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Nexus between environmental collapse and hardships faced by the people in flood-prone areas of South Punjab, Pakistan

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Abstract

This Study explores how the environmental collapse escalates human hardship in flood-prone areas by disrupting livelihoods and causing displacement, contaminated water, and food insecurity. This study used a qualitative approach, which was based on a phenomenological research design to obtain deep insight. The purposive sampling technique helped to recruit thirty participants (fifteen men and fifteen women) from flood-prone areas of District Rajanpur, South Punjab, Pakistan. Semi-structured, in-depth interviews were conducted to collect data and analyzed through thematic analysis. Results indicate that environmental collapse, in form of land degradation and soil erosion, deforestation and loss of natural buffers, inappropriate land use, pollution and waste management failures, and climate change and environmental loops, aggravates the occurrence and magnitude of floods that in turn cause complex hardships for local communities. Flood-affected participants reported experiencing displacement, loss of livelihood, food insecurity, and limited access to health services as ongoing challenges. Women emphasized extra roles in caregiving, lack of movement, and increased exposure to gender-based vulnerability and loss of kitchen gardening and small-scale farming. The research concludes that environmental collapse and human hardships are so closely connected that we need to create combined disaster management policies, which will incorporate ecological restoration with community-based resilience approaches.

Keywords: Environmental Collapse, Degradation, Hardship, Flood-Prone, Pakistan.



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Introduction

In the last couple of decades, floods have increased not only in frequency but also in their intensity. The serious consequences of global warming have unreasonable effects on citizens of low- and medium-income nations, who are bearing an excessive burden of these disasters (Intergovernmental Panel on Climate Change [IPCC], 2022). Deteriorated ecosystems, deforestation, wetland loss, and polluted waterways undermine their natural cushions and turn hydro-meteorological disasters into livelihood, health, and displacement emergencies (IPCC, 2022; Bertoli et al., 2025). Reports in Pakistan indicate that the vulnerability of livelihoods is strongly escalated with the interface of exposure and weak adaptive capacity, enhancing food insecurity as well as asset loss and poverty risks (Akram et al., 2025; Knippenberg et al., 2024). Meanwhile, the cost-benefits of intact nature in mitigating flood losses are being established, and the relevance of nature-based and green-infrastructure solutions in risk governance is being recognized (Barbier, 2020). However, environmental capital, such as rivers, wetlands, and riparian areas, is not estimated in risk assessments, the impacts of which cascade in ecological services that sustain local economies (Bertoli et al., 2025). The nexus viewpoint makes restoring the environment a social protective measure and a climate-adaptation focus of flood-affected communities (Barbier, 2020; Knippenberg et al., 2024).

Flood disasters rank among the most common and destructive natural hazards that our planet faces. They generate significant environmental consequences (Keller & DeVecchio, 2019). The characteristics of ecosystems, patterns of land use, and the overall health of the environment play a crucial role in determining vulnerabilities that affect how often and how severely floods impact an area (Wang et al., 2023; Talbot et al., 2018). The environmental challenges faced by countries like Pakistan, including significant deforestation, inadequate land management practices, and ineffective waste disposal methods, contribute to their heightened vulnerability to extreme flooding events (Afridi et al., 2025; Aslam et al., 2021). Land degradation encompasses various issues such as soil erosion, insufficient vegetation cover, and unsustainable agricultural practices (Hossain et al., 2020). These factors diminish the land's inherent ability to absorb rainfall and mitigate the impact of flooding (Qin, 2020; Chang & Franczyk, 2008). Research conducted by Bai et al. (2008) indicates that flash floods and elevated flood peaks result from increased surface runoff on degraded land following significant rainfall events.

The issues of overgrazing, monoculture farming, and ineffective land management significantly contribute to the degradation of land in Pakistan, especially within the Indus Basin and the hilly areas. The ability of agricultural land in flood-prone regions of Punjab and Sindh to retain water has notably declined, attributed to soil compaction and a reduction in organic matter, as noted by Masood et al. (2024). The inability of the ground to effectively absorb rainfall results in surface flooding and erosion. Agroforestry, contour farming, and the use of organic soil additives possess the potential to restore degraded land; however, this potential can only be realized through the coordination of investment and educational initiatives. Land restoration should be a component of national flood mitigation efforts to reduce environmental vulnerability (Gomiero, 2016).

It is often known that deforestation is a significant factor that increases the likelihood of floods. Forests not only soak up precipitation but also stabilize soil and reduce runoff. Think of forests as natural sponges. Deforestation, especially in catchments above or downstream, dramatically increases the frequency and severity of floods in downstream communities. According to studies like the one by Bradshaw et al. (2007), the intensity of floods in many developing nations is inversely related to the quantity of forest cover. Several factors, such as illegal logging, forest land

invasion, and lax implementation of forest preservation regulations, contribute to the depletion of Pakistan's natural flood buffers. Ullah et al. (2023) asserted that a fast phase of deforestation has occurred in recent decades in the northern areas of Khyber Pakhtunkhwa and Gilgit-Baltistan. Reforestation initiatives like Pakistan's "Billion Tree Tsunami" program have been praised for restoring ecosystem services, such as lessening flood damage. But critical evaluations show that issues with species selection, long-term maintenance, and plantation quality persist (Haq et al., 2024; Ullah, 2024). Sustainable replanting requires community-based forest management that incorporates indigenous knowledge.

The three primary roles of wetlands are to recharge aquifers, filter pollutants, and absorb floodwaters. Rapid urbanization and land reclamation for agricultural use and infrastructure have drastically destroyed wetlands. Data collected by the Ramsar Convention shows that over 60% of Pakistan's inland wetlands have vanished in the past fifty years (Ramsar, 2020; Khan & Arshad, 2014). By cutting down natural drainage systems and expanding into once-wetland areas, cities like Lahore and Karachi have raised the danger of urban flooding. The conversion of once-wetland regions into housing societies has obstructed stormwater flows (Hyder et al., 2024), making urban flooding more common during monsoon seasons.

On the other hand, green spaces help sustainable urban water management (Zia et al., 2022). Wetlands must be protected and restored as part of Eco-DRR, or ecosystem-based disaster risk reduction (Wickramasinghe, 2021). Wetland restoration increased flood management and maintained biodiversity (Batool et al., 2025). This benefit was observed in regions like the Indus Delta. Zoning restrictions and official acknowledgement of wetland areas can deter further development while also promoting their preservation (Masood et al., 2024).

Improper waste disposal, clogging of drainage systems, and water pollution all contribute to floods and public health risks. Inadequate solid waste management in cities worsens localized floods caused by clogged stormwater drains (Ozoh et al., 2021; Lamond et al., 2012). Another issue is that when floodwaters mix with pollutants from houses and companies, they can damage land and groundwater. There is a detrimental effect on environmental quality and human health as a result of this. A significant issue with untreated sewage dumping into natural waterways is in industrial cities such as Gujranwala and Faisalabad. Attempts to enhance the efficacy of current environmental regulations concerning municipal waste management have not yielded positive results. Engaging in trash collection and recycling efforts through public-private partnerships can significantly improve a town's resilience against flooding (Afzal, 2024).

The frequency and intensity of extreme weather events are on the rise as a result of climate change, which in turn heightens environmental vulnerability. The consequences of a warming world include intense monsoon precipitation, glacial melt, and increasingly unpredictable weather patterns, all of which elevate the likelihood of floods (Hirabayashi et al., 2018). Ecosystems face significant challenges due to climate change, which includes changes in the viability of land use and a decline in biodiversity. The interactions between climate-related stressors and environmental deterioration create a harmful cycle of vulnerability. It is crucial to adopt ecosystem-based adaptation strategies, develop climate-resilient infrastructure, and implement adaptive environmental governance to break this cycle (Chong, 2014). The vulnerabilities present in our environment play a significant role in determining both the frequency and intensity of flood disasters, which have been documented by Pathak et al. (2020). Various social and economic elements come together to intensify environmental risks, such as land degradation, deforestation, pollution, the loss of wetlands, and climate change (Wang, 2004). The restoration of ecosystems,

the engagement of communities, and the sustainable use of land should serve as the core principles in any thorough strategy aimed at tackling these challenges (Santini & Miquelajauregui, 2022).

Research Methodology

In this study, we employed qualitative research methodology to gain insight into the environmental collapse and hardships faced by the people in flood-prone areas of South Punjab. A phenomenological research design was selected to explore the lived experiences and perceptions of the individuals in flood-prone areas (Creswell & Poth, 2018; Van Manen, 2016). Through gatekeeper researchers purposively recruited the most flood-affected thirty participants from both gender (fifteen females and fifteen males). Data collection continued until saturation was reached, at which point no additional themes emerged from the detailed information gathered (Guest et al., 2013). In-depth interviews were performed utilizing a semi-structured interview guide (Kallio et al., 2016). The interviews were conducted in the local languages and audio-recorded with participant consent. The study employed participant observation to analyze nonverbal communication and the contextual factors underlying the phenomenon (Patton, 2015). Interviews were word-transcribed to allow transparency and accuracy in the process. This paper used pseudonyms for all participants to safeguard their identities and remain anonymous (Liamputtong, 2010). Data were analyzed using Braun and Clarke's (2006) thematic analysis method. This process allowed the researchers to explore the environmental vulnerabilities of flood-affected people (Nowell et al., 2017).

Data Analysis

This paper aims to explore the intersection between environmental collapse and human pain in flood-prone areas. Results indicate that agricultural productivity had decreased profoundly with land degradation and soil erosion, making communities more vulnerable to food insecurity and poverty. Women participants highlighted how topsoil depletion rendered kitchen gardening and small-scale farming unsustainable, particularly for the most deprived households. Deforestation and the disappearance of natural buffers, such as trees and wetlands, were noted to be the most significant contributors to the increased risk of floods. Some men said the loss of trees in unrestricted cutting for fuel and for housing materials had removed key natural buffers that previously impeded floodwaters. Pollution and failures in garbage management were also significant contributors; clogged drains and plastic waste, among other factors, exacerbated these issues and particularly increased health risks for women and children.

Additionally, research often linked these local problems to larger climate change trends, pointing out unusual storms, longer dry spells, and unexpected weather events as signs of worsening climate cycles. There was fear that the climate variability was beyond the addition of traditional coping mechanisms, making it difficult to recover. Taken together, the interviews sketch a picture of how environmental vulnerabilities based on local practice and global change exacerbate the effects of floods—and compound local vulnerability.

Land degradation and soil erosion

The flood disasters significantly disrupted agricultural livelihoods due to land degradation and soil erosion. The floods swept away fertile topsoil, leaving behind barren, cracked earth, as men and women described. Such conditions not only diminished food production but also escalated economic vulnerability and reliance in flood-affected communities. The soil erosion immediately following the flood caused a decrease in crop production, which was especially challenging for small-scale farmers who depend on seasonal production. Some among them spoke of the

hopelessness of lost harvests, falling income, and deepening poverty. A male participant said, “The land was everything to us, but since the floods, nothing has been growing here. Wheat won’t even grow up now” (Naseem, M, 52).

Women were upset that they weren't included in talks about restoring the land they worked on daily. Their knowledge was often overlooked. A female participant stated, “I would help with sowing and harvesting. Now, they say the land was destroyed, but nobody asks us how to recover it” (Sadia, F, 46). The loss of inherited land triggers a deep emotional shock, particularly on older members of the community who associated the land with identity and a sense of belonging. A male participant shared, “My father worked on this land all his life. It feels like I’ve lost a part of him when I see it destroyed” (Mumtaz, M, 60). Decreasing crop production meant everyone had taken on extra work, including women who had to earn additional income and be responsible for shortages of food, which added up to pre-existing gendered divisions of labor. A female participant stated, “So now I have to work in other people's homes. In the past, our land used to feed us, but now it’s a dead land” (Saba, F, 34). The experiences of flood survivors highlight that land degradation and soil erosion were not ordinary environmental concerns; they were also fundamentally socio-cultural and gendered. Men and women experience a heavy toll of economic loss, emotional loss, and cultural loss. Their strengths and wisdom were lost to them in structured disaster recovery.

Deforestation and loss of natural buffers

The extensive deforestation and the resulting loss of natural obstructions, such as riverine forests, wetlands, and embankments, have caused floods to flow earlier and spread wider. Both the male and female participants admitted that the loss of these protective features has increased the vulnerability of their communities to the inundations caused by floods, soil erosion, and frequent destruction of their homes and livelihoods. The male participant directly associated deforestation with the slowing of the floodwater. One farmer stated that the area once had dense forests that slowed down floods, but now the water surges in unhindered. A male participant said, “We cut the forests that help reduce floods, and now the water comes like a monster with no resistance” (Nasir, M, 44). In the past, the trees acted as hydrological barriers, and clearing them increased the rate of water infiltration into houses and farmlands. Women drew attention to the deprivation of the forest-based resources, including firewood and medicines. A female participant said, “The trees were our lifeline. We gathered leaves and firewood, which we used in cooking. It was now floodwater, clearing everything, and we could not even light up a stove” (Nazia, F, 31). Deforestation, therefore, damages women's subsistence and enhances economic vulnerabilities.

Flood-affected people complained about the state's carelessness in protecting natural obstacles. A male participant stated, “They ‘*cut down trees*’ to create a road, but they never contemplated planting again. And now we were penalized every year by floods” (Khalid, M, 47; Ateeq, M, 30). The ecological loss was not only ecological, it was structural, and it was representative of the rule of governance that would not uphold the environmental stability of the countryside and local safety.

A significant emotional burden was created by the process of deforestation, especially among the elders. A female participant shared, “We sat and prayed under that big ‘peepal’ tree. It vanished, taking our peace with it” (Zeesahn, M, 34). The loss of these natural buffers had both spiritual and community significance, representing a broader loss of cultural continuity. Respondents frequently associated soil degradation with deforestation. One of the interviewees said, “The trees would have stabilized the soil. Here, the water now comes and eats the earth, and we have nothing to plant”

(Ahmad, M, 36). Without root systems, farmlands become vulnerable to soil erosion and harvest susceptibility. The participants stressed how they were not consulted on decisions about local ecological systems: a middle-aged woman noted how, before they cut those trees, no one ever asked them, "We live here, we suffer, but nobody was listening." This assertion provides a gendered imbalance with regard to the governance of the environment, where the views of women were marginalized in the control of resources. Moreover, the patterns of deforestation and the disappearance of natural cushions increased the effects of floods and, at the same time, enhanced gendered vulnerabilities. It was an ecological, emotional, and political crisis that required a community-based, gender-sensitive reforestation and the integration of environmental governance in flood-prone areas to restore resilience.

Pollution and waste management failures

Participants repeatedly pointed to the combined failures of pollution control and waste management as key problems during and after the floods. Contaminated stagnant water, garbage, and overflowing sewage created a foul environment and posed serious health threats. Those shortcomings exposed a pattern of systemic neglect, amplifying the sense of helplessness experienced by communities already coping with disaster. Gendered experiences revealed the differences in coping patterns and vulnerabilities of men and women in response to health and environmental concerns associated with waste. Many participants indicated sewage water mixed with the floodwater produced an unbearable smell and a spike in skin and breathing infections. It was especially women, who bear most of the care and support responsibility, who suffered disproportionately because of the frequent illnesses of children and the lack of clean, drinkable water. A female participant said, "The gutter water came right into our house. My children got sick, and I couldn't obtain medicine" (Nazia, F, 31).

Both male and female participants observed that garbage piles remained uncollected for weeks. Waste blocked the drainage and worsened water stagnation. The lack of municipal response was linked to neglect of rural communities. A male participant shared, "We called the office again and again, but no one came. The rubbish was still where the water finally pulled back" (Ahmad, M, 36). Even where the government had done little, participants said neighbors had united together to clear away garbage and dig drainage ditches. Women would commonly cook for workers, as men physically cleaned spaces. A female participant stated, "We didn't wait for the officials. My sons and neighbors had to clear garbage themselves. We had to protect our kids" (Saba, F, 34).

Floods also created discomfort and health hazards due to the lack of toilet facilities and a problem with menstrual hygiene. Improvisation did not shield privacy and ensure cleanliness. A female participant stated, "There were no 'latrines' (toilets) we could use. Every night, we had to walk far into the fields to find a toilet. It was dangerous and disgusting" (Iqra, F, 29). The flood-affected community complained of the bad smells, stagnant water, and unpleasant trash. For them, those sights became a powerful symbol of official neglect and provoked their ongoing mental strain. A male participant said, "It felt like we had lived in a rubbish pit. The smell burned our noses, and everything looked dead" (Zeeshan, M, 34). Women who had to go to acquire water regularly had to walk through stagnant and polluted waters. Such behavior posed a higher risk of skin infections, and there was increased anxiety about waterborne diseases due to daily exposure to such conditions. Men recognized that such conduct was dangerous, but in most cases, they did not engage in these activities, leaving women to carry the risk alone. A female participant shared, "Every morning I walk through muddy water just to find clean water that we can drink. Now, my feet are covered in infected cuts" (Fara, F, 42). Pollution and waste mismanagement exacerbated

suffering after the flood, particularly for women, who faced the burden of caring for others but were also responsible for cleanliness and hygiene. The voices of participants underscored institutional indifference, gender-specific vulnerabilities, and the power of community. Neglect in managing the environmental aftermath of floods contributes to long-term health and psychosocial effects, necessitating gender-sensitive strategies for managing disaster waste.

Climate change and environmental loops

Participants vividly described how climate change triggers a cyclical environmental loop, where floods exacerbate land degradation, which in turn intensifies future floods. Both men and women perceived these loops as relentless forces disrupting livelihoods, deepening vulnerabilities, and challenging traditional coping strategies in Rajanpur's flood-affected communities. According to the participants, there was a loss of fertile soil due to the repetitive nature of floods, resulting in lower agricultural productivity, which in turn led to more poverty and increased vulnerability to flooding. A female participant stated, "After each flood, the land becomes useless. We are unable to cultivate crops as before, and we have to bear hunger and suffering every year due to flash flooding and monsoon rains" (Fara, F, 42). Men also expressed the unpredictable rainfall and escalating heat as signs of climate change, and as a result, it was becoming more challenging to predict floods and their intensity. A male participant shared, "Today the rains were out of season; they came either late or too heavy, and we lost everything we had rebuilt" (Naseem, M, 52). Women discussed how the environment has changed such that the coping strategies used by forefathers no longer work, thereby leaving them helpless. A female participant stated, "Our mothers taught us to save fields, but today floods do not recognize those routes. We were lost and helpless" (Iqra, F, 29). Both men and women emphasized that environmental degradation increased the poverty level, which necessitated either migration or obligation. Some participants shared, "Floods sweep away homes, livestock, and crops. We take loans to live on and debts increase in every flooding season" (Sadia, F, 46). In the climate change-induced loops in the environment, the environmental loop revolves in a never-ending cycle of destruction and vulnerabilities. These tragic circles that foster resilience indicate the necessity of adaptive solutions, which should be created and implemented locally, taking into account local knowledge and skills, to break these vicious cycles and develop resilience in communities where there has been flooding.

Discussion

Such environmental vulnerabilities in flood-prone areas are closely interlinked with societal, economic, and ecological systems, resulting in a recurring cycle of degradation and suffering. Among the top issues were land degradation, soil erosion, and waterlogging, which reduce agricultural yield, especially in rural agricultural regions (Hussain et al., 2020; Chalise et al., 2019; Khan et al., 2013). Floodwaters wash away rich surface soil, destroy cultivable land, and deposit sand and silt, which make the land infertile and unfit for agriculture (Ashraf, 2022; Meenambal, 2019; Osman, 2014). In societies where people depend on farming activities, this destruction is not only causing food insecurity but also undermining the land-based generational heritage and inheritance systems (Corn tassel & Hardbarger, 2019). Emotional trauma of losing inherited land poses an immense burden (Lamond et al., 2015), with the land as one form of property in much of the Pakistani rural setting, not just an economic resource but a means of social status, the sense of being part of the family, and an individual self-identity (Waqar et al., 2025).

Higher rates of deforestation and the removal of natural buffers like riverine forests and mangrove forests multiply these risks (Bhowmik et al., 2022). The vegetative cover, especially trees, acts as

a hydrological barrier, mitigating the speed of floods and their erosive power (Marapara et al., 2021). However, many areas have been robbed of these natural protections due to the widespread destruction of forests caused by urban sprawl, timber logging, and governmental neglect. This negligence of duty was emblematic of the broader tendency of institutions failing to protect ecological resources so vital to resilience from disaster (Aslam et al., 2021; Reboredo, 2013). Flood-prone areas disproportionately affected women, who rely on forest-based resources like firewood, food, and herbs. The loss of these resources leads to women needing to travel longer distances, putting them at greater physical, social, and health risks (Uzair & Malik, 2025; Raza et al., 2019; Wan et al., 2011).

Heavy pollution and inadequate waste management exacerbated post-flood environmental vulnerabilities. Choked drainage systems usually malfunction, causing the accumulation of stagnant, dirty water, trash, and raw sewage. These environmental threats create fertile environments for waterborne diseases and also raise the risk of developing skin infections and respiratory conditions (Shah et al., 2023; Tariq & Mushtaq, 2023). Poor local government response (which is not uncommon because of scarce resources and weak planning and political will) leaves such communities, especially the poorer populations, to manage such hazards on their own. At most times, stagnant water remains untreated for several weeks, resulting in environmental degradation and public health disasters (Abdullah et al., 2024; Rana et al., 2021). Climate change is increasing the environmental vulnerabilities, which are defined by a lack of predictability in the rainfall patterns that apparently lead to the severity of flooding water in flood-prone areas, as well as other climatic events of sudden intensive rains and long dry periods and growing heatwaves increasing the loss of human life, assets, and displacement of people from their houses in Pakistan (Wells et al., 2023; Fahad & Wang, 2020; Jamshed, 2015). These are not isolated incidents, but rather part of a broader climate-environmental cycle that heightens the vulnerability of communities (Rivera-Collazo, 2022). With such responses, climate change disturbs the ecosystem's balance (Verma, 2021), forces down adaptation capacities, and enters a vicious cycle where every shock consumes a part of the natural resource base and community resilience. The depleted system becomes more vulnerable to future shocks (Uddin et al., 2021). The environmental vulnerabilities in flood-prone areas were not just limited to the natural calamity's prompt effects; they were also indicators of system mismanagement, socio-ecological inequalities, and climate-driven stresses. Successful mitigation necessitates the use of a multidimensional approach that integrates ecological restoration, disaster risk reduction, and community-based environmental governance.

Conclusion

These are strongly entangled with the problems of environmental destruction and human exposure, as the nexus of environmental collapse and hardships faced in the lives of people and families residing in flood-prone areas proves how closely things are related to each other. The results of this study indicate that the frequency and magnitude of floods are greatly compounded by deforestation, inappropriate land-use conditions, uncontrolled urbanization, and weak climatic management practices. Such failures to the environment not only cause disturbance to the ecosystems, but also tend to translate as direct social-economic and health-based hardships to already impoverished groups of society. The findings show that losing jobs, being forced to move, not having enough food, health problems, and mental stress are all connected issues caused by environmental damage made worse by poor disaster response. Further, the distinct impact on vulnerable population groups, especially women, children, and low-income household groups, displays social-structural inequalities that exacerbate the effects of disasters. As such, it is not

enough to carry out immediate relief operations to tackle the consequences of floods, but rather crucial to introduce comprehensive interventions to enhance environmental management, build resilience within communities, and incorporate social equity in the process of governance during disasters. This study confirms that sustainable measures addressing flood vulnerabilities should be based on a dual strategy of ecological restoration and, at the same time, alleviating socio-economic inequalities. Only with such integrative approaches can the communities in flood-prone areas rise to resilience, dignity, and security in the face of increasing climate challenges.

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Conflict of Interest

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