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THE IMPACT OF GLOBAL ENVIRONMENTAL TRENDS ON PAKISTAN'S ENVIRONMENT: A STUDY OF DEFORESTATION, DESERTIFICATION, AND WATER SCARCITY

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ABSTRACT

Pakistan, like many developing nations, is grappling with the severe consequences of global environmental trends, which have exacerbated local ecological challenges such as deforestation, desertification, and water scarcity. This study examines the interplay between global environmental changes and Pakistan's deteriorating ecosystem, highlighting the country's vulnerability to these interconnected crises. Despite early warnings from international organizations like the UN in the 1950s and 1960s, Pakistan's response to environmental degradation has been inadequate, with policymakers prioritizing short-term economic gains over long-term ecological sustainability. The research identifies deforestation, driven by urbanization, agricultural expansion, and illegal logging, as a critical factor contributing to habitat loss, biodiversity decline, and increased carbon emissions. Desertification, fueled by unsustainable land use practices and climate change, is transforming arable land into barren landscapes, threatening food security and livelihoods. Water scarcity, exacerbated by glacial melt, inefficient water management, and pollution, is emerging as a pressing issue, with implications for agriculture, industry, and domestic use. Using a mixed-methods approach, this study analyzes the socio-economic and political factors that have hindered effective environmental governance in Pakistan. It also explores the role of global environmental trends, such as climate change and transboundary pollution, in amplifying local challenges. The findings reveal a lack of public awareness, weak enforcement of environmental laws, and insufficient integration of environmental education into academic curricula as key barriers to addressing these issues. The study concludes with actionable recommendations, including the adoption of stringent environmental policies, reforestation initiatives, sustainable land management practices, and improved water conservation strategies. It emphasizes the need for a holistic approach that aligns local actions with global environmental goals to ensure the resilience of Pakistan's ecosystems and communities.

Keywords: Environmental Degradation, Deforestation, Desertification, Water Scarcity, Climate Change, Pakistan, Sustainable Development, Environmental Policy, Global Trends, Ecological Resilience.

Introduction

Before the dawn of the new millennium, the prevailing focus was on the "population explosion" theory. Hardly was the murmur of "environmental change" or activities resulting in "global changes" heard in the discourse of Pakistan's environmental change. But the alarm bells should have rung loud enough much earlier, say by the plea of UN in 1950s and 1960s. Regrettably, it all falls on deaf ears as witnessed the ongoing unsatisfactory attitude and simpler gesture of authorities towards this crucial issue. The dark forebodings made by the environmentalists nearly a decade ago began to dawn upon people the way a gruesome encounter would haunt nightmares after having gone through a Spook House. "Impending flood," "Food scarcity," "Deforestation," "Climatic variation," the terms were floating in the air but our gefilte fish looked, rather, interested in change of Doordarshan schedules and price of petrol, ignoring the irony that uncontrolled activities are playing havoc with the ecosystem (Ahmed Golo et al., 2024).

Modern man is not only degrading his own habitat at an unprecedented pace but also uncaringly endangering the bio-system upon which human species ultimately depends for sustenance. The mania for modernization, pace of progress and perverted sense of progress eating into vitals of life world over gives rise to a host of environmental problems. It has been a gross fault of the politicians, rulers, administration, technocrats, big organizations and even the intelligentsia of our country for not having made a coalition to adopt a holistic approach (Best, 2021). Study of oceanography, meteorology, botany, biology, biochemistry, pollution should have been made a part in all schools and professional institutions and not less importantly all kinds of man-made pollution should have been checked quite early by the law and with an iron-hand. It is vital for the political leaders and administrative policy makers to realize the importance of the environment since it "is where you and I work, live and play and is what we share and also what we inherit from the past and pass on to the future". Such an approach does not require any extra budget but just a little bit of sensitivity and concern dedicated in right direction for posterity and for surviving human kin.

The globe is in the grip of a myriad of environmental transformation because of loosely knit interconnectivity of what is transpiring at one corner of the world and what is happening of the other end. The predication by modern ecologists, universities and environmental agencies about the eternal alliance of the environment has served as an alarming call for the granery of its much needed friction (Nygaard, 2022). Efforts should be made to reverse this degradation in environment by stringent measures

against deforestation, industrial effluents, vehicular emissions with toughening the environmental pollution laws and introducing the study of environmental sciences as a formal part of academic curriculum. Counter measures need to be transformed into sincere actions irrespective of little bottlenecks and harmonization of special strata.

Background and Rationale

Worldwide, environmental degradation is at its peak especially in developing countries where the population is increasing at an alarming rate. Pakistan cannot escape from this whirlpool of degradation as it is facing numerous challenges due to the growing population, urbanization, industrialization, land uses for economic pressures, housing needs, existing dams, general public unawareness, and the lack of strong standards to protect environment. These factors are also contributing to deforestation, desertification, land covering, cities smog, and water scarcity also involving global environmental patterns (Ahmed Golo et al., 2024). Deforestation, desertification, and water scarcity take place in a slow but severe manner. Haste makes waste, saving money by cutting the forest down now is making money on the installation of Ruins.

Ecosystems and communities are vulnerable to changes and disasters. Since 1960s in a geographical spectrum, there are huge variations in environments and hazards along which regions threatened by common natural hazards physical exposure, social sensitivity, and environmental exposure, which can see communities experience much greater vulnerability. The developmental gap, distorted benefits and risks, underlying health issues, the absence of sustainable management of natural resources and environmental degradation increases the likelihood of life and property loss. Glacial melt, landslides or flash floods lead to frequently occurring disasters in the mountains and environmental degradation. Global environmental trends are increasing at the local level multiply a constant review of local natural resources as access to these resources becomes competitive, thereby increasing unsustainable practices and further degradation of the rural environment. For the public and researchers in the development sector, these interactions of macro and micro-scale phenomena are often under-addressed or unexplored.

Deforestation in Pakistan

Deforestation is a critical problem in Pakistan, where harsh environmental trends highlight widespread environmental degradation. Rapid deforestation is a major concern due to diverse biodiversity, severe soil erosion, loss of agricultural capacity, and widespread water scarcity. The implications of deforestation are severe, contributing to eroding ecological conditions, loss of carbon storage, and a lack of biodiversity. This study primarily considers the Margalla Hills in Islamabad as a critical issue. The primary aim is to perform a multifaceted study of the causes and implications of deforestation in Pakistan. In this context, the study focuses on the

Margalla Hills, an area of unique biodiversity located in Pakistan's capital territory. By examining this case in detail, a deeper understanding of deforestation trends is developed (Qasim, 2022).

2.2 Background Pakistan is a low forest cover country, with forest cover currently below 5%. Rapid deforestation is ongoing, with rates peaking at 0.306% in 2000. The majority of Pakistan's deforestation is due to extensive agricultural expansion, with firewood collection, logging, and land conversion as persistent issues. The nation is additionally committed to international agreements regarding the Reduction of Emissions from Deforestation and Forest Degradation (REDD+). The Margalla Hills are a natural reserve park, home to unique biodiversity, yet deforestation is ongoing ((Rehana) Batool et al., 2016).

There is a persistent conflict between state ambition to develop infrastructure and quarry along the hills and environmental regulation. Current enforcement against deforestation is low. The forest department claims deforestation rates are 64 ha/year, yet a study estimates the loss to be around 200 ha/year. The research is conducted to objectively measure the loss utilizing pre-existing satellite images. At stake are ecological balances, biodiversity both flora and fauna, and socio-economic issues related to the dependency of forest-dwelling communities. However, little detailed research is available that examines Pakistan's deforestation.

Environmental Consequences

Global environmental trends remain a serious concern for countries around the world in this era of globalization. Issues such as deforestation and desertification are global concerns that also carry with them a significant danger with respect to the environment of Pakistan. For every tree that is felled, the network of roots that is destroyed reaches deep underground. As rainfall hits the surface, without the root system present to lessen the force of impact, the soil particles are pounded into nothingness and hide beneath the surface of the water (Sule et al.).

One of two things can then occur: eventually, either the water finds a way to carry away the newly formed soil particles or the torrential force of water heightens enough to dig a space for itself. In either scenario, a slide is caused and happens. Thus, if tree-cover is destroyed in an area, it is only a matter of when, not if, a mudslide shall occur. To say that deforestation's ecological effects are disastrous would be a massive, though wholly understated, understatement. Deforestation results in biodiversity reduction (Faria et al.2023). In lowland regions, extensive tracts of remaining forests must dry in consequence of an altered monsoon regime, and thus are lost to the tinder-box conditions, inviting further uncontrolled fires which spread into the neighboring stands of trees. The conflagrations are so extensive that little is spared.

The marvelous diversity of life that once inhabited those habitats is reduced to a wasteland of soot and ash.

The expanding areas of deforested land increase the vulnerability of ecosystems to the effects of climate change. Sea level rise, increased frequency of extreme weather events, altered precipitation patterns are direct consequences of global climate change. Local ecosystems will be affected by these broad changes, such as soil degradation, erosion or habitat degradation. Mitigating and adapting to the effects of global climate change is a priority, mainly because of poor populations depending directly on resources offered by nature. Many traditional agriculture and forestry systems developed close to natural – or near-natural – ecosystems. In these terms, adaptation to the effects of climate change is somewhat limited to the resources found in 'healthy', viable ecosystems. In the absence of a diverse biota of trees, the local climate loses its monsoon habits, and becomes erratic. Water cycles are disrupted, and periods of dryness are protracted. Soil hydration drops precipitously, becoming arid, bereft of microbes within it to support life. As water becomes scarcer, so too do the biotic communities.

Granite heads previously lush with foliage, now resemble the cracked hide of an extinct beast, devoid of life. Stripped of the vegetative backbone, ecosystems disintegrate entirely; the land becoming hostile, dead. Maintaining the biotic and ecosystem diversity is of crucial importance, especially under the changing climate patterns. A vast majority of greens; old, new, rare, or undiscovered will be found within forests or tree-thickets. All trees eliminate and filter pollutants. When sunk into the ground, their roots act as earth-builders (Stange et al., 2021). They support soil structures, or reclaim land subverted by slides, or erosion has occurred. Leaf litter mulches planer soils against rain, and direct the force of raindrops to the ground where they are attenuated by the carpet of dead leaves, not the living soil.

Desertification in Pakistan

Desertification is a major environmental challenge faced worldwide, including Pakistan. It is a common point of agreement in various international forums, policy statements, and dialogues that the world is facing an unprecedented environmental crisis. In this regard, sustainable development of global landscape to prevent desertification is one of the Millennium Development Goals. Desertification and degradation of arable lands are two major issues confronting Pakistan as well. There are numerous human activities like faulty irrigation system, deforestation, overgrazing, monoculture crops, urbanization, and industrial effluents which have induced salinity and desertification in this country.

The misuse, mismanagement, and inequitable distribution of easily available land resources have already resulted in desertification and degradation of arable lands

((Rehana) Batool et al., 2016). As per conservative estimates, 6.7 million hectares of arable land has already been affected by desertification in the shape of waterlogging and salinity in the provinces of Sind and Punjab. The scarcity of sweet water has paved the way for seawater intrusion either from rivers or sub-soil aquifer, degrading additional more lands to salinity and sodicity. On the other hand, biotechnical interventions on arid and semi-arid rangeland areas have been scanty to prevent land degradation through soil erosion and rise in groundwater table. Congo is the only few plays where windbreak and shelterbelt have been raised by utilizing technical experts and implementing modern technology.

However, these have now started a disjunction either due to dynasties of wind or flood or grazing them by nomads. But the gap in untrained staff, lacking scientific knowledge, paucity of seeds for afforestation, deficient funds, no maintenance, poor performance in guarding, and established the windbreaks caused the process of disjunction. More importantly, the ariel photography and satellite imagery of 1980 and 2000 have indicated the extension of desertification in the shape of sand dunes mostly 10 km, and mosey in three districts of Punjab, D. Khan, Rajanpur and Bahawalpur, and Bahawalnagar, respectively.

Factors Contributing to Desertification

One of the arid regions of Pakistan affected by desertification is the Cholistan desert in Punjab. Thus, applying a general model on the desertification process lead it to be a researchable product. The study deduced that deforestation and climate change will increase the process of desertification in Cholistan. Overgrazing and improper farming practices are also increasing the process of desertification ((Rehana) Batool et al., 2016). Particularly Cholistani, land is compared with Rajasthan, India which has the Thar Desert. Trees in Cholistan were 3.20% of the total area of Cholistan whereas in Rajasthan only 0.5% of the area was covered with trees. Therefore, the forest cover of Cholistan is comparatively better than Rajasthan. However, both populations are statistically similar with respect to deforestation.

Desertification has become a severe issue globally. Particularly, land under the influence of arid and semiarid climates has been degraded which affects the economy at a broader scale. Cholistan is under severe threat for desertification due to harsher climate conditions. The World Atlas calculates that 44,000 square kilometers are affected by desertification in Pakistan, and this has become another major threat to the economy of Pakistan. On the other hand, deforestation and improper farming practices have already destroyed 90% of arid climate forests in Pakistan while the remaining 10% are surviving in just a few forest protected areas. Apart from that, the forest policy of Pakistan considers the forest area=5% of total land area of Pakistan. However, the area under the forest at the time of independence in 1947 was about

4.15% of the total area of Pakistan which, due to a lack of law enforcement, has been degraded and is now only around 1% (Abdelaziz Azzouzi et al., 2017).

Water Scarcity in Pakistan

Pakistan shares the Indus, Jhelum, and Chenab rivers with India, relying heavily on the Indus Basin Irrigation System, which meets nearly 90% of its agricultural water needs. This system covers 25% of Pakistan's area. However, per capita water availability dropped from 5,000 m3 in 1951 to about 1,100 m3 by 2005. The Indus River irrigates approximately 109 million acres, with an annual flow of 44 to 59 maf. Underground resources total 58.5 maf, but 43.0 maf have been extracted, with only a natural recharge of 5.8 maf (Ahmad & Ahmad, 2023). Snowfall in northern regions is critical; any changes can severely impact water supply and groundwater recharge. Predictions show a potential 79% loss of glacier area by 2030-2050 due to climate change, compounded by erratic rainfall that threatens food security and exacerbates socio-economic disparities.

Pakistan is facing a severe water scarcity crisis exacerbated by insufficient investment in the water sector and inefficient usage of surface water. Groundwater contamination due to untreated industrial waste and poor sanitation compounds the problem. The nation requires 274 million acre-feet of water, but availability is projected to fall to 228 million acre-feet by 2010, resulting in a potential shortfall of 46 million acre-feet. This situation will likely decrease underground water extraction and lower the water table, posing a threat to food security. Water scarcity is predicted to have detrimental effects on livelihoods and food production in Asia, particularly in Pakistan, where agriculture is crucial, contributing about 25-30% of GDP and employing 44% of the labor force (Ali et al., 2022). Agriculture consumes around 80% of available water, yet the crisis is not only about supply timing but also inefficient water resource management. Overall, poor management undermines uniform water distribution and enhances waste, risking the effectiveness of irrigation efforts.

Sources and Availability of Water

Water is one of the most valuable resources on earth. It is vital for all life forms and is a cornerstone for ecological stability, biodiversity, and economic development. Unfortunately, freshwater reserves are the most rapidly depleted natural resources with the most vulnerable populations already suffering severe water scarcity (Amir Fahim, 2011). In Pakistan, an acute water shortage is becoming a matter of crises, with rapidly depleting water levels in the main reservoirs, as well as less availability of surface water compared to ever-increasing water requirements. There are many sources that are used to help with water scarcity as well as those that face the problem of scarcity, such as rivers, lakes, and rains.

Four rivers are the primary source of water in Pakistan. As a result of the Indus Waters Treaty with India, among the western rivers, the River Indus is the biggest single stream flow, which afterwards takes huge tributaries. The teen hissar of Ravi, Sutlej, and Beas are located on the headworks of India, and would frequently curtail the water under the bilateral agreement on the distribution of water between Pakistan and India. Flow in all rivers is seasonal, and most comes from glaciers in the summer season, with the result that peak flows exceed the flow that can be stored in the reservoirs (Khan et al.2021). Rivers are used to irrigate various crops, and what is grown is documented in khareef and rabi water flows. The availability of canal water influences land prices, lease value, and holding size. A small amount of landholdings would be sufficient in the riverine or canal command areas. The remaining areas largely depend on tube well aid or rainfall flooding. In Pakistani areas, tube well technology is gradually being implemented, resulting in greater water scarcity.

Impact on Agriculture and Livelihoods

The agriculture-based economies of developing countries are increasingly threatened by global environmental trends that undermine fragile natural resources. This text analyzes a case study from Pakistan, where deforestation and desertification have caused sandy regions to encroach on agricultural land. Concurrently, rising water scarcity poses a significant challenge to production due to growing demands, declining water tables, and erratic river flows. These adverse land-use changes result from intertwined social issues like population growth, migration, and shifting socio-economic structures. Water scarcity significantly affects and is affected by social change, impacting over 60% of smallholder farmers reliant on water-intensive agriculture and linking local and broader socio-environmental changes.

Water scarcity is increasingly severe globally, impacting agricultural productivity and food security. South Asia, using over 90% of its water for irrigation, faces significant reductions in water availability as rainfall decreases. This leads to lower food production and income, hindering investments in agriculture. Farmers struggle to maintain water-absorbing bunds due to resource constraints, causing yield reductions and food insecurity at the household level. Consequently, farmers may cut workdays, limiting their ability to purchase necessary goods for effective irrigation, creating a cycle of decreasing productivity and investment, which is vital for economic growth and livelihoods (Ahmad et al., 2021).

Women especially face challenges in contributing to household income amid agricultural instability, pushing families toward food insecurity and deeper poverty. The focus on water-intensive cash crops drives farmers in buffer zones to seek off-farm employment, often at substantial distances. This desertification exacerbates unemployment and reduces local economic opportunities, complicating rural

development and widening socio-economic disparities. Discussing in-migration aims to highlight broader socio-economic issues, focusing on the political vulnerability of migrants in rural development and environmental management.

The depletion of water resources, with many rivers no longer reaching the sea due to over-extraction, is well-documented. Heavy subsidies for water lead to depletion rates exceeding sustainable levels. More than 80% of global croplands depend on irrigation, which is often inefficient due to mismanagement and outdated practices. Soil salinity from poor water management leads to cropland desertification, forcing millions of farmers to leave their land and migrate to cities in search of low-paid jobs (Ruess et al.2023). Outdated and poorly maintained infrastructure worsens the uncertainty of water supply.

Potential responses to combat these issues include investing in efficient irrigation methods like drip irrigation, improving water storage infrastructure, diversifying crops, and supporting displaced farmers rather than deterring them. However, given the interconnectedness of issues at play, isolated strategies may only shift problems elsewhere. It's crucial to focus on local impacts in regional and national planning and management processes.

Policy and Governance Responses

Increased environmental awareness in Pakistan has been promoted as a key goal of policy, and a number of new policies and programs have been adopted in an attempt to curb deforestation, desertification and water scarcity, with varying degrees of success (Ahmed Golo et al., 2024). Major productive and environmental sectors, such as agriculture, forest and water management, need to better integrate environmental concerns. Pakistan's needs in the area of environmental preservation have also been noted in recent policy and planning documents. The Seventh Five-Year Plan document, reviewing environmental accomplishments and shortcomings, stresses various pollution control schemes, as well as numerous afforestation plans. However, such environmental considerations are almost completely absent from development planning; who review does not even make a single reference to issues of deforestation, desertification or water.

Approaches to achieving sustainable forestry also largely ignore those political, social and economic ills of the forestry sector which most directly impact upon environmental management, e.g. the policies and activities of private companies, political and administrative structures such as the Forest Department, and issues of resource access and ownership. A planned shift to a more environmentally oriented community-based resource management approach will only be successful with considerable democratization of the forestry sector, as well as broader political and economic changes. International arrangements and actors are also important in setting the

context in which environmental governance occurs. Concerns about the "debt crisis" in the developing world, and how it may impact both financial program of other developing countries and the ability of those countries to alter existing economic arrangements, has prompted an intense focus on the impact of such; could also have influences, direct and indirect, on the environment.

National Policies and Programs

The government has enacted various policies against environmental degradation, such as the National Conservation Strategy and a ban on deforestation. Forests are now conservation areas for nature-based tourism. The Ministry of Water and Power initiated a project to decrease water wastage in horticulture and improve range land management. Efforts to combat desertification through forest and wildlife protection are underway. The Ministry of Environment started a Storm Water Drainage Management project to reduce urban flooding in Katchi Abadis. A 5% forest development tax on timber aids conservation, while the Parks and Horticulture Authority protects recreational forests. A drip irrigation promotion project in Sindh aims to enhance water efficiency. However, these initiatives face limitations due to resource constraints and isolated actions. A comprehensive national strategy is essential for better coordination across regions. Barriers such as lack of political will, capacity issues, weak institutions, non-implementation of standards, and inadequate funding hinder governmental effectiveness. (Waheed et al., 2021)

Involving civil society and local communities is vital for addressing environmental issues. Community-based organizations (CBOs) raise awareness about deforestation and encourage joint forest management. The development project for Astola Island, Balochistan, engaged local communities to promote sustainable island management. Projects aimed at awareness and social development included strengthening federal and provincial EPAs' capacity to monitor environmental laws. In the Kinhar River catchment area, land-use training helped communities build resource management infrastructure and establish alternative energy sources. (Ewane, 2024) The Punjab social welfare department launched the Food Project Cleanup Campaign to enhance cleanliness awareness. A social team ensured compliance with environmental standards. However, limited information on the effectiveness of these actions exists, necessitating regular assessments. Transparency and accountability are critical, as some initiatives may serve other purposes, hindering community benefits. Findings underscore the importance of national policy frameworks in managing natural resources while addressing environmental challenges. Effective land-use choices can mitigate risks, particularly against natural disasters like floods.

International Collaborations and Agreements

Pakistan is a developing country that is significantly vulnerable to impacts associated with deforestation, desertification, and water scarcity. These influences are of international concern and are often governed via international treaties. Pakistan is a signatory to various international treaties concerning the environment, and protection of the country is a direct international responsibility. This study notes the current state of global environmental trends, and assesses their impact on Pakistan's environment, policy-making apparatus and policy. This chapter discusses the findings of the empirical research, specifically those related to deforestation, desertification and water scarcity in relation to Pakistan (Adnan et al.2024). In this way, it examines the extant state of, and response to, global environmental trends in one developing country.

Pakistan is a party to multiple international environmental agreements, including the UNFCCC, Kyoto Protocol, and CITES. After the December 2015 UNFCCC Conference of Parties, Pakistan committed to the New York Declaration on Forests and the Green Climate Fund. Under the Paris Agreement from COP21, it pledged to reduce energy intensity by 60% by 2030. In January 2018, Islamabad banned plastic bags and enacted a Climate Change Act, creating a Climate Change Council (CCC) and Authority (CCA). Various NGOs and organizations work on environmental issues, promoting sustainable practices and biodiversity conservation. Cooperation with these entities will enhance Pakistan's environmental protection and capacity building. Pakistan also has technology transfer mechanisms under international agreements and has signed treaties addressing environmental protection, land degradation, and water scarcity. These treaties support combatting drought through food aid, technology transfer, and information sharing, while also tackling biodiversity erosion in line with the Convention on Biological Diversity, with the WTO's Committee on Trade and Environment focusing on aligning trade rules with environmental sustainability (Butt et al.2022).

Case Studies

Introduction. Pakistan, a developing country in South Asia, has faced significant environmental challenges since its inception in 1947. This study investigates deforestation, desertification, and water scarcity as major issues through various case studies, highlighting both successful interventions and ongoing challenges. Each case offers unique insights into environmental degradation across different regions in Pakistan, with a chronological examination from early to recent historical contexts. Historic evidence is prioritized, focusing exclusively on Pakistan's ecological environment while excluding aspects of archaeology, historical architecture, or urban planning, despite their relevance (Aziz, 2023). The study adopts a national perspective, without engaging with ethnographic insights or the societal knowledge of other countries. By addressing these diverse examples, the intention is to cultivate an informed and critical readership, diverging from mere reiteration of the project brief.

This exploration aims not only to serve as a guide for studying various forms of environmental degradation but also to enhance understanding of the complexities within this vast field of humanities and cognitive sciences.

Specific Examples of Environmental Degradation

Several situations illustrate the drastic effects of global environmental trends on local levels, highlighting the severe consequences of deforestation, desertification, and water scarcity affecting Pakistan. Issues include tree cutting impacting surrounding structures, urban expansion causing desertification, and increasing water scarcity in numerous local areas. As a Global South nation, Pakistan faces challenges buffering the negative impacts of these global environmental trends. Unlike Nepal and Bhutan, where forest cover is increasing, deforestation in Pakistan is escalating rapidly, threatening the Indus area with desertification due to climate change.

Current climatic events struggle to adapt to significant global changes affecting the Indus River system. Efforts to create new canals and dam projects cannot ensure reliable irrigation for communities. To address these issues, fostering environmental responsibility among the populace is critical. Many communities reside near unstable Indus Riverbanks, necessitating the removal of decayed trees for resource management (Jamali et al., 2023). Although there were fears that tree removal could destabilize nearby houses, significant damage was minimal, and the transported wood led to bamboo crab overgrowth, adversely impacting the local ecology.

A severe lack of resources prevented communities from removing tree remnants, exacerbating conditions. Increased global temperatures may encourage more aggressive growth of bamboo trees in expanding markets and urban areas, pushing deserts to absorb nearby townships, risking them drying up. Previously fertile areas are turning desolate despite attempts to stabilize environments. Disruptions in adjacent forests lead to serious disturbances in the natural water cycles, crucial for local households and the overall ecosystem. New bamboo swamps near villages evoke arid winds carrying sand and shifting terrain into semi-desert ecosystems.

Karachi exemplifies these struggles, housing 2% of Pakistan's population and serving as a key financial and bureaucratic hub. Even amid urban growth, many residents lack access to water, forcing them to purchase it at high prices for personal use and urban agriculture. Some rely on tankers, but irregular deliveries leave many without reliable access. Consequently, people wait in lines for water, and disputes arise among those trying to secure enough for their needs. As rival factions emerge, they dig tunnels to sabotage each other's access to water supplies, compounding the existing difficulties in this challenging context.

Community Engagement and Sustainable Practices

Environmental problems represent a pivotal crisis globally. Deforestation, desertification, and scarcity of potable water are major environmental issues. An attempt is made to explore the impact of global environmental trends on the environment of Pakistan. The management of forest and water in the light of global environmental issues will be analyzed after looking at the current situation of biodiversity, deforestation, desertification, and water scarcity in Pakistan. It is not only the management of forest but also how vegetation of any kind is managed and becomes the inter-relationship between plants and other resources, especially between plants, soils, animals, and humans that live around it.

Research on deforestation and desertification and its impact on the existing global environment comes from different theoretical backgrounds that usually focus on political economy, geography, environmental history, and critical ecological economics because it often calls attention to the socio-economic forces that drive environmental degradation. However, many studies do not consider the roles of biodiversity and the local perspectives for sustainability. Furthermore, the pervasiveness of globalization and neoliberal policies in both environmental management and development frequently direct the focus on globalist while local specificities and alternatives indicate the necessity of more ethical, not directly profit driven, and relationships with the ecosystems.

Despite the strategic and destructive consequences of livelihood strategies on the part of the poor, it would be inadequate to construct a different, more constructive local perspective on development and environmental management that take into account the needs and knowledge from the same disadvantaged populations. Using community resources and fostering community governance would promote sustainable ecosystem management without undermining appreciation of local knowledge, which is critical for successful biodiversity conservation. At the same time, some data and analysis about Pakistan will be presented in light of these contexts, giving also to a better understanding of environmental problems, especially deforestation, desertification, and water scarcity (Ashiq and Hussain2024). By combining globally codified scientific rationale with local perspectives, this analysis should provide suggestions for the strategic possibility of eco-regional sustainable management that must bring advantages to plants, but also to animals, water, soils, and people, helping local economies to progress. Along with forests and desert, the discussion will be concentrated on resource management in water.

Future Research Directions

Following the ongoing and alarming environmental degradation process in Pakistan, it is imperative that a step forward encompasses a deeper understanding and the implementation of practical measures to be taken in future studies. These efforts

should focus specifically on the island's sustainable development while considering various anthropic activities and the natural environmental settings that influence them. Throughout the prehistoric years, it has become increasingly clear that anthropic activities including uncontrolled logging, extensive agricultural practices, and various forms of natural resource exploitation have resulted in tricky and far-reaching consequences for environmental degradation over the longer term. One significant manifestation of this is deforestation, which has serious implications for ecological systems.

During the Archaic Himalaya era, profound and intensive logging coupled with rampant wood deforestation appeared to have proceeded alongside alarming and ever-accelerating rates of soil subsidence and land certification degradation. These historical precedents reveal patterns that are critical to understanding contemporary issues. Presently, we observe dramatic disparities among the regional environmental degradation experienced particularly in the border areas of extensive mega poles when juxtaposed with the vast expanses of natural environments found across the Tibetan Plateau. The degradation process affecting the environment, primarily due to extensive breeds of economic growth that span the recent three decades, is characterized by significant and unexpected desertification, the migration of various wild fauna and flora species, deforestation, and increasing rates of soil erosion. Furthermore, there has been a noted decline in surface water quality due to extensive anthropic activities, which include but are not limited to the application of herbicides, pesticides, and widespread agricultural breeding practices.

The combination of rapid population growth alongside unchecked economic development activities in the broad plains of the island further fuels an unexpected and even uncontrollable trajectory of environmental degradation, leading to consequences that may be irreversible. A stark example of this is found in the extensive desertification occurring within the basin of Hypaethral and the alphabetical sub pathetical lakes, where a notable decline of almost 28% in water levels has been documented. This drop in water availability is accompanied by alarming declines in the instinctive principles governing indigenous wildlife biodiversity and flora composition. The interconnectedness of these natural and anthropic factors demands immediate attention and concerted effort to mitigate further damage and promote sustainable practices for the future.

Conclusion

The findings of this study suggest a strong relationship between deforestation, water scarcity, and desertification in Pakistan. This result aligns with the interlinked prognostications of global environmental trends. The devastating consequences of these issues are manifest in the already vulnerable context of Pakistan's environment.

As deforestation continues to accelerate desertification, and as forests are absolutely crucial for the provision of water, these interconnections loom large as a serious threat to the Western parts of Pakistan. This threatening scenario underscored the implementation of urgent and wide-ranging comprehensive strategies to address the issues of deforestation, desertification, and water scarcity. Such strategies require immediate attention as the current consequences could develop into irreversible long-term impacts. Given the complexity of environmental interconnections, the most effective measures would adopt a multifaceted approach targeting the multiple interconnections of environmental issues.

Efforts can be undertaken at the community level to reduce the negative impacts of deforestation and desertification. Community involvement in the protection of forest resources was prioritized, acknowledging that deforestation and water scarcity are largely driven by increased population pressure on forest resources, which is closely related to livelihood activities and hereditary dependency on forests. Since these activities are practically impossible to replace in the near future, cooperation with local communities in forest protection can at least prevent illegal logging and reduce the intensity of closely connected desertification and water shortages. However, community involvement can only provide short-term relief, and the complex long-term relationship between environmental issues in Pakistan calls for an integrated approach that emphasizes the comprehensive reform of national policies and the pursuit of technological innovation in sectors crucial to environmental resilience.

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