

IMPACTS OF ENVIRONMENTAL DEGRADATION AND FLOOD HAZARDS (2010-2022) ON HUMAN SECURITY IN PAKISTAN

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ABSTRACT

Environmental degradation is driving acute and recurrent floods in Pakistan, creating major threats to human security. Human driven factors such as global climate change, deforestation, and unplanned urbanization are causing severe environmental decline. This not only triggers hazards such as floods but also creates a cycle of further environmental deterioration. The floods impact human security across all of its dimensions. The multilayer approach to human security expands the concept by introducing freedom from fear, freedom from want, and the right to live in dignity. Available records mainly show direct and immediate flood damage, while less attention goes to factors that intensify flood severity and frequency, and to the broader impacts of floods on human security in the country. This paper aims to examine these overlooked issues. This research uses a qualitative, descriptive analytical methodology with human security as the framework to examine contributors to environmental degradation, how they cause floods, and their impacts on human security in Pakistan. Major flooding events of 2010 and 2022 in Pakistan are analyzed in depth. The findings show that recent floods have affected personal, economic, health, food, community, political, and environmental security, making it imperative to address the root causes of environmental degradation. Due to rampant degradation flood hazards have become environmental rather than just natural or hydrological/meteorological disasters, jeopardizing human security.

Keywords: Human Security, Environmental Degradation, Global Climate Change, Flood hazards, Deforestation

Introduction

The heedless, unsustainable human thirst for environmental resources is not only culminating in environmental degradation but also unbalancing the naturally maintained equilibrium of the environmental system. Human driven factors such as global climate change, particularly global warming, rampant deforestation, and unplanned urbanization are disrupting the balance of the environmental system. Predominantly, the discourse begins with stressors, such as Green House Gas (GHG) emissions resulting from technological and industrial advancement, and unsustainable, ruthless consumption of environmental resources. A disturbed ecosystem and environment lead to extreme climate changes (increased warming) that cause altered weather

patterns, such as the Monsoon in Pakistan, glacial melting, sea-level rise, soil degradation, and pollution (in the atmosphere, lithosphere, and hydrosphere), thereby contributing to flood recurrence (Tadjbakhsh, 2007). More likely the Earth is becoming inhabitable hothouse (Ripple, et al., 2025).

It is a matter of great concern that, despite contributing less than 1% to Global Green House Gas (GHG) emissions, Pakistan is facing severe climate challenges, including flooding. The country is among the 10 countries most vulnerable to climate change in the world, along with changing weather patterns that intensify the Monsoon and Asian seasonal wind circulation system associated with precipitation. Such as, the floods of 2010 and 2022 were chiefly triggered by the extreme Monsoon. A

flood is an uncontrolled, anomalous spilling of water, surging through places that usually remain dry. In other words, it is a hydrological scheme of the movement and distribution of water.

Human wellbeing, in the form of human security, is crucially threatened due to the repeated and disastrous flooding events. The personal security of flood-affected communities is compromised by the loss of homes and forced displacement. Economic security is threatened by loss of livelihood and sources of income. Health security is jeopardized by the unavailability and inaccessibility of even basic medical facilities. Food security is undermined by disruptions in food supply networks. Governance failure to provide resilience based, timely, and efficient flood management measures causes serious threats to political security. Community security suffers when social networks collapse, especially because of displacement. Above all, anthropogenic adverse infiltration into the environment presents formidable threats to environmental security (UNDP, 1994).

This study has focused on the primary factors behind environmental degradation and the initiation of floods. In particular, extensive deforestation from cutting and burning forests for food, feed, timber, and energy, unsustainable land use practices, excessive consumption of environmental resources, and loss of biodiversity due to overhunting and overfishing cause severe environmental decline. Large scale industrialization causes pollution in the hydrosphere, atmosphere, and lithosphere. Unplanned urbanization, especially near river catchments, is causing multiple challenges. Larger areas of forests and agricultural lands are being continuously transformed into modern urban societies. However, the environmental changes driven by natural ecological processes over a history of some 4.5 billion years have not been the focus of this study. These changes are beyond human-induced environmental degradation.

The article aims to investigate the nexus of environmental degradation and floods that impact human security. Accordingly, the research has focused on the research question: What are the primary anthropogenic factors causing environmental degradation that lead to

floods and impact human security. By applying the human security theoretical framework, the paper has focused on the major flooding events of 2010 and 2022 in the country's history. The study motivates one to consider these human security threats, arising from floods, as daunting challenges for human survival on Earth in the future. These uncontained human adverse practices will cause more environmental degradation and more floods as consequences. Intimately, by 2050, a population of 1.2 billion is under the threat of floods. Since 2000, water related disasters like floods have increased by up to 134 % (WMO, 2021). To uphold human security, it is urgent to address these stressors through anthropogenic sustainable practices.

Humans are essentially and substantially reliant on the environment for survival; on the other hand, unsustainable human intervention in the environment is causing environmental degradation that poses fearsome challenges to human security in the form of floods. The available literature has highlighted global climate change, deforestation, and urbanization as compelling contributors to environmental degradation that cause floods (Ali, 2024; Maurya, 2020; Mbedzi, 2025). Several international and national organizations have strongly held these stressors responsible for the initiation of floods (FFC, 2023; IPCC I. P., 2021; NDMA N. D., 2024).

Nonetheless, little research has been devoted to explaining these drivers of environmental degradation in the context of floods in Pakistan, which have become more frequent and severe over the last couple of decades. Despite the existing literature on human security, there is a significant research gap regarding the impacts of the 2010 and 2022 floods in the country through the lens of human security theory. However, some pragmatic scholars have applied the concept of human security to climate induced disasters like floods (Altaf, 2020; Hamidi, 2022; Hobson, 2014; Mumtaz, 2025; UNTFHS, 2016). This study has endeavored to fill this research gap by examining the impacts of floods in Pakistan across the dimensions of the human security approach: personal, economic, food, health, community, political, and environmental (UNDP, 1994).

Based on various sources, this paper concludes that global climate change in the form of global

warming is the primary contributor to environmental degradation (Shaheen A. S., 2020). An unsustainable environment shows its muscles in the form of hazards such as floods (Cutter, 2006). As the floods in Pakistan, since couple of decades are considered disastrous ones in human history (Chen, 2024). Such environmental dangers are most crucial to human security (Brauch, 2008). Human security is wide and interrelated concept of human rights, global security, and justice, as all trends and threads aim to protect humans (Khaemba, 2025). While the human civilization, since its outset, has immensely impacted the climate and environment (Huntington, 1915).

Theoretical Framework

The study has been grounded in human security theory. In its basic terms, the concept equates security and sustainable development with the people rather than with the state only apparatus, such as territories and military related motives. Human security has shifted the traditional concept of security from state centric concerns to people centric motives, emphasizing the daily security of individuals. In practical terms, the concept calls for protecting humans from all threats that may hamper their daily lives, physical and psychological wellbeing, and safety. That may arise from conditions such as disease, disasters like floods, hunger, or any sudden and harmful distractions in daily life. The human security approach holds that a state must preempt, prepare for, and mitigate all threats that hinder the daily lives of humans.

The concept of human security, which transitioned the state-oriented traditional security concept to a people-oriented direction, was formally introduced to the world through the leadership of the Global South, as envisioned by Mahbub ul Haq in the 1994 Human Development Report by the United Nations Development Programme (UNDP, 1994). As the floods 2010-2022 in Pakistan have caused loss of lives, livelihood, homes, livestock, agricultural lands, basic public installations roads, bridges, hospitals, schools, worship places, and banks. Thus, the population suffers across all dimensions of the human security framework, including personal, health, economic, food, community, political, and environmental areas.

Methodology

A qualitative research design, using a descriptive-analytical approach, has been employed to explain: the contributing factors behind environmental degradation (descriptive approach); the nexus between environmental degradation and floods; and the relative impacts on human security (analytical approach). The research methodology primarily relies on primary and secondary data sources. By focusing solely on extreme flood events in the country, the study has explained the impacts of the 2010 and 2022 floods, which were historically disastrous. The data used for this research include journals, books, and reports from the IPCC, UNDP, NDMA, WHO, OCHA, UNEP, and FFC. While making the study simple, replicable, and cost-effective.

Environmental Degradation Precipitates Flood Hazards

Human existence on Earth is substantially reliant on the environment and its resources. About half of the global annual GDP, approximately USD 44 trillion, is generated through environmental resources (WEF, 2020). The environment encompasses all biotic (living) and abiotic (non-living) elements on Earth, including the totality of systems, events, and causal dynamics.

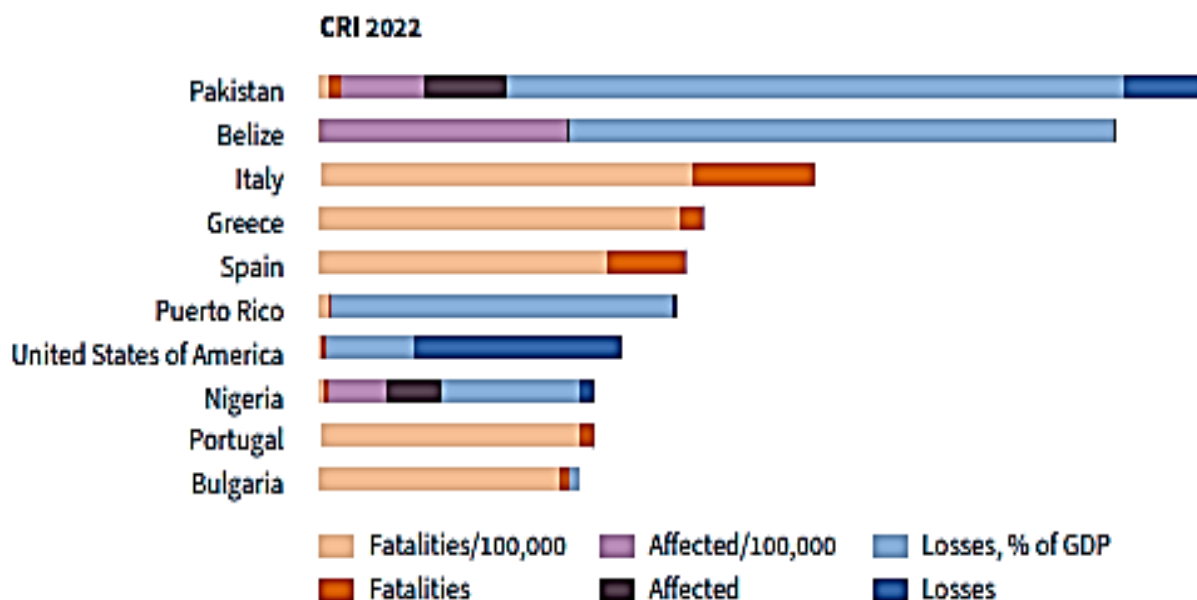
Abiotic components of the environmental system include the atmosphere, lithosphere, hydrosphere, cryosphere, and biosphere. Atmosphere includes air to breathe (oxygen for humans and carbon dioxide for plants), weather & climate systems, the ozone layer, essential gases, water vapor, and greenhouse gases. Lithosphere comprises all landforms, Earth's crust, soil, minerals, rocks, and tectonic plates. The hydrosphere comprises all water resources on Earth, including oceans, seas, rivers, lakes, and wetlands. The cryosphere encompasses all frozen water on Earth, including glaciers, ice sheets, ice caps, glacial lakes and permafrost. The biotic segment of the environmental system encompasses living organisms and their interactions with other environmental components. All of these elements are interconnected and work together to balance the environment. Any disruption to the environmental system, such as degradation, hampers the entire system's performance.

Environmental degradation involves a set of processes and practices that lead to decline, damage, and deterioration in the status, quality, condition, performance, productivity, and efficiency of the environmental system. It involves any disturbance or change in the environment that is otherwise unnatural, uninvited, deleterious, unsustainable, and undesirable.

It is a matter of great tragedy that Pakistan is considered one of the most flood prone country in the world (FFC, 2022). Unfortunately, the country falls in the lowest tier (179th) in the

index of environmental development and has been ranked 140th out of 167 countries, with a minimum Sustainable Development Goals (SDGs) ratio of 56.97% (SDGs, 2025). Regarding the future of human survival on Earth, it is projected that rising temperatures will push almost 600 million people into unlivable conditions (WCRP, 2025). Moreover, massive technological-industrial advancement, along with the utterly vile resource thirst of humans, is continuously causing degradation of the environment, thus rendering flooding a recurrent disaster (IPCC I. P., 2021).

Figure 1. Climate Risk Index (CRI)



Source. From Climate Risk Index by, German Watch, 2025

As Figure 1 shows, Pakistan has been declared the most climate vulnerable in the 'Global Climate Risk Index' (CRI) due to the 2022 floods (Germanwatch, 2025). In fact, the global average temperature is increasing by up to 1.450 °C, which is the highest since the pre-industrial period (1850-1900) (WHO, 2022). Thus, the grave climate change caused by greenhouse gas emissions is driving altered rainfall patterns, more heat waves, surging methane levels, rising ocean levels, and, consequently, recurrent flooding (Ehlinger, 2022).

In particular, the devastating cyclic process of environmental degradation begins with stressors such as global climate change (increasing

warming due to GHG emissions), deforestation, and urbanization. Emissions are significantly raising global temperatures and pollution levels on land, in the air, and in the water. Deforestation (forest burning and cutting for food, feed, timber, energy, and fuel) is not just impacting the lithosphere (land) from absorbing carbon, which then returns to the atmosphere, resulting in increasing temperatures, but it is also reducing the natural buffers (trees) that absorb emissions and store floodwaters in their roots.

Increased warming, in turn, prompts the hydrosphere to respond through sea-level rise and sedimentation. On the other hand, global

scale warming is also intensifying the Monsoon. At the same time, warmer temperatures, along with extreme precipitation, trigger glacial melting, which in turn causes river overflows. Therefore, from multiple sources, intense Monsoon, glacial melting in northern areas, and the Indus River overflowing, excess water flows, manifesting as floods, in Pakistan.

The Antecedents of Environmental Degradation

The following are the anthropogenic factors to environmental degradation that instigate flood hazards:

1. Lithosphere Degradation

The lithosphere of the environmental system is subject to degradation due to rampant deforestation. Other factors include excessive consumption of land resources (soil, minerals, coal, oil, rocks, plains, and plateaus), explosions, mining, unsustainable agricultural practices like the use of fertilizer, overgrazing, and unplanned urbanization (UNCCD, 2017; UNCCD, 2022).

Pakistan is forest deficient country, mainly due to arid and semi-arid climatic patterns and the absence of governmental patronage (Pakistan F. M., 2009). Whereas trees act as natural interceptors, blocking and absorbing excess water in their roots, helping prevent rapid water runoff. In case of flooding in the country due to Monsoon intensity and river overflows, the absence of these natural buffers against flooding causes rapid, extreme flooding. The deforestation further causes surface runoff and soil erosion. Moreover, clearing forests and agricultural lands for urban settlements has become a prevalent tendency in the country.

2. Biosphere Degradation

Biosphere deterioration is the decline of the entire life-support system of Earth. The declining ability of such systems to manage, regulate, and consume excessive water causes acute floods in country. Biosphere degradation is caused by: overconsumption of environmental resources, habitat loss due to overhunting and fishing, pollution (water, air, and land), unsustainable land use practices, unplanned urbanization, biodiversity loss, deforestation, global warming, fertilizer based agricultural

practices, and large-scale industrialization (FAO, 2020).

3. Hydrosphere degradation

The hydrosphere is suffering from degradation due to water pollution, particulate suspensions, and changes in chemical composition. The industrial sector generates large amounts of harmful waste that pollutes water. Over-extraction of groundwater, agricultural fertilizer, plastic pollution, urban sewerage, shipping pollution, and oil spills all contribute to this problem (IPCC I. P., 2021). Global warming further perturbs the natural hydrological cycle. As a result, rainfall becomes more intense, especially during the Monsoon in Pakistan.

4. Atmosphere Degradation

Atmospheric degradation results from adverse changes in atmospheric composition, including aerosols, GHG emissions, vehicle and industrial air pollution, fossil fuel burning (oil, coal, gas), ozone layer depletion, and ammonia discharges from agricultural fertilizers (IPCC I. P., 2021). These factors cause global warming, which in turn increases the frequency and intensity of rainfall by raising atmospheric moisture and leads to heavier downpours. When these downpours occur, rivers and other water storage areas fail to contain the excess water, leading to flooding. Additionally, global warming accelerates glacial melting, which further increases river overflow thus the flood intensity.

5. Cryosphere Degradation

Cryosphere is also degrading due to global warming, GHG emissions, deposition of black carbon, pollution (air, water, land), agricultural unsustainable approaches, deforestation, explosion, and mining (IPCC I. P., 2019). Glacial melting due to rising temperatures reduces snow cover and accelerates water flow into rivers. The river overflow in turn triggers floods. Moreover, the temperature induced melting increases the size and number of glacial lakes. The lakes are subject to sudden bursts, also known as 'glacial lake outburst flood' (GLOFs). Pakistan is highly vulnerable to GLOFs due to a larger number of glaciers (almost 7000) and glacial lakes (almost 3000) in the regions of Karakoram, the Himalayas, and Hindu Kush.

The Flood Hazards in Pakistan

The extraordinary floods of 2010, assessed as a riverine flood, began in the month of July, following unprecedented monsoon rainfalls in KP, Sindh, Lower Punjab, and Baluchistan. An ever heavier Monsoon cycle caused pluvial floods in 2022. The torrential rains triggered flash floods in Sindh, Baluchistan, and KPK, and in the South-West areas of Punjab (initially in the hill torrents of Rajjan pur and D.G. Khan Districts and the Koh Suleman range). These Monsoon rains of the highest intensity triggered floods in several tributaries of the Kabul River Basin in KPK, as well as in the River Indus. Other major rivers of Ravi, Sutlej, Jhelum, Chenab and secondary rivers of Swat and Kabul and some major nullahs (manmade or naturally formed water channels for drainage) like Jindi and Kalpani, with high flood water flow, add to the losses by submerging large areas along riverbeds.

In Pakistan, the Monsoon typically touches the southern side of the country in mid of July. Meanwhile, the glaciers in the country's northern regions start melting, causing excessive runoff into the rivers. The process increases the water influx. The bitter reality is that due to a smaller number of water reservoirs in the country, like dams and inadequate water management, the excessive flow of river water with additional water carried by the Monsoon, initiates floods in South Punjab, Baluchistan and Sindh provinces (Ali, 2024; NDMA, 2024). Degradation of the environment, along with physiographic variation and global climate change, results in different types of flooding in Pakistan (CRED, 2025; IRDR, 2022; FFC, 2022). Which are as follows:

1. Riverine Floods

Generally, such floods are generated by water overflow from a river channel or a stream. While inundating dry lands within the floodplains bordering the channel. In Pakistan, it is caused by extensive Monsoon (July through September). In upper catchments, it is sometimes augmented by glacial melting. The Ravi and Sutlej rivers are usually the first to be affected.

2. Coastal Floods

The tidal conditions, along with changing weather patterns, drive sea-level rise, which

results in flooding in coastal areas. In Pakistan, such surges are generally caused by cyclonic activity and strong storms in the Arabian Sea. The storm pushes the water up while creating high waves. Tropical storms, offshore low-pressure systems, and hurricanes generate winds that drive seawater inland, causing intense flooding. Usually, tropical cyclones that occur in the Arabian Sea cause this type of flooding along the Makran coast (Balochistan) and in Sindh (South-East region). Such flooding can last from days to weeks.

3. Flash floods in Hill-Torrents

Excessive and heavy rainfalls, generally within a short period of time, in mountainous and semi-mountainous areas, along with the adjacent piedmonts, are the primary contributors to such floods. Rainfall quickly raises water levels in rivers, streams, and channels. It initiates immediate, rapid water runoff, triggering flooding within minutes or a few hours, even during and after rainfall. Thirteen major hill torrents in Pakistan are highly exposed to floods. As Koh-Suleman and Kirther endured unprecedented loss during the historic floods of 2010 and 2022.

4. Urban Floods

These floods can be triggered by any type, such as flash floods, river floods and coastal floods. The term is specific, as it is associated with urban areas, but the flood type behind urban flooding may not be specific. They usually occur due to failures in the drainage system e.g. unplanned, encroached, clogged, or undersized. Generally, during the Monsoon season, densely populated cities like Lahore, Karachi, Faisalabad, Hyderabad, and Multan experience urban flooding.

5. Glacial Lake Outburst Floods (GLOFs)

These floods are caused by melting glaciers. It is the sudden discharge of water from a glacier. The snow melting tends to create large lakes. The lakes can breach their artificial and natural barriers, releasing large volumes of water. Glacial melting creates both the lakes at the front of the glacier (marginal lakes) and the lakes below the ice sheet (sub glacial lakes). In the Gilgit-Baltistan region of Pakistan, GLOFs are common.

The Impacts of Floods 2010-2022 Events on Human Security

The 2010 and 2022 floods are considered the most devastating in Pakistan's history. Though varied in intensity, they affected the entire country (Punjab, Sindh, Balochistan, Khyber Pukhtunkhawa, Gilgit Baltistan, and Azad Jammu & Kashmir). Due to floods, the population lost their lives, livelihoods, food and water sources, homes, agricultural lands, gardens, livestock, public infrastructure (roads, bridges), communication channels, health facilities, educational centers, and places of worship. The displacement of affected people brings further disparities like inadequacy and unavailability of shelter places, scarcity of

sufficient food and clean water, loss of dignity and wellbeing. Thus, the population's daily life cycle was jeopardized.

The marginalized segment, including women, elders, and persons with special needs, was more exposed to flood impacts. While issues like child safety, spread of water borne and vector borne diseases, mental traumas, shattered social networks, looting and robbery incidents, and social polarization added to the flood vulnerabilities. Besides immediate losses, the country endured significant economic downturns, challenges in infrastructure reconstruction, and the revival of the agricultural and health sectors. Above all, a country with fragile economic and political structures cannot afford such calamities.

Table 1. Impacts of Major Floods on Human Security in Pakistan.

Serial No.	Year of Flood	Loss in millions (USD)	Number of Villages Affected	Fatalities	Flooded Areas in Square Kilometers
1	1950	488	10,000	2,190	17,920
2	1955	378	6,945	679	20,480
3	1956	318	11,609	160	74,406
4	1957	301	4,498	83	16,003
5	1959	234	3,902	88	10,424
6	1973	5,134	9,719	474	41,472
7	1975	684	8,628	126	34,931
8	1976	3,485	18,390	425	81,920
9	1977	338	2,185	848	46,57
10	1978	2,227	9,199	393	30,597
11	1981	299	2,071	82	4191
12	1983	135	643	39	18,82
13	1984	75	252	42	10,93
14	1988	858	100	508	6,144
15	1992	3,010	13,208	1008	38,758
16	1994	843	1,622	431	5,568
17	1995	376	6,852	591	16,686
18	2010	10,056	17,553	1985	160,000
19	2011	37,30	38,700	516	27,581
20	2012	2640	14,159	14,159	4,746
21	2013	2000	8,297	333	4,483
22	2014	440	4,065	367	9,779
23	2015	170	4,634	238	28,77
24	2016	6	43	153	N/A
25	2017	N/A	N/A	172	N/A
26	2018	N/A	N/A	88	N/A
27	2019	N/A	N/A	235	N/A
28	2020	N/A	N/A	40A9	N/A
29	2021	N/A	N/A	198	N/A

30	2022	30,000	6,631	1739	85,000
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Source. From Federal Flood Commission (FFC, 2023).Page 35

As Table 1 highlights, since its inception, Pakistan has experienced 30 major floods and, over the years, the country sustained greater losses than in previous ones. However, the floods in 2010 and 2022 were the most disastrous (NDMA N. D., 2022).

Floods' Impacts on Environmental Security

Environmental degradation directly undermines environmental security, in ways like large scale deforestation, increasing global warming, river side encroachments and loss of wetlands, increase flood frequency and intensity in the country (Mbedzi, 2025). The cyclic discourse originating from atmospheric degradation leads to degradation of the lithosphere, hydrosphere and cryosphere, and biosphere, one after another (Ali, 2024).

Floods' Impacts on Economic Security

Floods 2010 caused 1,985 fatalities, about 1,608,184 homes and similar structures were completely wrecked down, roughly 17,553 communities were impacted, 17,553 villages were destroyed, and 160,000 SQ KM area got affected, and the cumulative loss sustained was evaluated as 10 billion USD (FFC, 2010). In total, "The 2010 monsoon produced Pakistan's worst flooding in 63 years" (NDMA N. P., 2024, pg 13).

The 2022 flood disaster affected 33 million people, of whom 6.4 million were left in dire need of necessities for months, and the country required USD 160.3 million to meet their needs. The education sector required USD 10.2 million, the health sector USD 22.8 million, the

food and agriculture sector USD 48.0 million, the nutrition sector USD 9.0 million, homes and shelter (non-food items) require USD 31.03 million, water (sanitation and drainage) USD 25.0 million, and the logistics sector USD 1.1 million (OCHA, 2022).

The flood of 2022 caused massive damage (287,000 houses were fully damaged and 662,000 partially damaged); in total, nearly 950,000 houses were wrecked across the country. Compared to other provinces, Sindh suffered the greatest loss, with 571,699 houses destroyed, accounting for almost 86% of the total in the country. Loss to houses also includes loss of home appliances and permanent fixtures within the houses. Besides this direct loss, indirect losses, such as depreciation in the market value of houses and agricultural lands, further increased the economic losses of flood affected populations. The records showed that the damaged houses were mostly the "kacha houses", i.e. mud houses, which were unable to resist flood water. The flood affected communities needed rental houses as well as the amount to pay rent, and to buy new home accessories. They also required tools and machinery to remove debris and to reconstruct and repair their residential and agricultural properties.

Table 2. Intensity of Monsoon Causing 2022 floods

Sr. No.	Province	Rainfall Occurred (mm)	Rainfall Occurred (%age above Normal)
1	Sindh	703.1 mm	426%
2	Balochistan	320.7 mm	450%
3	Punjab	393.5 mm	70%
4	Khyber Pakhtunkhwa	341.1 mm	33%
5	Gilgit-Baltistan	81.1 mm	104%
6	Azad Jammu & Kashmir	382.6 mm	2%

Source. From the Federal Flood Commission, Pakistan, 2022

As Table 2 shows, in 2022, the provinces of Sindh and Baluchistan recorded above 400% Monsoon. The continuous rain started in mid of July (2022), affecting 75% population in the country, i.e., 116 districts (out of 154), affecting 33,064,329 million people, including 421000 refugees, where roughly 6.4 million were in dire need of basic human needs (WHO, 2022) . From 14 June to 18 November 1739 people died, and 12867 were injured. In the 2022 floods, roughly 897,014 houses vanished completely, 1,392 houses were damaged partially, 439 bridges collapsed, and over 1,164,270 livestock were affected (NDMA N. D., 2022).

Floods' Impacts on Food Security

During the 2022 floods, roughly 2 million acres of cropland and orchards were damaged, of which 178,186 acres were in Punjab, 304,475 acres in Baluchistan, and 1.54 million acres in Sindh. The livestock (poultry/animals) sector lost a total of 719,000, with major losses in Baluchistan (around 500,000), in Punjab (202,593), in Sindh (14,927), and in KP (8,767 (OCHA, 2022). Hundreds of thousands of acres of standing crops and agricultural land got destroyed, and a significant number of public and private infrastructures were ruined. Agricultural loss extends to both Kharif (standing crop) and Rabi (due to waterlogging, the soil remains wet, thus becomes incapable of further sowing).

Floods' Impacts on Health Security

Health facilities were assessed as one of the major concerns of flood affected population, as an assessment made by 'International Rescue Committee' showed that 52 % of the population ranked health as a priority among all other miseries (IRC, 2022). The floods of 2022 ruined a large number of health facilitating centers: almost 501 only in Sindh, and 244 only in Balochistan. However, available records fail to explain the vulnerabilities in accessing hospitals, medicine availability, transportation issues, medicine stock availability, emergency triage equipment availability, medical camps, patient's beds, wheelchairs, staff of doctors and para medical.

Major health issues threatening the flood affected persons were Malaria, Acute watery

Diarrhea, Skin Infection and Dengue fever. Whereas the flood affected people were highly exposed to standing flood water, which caused vector-borne and water borne diseases. Women sector of the displaced population, including 4% pregnant Women, 1.6 million women of reproductive age were in high trouble (OCHA, 2022).

Floods' Impacts on Community Security

The displacement of people in millions, loss of homes and livelihood, loss of basic necessities of life, scarcity of food and clean drinking water not only augments poverty among already marginalized communities, but they also fragment the societal networks. As such, insecurities impair social cohesion whereas disrupted social networks remain disturbed for months and even for years.

Floods' Impacts on Political Security

Governance failure in this regard augmented flood vulnerabilities. Where governmental level measures proved insufficient, impractical, and inadequate. Pathetic and biased flood relief distribution made the population disappointed, which flared up agitation against government and relevant institutions. The civil unrest unleashes political apathy, which undermines political will and democratic values. In a country like Pakistan, the floods and their impacts on human security, if left unaddressed, would surge tremendously. (Hobson, 2014; Tadjbakhsh, 2007).

Floods' Impacts on Personal Security

During the 2022 floods, roughly 500,000 people were displaced and forced to take shelter in relief camps. They faced issues of inadequate facilities in terms of co-sharing of basic needs, gender based violence, high risks of harassment for women, unsafe recreational activities for adolescents and children. Among children, 46.6 % were under threats like neglect & abuse, challenges of being separated from families, psychological and mental traumas for loss of their households, future concerns after floods (OCHA, 2022). Living in unsafe shelter places also presents physical threats, such as animals, insects, snake bites, and other related issues. Generally, the most susceptible and first victims of floods were children, almost 50 % to 60 % of

the whole flood afflicted population. They sustain deaths, injuries, starvation, and illness issues (Shah, 2020).

Table 3. The Comparison of 2010 and 2022 Floods' Impacts.

Serial No.	Comparison Parameters	2010 Floods	2022 Floods
1	Flood Type (Origin)	Riverine -Alluvial	Rain-caused Pluvial
2	Rainfall Ratio (the Percentage of above normal)	84% Above usual ratio	175 % above Usual ratio
3.	Main Areas Inundated	A. All provinces, including GB FATA (recently merged areas), along with Azad Jammu and Kashmir B. KP was most impacted, followed by Punjab and Sindh	A. All Provinces including GB FATA (recently merged areas) along with Azad Jammu and Kashmir B. Southern parts were mostly affected as Baluchistan and Sindh, followed by Punjab and KP
4.	Loss of lives (numbers)	1985	1739
5.	Districts Impacted (Numbers)	78	84
6.	Loss (direct)	10,000 (USD Millions)	30,000 (USD Millions)
7.	Affected Population (millions)	20,185	33,046
8.	Damaged Houses	1,608,184	2,284,459
9.	Persons Injured	2,946	12,876
10.	Roads destroyed (Kilometers)	25,088	13,115

Source. From Federal Flood Commission, Pakistan (FFC, 2023) & (FFC, 2010)

As Table 3 shows, the 2022 flood was more devastating than previous ones. The flood of 2010 was riverine, triggered by prolonged and excessive rainfall that led to river overflows, typically occurring gradually. Conversely, the floods of 2022 was classified as Pluvial floods, resulting from intense storms with substantial rainfall (Monsoon) over a brief period.

Analysis

Humankind is rushing towards environmental chaos (William J. Ripple, 2025). The

consequences of human driven environmental degradation are no longer future threats, but they are here now. Due to this environmental emergency the earth is experiencing heat, floods, draughts, fires and storms. The year 2024 was recorded as the hottest year on Earth, (WMO, 2025) even the most hottest than the interglacial era almost 125,000 years ago.

Unfortunately, humans have gravely degraded the environmental system_ almost 75 % of the lithosphere is degraded, 66 % oceans are impacted, and nearly 85 % wetlands have

disappeared from Earth. Roughly 32 million hectares of highly enriched bio diverse forests have been lost, 25 % of precious species of plants and animals are endangered. Between 1970 and 2020, almost 73% of the monitored wildlife population has declined, respectively 95% in Latin America, 76% in Africa, and 60% in the Asia-Pacific (WWF, 2024). The preceding discussion has reiterated that the human-driven stressors are the real culprits.

In Pakistan, rural areas and districts near or along riverbanks are usually more vulnerable to floods. Despite contributing less than 1% of global GHG emissions, the country is declared among the top ten climate vulnerable countries in the world. Roughly 40% of the Earth's land is degraded, directly affecting half of the global population and threatening almost half of global GDP (USD 44 trillion).

The floods (2010-2022) have impacted human security, personal dignity and wellbeing of the population, due to loss of: homes and livelihood, food and water sources, basic home utilities (electricity, gas, and water) public infrastructures (roads, bridges, highways, and public parks), health facilities (hospitals, dispensaries, medical staff, medicines, medical stores). Moreover, the collapse of basic settlements not only disrupts essential daily life circulations but also erodes community networks, instigates several crimes, grave disappointments, and restlessness, and deprives people of necessities. In such situations, women and children were more vulnerable among flood afflicted population. The sufferings caused social instability, large scale displacement, outbreak of water borne and vector borne diseases, child abduction, and hatred against political and governmental agencies due to the absence of basic facilities and effective, timely rehabilitation measures.

Structural, institutional, legal, and policy-related shortcomings at governmental level in Pakistan, are substantial factors behind the exacerbation of flood suffering in the country. In this regard, an integrated resilience based flood management mechanism in Pakistan should be devised, combining both the structural mechanisms (dams, barrages, embankments, floodwalls, levees) along with nature oriented measures (protection of wetlands, afforestation, climate-friendly agriculture). The indicators are

stark reminders for the Government of Pakistan to plan, adapt, mitigate, transform and devise such mechanisms to promote the sustainability of the environment, efficient institutional frameworks for strict policy adherence, capable risk reduction mechanisms, construction of water containment sources, save wetlands, stop river side encroachments, and protect the green cover of the country (afforestation).

Realizing this, it seems mandatory to map long-term environmental strengthening strategies that can enhance and develop not only the sustainable environment and ecosystem restoration, but also uphold human security in the country. Curated and modified human interactions with the environment can protect it and help retain its sustainability.

Conclusion

Environmental degradation is soaring now. It is simple and quite obvious that if humans had saved the environment, in response, the environment would have shielded humans. The flooding, without resilience based efficient flood management, cripples human security, existence, dignity, wellbeing and survival on earth. The floods in Pakistan have impacted human security across personal, health, economic, food, political, community, and environmental domains. Conclusively and collectively, the study has supported the direct analytical relevance of 'Human Security Theory' as an exhaustive framework for explaining how environmental degradation and floods strangled the population in country.

By employing comprehensive environmental governance, sustainable use of land resources, and strict policy implementation, ongoing degradation can be controlled. Contemporarily, everyone, including the population, communities, governments, businesses and international organizations, are pivotal player, and hence responsible for restoring the environment. The environmental emergency requires efficient water management frameworks to design and construct structures that purposefully control, absorb, divert, preserve, use, and manage excessive water influxes. Large scale government level afforestation, strict prohibition of urbanization alongside river catchments, efficient zoning of flood plains and community awareness would be

effective in this regard. For coordinated resilient water resource management, the construction of dams, embankments, reservoirs, levees, barrages, flood walls, water diversion channels/canals, spillways, adequate drainage and climate friendly irrigation techniques should be considered. Above all, governmental best practices are recommended in this regard. Considering several trains of thought, it has been assessed that the environment, if left unprotected, might touch irreversible tipping points.

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