

Food Security and Disaster Response in Pakistan: A Review of National and International Efforts Post-2010 Floods

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Abstract

The 2010 floods in Pakistan marked one of the most climate-induced disasters in history, severely affecting agriculture, public health, food security, GDP, and national infrastructure. Pakistan, highly dependent on agriculture that faced a massive shortage of food, crop failure, and livestock losses, eventually led to food insecurity and economic suppression. Therefore, this article critically examines the aftermath of the 2010 flood through a mixed research method by focusing on the efforts of national and international institutions like FAO, WFP, IFAD, and UN agencies' contributions in addressing agricultural recovery, displaced persons, health crises, food distribution, loan assistance, and institutional framework. For example, NADMA, the National Climate Change Policy, started emergency programs like PIFERP for capacity and resilient building by providing factual data. By analyzing these coordinated efforts, this article provides key lessons & insights into the strategic importance of climate resilient governance, food system sustainability, food security governance, and global cooperation in disaster-affected regions under the extensive shadow of climate diplomacy.

Keywords:

Food Security, Climate Change, National and International Institutional Efforts, Climate Diplomacy, Food System Sustainability

Introduction:

Climate change has become one of the most pressing challenges of the 21st century, dramatically influencing socio-economic, environmental systems worldwide. Among other concerns of a warming planet, food security has risen as a major concern within global narratives. Therefore, Pakistan, with its diverse climatic zones & remarkable topography in the South Asia region, is an enduring challenge to combat food insecurity. Pakistan's economy is heavily based on agriculture, but unfortunately, due to experienced almost 152 extreme weather events such as floods, droughts, earthquakes, heat waves, glaciers melting, acid rain, etc. & 50 floods since 1950, it has faced immense loss of 3.8 billion dollars. The damage from the 2010 floods is estimated at Rs. 324.5 billion (1.6 percent of GDP), with direct damages aggregating to 1.3 percent of GDP and indirect losses of 0.2 percent of GDP (Bank A. D., 2011). In this regard, climate diplomacy ensures multiple activities through international climate agreements, advocacy for climate justice & cooperation with world institutions to counter these devastating challenges in collaboration.

The 2010 flood was considered a catastrophic natural disaster that precipitated major humanitarian crises. So, the flood stemmed from abnormal heavy rains. The damage from the 2010 floods is estimated at Rs. 324.5 billion (1.6 percent of GDP), with direct damages totaling 1.3 percent of GDP and indirect losses of 0.2 percent of GDP. The monsoon season in July and August 2010 flooded the Indus River Basin, traversing north to south of Pakistan (Scott., 2011). A little amount of clean water remained for those who were affected, particularly children, displaced citizens; women faced potential severe disease outbreaks like diarrhea, cholera, dengue, etc. Pakistan, as a rich agricultural landscape, which is the cornerstone of its economy, has potential threats to agricultural productivity and food availability. However, the dramatic loss of crops, wheat production, and extensive damage to the infrastructure led to long-term effects on Pakistan's food security, economic growth & territorial agricultural productivity. In such a devastating situation, climate diplomacy & effective policymaking become a need & opportunity for Pakistan to preserve its economy & national standards of living through excessive food availability, effective utilization, and stability. Thus, Pakistan Prime Minister Shaukat Aziz in 2005 formed a committee on climate change with the release of the National Environmental Policy. Throughout its proceedings, the planning commission established a 'Task Force on climate change' that aims to provide strategies for well-established agenda settings, including National Water and Forest Policy, etc. However, this article demonstrates the loss to agriculture, food security & economy of Pakistan after the devastating flood of 2010, and which policies/strategies measures adopted by it through engagement in climate diplomacy. Moreover, it also highlights the role of national agencies, international institutions, and global climate diplomacy in assisting effective disaster response and recovery.

Problem Statement:

The purpose of this research is to illustrate the aftermath of the 2010 flood on the living standards regarding health, malnutrition, Government national and international institutional policies & initiatives for infrastructure development, economic rebuilding & food supply to the victimized community under the umbrella of climate diplomacy. As 2010 flood in Pakistan was not just a disaster but also served indictment of institutional fragility, unprepared governance, and underdeveloped climate resilience. Despite global humanitarian assistance & Pakistan's climate diplomatic efforts, the national response revealed critical shortcomings in emergency planning, policy coherence & sustainable agricultural preservation. In short, this study aims to get deeper insight into Pakistan's diplomatic efforts and agricultural productivity for encouraging food security resilience through the coordination of international communities & humanitarian aid. Moreover, it also addresses the central challenge of how effectively Pakistan & its international partners mobilized policy, infrastructure, and aid to ensure food security. How can pre-disaster effective planning, measures, strategies, and climate change resilient governance work to avoid such devastation in the future? Thus, the issue that research proposals seek to answer is that there is a crucial requirement to uphold pre-planned strategies and reactive disaster management into proactive climate resilience to counter such extreme devastation in the future.

Research Objectives:

The core objective of this research is to provide empirical insight by evaluating the long-term sustainability & resilience against devastating infrastructure through assessing Pakistan's climate diplomacy on the formation & pre-planned agricultural and well-organized climate adaptation. This study will investigate & portray the assessments of agricultural, infrastructural, and economic disruption due to the 2010 flood in Pakistan by focusing on crop destruction, livestock loss, decline in food production, GDP affecting rate, life expectancy rate, etc. It will also evaluate the role of

key institutions like FAO, UN, UNFCCC, WFP, etc., in food relief, recovery, and disaster response operations. Moreover, it also examines the effectiveness of adaptation policies for building long-term resilience through disaster risk governance, the role of financial instruments and aid flows (regarding food supply chains and agricultural recovery). Furthermore, this study also suggests that earlier adaptive strategies regarding any environmental challenge could prove beneficial for combating territorial infrastructure from such extensive disasters that create particularly food insecurity, economic burden, mass displacements, etc.

Significance of Study:

This study emphasizes the need to integrate disaster risk management, sustainable agriculture, and effective governance into Pakistan's national policy framework. It aims to illustrate that upgrading irrigation and water governance, climate-smart agriculture, public awareness, and long-term health effective measures could create resilience through embedding pre-preparedness into national planning and governance structure. Moreover, it also illustrates the evolving nature of climate diplomacy and international cooperation in disaster recovery and sustainable development through financial aid and technical assistance, policy coordination on climate adaptation, supporting field-based operations regarding infrastructure rebuilding and policy supply logistics, and promoting capacity building & institutional strengthening. Thus, this research underscores that climate challenges are shared and that collaborative diplomacy is vital for food security, human well-being, and sustainable development in this modern era.

Literature Review:

Pakistan has learned a lot through the devastating experience of the aftermath of the 2010 flood, and Pakistan's climate diplomacy adaptation at the state & international level proves beneficial for the humanitarian assistance under the support of the UN. However, this literature review explores the multiple aspects of climate diplomacy & its implications for restoring food security after the 2010 flood in Pakistan. It is noted that high glaciers runoff pushed the river from out of limit especially in southern region of Punjab. According to a disasters emergency committee 2015 report such massive flood led to the death of almost 2 thousand people approximately 1985 civilians. After two months, it was found that almost 20% land area & more than 20 million people were affected by the destruction of poverty, livelihood & infrastructure, especially small property owner farmers & landless farmers did not gain enough compensation for lost income (Gazdar, 2011). They estimated of about \$43 billion loss of the economy. According to one of the United Nations surveys assessed that almost 10.1 million civilians require shelter & humanitarian assistance, while 1.1 million houses a destroyed. The government of Pak has approved Rs. 730 billion Public Sector Development Program (PSDP) for 2010-2011. The federal component of the PSDP was Rs. 300 billion; therefore, the component for provinces was Rs. 420 billion (Economic Adviser's Wing, 2010-11).

Table 1: Flood damage and Reconstruction cost by sectors (Rs. in Billions)

Sectors	Damages	Reconstruction Cost (Billions)
Transport and communication	113	200
Irrigation	24	37
Energy	26	9
Agriculture	429	22
Education	27	43
Health	4	4

Water and sanitation	9	6
Environment	1	18
Governance	6	5
Disaster Risk Management	---	2
Housing	135	126
Private sectors	24	9
Livelihood support	---	58
Financial sector	57	39
Total	855	578

Source: National Flood Reconstruction Plan 2010

Flood-Affected Roadside Refuges: Infrastructure and Human Impact

It had been more than eight weeks when this destructive flood surged southward in Pakistan, and approximately 20 million citizens were affected, a figure more than the combined aggregates of the 2004 Indian Ocean Tsunami, the 2005 Kashmir earthquake, and the 2010 Haiti Earthquake (ISLAMABAD, 2022). That super flood left about 11 million people homeless, even after 1 \$ billion in aid was provided, but unfortunately, various Sindh communities still lived in temporary shelters for several months. Moreover, 1500 people resided in bare, white tents that were provided by Arab & western aid groups. (KHOSO, 2011). According to the Guardian, floodwater has devastated homes, schools, livestock, businesses, etc. in Sindh. Families without proper jobs, crops were unable to provide adequate food to their loved ones (especially larger families). In this regard, economic suppression led the families to be unable to provide proper treatment to their children, like ten-year-old Gulbahr Hidayatullah's bone disease, rickets, whose family cannot afford to buy enough expensive medicine. Almost 77.8% of households reported needing health services within one month of the disaster, including rural residence location, large household size, also lower pre- and post-flood income, were unable to access healthcare at that time. Many children of flood-affected affected never returned to their school for academic study due to not having adequate resources, wealth, and infrastructure under NMDA 2010 and UN 2012 (International, 31 Oct 2024). A massive population who displaced at that time was trying to shift their job of nature from agriculture to industries because they did not want to face any such condition in the future where they could remain barehanded (Justin George, 2021). Women affected by this trauma, as most of the women play a crucial role in the production of food through the informal economy & mainly depending on natural resources like crops, energy, and water in Pakistan (Nosheen Khaskhelly). A booklet issued by the United Nations proved that women are affected by climate change as compared to men, and poverty is connected with the marginalization & vulnerability of women. Thus, flooding causes severe damage to infrastructures, buildings, and houses, then the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) claimed that there is a large need for emergency shelter.

Impacts on Agriculture, Crop & Livestock:

Farmers who were very reliant on agriculture were not able to do the harvest, which consequently undermined their ability to participate in the local economy, food security & economic development. Flood 2010 caused tremendous damage to agriculture as it experienced the absolute loss of RS. 428 billion, while on the other hand crop suffered 89% damage. Under the FAO assessment report 2012 productivity of cotton reduced by 11.76 billion bales, and livestock estimated damage was RS. 48 billion (Pakistan: Flood Impact, 2010). Therefore, all efforts to reduce poverty went in vain, and the prices of basic agricultural inputs surged as diesel from 75.7 liters to 94.1 per liter (January 2017 of Environmental & Analytical Toxicology) + (figures

uploaded by Syed Lazaz Ahmad Bhukari). In this particular regard, in an interview in September 2010, Dr. Shahid Hassan Siddique (economist & Scholar) claimed that this inflation was artificially injected into people due to poor management, corruption, and disorganized governance by officials & explained how corruption and bad governance built up economic burden on innocent civilians. The agriculture sector in the country registered 1.2 percent growth during the financial year 2010-11 as against the estimated targeted growth of 3.8 percent and the previous year's performance of 0.6 percent. In this regard, the agri-sector has lost significant growth momentum (Wasti, 2011). It has been reported that approximately 25% of the crop was affected, which has created backlash for the exporter of cotton crop by a decline in textile production rate in 2010 (FAO, IFAD, WFP to accelerate assistance to Pakistan flood victims, 2010). Undoubtedly, wheat is the most staple crop in Pakistan, providing 35% of average capita per calories requirement; therefore, it also contributes 2- 3rd of annual national cereal production. However, unfortunately, 5-6 million tons of wheat stocks at the farm level were adversely affected due to the flood (Bank t. A., 2010). Moreover, damage to the well and irrigation system affected wheat production up to 90% in Pakistan. FAO also established a response management team in collaboration with WFP and the International Fund for Agricultural Development (IFAD) to provide technical assistance to the most affected area to meet three core goals: preparedness for planting season, rehabilitating lands and irrigation systems & saving multiple livestock. Furthermore, FAO also supplied crucial agricultural inputs like seeds, fertilizers, and farming tools to make water more sustainable & clean for well-organized growth of wheat in the Rabi season. Based on such approaches, FAO announced that it had reached around 5.3 million families with agricultural inputs, 19000 families with irrigation support, and approximately 1.6 million families with animal feed. However, the US Agency for International Development (USAID) also provided \$ 16 million to FAO to provide agricultural input to the families affected in Baluchistan province on 29 Oct 2010. Hence, millions of surviving animals also faced a severe shortage of feed & livestock, also the agriculture rapid assessment organization noted that six million livestock have been suffering from malnourishment & diseases, while 67000 have died.

National & Institutional Efforts:

FAO reached 1.6 million affected people in their areas with the distribution of wheat, seeds, fertilizers, vegetable seed kits, animal feeds, and veterinary supplies for livestock. The International Fund for Agricultural Development IFAD organization had initiated five programs, four of them worth over \$ 100 million for mostly flood-affected places, particularly in remote & marginalized areas. This organization, in collaboration with the World Food Program WFP plays a magnificent role in the post-flood rehabilitation and reconstruction efforts. Moreover, WFP also reached 6 million people with monthly family food rations, including nutritious ready-to-use food supplements for children, who were at high risk of malnutrition. FAO also approaches farmers with seed kits & other tools for preparing them about the upcoming crucial wheat-planting season and rehabilitating damaged agricultural lands and infrastructure (FAO, IFAD, WFP to accelerate assistance to Pakistan flood victims, 2010). Initially, Pakistan's response was through the mobilization of military forces & equipment into the flooded areas to evacuate people & distribute supplies. As a civilian government, the response was much weaker due to not having a proper pre-analysis of such a disaster of this magnitude. Then, national institutes as (Pakistan National Database and Registration Authority distributed debit cards to over 900000 families in September 2010 by aiming to provide almost 1150 dollars to each household to better recover from the flood. Therefore, the Economic Affairs Division and the Pakistan Natural Disaster Management Agency (NADMA) work collaboratively with federal ministers, government departments, armed forces,

UN agencies, and provincial & district-level governments to provide and mobilize relief goods to flood-affected people. (NDMA, 2010)

Humanitarian Responses:

The United Nations coordinated with the Government of Pakistan through the flood emergency response plan (PIFERP) on 11 August 2010 by providing approximately \$ 460 million for immediate relief to the flood-affected population. This plan covered 12 humanitarian areas like water & sanitation, health and shelter, agriculture, protection, education, nutrition, camp management, coordination, logistics support, food, and community restoration. In this regard, FAO for agriculture needs to the United Nations for development through community restoration applications. Under the UN plan, almost \$ 1.9 billion was allocated for this program. (FPERP, 2010)

Healthcare System:

Standing water caused by flooding can serve as a breeding ground for mosquitoes, increasing the possibility of vector-borne diseases. There were almost 514 health facilities destroyed by flood in Pakistan, including hospitals, medical centers, etc., which created key concerns that women had insufficient access to reproductive health care facilities & limited aggregates of female workers available there. In this regard, poor hygiene & sanitation created major risks, especially in those areas where individuals formally or informally gathered. At that time, only 3.5 million people had access to contaminated water (UNICEF, 2010). WHO health cluster tested all cases of acute watery diarrhea & cholera. Although WHO projected the worst experience of almost 1.5 million diarrhea disease, including 1.4 million cases of cholera & 1 million cases of malaria for over the next three months. Therefore, WHO made multiple implications along with national institutions to make water hygienic & clean to protect against severe water pollution consequences? Thus, mental health care departments were built to cure those citizens who became severe victim of blood trauma. In addition, the WHO also made policies regarding increasing concerns of dengue fever (CCFH), polio, and malnutrition among children and pregnant women for their better survival of living. (WHO, 2022)

Food Security and Climate Diplomatic Approaches:

One of the major contributions of this research lies in connecting climate diplomacy with practical outcomes in terms of disaster relief & food security. It also evaluates how Pakistan pursued international cooperation and global climate justice narratives to secure assistance from several international institutions. As above-mentioned how drastic climate change directly affects food security, whereas temperature change, precipitation patterns, acid rain & frequent extreme weather conditions lead to reduced crop yields. Therefore, food security is highly sensitive to climate change; therefore, Pakistan's 47% population earns from the agriculture sector & its contribution to GDP is almost 24%, and 80% of foreign exchange from agriculture (Economic Adviser's Wing, 2010-11). While in the aftermath of the 2010 flood, Pakistan established the Natural Disaster Management Act (NDMA) to make policies regarding improving the drainage system, awareness campaigns, dam system, etc., under the Umbrella of climate diplomacy. The UN 2010 Pakistan Floods Emergency Response Plan (FERP) compensated both humanitarian and early recovery crucial needs and had an overall funding requirement of US\$1.9 billion. It remains the biggest humanitarian appeal conducted in the history of the UN. As of 27 June, the revised FERP was 69% funded, on par with the Haiti 2010 Flash Appeal, which is 74% funded (FPERP, 2010) The absolute contribution of £134 million is the UK's immense humanitarian response to date. The UK helped to facilitate the transportation of goods and services into Pakistan by airlift (seven civil and

five military flights), including 4,500 tents and 14,600 shelter kits. Therefore, part of the early recovery effort, DFID brought forward a £10 million programme to provide bridges in the north of Pakistan (London, 2011). Therefore, the ND index illustrates the aggregates about resilience & preparedness of a country about climate change, and it could help identify exposure, capacity, and sensitivity about the overall climate change risk method. For example, it has been identified that crop production is affected by almost 5-10 % due to climate change. Moreover, there is an emphasis on the importance of collaborative climate diplomacy with other nations to pursue mutual goals. According to the Intergovernmental Panel on Climate Change (IPCC), it reports that it unconditionally influences the food supply chain with prolonged impacts, so adaptive measures & resilience is most crucial to counter this impact. At that time, UNICEF provided a response requirement of US\$39.16 million for humanitarian assistance to all victims of the flood under General Assembly recommendations (IPCC, 2021). Also National climate change policy in 2012 adopted regarding smart agriculture techniques for water efficient irrigation, crop diversification, and improved seed quality to counter food insecurity & starvation. A scholarly article has illustrated a detailed discussion about the relationship between international climate finance and agricultural outcomes in Pakistan. There has been an analysis of some contrasting challenges in implementing climate resilient practice, challenges like financial constraints, lack of technical expertise, and weak institutional framework, documented by international organizations, especially. There were almost 17 million people who became food-insecure because of the 2008-9 economic crisis, while surprisingly; 60 million people became the victims of food insecurity due to summer 2010 flooding. (WHO, 2022) . Furthermore, WFP worked with over 30 NGO to provide food to 1.25 or 1.5 million people per day with an ultimatum of supplying sufficient food to 6 million people for the next 12 months through mule and air transport, as most of the roads and bridges had been washed away in the flood. PIFERP and WFP aimed to facilitate the population of harder hit areas by approving a budget of approximately \$ 600 million to feed people from July 2010 to August 2011 for maintaining surviving livestock (FAO, IFAD, WFP to accelerate assistance to Pakistan flood victims, 2010). As unequal distribution of income and resources for agricultural production created limits for the nation to reach its demand. Moreover, several studies show that the average temperature of Pakistan has been unpredictably changed in the recent two decades, with future changes likely to occur in every century. (Sajjad Ali, 2017)

Research questions:

Here are some of the core sub-questions about this topic:

1. How has Pakistan's climate diplomacy encouraged agricultural productivity in food-affected areas (2010-2020)?
2. How did collaborative efforts between national & international institutions make to address & mitigate the aftermath of the 2010 flood?

Theoretical Framework:

Liberal institutionalism, a central strand of liberal theory in international relations, emphasizes that global cooperation is not only possible but can also be fruitful in addressing global interconnected issues like climate change, food security, humanitarian crises, etc. Therefore, this framework focuses on the exponential role of international & national institutions, interdependence of states, institutional rule-based cooperation through a set of practices & norms that automatically facilitate cooperation among states by reducing transactional costs, a transparent international framework, and foreign assistance. Now applied in the case of the aftermath of the 2010 flood, liberal institutionalism helps us to understand the whole phenomenon of how several national and international organizations supported recovery efforts, fostered climate resilience and food

security in the adversely affected nation. Moreover, this theory offers a lens to analyze how that assistance was structured, mobilized, and developed through cooperation rather than through competition. Although financial mechanisms like international climate funds, Green Climate funds, enhanced capacity building, and improved food security are. According to this notion, states will easily adopt resilience-building strategies like crop diversification, soil conservation, and water management to combat the climate change impact and enhance agricultural productivity. (Bank t. F., 2013). Institutions like FAO, USAID, NADMA, UNFCCC, NCCP, IFAD, WFP, PIFERP, and UN played a crucial role in funding, distributing relief goods, managing temporary shelters, and providing healthcare to every flood-victim citizen, including farmers, women, and displaced persons (Bank A. D., 2011). Applying such theories in the context of preservation of food security, normal livelihood, and economic condition of the country can be beneficial for avoiding any future uncertainty and distortion within the territory due to climate change. Hence, it not only explains the presence of international cooperation but also the institutional architecture, normative alignment that provoked Pakistan's recovery in a broader regime of transnational governance, shared institutional interests, commitments & norms to promote food security and climate resilience through humanitarian assistance in flood crises.

Research Methodology:

This research adopts a mixed research methodology integrating both qualitative & quantitative) by exploring the socio-economic, political, and institutional dynamics surrounding the aftermath of the 2010 flood and the role of national & international institutions in establishing food security through climate diplomacy in Pakistan. It involves gathering of quantified, detailed, unchanged data and a depth explanation of human and institutional dimensions of disaster response & food security. The diplomatic role of Pakistan in ensuring food security after the 2010 devastating flood proved beneficial for food security. However, this methodology aims to provide a comprehensive statistical dataset for a better understanding of the impacts of climate change (Flood 2010) on the agricultural productivity & other sectors of Pakistan through combining quantitative analysis, case studies, policy analysis, lived experiences, etc. Thus, quantitative datasets include metrics on agricultural, infrastructural loss, GDP impact, aid distribution, health services facilities, funds allocation, etc. On the other side, the Qualitative method captures the lived experiences of populations like smallholder farmers, displaced persons, women, and disease impacts- how climate diplomacy & global cooperation strengthened the miserable conditions of those victims. Ultimately, this methodology strengthens the research by combining macro-level trends with micro-level human experiences to build effective climate-resilient & disaster management techniques in the aftermath of the 2010 flood.

Data collection:

Although secondary data is used in this proposal from high authority, reputable sources such as the Pakistan Bureau of Statistics (PBS), Food and Agriculture Organization (FAO), International Food Policy Research Institute (IFPRI), Research Papers, pre-reviewed articles, Journals, Reports from organizations, i.e., FCCC, FAO, NADMA, UNFCCC, NCCP, IFAD, etc. In this regard, these sources provide agricultural productivity figures, food security indicators, infrastructure damage, health impacts, aid disbursement, climate variables, economic metrics, and percentage differences of data about (agricultural foreign exchange, export, financial aid, GDP, etc.) from the aftermath of the 2010 flood. Apart from this, existing scholarly literature, relevant books & documents, news articles, media platforms, etc., also portray descriptive statistics & the whole framework of crises by capturing the narrative of vulnerabilities. In such regard, there has been demonstrated comprehensive data about various aspects of findings, adaptations, facilitating comparisons &

trend analysis about climatic situation, macro-level institutional response, and micro-level community resilience mechanism along with its impact on food security.

Discussion and Data Analysis:

This research proposal emphasizes analysis that aims to identify the relationships and patterns that shed light on the consequences of the 2010 flood by detailed statistical data and various diplomatic approaches by Pakistan at the domestic level, through collaboration with international institutes.

- **Long-term sustainability:**

This study provides a framework for strategic planning and policy information to policymakers, illustrating the view that there should be a well-established up-gradation of irrigation facilities and better planning of water management for protection from any unpredictable extreme weather event. As there was a lack of planning, poor coordination, and governance issues resulted in a delayed and inefficient disaster response. The lesson learned from this experience is to develop a more integrated disaster risk-management framework for real-time information sharing, an early warning system, and a decentralized mechanism. Now AI tools can play a very influential role in pre-detecting & automating responses to any sort of disaster concerns. Although, emphasizes the work through creating awareness, education campaigns in Urban & backward areas as well about changing conditions in the Earth's atmosphere through anthropogenic (human-made) activities, which lead towards the production of harmful gases like CO, CH₄, H₂S, etc. (HARI, 2021). Undoubtedly, another key component of sustainability is education and raising awareness. As aftermath of the 2010 flood raised understanding in Urban and Rural communities about environmental concerns like sanitation, health risks, diseases, and sustainable land practices rose. There is also a requirement to stress the importance of nationwide awareness campaigns, climate education in schools, marginalized communities like women and rural youth-who play central roles in food production & household resilience but often lack access to critical information and awareness. These pollutants in the atmosphere do chemical reactions by enhancing the greenhouse effect; consequently, heat waves, acid rain, droughts, floods, cyclones, and tornadoes occur on Earth. Overall, there is a crucial requirement to implement disaster risk management through preparedness, response, mitigation, and recovery. Thus, Effective decision making for long-term sustainability is required for building resilience and a sustainable food system for the better well-being of present & future generations. It is integral to consider that resilience is embedded not only in infrastructure but also in governance protocols and national planning strategies. When looking from a health and hygiene perspective, there are long-term effects of contaminated water, vector-borne diseases, diarrhea, dengue, lack of medical infrastructure, and extreme difficulties for women during pregnancy. Over 514 healthcare centers were destroyed, and millions of people were exposed to severe health hazards. In addition, there were also made national climate policies that encourage food security and sustainability (Haider Warraich, 2011), like the development and implementation of the National Climate Change policy of 2012 and the Natural Disaster Management Act (NDMA) for long-term future goals. As strategic climate-smart agriculture, renewable energy adaptation, and environmental legislations are not optional components, but can play a part in future well-developed sustainability. Finally, this study provides the vision for integrating disaster preparedness, food security, and climate adaptation by ensuring long-term investment in water management, public health infrastructure, sustainable agriculture, and community-level resilience through national and international institutional partnerships.

Global Connectivity:

This study also makes on major contribution to global connectivity and through climate diplomacy and multilateral cooperation for building peace, security, and prosperity of the nation. Pakistan's ability to secure international funding under technical support from organizations underscores the

power of diplomacy for addressing shared climate issues. All such global connectivity also portrays the holistic picture that diplomacy is not only limited to negotiation in international conferences, but it is employed through real-time cooperation, field deployment, and coordinated responses. For example, the largest humanitarian appeals in the history of almost \$ 1.9 billion through the UN's Food Emergency Response Plan (FERP). Under bilateral assistance, the UK's DFID funded \$ 10 million for a bridge construction and restoration program in northern Pakistan, and the airlifting of over 14600 shelter & camping kits highlighted the role of diplomatic trust and aid diplomacy. (London, 2011). In this regard, various MNCs and NGO's agencies played a crucial role in a decentralized and diversified response mechanism, e.g., more than 30 NGO's worked alongside with WFP to distribute food to over 1.5 million individuals daily, along with providing a logistical approach by developing roads and infrastructure. Although all global connectivity was not only about aid, but capacity building, disaster-resilient measures, and policy framing. In addition, it provides a better understanding of climate diplomacy at the international level through a collective approach to mitigate the future shocks of environmental conditions. Such engagement at the International level is beneficial for attaining technological & financial assistance to enhance capabilities in the agricultural sector and combating future risks. In this regard, this study also provides insights into how climate change affects the vulnerable population of Pakistan, such as farmers, women, marginalized community. Thus, it also emphasizes the significance of how such extreme level coordination of different nations in climate diplomacy engages them collectively & collaboratively for tackling this through different initiatives from IOs, NGOs, MNCs, etc. Therefore, such climate policy adaptation encourages nations to keep aside their national interest because the climate issue is not a concern of a single state but the whole world. Hence, it also demonstrates that effective diplomacy not only accelerates post-disaster recovery but also builds long-term adaptive capacity for any sort of future climate shocks. In addition, it also emphasizes that in the current era of global independence, collective security, and food security, there is always a greater requirement for such global uniformed action and connectivity. Therefore, there has been done descriptive data through regression analysis explain between climate variables and food security indicators, illustrating how various factors, like diplomatic efforts, aid received, and national adaptive initiatives, limited the burden of the destructive outcomes of the 2010 flood in Pakistan. In addition, these sources give deep quantitative & micro-level insight about economic losses due to floods in agricultural yield, productivity, trade, and GDP, etc., and sustainable benefits of climate adaptation measures encouraged by international support (Conflicts in the aftermath of the 2010 Pakistan floods, 2010). Approximately, due to this flood, 90% of people affected by natural hazards in Pakistan; therefore, in an analysis of 2018, an estimated 315 disasters damaged approximately 68 million people in the country. At the initial stage of consequences, the domestic institutional response by NADMA, NADRA, and other provisional institutions demonstrated a lack of preparedness and pre-disaster measures (Programme, 2010). Moreover, international organizations and the military of Pakistan also collaborated effectively in initiating climate-resilient policies. Therefore, Pakistan's strategic engagement in the aftermath of 2010 for climate diplomacy reflected from reactive to proactive international alignment. Through institutions like the National Climate Change Policy (2012) & participation with multiple UNFCCC meetings, Pakistan effectively addressed its vulnerability to climate change by accessing multilateral funds for humanitarian aid like PIFERP's \$1.9 billion appeal. Empirical data about massive agricultural loss, decimated wheat, cotton stocks, and displaced persons further demolished the rural economic condition. (UNFCC, 2021). All these factors directly contributed to slow GDP growth, disrupting exports in key sectors, undermining national food security for the vulnerable population, etc. Then there arose a crucial requirement of economic diversification, climate-resilient agricultural practices for better and well-sustained national stability through

establishing a dimension for an appropriate standard of living. For example, beyond the displacement of over 20 million individuals, those humanitarian organizations absorb the burden of every socio-economic situation through well-sustained, resilient & climate diplomatic efforts, e.g., WHO and UNICEF built short and long-term relief healthcare systems restoration for preventing effective population from diseases like dengue, malaria, diarrhea, etc. As the United Nations launched Pakistan's initial Flood Emergency Response plan (OIFERP), providing \$ 460 million for humanitarian needs and the WFP supplied over 87000 metric tons of food to assist the 7 million highly affected populations. (Pakistan, 2024). Undoubtedly, disaster requires the necessity for robust national policies, effective national & international collaboration through strengthening institutional community engagement. In this way, various analyses are also involved in correlating diplomatic institutional efforts for the change in food security indicators such as food prices, agricultural productivity, nutritional status, infrastructural betterment, providing shelter & humanitarian aids to the victims & standard of living of that adversely flood-affected population. By reviewing international diplomatic efforts, this research also showed how much climatic agreements & aid received by IOs like FOA, UN, UNICEF, etc. (Bank A. D., 2011)

Ethical Considerations:

In this research by keeping in view all the ethical considerations, the research completely quotes the research purpose, and it navigates the cusp of quantitative and qualitative analysis based on informed consent & strict confidentiality under all ethical concerns with respect and integrity. However, research adheres to ethical standards to ensure respect, confidentiality & fairness in exploring the aftermath of the 2010 flood in Pak. Therefore, by maintaining the highest standards of research morality, research illustrates the references & sources of each statically data relevant to a specific article, newspaper, document, or book (periodic sources). Secondary data used from organizations like FAO, WO, UN, NADMA, etc., by critically assessing & contextualization to maintain the integrity of their reports and actions. Although not a single data misrepresented or used beyond its intended scope, because the research avoids any sort of re-traumatization when referencing disaster effects, aids, etc., and refrained from exploiting the suffering of affected communities. Thus, all the information coded by authentic material and nothing in this research is illustrated on behalf of self-interpretations about any particular statistical data. There has demonstration about the methodology & research objectives by avoiding any misconduct through honest data finding & collection. Hence, all finding interprets the reflexivity, acknowledging the researcher's positionality and ensuring that analysis should portray the realities of those impacted by the execution of the research by promoting respectful, inclusive, and responsible inquiry.

Research Limitations:

It is crucial to acknowledge the limitations of this research proposal. Firstly, the year of the 2010 flood represents a specific period. Therefore, this study is seen as a snapshot of a specific situation rather than focusing on a comprehensive analysis of entire long-lasting phenomena. Secondly, much of the analysis relied on secondary resources from institutional reports, which, while credible, may reflect institutional biases. Thirdly, a lack of real-time, disaggregated data on vulnerable groups, particularly land farmers, women, and displaced persons. Thus, such absence of field-based primary data collection due to the retrospective nature of the study reflects the lived experiences & community-level dynamics. Fourthly, as this study highlights the key aspects of climate change but it does not fully account for the seen diplomatic negotiation and political constraints, which shaped international funding & assistance flows, which could affect the interpretation of policy outcomes. Therefore, the research was subjected to challenges associated with data collection and analysis. While gathering accurate and comprehensive statistical data is

quite a complex task. In this regard, there should be mindful of potential biases and limitations in the data source used and employ rigorous research methodologies to mitigate these issues. Thus, despite several limitations, this research provides a comprehensive understanding of the long-term impacts of floods on food security.

Conclusion:

Considering everything, the 2010 flood in Pakistan marked a turning point in the national discourse on climate resilience, food security, disaster response & effective preparedness. In such a way, national mechanisms like NDMA, NADRA, etc., mobilized large scale but were hampered by limited pre-response, bureaucratic inefficiency & delayed civilian action. Then, climate diplomacy under global institutional governance played a crucial role in stabilizing food security, restoring livelihoods, and providing healthcare, securing financial and technical assistance from FAO, WHO, UNFCCC, PIFERP, WFP, etc. Therefore, such national & international institutions' collaboration limited the post-crisis response through extraordinary governance, inclusion, and adaptive planning. Research emphasizes the significance of climate diplomatic efforts in limiting the burden of multiple losses due to the 2010 flood in Pakistan, particularly with the mutual collaboration of Pak government & International institutional recommendations by multiple policy implications & international aid within Pakistan. To conclude, through mixed analysis, research explores how efficiently diplomatic efforts prove beneficial on agricultural recovery & food security resilience. Overall, the study underscores that strengthening climate diplomacy, promoting sustainable agricultural practices & enhancing disaster preparedness are crucial strategies for combating climate-related food insecurity in Pakistan due to uncertain extreme weather conditions like drought, flood, etc. Due to such unpredictable results of climate change, this study endorses the importance of establishing a well-developed system of disaster risk management and effective decision-making by the authoritative government.

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