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ENVIRONMENTAL DEVASTATION IN SINDH AND THE PURSUIT OF JUSTICE FOR ITS SUSCEPTIBLE POPULATIONS AMID CLIMATE CRISIS

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Abstract

The impacts of climate change are obvious in the present times as it has been devastating the most of the regions all around the world whether in terms of heat waves, forest fires, change in weather patterns, severe rainfalls, deadly draughts etc. Through this research paper, the focus will be on explaining environmental issues of the province Sindh of Pakistan in regards to going global climate change considerations as it has been proved lethal to Sindh. Firstly, it identifies and evaluates the reasons for environmental degradation, and, secondly, it also explains the repercussions of disaster in the region, as climate change and other impacts and stimuli for internal displacement, heat waves, and water shortages. The paper also has an objective to try to catch the basic understanding of the climate change legislation on national and International level with prospect of how Pakistan is working under the hood of the UNFCCC- United Nations Framework Convention on Climate Change. The paper also tries to analyze the availability of legislations whether these legislations are sufficient to safeguard people from the havoc caused by climate change or if there is still need for the legislations to deal with the environment problem so far as Sindh's climatically vulnerable population is concerned, noting though there are policies and laws to ensure Sindh as the victim of climate change but it is yet to see that how much Sindh government and other related stakeholders are committed to understand and implement whole change.

Keywords **:** *Climate Change, Climate Crisis, Risk Tipping Points,*

Legislations, UNFCC, Climate Crisis in Sindh, Environmental Legislations in Sindh.

INTRODUCTION

Presently, humanity faces a frightening reality as the climate crisis takes center stage, intensifying worldwide emergencies and jeopardizing the integrity of decades of progress in public health. The convergence of variables endangering people's health, public health, and healthcare systems globally was highlighted in the 8th annual report of the Lancet Countdown on Health and Climate Change, which was published in November 2023. A number of aspects, such as the increasing degree of food insecurity, the spread of diseases susceptible to climate change, and the rise in the frequency and severity of extreme weather events, are examples of how the climate crisis presents itself. The world's health systems are under unprecedented strain as a result of these combined conditions, necessitating swift and extensive response. According to The Lancet Countdown Report, the effects of climate change on health are becoming more and more severe on a global scale, wreaking havoc on lives and livelihoods. Since 1986 to 2005, there have been twice as many heatwave days annually for those over 65 and newborns under one-year-old, who are especially susceptible to intense heat (Heat-related fatalities of individuals above 65 years of age increased by 85% and more than twice the upsurge projected if temperatures had not altered). Heat exposure-related damage in labor capacity caused in average probable income losses equivalent to $863 billion in 2022. Agricultural workers were most affected. Extreme weather events are becoming more damaging, endangering food production and water security and raising the risk of starvation for millions of people. When comparing the annual data observed between 1981 and 2010, it is concerning to note that 127 million more people in 122 countries had moderate to severe food insecurity in 2021 as a result of the unsettling statistics of more frequent heatwaves and droughts. In the same way, the spread of infectious diseases that might be fatal is quickening due to climate change. Warmer waters, for instance, have expanded the global coastline's ideal region for spreading Vibrio bacteria, which may infect humans and cause mortality, by 329 kilometers since 1982. The transmission probability of dengue by Aedes aegypti and albopictus amplified by 28.6% and 27.7% correspondingly and 12.7% more of the coastline was suitable for Vibrio transmission in 2022 than in 1982-2010, putting a record 1.4 billion people at risk. As a result, a record 1.4 billion people are now in danger of sepsis, severe wound infections, and diarrheal disease (Romanello et al., 2023).

The current state of health concerns is obviously urgent, but it also acts as a warning of impending problems. The world is headed in the wrong way, as the report emphasizes, continuing to rely too much on fossil fuels and failing to include the most

vulnerable populations in the crucial shift to sustainable energy sources. Not only is the Paris Agreement's implementation vital for the environment on a global scale, but it is also essential for public health. There will be dire ramifications for mankind and its health if significant progress toward the 1.5°C target set forth in the Agreement is not made. Malnutrition will affect more children, disease outbreaks will occur more frequently and widely, and the number of people dying from respiratory illnesses will keep rising. There is no doubt about it: we need to take action right away (Romanello et al., 2023).

International agreement to "keep global warming to well below 2°C above pre-industrial levels" and "pursue efforts to limit the temperature increase to 1.5°C" was sparked by the historic 2015 Paris Agreement. However, the world is getting dangerously close to missing the 1.5°C limit. The IPCC AR6 synthesis report, which was circulated in the month of March 2023, lays out the implications for society as well as what may still be done to prevent catastrophe. In the climate community, sticking to the greater 1.5°C objective for climate change has become crucial since the Paris Agreement was signed (Lee et al., 2023). Global warming is having an effect on society, but for the roughly 3 billion people who live in regions that are extremely susceptible to climate change, warming that exceeds 1.5°C will be catastrophic. The impact of climate change can hastily escalate from an ecological issue to a monetary threat in a world where global warming exceeds 1.5°C. For example, if a protracted drought results in a failed harvest, supply chains will experience a reduction in availability and prices will rise. This is becoming increasingly evident (Romanello et al., 2023).

RISK TIPPING POINTS

When the systems on which our lives and societies depend become less resilient to risk and cease operating as intended, we have reached a tipping point for risk. We are approaching the intersection of several risk tipping points today. This planet's rapid and fundamental transformation is caused by human activity, which is moving us closer to a possible disaster. Humans seem to believe that processes are straightforward and predictable. We turn on the tap and water flows out when we need it. But we rarely consider the source of the water and are frequently ignorant of the numerous underlying processes that take place before it reaches us. The impact of our use on others in the system and the possibility that our water supply may eventually run out are so little understood by us. There are systems everywhere and they are intimately related to us. Systems that involve interactions between separate parts make up our world, including those involving food, water, transportation, information, and ecosystems. These systems have grown more complicated throughout time as a result of human activity, including worldwide trade, global supply chains, and communication networks. As these linkages grow stronger, they present chances

for international collaboration and assistance, but they also put us at risk for greater unpleasant shocks and hazards, especially when our own activities endanger a system. Our life-sustaining systems, such the ones that provide us with food and water, usually don't break down in a straightforward or predictable way. If you take away one construction block at a time, a tower composed of building blocks might initially stand, but instability gradually creeps in until you take away one block too many and it topples over. Similar to a stack of bricks, a system may collapse or undergo a fundamental transformation when it reaches a specific level of instability. Abruptly, nothing comes out of the tap when we open it. This is referred to as a tipping point, and tipping points can have disastrous, permanent effects on both humans and the environment (United Nations University-Institute for Environment and Human Security, 2023).

There are various types of tipping points. They are referred to as "climate tipping points" associated with climate change, which are particular thresholds that trigger irreversible changes in the planet's climate. Vast global systems, such as the Amazon rainforest and the Greenland Ice Sheet, will eventually collide when rising temperatures push them beyond specific thresholds. However, there are other factors that influence danger than physical boundaries, and climate change is just one of them. When and where our physical and ecological environments combine with human society, a host of new concerns arise. Certain tipping points cause dramatic changes to our life-supporting systems, which have the power to upend entire societies. For this reason, a new category of tipping points called risk tipping points is suggested in the Interconnected Disaster Risks report for 2023. The point at which a particular socio-ecological system can no longer withstand risks and perform as expected is known as the "risk tipping point," and it is at this point that there is a significant increase in the likelihood of catastrophic effects on these systems. We are dangerously approaching the intersection of several risk tipping points right now. This sudden and profound alteration of the globe is the result of human activity (United Nations University-Institute for Environment and Human Security, 2023).

GROUNDWATER DEPLETION

The indiscriminate extraction of our water resources, destruction of nature and biodiversity, degradation of Earth and space, and elimination of our instruments and options to mitigate catastrophe risk are all contributing to the introduction of new dangers and aggravation of existing ones. The depletion of groundwater required for agriculture is one instance of the risk tipping point. Aquifers are underground reservoirs that hold groundwater, a vital freshwater resource. Over 2 billion people rely on these aquifers for their drinking water, and 70% of the withdrawals are

utilized for agricultural purposes. However, the world's biggest aquifers are losing more than half of their capacity more quickly than nature can refill them. Groundwater is practically a non-renewable resource since it has been built up over thousands of years. In this instance, the water table's decline to a point where wells that are currently in operation may access it marks the tipping point. Farmers will lose access to groundwater for crop irrigation once it is crossed. This increases the risk of food instability and the collapse of entire food production systems, in addition to the risk of farmers losing their livelihoods. This is not a hypothetical danger. This tipping point for groundwater risk has already been reached in some areas, such as Saudi Arabia. Saudi Arabia ranked sixth in the world for wheat exports in the middle of the 1990s due to its extensive use of groundwater for irrigation. This risk tipping point is also rapidly approaching for other nations, such as India and Pakistan (United Nations University-Institute for Environment and Human Security, 2023).

ACCELERATING EXTINCTIONS

Many species have become extinct on Earth over the course of human history. Extinction is a natural component of the evolutionary process that has molded life on Earth, however, it frequently happens gradually over millions to thousands of years. Regretfully, we have accelerated the process of extinction through our heavy involvement in changing land-usage patterns, over-exploitation, contamination, climate change, and the introducing invasive species. Because of human involvement, the current rate of species extinction is hundred times faster than it is normally, with dire ramifications for all life on Earth. The complex webs of interactions among various species provide the foundation of ecosystems. Because of this, the actual risk of extinction might be far higher than we think, particularly given the fact that many species have close relationships and create special bonds with one another. Such an organism's extinction has an impact on the ecosystem as a whole and may cause a "co-extinction," or the extinction of dependent species, which might start a chain reaction of extinctions that could ultimately lead to the collapse of the ecosystem. Put simply, extinction encourages extinction. 400+ vertebrate species have become extinct in the past 100 years; 32 million hectares of primary or recovering forest were lost between 2010 and 2015; and 1 million species of plants and animals endangered to extinction, a majority of them within decades (United Nations University-Institute for Environment and Human Security, 2023).

MOUNTAIN GLACIER MELTING

Glaciers serve as "water towers" atop the tallest mountains on Earth, holding and releasing freshwater. Entire regions receive water for drinking, irrigation, hydropower, and ecosystems from the meltwater from glaciers and snow. Glaciers retreat as the ice mass that was developed in ages melts faster than snow is able to replenish it. The world's glaciers are melting twice as quickly as they were twenty years ago as a result of global warming. Glaciers lost 267 gigatons of ice year between

2000 and 2019, which is nearly equal to the mass of 46,500 Great Pyramids of Giza. In the event that global warming is kept to 1.5°C, it is predicted that, with the exception of Greenland and Antarctica, we will lose about 50% of our glaciers by the year 2100. It is estimated that by the middle of this century, even the glaciers on the highest peaks—like those in Asia's high mountains—will have reached their peak water levels. As a result, the approximately 870 million people who depend on the 90,000+ glaciers in the Himalayas, Karakorum, and Hindu Kush mountains are also at risk (United Nations University-Institute for Environment and Human Security, 2023).

UNBEARABLE HEAT

It has been established by the WMO's apprehensive State of the Global Climate report that 2023 was the warmest year ever recorded (WMO, 2023). Global temperature rise brought on by human-caused climate change is resulting in more intense and frequent heatwaves with severe consequences; during the last two decades, extreme heat has been linked to an average of 500,000 excess deaths annually, disproportionately affecting the most vulnerable; high humidity exacerbates the effects of heat by impeding sweat evaporation, the body's natural cooling mechanism. Since 2010, this has happened at least twice in Jacobabad, Pakistan, which is one of the hottest cities on Earth. These incidents are happening more frequently even though they have only lasted a few hours each. For instance, wet-bulb temperatures in India during a heatwave in 2023 exceeded 34°C. According to research, regions of the Middle East and South Asia will frequently cross this barrier by 2070. By 2100, more than 70% of the world's population may have experienced at least 20 days of lethal climate annually, compared to the current proportion of about 30%. People who work in hot kitchens, farms, or construction sites are subject to extra heat from their surroundings or physical activity. Similar to how socioeconomic status might influence susceptibility, living beneath a tin roof versus air conditioning in the same city on the same day can have catastrophic differences (United Nations University-Institute for Environment and Human Security, 2023).

UNINSURABLE FUTURE

Extreme weather events such as floods, tropical cyclones, extreme heat, and drought had significant impacts on various continents. Mediterranean Cyclone Daniel caused flooding and loss of life in Greece, Bulgaria, Türkiye, and Libya. Tropical Cyclone Freddy and Tropical Cyclone Mocha had major impacts on Madagascar, Mozambique, and Malawi. Record-breaking temperatures were observed in southern Europe and North Africa, with Italy reaching 48.2 °C and Tunisia reporting 49.0 °C. Canada experienced an unprecedented wildfire season, with 18.5 million hectares burned. Droughts in the Greater Horn of Africa and parts of Central

and South America were followed by floods (WMO, 2023).

The expense of the damage caused by extreme weather events has increased along with their frequency and severity worldwide. Damages from weather-related disasters have increased sevenfold since the 1970s; in 2022 alone, the world economy lost $313 billion. Insurance protects individuals from the possibility of suffering losses due to property damage during natural disasters; the premium is determined by the likelihood that the losses will occur. Extreme weather events are more likely to occur in certain places, endangering more lives and property. Simultaneously, it is anticipated that the extent and quantity of at-risk regions will increase due to climate change, which would cause a shift in the spectrum of hazards such as storms and wildfires (United Nations University-Institute for Environment and Human Security, 2023).

ROOT CAUSES FOR ENVIRONMENTAL DISASTERS

The underlying variables that set the stage for catastrophes to occur are known as root causes. If we consider a disaster as the tip of an iceberg, the apparent portion of a far bigger structure that remains concealed beneath the water's surface, root causes form the deeper structures that developed circumstances for the catastrophe to happen, and they are astonishingly similar to numerous presumably unrelated events (United Nations University - EHS, 2023). The root causes include:

HUMAN-INDUCED GREENHOUSE GAS EMISSIONS

Emissions of greenhouse gases caused by humans, such as CO2, CH4, nitrous-oxide, and synthetic fluorinated gases including chloro-fluoro-carbons commonly known as CFCs that are also well known for depleting ozone layer, trap heat in the atmosphere and cause extreme weather, rising sea levels, and other environmental changes that endanger people and wildlife globally.

INSUFFICIENT RISK MANAGEMENT

Insufficient risk management may lead systems to go beyond risk tipping points, make disasters and system failures more likely, and leave people unprepared for hazards. Current approaches to risk management are often reactive and inhibited by a lack of political will; instead, an innovative strategy that takes root causes and interconnectedness into account is needed.

UNDERVALUING ENVIRONMENTAL COSTS

Failing to anticipate the underlying environmental overheads of development and administrative choices, predominantly in land-use adjustment, leads to economic development that ignores critical environmental impacts, increasing risks and negatively affecting livelihoods, food security, ecosystem functioning, durable growth, social susceptibility, and the capability of nature to diminish disaster risk by losing biodiversity and resilience.

INSUFFICIENT COOPERATION

The international community's capacity to address important issues like

climate change, disaster risk, and the sustainable management of limited resources is hampered by a lack of cooperation and legally enforceable agreements. The communication and enforcement of safety standards and legal frameworks by authorities, institutions, and governments can reveal common challenges in anticipating and mitigating risk.

PRIORITIZING PROFITS

Economic gain is prioritized by individuals and governments all around the world. Risk to diverse effects, however, rises when profit maximization takes precedence above social and environmental responsibilities. The discrepancy between economic profit and appropriate risk governance is further highlighted by the fact that more cost-effective choices for risk management are frequently turned down for budgetary reasons.

GLOBAL DEMAND PRESSURES

The likelihood of disasters and the reaching of risk tipping points could rise due to the growing worldwide demand for scarce resources. Global demand pressures for food, water, energy, land, and other resources, fueled by population growth and increased development, encourage production techniques that prioritize profit over the health of our social and natural systems.

INEQUALITY OF DEVELOPMENT AND LIVELIHOOD OPPORTUNITIES

Due to their limited ability to manage risk, marginalized groups frequently priorities their basic needs over risk mitigation and relocate to high-risk areas with few support systems. This leads to vulnerability as a result of opportunity inequality, which calls for a sociocultural shift to address inequality and build a better system for everyone.

COLONIALISM

Colonialism is a worldview that is focused on growth and the goal of dominance, exploitation, and control over a particular region. Colonialism's impact has changed the risk landscape of nations all over the world for centuries. This is because it has perpetuated marginalization, strengthened elite structures, or encouraged exploitative behaviors that worsen inequality or harm the environment. Notably, among other manifestations of neocolonialist authority, colonialism still occurs under covert new forms, such as economic policies, humanitarian initiatives, and international agreements.

CLIMATE CRISIS AND SINDH

Pakistan ranked at fifth position among countries most impacted by climate change. Of all of the provinces in the nation, Sindh is one of the most severely affected. Both the intensity and frequency of hydro-meteorological hazards, including heat

waves, cyclones, flooding, and heavy rains, are on the rise due to shifting patterns of both temperature and precipitation. Unprecedented rainfall and flooding in the year 2022 had served as an urgent warning for policy and decision-makers, indicating that climate change is serious and will have long-term negative effects on Sindh if meaningful steps are not made to mitigate and adapt to it. Masses of individuals have been crushed by the gigantic devastation and catastrophic landslides and flooding that Pakistan got as a result of the 2022 monsoon rains. This flooding, that is considered as one of the most horrible in decades, has affected over 33 million people in 90 districts and resulted in almost eight million people being displaced. The Pakistan National Disaster Management Authority (NDMA) declared on November 18, 2022, that there had been over 1,700 confirmed fatalities and over 12,800 people were injured. Hundreds of thousands of homes have been devastated as a consequence of the disaster, and the loss of more than one million livestock compounds to the serious and pervasive effects of this natural disaster.

The climate change has proved damaging especially for Sindh in number of ways that are discussed in here:

INTERNAL DISPLACEMENT

For the coastal people in Sindh's Indus Delta, climate change is causing persistent internal displacement. People have been moving inland over the past few decades for a variety of factors, including salinization, increased frequency of disasters due to climate change, and the incursion of seawater. Hundreds of thousands of people have been relocated due to the loss of land and means of subsistence; in 2022 alone, amid the worst floods the nation has ever seen, an estimated 1.5 million people were uprooted. The resettled population dwells on marginal territory that has not been claimed by others, which restricts their options for farming and increases their reliance on fishing, putting them at risk of environmental degradation and climate change (Dorien Braam, 2023).

EXTREME WEATHER EVENTS

Climate change has greatly moved up in the scale of priority global issues, as extreme climatic events are occurring with increasing frequency in different places around the world. Pakistan, which is all the time emitting such tiny and insignificant amounts of greenhouse gases is one of the most seriously impacted countries by climate change. The year 2022 was one of the most disastrous in the history of Pakistan; certainly it was never as disastrous as the floods in the regions of Sindh and Balochistan, which quite literally changed the shape of the earth. The normal average temperature in March in Karachi is around 19.4 degrees centigrade but in the March of the year 2024, Karachi hit a new lowest temperature of less than 9 degrees centigrade and this was the case in all over Sindh as well where the temperatures reached near about 7 degrees that is all time low in the month (The News, 2024).

2.2.1 Record Rainfall and Floods:

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According to the climatologists, the monsoon season of 2022 was characterized by extraordinary rainfall in Sindh. Padidan witnessed a 1,672% rise in rainfall in just three months which is equal to 1,763 mm. This is a record or in other words skyrocket since usually Padidan gets only 100 mm of rainfall on average. In the same way, Mohen-jo-Daro which is a very dry place for 6 months recorded 990 mm (1,293% more than the average). Rain-induced floods ravaged both the countryside and the cities of Sindh, killing hundreds of people, displacing millions, and destroying infrastructure and crops across millions of acres of land (Khan, 2023).

The river flood threat in Sindh has been classified as high based on the modeled flood statistics currently accessible to this instrument. This suggests that possibly catastrophic and potentially fatal river floods are likely to strike at least once in the next ten years. Model forecasts' estimations of rainfall changes are contradictory. The current hazard level may rise in the future as a result of climate change (The News, 2024).

WATER SCARCITY

Water scarcity crisis in Sindh, a lower riparian province of Pakistan, which is highly dependent on the Indus basin river, becomes exacerbated due to agreements set in 1960's which seem outdated when compared to population growth, industrialization, and urbanization. The agricultural sector, the major consumer of water right through the process of irrigation and with limitations like waterlogging and salinity, is entirely dependent on this resource which is scarce. Public health is at major probability, as seven out of ten water samples in Sindh has the quality not of consuming, consequently, a strain of drug resistant typhoid has been on the increase in the region. Furthermore, this issue endangers the availability of water due to increased floods and droughts, key freshwater ecosystems including Keenjhar and Haleji lakes are put under threat. This emergency needs a multi-faceted Water Management Policy for Sindh that will improve the governance through introducing regulations for water management and enforcement of the rules by adopting the innovative solutions based on the evidence. The final step should be to ensure the sustainability of water management and protection of the nature, that is public health and the environment (Geo TV).

OTHER CONCERNS

There are several other important impacts some of which are very well known while some need to be further studied in the context of Sindh. The other issues that are important to discuss here include:

Food Security: Due to extreme weather, the crops are damaged or they lack the actual yield per acre. Increased temperatures and changed weather patterns influence the impact of pests on the pest-sensitive crops, damaging crops overall yield

percentages. Further, water scarcity also impacts the crops. This situation might result in the lower crop yields for the 5th most populous nation in the world causing food emergencies as Pakistan is facing multiple debt issues including foreign debt where they have to borrow from IMF for paying import bills as their foreign exchange reserves are far too low due to very high gap in import-export bills. If Pakistan, an agriculture based economy will import the food items for its population than the issue will further aggravate the already dangerous situation for the people of Pakistan.

Access to shelter: The damaging situations arrive every 5 to 10 years apart where millions of people are affected by climate crisis as was the case in 2022 that left almost 33 million people affected. The people were on the roads for months as there was no any place to live as the havoc left their shelter uninhabitable. Almost similar situations were seen during the 2010 floods in Sindh. This situation is alarming as the people of Sindh are the most affected by such climate related calamities.

Education: Beside all these things, education sector is also one the most sensitive sector that is hit tremendously by the climate related incidents as number of schools are damaged by these conditions, children remain out of school for months and for years to cover the damages of their households, some children engage in child labor leaving schools, and so many issues surrounding it.

Health: Health is also most serious issue especially in terms of climate crisis as havoc results in emergence of number of diseases in almost all living organisms including humans and livestock. This results in loss of life as well as livestock due to unavailability and inaccessibility of proper treatment for the affected populations.

Psychological well-being: Most important health concern that is mostly understudied especially in the local populations of Sindh is the psychological well-being and emotional health as the people face devastating situations and the effects of such situations takes years to make them in a condition they were in before. Such circumstances make them feel helpless as well as disturbed that makes them to take decisions that are damaging and socially unacceptable.

Gender-Based-Violence: Another major concern that arise as a result of climate crisis is the gender based violations as the people being psychological disturbed by these devastating situations lose their temper and start to behave in unacceptable manner.

A THOROUGH HISTORY OF CLIMATE CHANGE LEGISLATION

Climate change has created immense problems for our planet. Climate change is having a severe influence on both rural and urban areas across the globe (O'brien & Leichenko, 2000). According to reports, the magnitude of climate change will have an impact on a variety of stakeholders' interests. As a result, all stakeholders must be brought together on a single platform to develop comprehensive climate change action plans and policies that take into account the substantial danger of climate change to

all areas (Srivastava, Mboh, Zhao, Gaiser, & Ewert, 2018). Bringing all stakeholders together can be best characterized as "governance" (Benz, 2004). Good governance is difficult due to the intricate nature of the relationships between distinct parties. The government system necessitates effective collaboration mechanisms among governmental agencies in order to design workable solutions. There is huge history of environmental legislations that is described in here very precisely that seems appropriate and relevant to our study. Our study is mainly focused, however, on climate change. So, present study will focus on the legislations related to climate crisis. Climate change is mainly caused by Greenhouse gases which involve mainly CO2 as its increased levels are causing so much damage that is difficult to gauge and measure.

Despite significant progress in the UNFCCC's orientation, legislative structure, and operation structure, worldwide attempts to mitigate climate change have not culminated in a corresponding reduction in global greenhouse gas (GHG) emissions. Since we cannot anticipate just one treaty to achieve this Herculean task, climate change governance has begun to take place in other international organizations, at the regional, national, and subnational levels, and via an intricate combination of commercial and public efforts (Abbott, 2012; Keohane & Victor, 2011). Despite this uproar of hustle and bustle, there continues to be a huge gap between the level of effort put forth at the UNFCCC and the results in terms of mitigation and adaptation to climate change, as well as producing appropriate funding for this (Kuyper, Schroeder, & Linnér, 2018).

The UNFCCC opened its doors for signatures at the 1992 Earth Summit in Rio de Janeiro, together with the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), and an array of nonbinding forest management directives. Collectively, these treaties resulted in a new phase of global environmental governance and discussions that, 25 years afterward, continue to expand in subject matter and magnitude to the point where today climate change is recognized as an international threat that is on par with, or even exceeds, "hard" challenges such as trade and security (Carle, 2015; Joanna Depledge & Chasek, 2012). The UNFCCC was established as an umbrella convention, describing its framework and initiating an approach to achieve its ultimate goal (Article 2). Negotiations under this paradigm were expected to develop over time, in response to emerging scientific knowledge, social perspectives, and developments in politics (Joana Depledge, 2017). The UNFCCC consequently adopted the so-called convention-protocol strategy, in which the regulatory structure is set up under the convention first, and then pledges for tackling the issue at hand are reached through

future conventions (Susskind, 1994). This accompanied the implementation of the ozone regime, which began with the 1985 Vienna Convention for the Protection of the Ozone Layer as a framework and eventually resulted in the ratification of the more targeted and determined 1987 Montreal Protocol and its subsequent revisions and modifications (Oberthür, 2001).

The Kyoto Protocol's strategy for combating climate change was strictly focused on mitigation, with industrialized countries receiving emission reductions (officially Quantified Emission Limitation or Reduction Objectives; QELROs). In actuality, during COP-3 in Kyoto in 1997, this was accomplished by a combination of volunteer pledges from individual nations and global pressure, although on a few significant nations. That demonstrates why Australia, for instance, was permitted an 8% increase above 1990 levels, Russia was permitted to stabilize its emissions, Japan was pressed to concur with a 6% decrease, the US to a 7% decrease, and the EU to an 8% cut commitment from 1990 levels. Pressure was put on these economies because of their significant net emission shares (the United States was the biggest emitting nation at the time) and/or political relevance. The politics around QELRO assignment were complicated by varying levels of discomfort among states, with 1990 serving as the basis year for the majority of states; only the selected states who had not yet established inventories of emissions by 1990 were assigned a base year of 1995. Although somewhat economical, this technique was obviously not equal, given the disparities in GHG emission spikes (or declines) among states. It may also have been ineffective because emissions in many states were not cut down, and developed nations grew less eager to commit to signing up to the Kyoto Protocol's Second Commitment Period (2013-20).

Post-2012 dialogue went away from this strategy, shifting from QELROs to choosing to set up a repository and provide mechanisms for Nationally Appropriate Mitigation Actions by developing nations at COP-13, to requesting pledges of "commitments" right before and right after COP-15 in Copenhagen and eventually to pledges of "contributions" at COP-19 in Warsaw. Many saw this as yet another example of governments abdicating their responsibilities for demonstrating their proportion of commitment to mitigation. Although the Kyoto Protocol established an objective of lowering Annex I countries' GHG emissions by 5.2% from 1990 levels by 2012, the Paris Agreement subsequently established a "global ambition" objective of "holding the increase in global average temperature to well below 2°C above preindustrial levels" and "pursuing efforts" to limit it to 1.5°C. Furthermore, it was stated that worldwide emissions ought to reach their maximum "as soon as possible" (Article 4.1) in order to preserve an equilibrium between GHG emission sources and sinks capable of absorbing and storing emissions, like forests and the oceans, by the end of the century. Regarding this determination, the Paris Agreement said that every

signatory "shall prepare, communicate, and maintain successive nationally determined contributions that it intends to achieve" (Article 4.2). Tragically, the correlation between the global targets and the nationally determined contributions is not clearly established in the Paris Agreement (Dimitrov, 2016).

The total number of NDCs presented according to the Paris Agreement is unlikely to be adequate to reach the goals outlined in Articles 2 and 4, hence the viability of this strategy is far from certain. As of 2017, the Climate Action Tracker predicted that following the US withdrawal, if every other nation complied with their NDCs, the median global temperature rises by 2100 will be 3.16°C above pre-industrialized levels (in contrast to 2.84°C predicted in 2016 with the US's NDC included). As a result, the Paris Agreement's success depends on increasing ambitions along the way (Kuyper et al., 2018).

HOW PAKISTAN IS BENEFITTED FROM UNFCC?

The UNFCCC has benefited Pakistan in many ways such as, Pakistan has got an avenue to participate at international level, contribute towards climate change mitigation and get funding and technological support to improve on its Capability. Here are some key ways in which Pakistan has benefited from the UNFCCC:

GREEN CLIMATE FUND (GCF)

The Green Climate Fund (GCF) is a UNFCCC-based fund that envisions a method for redistributing funds from rich to developing countries. This money is intended to assist nations with limited resources in their adaptation and mitigation efforts to counteract the effects of climate change. It is led by a Board of 24 members and assisted by a Secretariat. The Fund also supports preparedness and preparatory initiatives to increase country ownership. The Fund operates under two windows: adaptation and mitigation, with 50% of resources committed to each. Currently, Pakistan has a portfolio of USD 249 Million with the GCF (GoP).

Being a developing country that is a signatory to the UNFCCC, Pakistan requires financing to fund projects that would help in reducing the emission of greenhouse gases as well as building the country's climate change adaptation capacity, which it can secure from the GCF. For example, the GCF has provided Pakistan financial assistance for projects like the Acumen Climate Action Pakistan (ACAP) Fund that strives to set up a USD 80 million climate adaptation-focused investment fund in Pakistan that will provide strategic financing to agribusinesses. The fund's purpose is to increase vulnerable farmers' climate resilience and livelihoods by giving smallholder farmers access to climate adaptation technologies. A USD 10 million Technical Assistance package will offer customized assistance to strengthen the profitability of investee enterprises' business models while enhancing comprehensive climate resilience among smallholder farmers and the ecosystem. The

initiative aims to establish a commercially viable business model, boost farmers' climate adaptive capacity, and channel resources towards Pakistan's national climate adaptation priorities in the vulnerable agriculture sector.

GLOBAL ENVIRONMENT FACILITY (GEF)

The Global Environment Facility (GEF) is a family of funds committed to combating biodiversity loss, climate change, pollution, and threats to land and ocean health. Its grants, blended funding, and policy support assist poor nations in meeting their top environmental priorities and adhering to international norms. The fund's work is organized around five key areas: biodiversity loss, chemicals and waste, climate change, international waters, and land degradation. Pakistan has to date accessed USD 80.0 Million in funding from GEF (GoP). The Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF) also umbrella funds of GEF for combating climate change.

ADAPTATION FUND

The Adaptation Fund assists developing nations in strengthening their resilience and adapting to climate change. It was founded under the Kyoto Protocol of the United Nations Framework Convention on Climate Change and has allocated US$ 330 million to 51 countries since 2010 to build resilience to the negative consequences of climate change. It focuses on developing countries that signed the Kyoto Protocol and are susceptible to climate change. It funds programs and activities that help disadvantaged communities in developing nations adapt to the adverse impacts of climate change. These programs are focused on national needs and priorities. The Fund is funded in part by government and corporate contributors, as well as a 2% share of the proceeds from Certified Emission Reductions (CERs) issued under the Protocol's Clean Development Mechanism programs (UNDP).

CLIMATE JUSTICE AND EQUITY:

Climate justice involves two parts:

Recognizing that climate change disproportionately impacts socioeconomically underprivileged groups of people,Taking action to safeguard and empower underprivileged and historically disadvantaged groups.

Climate justice may encompass technological remedies, but it is centered on individuals and involves listening, learning regarding the disproportional effects of climate change and energy choices on historically disadvantaged populations, empowering communities with limited funds, political influence, and other resources, and eliminating constraints that hold back historically disadvantaged populations from taking an active role in making decisions that affect them.

LOSS AND DAMAGE (L&D) MECHANISM

At COP19 (November 2013) in Warsaw, Poland, the COP developed the Warsaw International Mechanism for Loss and Damage Linked to Climate Change Impacts (Loss and Damage Mechanism) to deal with loss and damage associated with

climate change impacts, involving extreme events and slow onset events, in the developing nations that are in particular susceptible to the adverse impacts of climate change (United Nations).

LEGISLATIONS AND POLICIES TO COMBAT CLIMATE CHANGE IN PAKISTAN

There are numerous legislations and policy measures for tackling climate change, the list of which is provided below:

PAKISTAN CLIMATE CHANGE ACT (PCCA 2017)

The PCCA 2017 introduces the Pakistan Climate Change Council to be chaired by the Prime Minister with the membership of its Ministers from different sectors, Chief Ministers of Provinces/Assumed, other persons to be appointed in such manner and from such a sector of the Federal Government/Provincial Government as the Prime Minister may consider appropriate, representatives from Chambers of Commerce, NGOs, technical members and others as may be specified by the PCCA 2017. It again entails overseeing the implementation of Act, ensuring compliance with international treaties climate change issues, harmonization of climate change considerations in planning and decision making processes, as well as endorsing and supervising the adaptation and reduction measures that are necessary to meet international obligations. The Council proposed to provide centralized policy coordination on the implementation of the Act, supervision of the international treaties on climate change, mainstreaming climate change in government policies, and applicable approval and monitoring of adaptation and mitigation measures for compliance with the international standards and policies (Government of Pakistan, 2017).

NATIONAL CLIMATE CHANGE POLICY (2012)

Through the National Climate Change Policy of Pakistan launched in 2012, Pakistan outlines a clear and organized structure that would address adaptation and mitigation of climate change effects on a sector by sector basis including energy, power, industry, transport and buildings. It seeks to foster water as well as food as well as energy security especially through diminishing climate risk for women in countryside. Efficiency, and diversification which include provision of solar, wind, geothermal and bioenergy are its major goals. It also called for the expansion of the hydropower and the green fiscal policy that operates on pragmatic carbon reductions. It provides for the sensitization of the public on the issue of climate change, passing of laws on energy conservation, better building codes, and the provision of efficient public transport systems with emphasis on the use of fuel efficient vehicles. They are useful in the enhancement of energy infrastructure, clean coal technology, and prioritized from Asia rather than oil and coal. Furthermore, it demands innovative

technology and global cooperation in the generation of clean energy with an aspiration to factor climate change adaptation into policy frameworks within the country across sectors and fields (M. o. C. C. a. E. C. Government of Pakistan, 2012).

NATIONAL DISASTER MANAGEMENT ACT (2010)

The framers of the NDMA Act of Pakistan formulated the National Disaster Management Act in light of the recommendations of different ministries, organizations, institutions and stake holders of Pakistan and consist of 48 sections in eleven chapters, to provide a legal framework for coordinated, effective and swift management of disasters with a view to minimize human loss, injuries and damages to properties, business and economy in Pakistan both at National, Provincial and District levels. It provides for the formation of the National Disaster Management Commission and the National Disaster Management Authority, which is required to prepare and approve policies and national/mi nutritional plans, set guidelines, fund mitigation/preparedness/response measures, and support international disasters. Results The National Plan, under consultation with the provincial governments and the specialists, covers goals in the area of disaster risk reduction, in terms of prevention, preparation, and building of the capacities with the definition of the responsibilities of federal ministries. The provisions of the Act extend to the formation of Provincial and District Disaster Management Authorities along with the National Institute of Disaster Management that conducts research and training in the field of management and disaster response, and a National Disaster Response Force. It also includes finance and accounting, penalties for misuse of the system, and other considerations which include anti-discrimination clause, annual report, and clerical error. The Prime Minister presides over the National Commission that supervises states', authorities' and municipalities' activities in the field of disaster risk prevention and control; in exceptional cases, the Prime Minister has special decision-making powers, but such decisions must be ratified later. The Act provides for a systematic and multiple level professionalism at a glorious turn key management at coordinating and implementing levels of natural and manmade disasters.

OTHER NOTABLE POLICIES

Environmental Protection Act (1997): A law that regulates environmental pollution, including air and water pollution, and waste management.Pakistan Environmental Protection Council (PEPC) Rules (2001): Rules that provide guidelines for environmental impact assessments and environmental monitoring.National Forest Policy (2015): A policy that aims to promote sustainable forest management and reduce deforestation and forest degradation.National Agriculture Policy (2019): A policy that aims to promote climate-resilient agriculture and reduce greenhouse gas emissions from agriculture.National Water Policy (2018): A policy that aims to promote water conservation and efficient use of water resources.

LEGISLATIONS AND POLICIES TO COMBAT CLIMATE CHANGE IN SINDH

After the devolution of powers in the 18th amendment, the provinces were handed over the powers for proper management of all the sectors that were previously managed by the federal government. Hence, all the provinces were independent of creating policy measures to tackle the issues in the region. The province of Sindh developed key strategies and regulations to tackle the issues regarding climate change that are discussed below:

SINDH CLIMATE CHANGE POLICY 2022

The issue of climate change is an emergent issue affecting the entire world and the country of Pakistan more specifically, and so, require an urgent measure to be taken in order to ensure a better future for our next generations. The effect includes intensified and longer lasting global warming, higher levels of greenhouse gases, high levels of Carbon dioxide emissions; constant use of fossil energy; higher sea temperature and sea levels, heat waves, core melting and Glacial Lake Outburst Floods and extreme weather situations such as floods and droughts, illness and diseases, internal displacement, threats to the food security at the international level. Realizing this, the Government of Sindh has formulated the Sindh Climate Change Policy in consultation with the National Climate Change Policy 2021 so as to establish a sound defense system. Measures include replanting mangroves forests, conserving the Indus Delta conservation, and integrating right policy approach to face the climate change. The Sindh Climate Change Policy 2022 appears to be formulated with an objective of providing a conducive environment to the future generation and to support the Paris Agreement with a vision to reduce the projected emissions by fifty percent by the year 2030 by moving toward renewable energy, electric vehicle, conclusion of imported coal and expansion of NBC in the sector of forest. It also helped to place Sindh on national and international maps as a worthy contributor to the climate change adaptation and mitigation.

PROVINCIAL DISASTER MANAGEMENT AUTHORITY

Disaster management policies and plans are contained within the province by the Provincial Disaster Management Authority (PDMA). It develops the provincial disaster management policies with the approval of the Provincial Commission; coordinate and monitor the implementation of the national and provincial disaster management plans; evaluate the regional susceptibility; and determine the prevention and reduction strategies. The PDMA also sets standards of the disaster management plans, assesses and improves the preparedness of the government and communities and mobilizes disaster response initiatives. It outlines response actions for provincial departments, facilitates education and community readiness, offers support to local

government. Also, the PDMA supports the Provincial Government on all fiscal issues concerning disaster response; ensures that structures being built meet the required standards; oversees the Provincial communication network; Frequently practices the preparedness campaigns; and performs any task as may be directed from time to time.

OTHERS

Other key acts and policies that are important to mention here include:

Sindh Environmental Protection Act (2014): A law that regulates environmental pollution, including air and water pollution, and waste management.The Sindh Forest Act 1927 amended 2023: A law that aims to promote sustainable forest management and reduce deforestation and forest degradation.Sindh Water Management Ordinance (2002): A law that regulates water resources and aims to promote water conservation and efficient use.Sindh Agriculture Policy (2018-2030): A policy that aims to promote climate-resilient agriculture and reduce greenhouse gas emissions from agriculture.

PROVISIONS IN THE CONSTITUTION

The constitution of Pakistan has provisions for the people of Pakistan for ensuring their safety and provide a better livable life through its provisions including:

Article 9: Security of person

Article 14 - Inviolability of Dignity of Man

Article 19A - Right to information

Article 25A - Right to education

Article 37 - Promotion of social justice and eradication of social evils:

Article 38 - Promotion of social and economic well-being of the people:

Article 184 (3) – Public Interest Litigation

CONCLUSION

The environmental destruction in Sindh in the context of climate change constitutes critical threats to vulnerable populations in the region, requiring vital collective response and advocacy for justice. The study has identified causal factors for environmental crises within the region, and established conclusively the effects of climate change in the region particularly through factors such as internally displaced persons, extreme weather conditions and scarcity of water. The policy frameworks aimed at handling those difficulties revealed through evaluating climate change legislation at national and provincial levels; these comprise the Sindh Climate Change Policy 2022 and the Provincial Disaster Management Authority. However, the practicality of these principles is still significant, and planned actions that should be taken to address climate injustice and protect the rights of the most vulnerable groups of people in Sindh. Looking to the future, every effort should be made for building a strong and sustainable Sindh, supporting resilience in its population as well as for the protection of human rights for men, women and children at the risk of environmental exploitation and climate change in this province.

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