

Navigating Rising Temperatures: A Literary and People-Centered Perspective of Ungreen Infrastructure in District Swat, Khyber Pakhtunkhwa Province

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Abstract

In the context of global conditions, Pakistan faces heightened susceptibility to a range of climate change-related risks and severe meteorological occurrences, which encompass intense rainfall, inundations, extended periods of aridity, and, in particular, the central subject of this investigation, escalating temperatures. Among the factors contributing to this phenomenon, deforestation, human-induced actions, the expanding populace, the presence of greenhouse gases (GHGs), and more can be cited, with non-environmentally friendly infrastructure being acknowledged as a primary catalyst for the temperature increase. Like other parts of the country, new ungreen housing societies and rapidly swelling anthropogenic infrastructures have

been reshaping the ecology of district Swat, which is directly impacting the temperature increase in the district. For these new infrastructures, the available trees/forests are being cut down at a rapid speed, while the concept of new plantations is overlooked in this ungreen infrastructural growth. Owing to its environmental gravity, the issue of rising temperatures has become multi-disciplinary. Just as the field of environmental sciences has paid significant attention to the matter, the discipline of environmental humanities, specifically the realm of environmental literature, including climate fiction (Cli-Fi), has also taken a substantial interest in addressing this concern. The study picks the select Cli-Fi texts, *The Lorax* (1971) and *The Overstory* (2018) for their bold reflections on the issue and (with the tool of textual analysis) explores the problem of rising temperatures and ungreen infrastructure across them. For building cross-geographical validity, the study cross-checks the gathered fictional claims with relevant scientific published data and the views of (70 voluntarily chosen male or female (18 or older) local respondents including 60 community members and 10 environmental experts to figure out the current degree, the core causes, profound effects, impending consequences, and sustainable remedial measures of the issue. Along with deforestation, a growing population, anthropogenic activities, and GHGs, the findings of the study certify ungreen infrastructure as one of the key stimulants of rising temperatures in the district. The findings of the study urge the concerned stakeholders to initiate strategies and laws that may control deforestation, growing population, and anthropogenic activities, and may supplement new construction projects with the principles of plantation and green infrastructure. In addition to its local and national significance, the study also corresponds to UN Sustainable Development Goals (SDGs) No. 13: Climate Action and 15: Life on Land.

Keywords: Cli-Fi, Ungreen infrastructure, Rising Temperatures, Swat,

1. Introduction

The widespread occurrence of swift urbanization, a global trend that has been prominent since the 20th century, has imposed substantial ecological consequences on our Earth.. This process instigates notable shifts in land use, alterations in landscape patterns, and changes in the structure and functioning of ecosystems. The resultant outcomes encompass the fragmentation of landscapes, a reduction in biodiversity, heightened emissions of greenhouse gases, and a rapid

increase in global warming. Furthermore, when combined with the negative effects of climate change, these transformations adversely affect human well-being, health, and ecological habitats (Pakzad & Osmond, 2016).

In response to these undesirable consequences—especially with increasing temperatures, green infrastructure appears to be more environmentally conscious and economically feasible solution. Enhancing the efficacy and sustainability of urban growth, green infrastructure aims to mitigate the impacts of many of the formerly detailed climate issues (Pitman et al., 2014; Laforteza et al. 2013). At its core, sustainability revolves around the concept of perpetuation over time. One of the most frequently cited definitions of sustainability characterizes it as "Development that fulfills present needs without compromising the ability of future generations to meet their own needs" (WCED 1987). The concept of sustainable development rests upon three pillars – ecological, social, and economic – which collectively create a comprehensive framework. The notion of ecologically sustainable development, as articulated by the Commonwealth of Australia (1992), entails "...the judicious utilization, safeguarding, and augmentation of communal resources to ensure the continuation of ecological processes vital for life, alongside the holistic well-being of current and future generations."

Consequently, within this discourse, the ecological dimension of sustainability centers on the incorporation of natural and biological systems into the domain of urban planning. The primary aim is to foster the long-term health and well-being of both human societies and ecosystems. In the context of Australia, the Australian Institute of Landscape Architects (AILA, 2012) defines green infrastructure as "a connected network of natural landscape assets that provide the foundational support for the economic, socio-cultural, and environmental functionalities of urban and rural regions. This encompasses natural spaces and water systems that intertwine, connect, and provide essential life sustenance to humans and other species within urban settings." In a similar strain, the United States Environmental Protection Agency (USEPA) (2011) underlines human involvement by defining green infrastructure as "a blend of natural or engineered systems designed to emulate natural processes, with the goal of improving overall environmental quality and providing practical services."

Keeping in view its importance and alarming situation, the issue of climate change in general, and increasing temperatures in particular has become multidisciplinary. Like the disciplines of Environmental Sciences, the discipline of Environmental Humanities—more specifically, climate fiction (Cli-Fi) has also taken serious notice of the issue. Cli-Fi reaches into various aspects of climate-related challenges to establish the status, causes, effects, consequences, and remedial strategies of the issue. In addition, Cli-Fi also informs us about the horrible future that looms if the required measures are not taken in time. Like other parts of the country, district Swat is also exposed to the destructive impacts of increasing temperatures and their born consequences. In addition to the growing population, deforestation, anthropogenic activities, GHGs, and an increasing number of automobiles and factories¹ (because of the region's tax-free status), un-green infrastructure appears to be a leading driver of rising temperatures in district Swat. Owing to the gravity of the issue, the current study has been designed to investigate the phenomenon of increasing temperatures in connection with the increasing ungreen infrastructure in district Swat, paying considerable attention to its leading causes. In the same context, Cli-Fi texts such as *The Lorax* (1971) by Dr. Seuss and *The Overstory* (2018) by Richard Powers richly portray the significance of greenery and its constructive impacts on the ecosystem. The work provides a unique and distinctive perspective on environmental issues, particularly green infrastructures. Hence, the select texts will be thematically analyzed to manifest the importance and need of green infrastructure whose literary claims will also be cross-checked and validated with the published factual data and views of the select respondents.

2. Research Objectives

The study investigates and thematically analyzes the issue of increasing temperature in relation to the un-green infrastructure in district Swat through fictional presentations cross-checked and validated with the relevant scientific published data and local respondents' views. It highlights how green infrastructure is significantly important in mitigating the hazards of climate change, especially the devastating impacts of global warming/increasing temperatures. The study explores and manifests the core causes, current position, profound effects, looming

¹ Article 246 and 247 of the 1973 Constitution of Paksitan declare Malakand division (Swat, Shangla, Buner, Dir, Chitral, Malakand, and Kohistan) as a tax-free zone. Retrieved from <https://www.dawn.com/news/1600649>

consequences, and remedial preventive strategies of the issue to save future generations from the hazards of rising temperatures through the remedial strategies of the plantation, green infrastructure, conservation of ecology, and control of the population, GHGS, and anthropogenic activities. The study would educate architectural engineers in the government and private sectors on how to cope with the lethal consequences of rising temperatures through green initiatives in new projects or newly emerging cities. Such initiatives, to a great extent, would pacify the wrath of rising temperatures in Swat and other cities across the country and the world.

3. Methodology

The adopted research methodology for the current study is a blend of both qualitative and quantitative research methods. Apart from exploring the issue in the selected texts, the study cross-validates it with the scientifically published data and local respondents' views. For fictive data, the study relies on the select texts of Cli-Fi. Given the demand of the cross-disciplinary argument, for the scientific data, the study relies on the relevant published flood data from ranked publishers. For the local respondents' views, the study purposefully conducted semi-structured interviews of 70 local volunteer male (N=55) and female (N=15) respondents (age 18 or above) from the seven tehsils of the district Swat (10 from each tehsil). These respondents included sixty community members (48 males and 12 females) such as farmers, orchard farmers, university students, teachers, businessmen, industrialists of tourism, local politicians, etc., and ten environmental experts (07 males and 03 females) either from the University of Swat or other universities but with permanent residency in Swat. Though the study intended to conduct an equal number of male and female interviews, the stringent patriarchal culture of the study proved an obstacle.

The interviews were based on open-ended questions, giving sufficient space for respondents to actively participate in the discussion and express their views, ideas, and experiences regarding the issue. The majority of the interviews were conducted in the major local language, Pashtu which were later, with thematic codes, transcribed and translated into English. In addition, some interviews were taken with the help of local collaborators in other sub-local languages of the district such as Gojru and Kohistani, which were later transcribed and translated with the help of the same local collaborators into English. Before each interview, the

respondents were briefed about the nature of the study and were taken on an agreement for the publishing of these stories for research purposes.

3.1 Need for Narrative-People-centered Approach

The views and suggestions of the respondents and communities are fundamental and to be given considerable attention in decision-making and policy development, especially by those vulnerable to hazards of climate change and its different stressors (Ajani and Geest, 2021; Oakes, 2019). It is important and essential to understand the behaviors and attitudes of the locals for building future resilient communities against climate change (Oakes, 2019). The views and narratives of the respondents bear the potential to give a novel perspective to research studies related to climate change, in comparison to other data forms and research studies. Narratives can be insightful in bringing to light the real situation of the issue, its driving causes, and observed consequences with the weight of personal experiences, beliefs, and perspectives (Ajani and Geest, 2021). The narratives of the local respondents originating from their life experiences related to climate change transcend the disciplinary boundaries and bring the diverse stakeholders into the same circle to foster collaboration (Moezzi et al., 2017). The people-centered approach helps in fostering understanding and specific-context decision-making or policy development because the impacts of climate change vary with changing context, region, landscape, and resource capacity (Ajani and Geest, 2021). In addition, this approach is also beneficial in bringing to light the under-represented people and under-developed countries that are critically vulnerable to the devastating impacts of climate change to present a more holistic picture of the scenario.

3.2 People-Centered Analysis

Table 1. List of 07 study sites; with the respondents' views about the current situation, causes, effects future consequences, and encountering remedial strategies.

Location	Study site/Tehsil	District and Province	Number of Respondents	Rising Temperature: Causes, Effects, Consequences, and Sustainable Remedial Measures

Matta	Matta	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures
Khwazakhela	Khwazakhela	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures
Bahrain	Bahrain	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures
Kabal	Kabal	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures
Charbagh	Charbagh	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures

Mingora	Mingora	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures
Barkot	Barkot	Swat, KP	10	Causes: Effects: Consequences: Sustainable Remedial Measures

4. Literary, Scientific and People-Centered Analysis

The nature of the current analysis is three-dimensional. First, the study explores the manifestation of climate change in general and the significance of greenery for a balanced ecosystem in particular, in the selected texts. Second, it verifies the claims made in these fictional works by comparing them with credible scientific data. Third, it aligns the fictional and scientific assertions with the perspectives of local respondents to ascertain the actual factors, effects, repercussions, and potential solutions for mitigating increasing temperatures through green initiatives and tree planting efforts, especially in the Swat district and on a global scale.

4.1. Literary Analysis of *The Overstory* and *The Lorax*

Like other branches of human knowledge, literature, particularly Cli-Fi, also reflects on the disastrous impacts of climate change and its stimulants, causes, effects, lethal consequences, and probable remedial strategies. In the same context, the present study selects two CLI-Fi works: *The Overstory* and *The Lorax*, for their generous depictions of green infrastructure and plantations.

The Overstory effectively portrays the relationship between human beings and nature specifically trees. The literary piece critically emphasizes the significance of forests and their undeniable role in supporting the intricate web of life. There are nine characters in the novel who do not know each other, but they are related to each other in their love for nature. All the characters belong to different fields of life but it does not bring them peace and tranquility without being in association with nature and trees. The literary work implies a deep relationship between human beings and nature, and if this relationship is accepted especially by human, it will bring about peace and humanity in the world and discourage the abuse of nature. As Powers states, "He feels he is casting rocks at a sentient being, with a duller sense than his own, yet still a blood relation. Old trees are our parents and our parents' parents. If you would learn the secrets of Nature, you must practice more humanity...." (Powers, 2018, p. 5). So, the deep analysis of these characters and their relationship with nature and trees prompts the readers to seriously reflect on the importance and need for green infrastructure.

Moreover, the novel at various points personifies nature and specifically green trees with the power to give birth and nurture. They shield human beings and other species against natural hazards like food and water scarcity, floods, pollution, and unbearable global warming. But human beings are ignorant of the facts and cause damage to them. When Hoel's father dies, he buries him under the same tree which he planted, the tree protects him from heavy rains and shelters him from the savageness of nature even after his death. Hence greenery and plants in our environment need to be protected; in fact, their protection stands for protecting ourselves.

Likewise, *The Lorax* commendably portrays the theme of the environment, greenery, and trees. The literary work narrates the story of a boy who lives in a polluted town and is keenly interested in knowing what happened to Lorax. Lorax was a man deeply in love with nature, greenery, and trees. There lived a businessman (Once-ler) in the same town who chops-down all the Truffula trees to flourish his business, destroying the habitat of many animal species and leaving the air and water polluted in the region. Lorax, being in love with trees, advocates for them but in vain and eventually gets disappointed and leaves the town. In the absence of Truffula trees, the pollutants emitted from Once-ler's factory destroy the environment of the town, degrading the quality of air and water and causing considerable changes in the landscape. In The

Lorax, forests, and plants are presented as major sources of conservation, shelter, food, and purified water.

5. Contributors to Ungreen Infrastructure and Rising Temperature in District Swat

Currently, in the era of drastically changing climate, there is a dire need for green infrastructure to mitigate the destructive effects of global warming/increasing temperature. A variety of factors act as major contributors to ungreen infrastructure, such as the growth of the population, the lack of plain areas, the tumultuous growth of tourism, and the tax-free status of the region, which, in return, exacerbates the rising temperature in the district.

5.1 Growing Population

Swat, an administrative district of KP, covers a total area of 5337 Km² with a population of 2.3 million which comprises almost 50.8% males and 49.2% females. The region has experienced nearly 46% population growth in the last 19 years (KP-BOIT). With the increasing population, the need for food, shelter, infrastructure, and other necessities of life also increases. As a result, both forests and plain land are being ruthlessly used for agriculture and rapidly growing ungreen infrastructure in the district (Rahman & Khan, 2013). To meet the emerging needs of infrastructure, new houses, and housing societies are being built across the district, with zero green initiatives.

Residents in the area have confirmed that the district has been undergoing a rapid surge in infrastructure development, virtually in every part of the region. They assert that new constructions have profoundly altered the district's landscape and ecological balance. They have observed infrastructure projects in locations that were previously unimaginable. Consequently, they perceive this rapid expansion of non-environmentally friendly infrastructure as a primary driver of the rising temperatures in the district.

5.2 Lack of Plain Area

The Swat valley lies in the Hindukush mountainous range, covered by high mountains while sharing a border with Chitral, Gilgit, and Dir. The mountainous ranges and peak elevations vary from 4500 to 6,000 meters above sea level (Bazinni, 2013; Bacha et al., 2018). The valley is also

covered by snow glaciers, meadows, and forests (PPAF, 2013). A greater number of mountains, glaciers, and peaks means a shortage of plain area. Thus, to meet the growing needs of population and infrastructure, forests are brutally cut down in the district. There are several cases as evidence where forest and green cover areas have been replaced with build-up areas and anthropogenic interventions. (Rahman & Khan, 2013). This rapid deforestation is a major cause behind the increasing temperature of the region.

The majority of the community members agree with the research studies and literary claims. They expressed their deep concerns about rapidly depleting forests in the district. The trees are being ruthlessly cut down for the supply of wood, agriculture, or construction purposes. The rapid construction is not only affecting the plain areas, but it is also taking a severe toll on the meager volume of forests. They believe all these activities are affecting the beauty and ecology of the district, which was once known as the Switzerland of the East.

5.3 The Tumultuous Growth of Tourism

Swat Valley, with its lush greenery, mesmerizing landscape, and beautiful natural scenery is considered the pearl of the Northern areas of Pakistan. The valley has the potential to attract both national and international tourists. Tourism, along with other sources like agriculture, dairy, fishing, and vegetation has been a major source of economic activity for the district (Rahman & Khan, 2011). The valley specifically for its scenic beauty has been one of the most renowned attraction sites and is often referred to as the Switzerland of the East. This title was conferred upon the district (at that time the princely State of Swat [1916-1969]) by Queen Elizabeth II (1926-2022) during her visit to Swat in 1961. (Ali & Khan 1991; Sultan-i-Rome, 2005). For the expansion and booming industry, insane infrastructure is taking place both on the high and low lands of the district as well as the prohibited river banks. These active human encroachments are taking a serious toll on the ailing health of the ecology of the district (Rahman & Khan, 2013).

On the one hand, the local respondents appreciated the steps taken to promote tourism in the district. On the other hand, they severely condemn rapid deforestation and haphazard ungreen infrastructure. According to them, the encroachment on river banks and meadows and its lethal impacts on the environment of the region have squashed the region into the mouth of climate hazards, such as heavy rains, flash floods, and rising temperatures. They requested the concerned

authorities devise nature-friendly laws and strategies, that may promote tourism without damaging the local ecology and climate in the district.

5.4 The Tax-Free Zone

Swat as a princely state came into being in 1916. In 1947, Great Britain gave independence to Pakistan and India and left the princely states at the mercy of their princely rulers and the new governments of India and Pakistan. Some states instantly joined either India or Pakistan while some continued floating with their independent status. Swat like the other princely states in the region such as Dir, Chitral, etc. continued with its independence until its merger with Pakistan in 1969 (Sultan-i-Room, 2008). The agreement between the rulers of Swat State and Pakistan declared Swat a tax-free zone for 100 years (Articles 246 and 247 of the 1973 Constitution of Pakistan). Owing to its tax-free status, the district has attracted plenty of businesses and factories. The district also allows its locals to possess non-custom paid vehicles. These reasons gave birth to the massive establishment of industries and a huge increase in the number of vehicles. The impacts of these elements are seriously affecting the health of the climate in the district.

At this point, the locals are both disappointed and content. They believe their job opportunities have been usurped by the non-locals, whose businesses affect both the natural and social climate of the district. In the case of non-custom-paid vehicles, they are happy because they are affordable. At the same time, they are conscious of the air and noise pollution that they cause. In sum, they offered mixed responses, but their growing concern hinged on the rising temperature.

6. Conclusion

The study's conclusions, derived from the literary declarations and validated through thorough cross-referencing with relevant scientific data and local input, indicate that, in addition to extensive reforestation efforts, population control measures, and restriction of unlawful human activities, the implementation of green infrastructure is an urgent imperative for mitigating the adverse consequences of escalating temperatures, especially in Swat district and, more broadly, across the entire nation and the world. The threefold analysis underlines the escalating

population, the scarcity of flat territory, the rapid expansion of tourism, and the region's tax-free status as key factors contributing to the absence of eco-friendly infrastructure and the rise in temperatures within the district. The study prompts both local and national stakeholders to pay considerable attention to the core causes of ungreen infrastructure and rising temperatures to save the district from the looming climatic calamity. The findings of the study also urge for the initiation of mass-level remedial strategies like awareness campaigns, green infrastructure, plantation drives, and control of illegal constructions and anthropogenic activities to save the district in particular and the whole country and world in general from irreversible climatic losses. This trans-disciplinary study has the potential to generalize its findings to other climatically vulnerable regions of the world.

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