by philosophical ruminations about nature, the Hudson River School comprising more than a hundred 19th-century artists captured the beauty and fierceness of the Hudson River Valley from 1825 to the end of the century and simultaneously promoted the preservation of natural landscape through practices of ecological conservation and nurturing of the rich biodiversity of the region. Be it a calm flowing river, gentle hues of the sky and dense forests, or storms and thunder raging and trees crashing down in the commotion, the Hudson River School represented myriad moods and expressions of nature.

The romantic school of literature in Europe, especially England, and its counterpart literary movements in the United States derived aesthetic inspiration from nature, natural phenomena, and landscapes and developed metaphysical insights, ruminations about aspects of human existence, and notions of justice from this inspiration. The students realized how the Hudson River School translated the philosophies of Romanticism and Transcendentalism into visual representations imbued with multi-layered connotations incorporated into art through clever visual cues. Though European artists like John Constable, J.M.W. Turner, John Martin, Paul Weber, and Claude Lorraine influenced the aesthetic aspects and compositional schema of the Hudson River School of Art, Romanticism, and transcendentalism blend into the art movement in subtle ways, which makes the Hudson River School way more complex than its credo of representing the discovery and exploration of suitable habitat along the shores the Hudson river and establishing settlements for cohabiting with the diverse flora and fauna of the region as a civilizational ecosystem. The artists often represented a superhuman grace percolating into the landscapes as a metaphysical principle, making the river valley a site for imbibing substantial lessons of life and coexistence. A celebration of the beauty, precariousness, and enigmas of the American landscapes and seasons, the movement became a matter of national and artistic pride as it was a visual philosophical engagement with nature, making it distinct from European schools of landscape art. What defines the Hudson River School more than the common geographical backdrop of the Hudson River Valley in the Catskill region in the north of New York City is the mystical vision attributed to nature. For the Hudson River School, the teachings

of transcendentalism translated into symbolic tropes such as luminism or the use of luminescence and shadow to weave a transcendental metaphysical or spiritual presence into the works of art. The pioneer of the Hudson River School of Art, Thomas Cole, and other landscape artists, Charles Herbert Moore, Frederic Edwin Church, Asher B. Durand, Harriet Cany Peale, and Albert Bierstadt, to name a few were prompted by love for nature and ecological understanding of humanity as part of an ever-expanding and inclusive web of life.

The artworks from the Hudson River School are part of the collections in museums across the United States and other parts of the world and the students could take a virtual tour of select galleries. To make the students and the youth familiar with the lessons of civilizational ecology, aesthetic and metaphysical appreciation of nature, and respect for flora, fauna, and inanimate beings like rivers, oceans, and mountains infused with profound lessons of existence and vitality, conscious efforts like the Hudson River School Art Trail Project[10] are conceptualized. The Trail project taps into the lessons in ecological conservation, and environmental and species justice by taking people on tours through the Hudson River Valley National Heritage Area that had inspired great works of art. The endeavour also provides people with the opportunity for an aesthetic and philosophical appreciation of the artworks of this school. Young Americans and students consider this as aesthetic pedagogy filled with lessons about environmental conservation and justice.

How the Hudson River School of Art has contributed purposively and inadvertently to the cause of environmental justice and commitment to nature conservation is an example that the art and art history traditions can learn from. Ecological conservation and species justice are interconnected. A simple explanation for this connection is that protecting all species from extinction and conserving life-sustaining environments like mountains, oceans, and forests for thriving aliveness for all species contribute to the robustness of ecosystems. The Hudson River School could create and sustain the impetus for conservation and justice by highlighting the civilizational ecology of the Hudson River Valley. I intend to introduce to the activity component of the project an option to create art, music, and other forms of aesthetic expression around rivers, mountains, and valleys like the Hudson River School of Art.

Another possibility of using art for environmental justice ventures beyond aesthetic education and explores the realm of critique and call for action leading to major changes in people's ideas, attitudes, and behaviour. "Ghosts of Gone Birds: Resurrecting Lost Species through Art," an

[10] <https://www.hudsonriverschool.org/hudsonriverschoolarttrail> accessed 10 May 2024

ongoing multimedia art tries to open our eyes to human misdeeds that lead to the extinction of species. I use the project in the course as an example of aesthetic education demanding a changed perception of species justice, supported by an action plan. Ghosts of Gone Birds is a collaborative effort of visual artists, musicians, performers, and writers committed to ecological conservation, environmental justice, and the wellness of species. Through painting, printmaking, sculpture, musical compositions, and genres of writing, the artists who take part in the project represent the disturbing aspects of the extinction of species, especially birds to compel people to reflect on what is irrevocably lost and how it takes away from the beauty and wellbeing of ecosystems. Initiated by the filmmaker, Ceri Levi, with the help of Chris Aldous, a creative consultant, the project has artists dedicating their work to build stories and creative expressions about extinct birds or birds facing the menace of extinction. Margaret Atwood, the famous Canadian writer who became part of the project by submitting a knitted great auk, an extinct flightless seabird made the following observation: "This magnificent show will reconnect us to the natural world, teach us about our past, and fuel our interest in saving what we are losing daily."[11] The revenue generated from the exhibition funds the activities of Birdlife International, especially its prevention of extinctions program[12].Birdlife Organization has dedicated programs for the protection of species. They partner with individuals and organizations to promote the conservation of birds. The collaborative venture, 'Ghosts of Gone Birds' was a meaningful step toward education, art, and activism for conservation. The exhibition has travelled to different continents and spread awareness about the grave crisis of species extinction and how it affects other species, using art, narrative, and performative expressions.

I also encourage the students to engage with dance, and theatre revolving around the themes of environmental conservation and species justice. In her "Tribute to Thimmakka," a narrative-rich Bharatanatyam composition, Malavika Sarukkai celebrated the contributions of Thimmakka, an old woman from rural Karnataka by depicting her as 'nayika.' The nayika in this composition is both a protagonist and a role model. She is capable of leading a community by exemplary deeds. Being childless, Thimmakka fulfilled her urge to nurture and care for life by planting trees. It is believed that she has planted nearly 9000 trees and cared for them, 400

[11] Margaret Atwood, (*The Guardian*, 11 August 2022) < https://www.theguardian.com/environment/2011/aug/24/ghosts-of-gone-birds-exhibition-artists> accessed 10 June 2024.

[12] <https://www.birdlife.org/species-champions/> accessed 15 May 2024.

of which are banyan trees. Popularly known as Saalumarada Thimmakka or Aalamarada Thimmakka (referring to her commitment to nurturing the Sal and banyan trees), Thimmakka is considered to be a green warrior. She was awarded the Padma Shri for her contributions to afforestation and environmental conservation in 2019. Sarukkai's visually stunning performance based on Thimmakka's life and mission of life was inspirational and informative.

Theatrical performances addressing diverse aspects of environmentalism have contributed to educating people about environmental conservation and justice. They have been a significant voice of critique and resistance to unjust practices affecting the wellness of ecosystems. "Under the Sal Tree" is a theatre festival that takes place in Assam in December. People assemble at an open-air theatre in the middle of the forest, sit on benches made of bamboo, and watch performances based on themes relevant to environmentalism, climate change, and sustainability. Eco Roots Foundation has conducted competitions in the form of *Nukkad Natak* or street plays on various relevant themes under their Theatre for Environment Program. Performative traditions such as dance, music, and drama can potentially keep ideas in the air and bring about social changes in all domains of human lives, including environmentalism. Performance traditions have appealed to the masses and the youth. Making students participate in performative activities like music, drama, and dance forms revolving around environmental justice and conservation could create an affinity to nature and commitment to the cause of species justice.

India has rich traditions of tribal art which bring together the sacred, spiritual, and aesthetic dimensions of art and also implies an ecological vision of the coexistence of all animate and inanimate beings. Ushered by travelling European artists, the conventions of portraying the beauty and ferociousness of nature and natural phenomena became an integral part of Indian art. Nature continued to remain the backdrop of human drama and other visual narratives represented by Indian artists. In the ritual schools of art like the Mural paintings of Kerala or Tanjore paintings, we can see an organic ecosystem comprising divine beings, demi-gods, flora, fauna, and forces of nature. Artists from the Bengal School of Art including Abanindranath Tagore, Nandalal Bose, and B.B. Mukherjee explored the aesthetic and symbolic possibilities of landscape painting. Even in the modernist and contemporary schools of art in India, the organic presence of the natural environments, the political undertones of symbols from nature, and the spiritual dimensions of landscapes are hard to miss. Gopal Ghose, S. H. Raza, and M.F. Hussain could interweave the visual narratives of nature into their work. The movements for ecological conservation and environmental and species justice can be reinforced by an aesthetic

appreciation of nature-inspired art and by roping in art practices into attempts towards conservation and justice for awareness generation and to critique the unjust practices.

The challenges for salvaging and sustaining traditions supporting ecological conservation, environmental, and species justice are two-fold. The primary challenge lies in cultivating or reviving collective cultures of aesthetic and philosophical appreciation of nature. The second and more important challenge is translating such cultures into tangible strategies for environmental conservation and justice. The study explored how the discourses highlighting sacred, ecological, philosophical, and aesthetic perspectives about nature should be made available to students and the population in general through pedagogical exercises, art practices, recreational endeavours like nature walks, performative arts, and awareness programs. Such insights about nature can be woven into focused activities like afforestation by planting trees and caring for them, conserving biodiversity through the protection of flora and fauna, and cleaning the beaches or waterbodies.

Actions and Activism for specific purposes do not originate from thin air. The strength of the ideas and feelings that drive actions for a particular purpose may add more life and ensure enhanced effectiveness. That is why I argue that environmentalism should be more purposive and informed by aesthetics and philosophical traditions. The rationale, emotional intensity, power, and energy of a thought or a principle that prompts an activity makes it more meaningful. I conclude with an optimistic belief that the strategies for laying the foundations of sacredness, aesthetic joy, knowledge and wisdom, and a sense of kinship and interdependence for our perceptions of nature as proposed in the study would provide more vitality and strength to environmentalism. Imagine if the actions and activism for ecological conservation and environmental and species justice are inspired by aesthetic and philosophical notions. In that case, more and more people may want to be part of the mission with reinforced determination and responsiveness.

The study, research, and extra-curricular and extension activities at educational institutions may incorporate art practices, an appreciation of tribal and rural art forms, recreational endeavours like nature walks, and awareness programs. Philosophical and aesthetic insights about nature can be woven into focused activities like afforestation, conserving biodiversity by protecting flora and fauna, and cleaning beaches or waterbodies. Educational institutions can facilitate such tasks through the NSS, clubs, and committees, addressing the practical problem of how art and philosophy complement efforts for ecological conservation and environmental justice. The strength of the ideas and emotions driving an action may add more vitality and ensure

enhanced effectiveness. That is why I argue that environmentalism should be more purposive and informed by aesthetics and philosophical traditions and pedagogical approaches can cultivate a more ethical approach to environmental justice.

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