

Poor Land Management and its Impacts on Climate Change

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ABSTRACT

The poor land management practices exacerbate climate change. The study elucidates the intricate relationships between deforestation, soil degradation, and their repercussions on climate patterns. The findings underscore the critical need for integrated land-use policies, afforestation initiatives, sustainable agricultural practices, community empowerment, and policy reforms to mitigate these adverse effects and foster a more resilient environment. The importance of land management in addressing climate change and mitigating its effects, which is the primary source of livelihood in developing countries. In this paper, we explore the basic concepts and principles of sustainable land management to combat climate change. A major focus is to provide an overview of the most important problems that the world faces with land-related, environmental, and climate change issues. However, the poor management of land is a silent crisis that permeates multiple aspects of our lives. This article sheds light on the critical importance of responsible land management and the far-reaching consequences of neglecting this vital resource. To ensure the success of this study, a variety of sources were used. These included books, journals, and special reports (UNFCCC, FAO, IPCC, IFG, and Land Portal special reports on sustainable land management and climate change). We used research-related tools like Arc GIS and QGIS to determine which land is most vulnerable and to find solutions for managing it and changing it into sustainable land.

Keywords: Sustainable, Land, Management, Land Degradation, Desertification

INTRODUCTION

One of the most significant global issues today is climate change. Climate change affects all countries in the world, resulting in severe droughts, water shortages, climate migration, food shortages, local, national, regional, and global conflicts, disrupting food availability, reducing access to food, and effect food quality. Desertification, land degradation, and drought affect more than 2 billion people, and the situation might worsen due to the unsustainable use of soil and water under the present scenarios of climate change. 2.6 billion people depend directly on agriculture, and 52% of the land used for agriculture is moderately or severely affected by soil degradation. It is estimated that, about every year, 75 billion tons of soil material are lost worldwide because of land degradation. 2–6 million hectares of cultivated land are lost annually due to anthropogenic soil degradation. (UNCCD, 2017)

Poor land management practices play a significant role in exacerbating climate change. The environment and its capacity to slow down climate change are directly impacted by the way we utilize and manage the land resources on Earth. Inadequate land management can lead to deforestation, soil degradation, desertification, wetland drainage, and the creation of urban heat islands, all of which contribute to global warming and other negative climate-related effects. In the world, 41% of the Earth's surface area is drylands, 2.6 billion people are affected by desertification, population growth was 18.5% in dryland areas in the 1990s, the GDP in dryland areas is 50% lower than in non-dryland areas, the reduction of global yields due to soil degradation and water scarcity is 16%, the potential yield increase through sustainable practices is 30%–170%, and the estimated loss of income due to desertification and degradation (US\$ billion per year) is in rainfed areas (8.2), irrigated areas (10.8), and rangeland (Safriel, 2009).

Maintaining ecosystem functioning and services is a prerequisite for SLM. SLM harbors great potential for the preservation and enhancement of ecosystem services in all land use systems. Degradation of water, soil, and vegetation, as well as gas emissions contributing to climate change, can be limited by SLM practices that simultaneously conserve natural resources and increase yields. The ecosystem services provided through SLM include three different types, namely provisioning services, regulating and supporting services, and cultural/social services.

The land is a critical resource. It is under pressure from human activities and climate change, but it is also part of the solution. According to the IPCC, keeping global warming below 2°C can be possible only by reducing greenhouse gas emissions from all sectors, including land and food. The way we use land impacts climate change, and in turn, climate change deeply affects our land. (IPCC, 2020)

Research Objectives

The main objective of this research is to reiterate the significance of sustainable land management (SLM), which will enable the maintenance farmer to intensify productivity and production by making sustainable use of the available land resources.

In rural areas, bringing more land into productive use will improve land management and may contribute to conflict mitigation. Also, investigate the effects of poor land management on climate change, and their solutions.

In this article, we explore how poor land management practices are quietly exacerbating climate change and threatening the future of our planet, it is a main problem, and for this problem how to reduce and mitigate this problem is our goal.

Research Questions

How does poor land management contribute to climate change, specifically examining the roles of deforestation, soil degradation, and unsustainable agricultural practices?

what measures can be implemented to mitigate these impacts and promote sustainable land use?

How can effective land management strategies be implemented to mitigate the adverse impacts of poor land management on climate change?

LITERATURE REVIEW

Precise national statistics of the prevalence of land conflicts since the fall of the Islamic Emirate of Afghanistan are unavailable, but studies on the topic over the last 10 years indicate that land relations are insecure, that a significant proportion of conflicts are land-related, that demand for dispute-resolution mechanisms for land is increasing, and that complex and intractable conflicts, many violent, are on the rise in provinces such as Khost and Kunduz (Oxfam, 2008; Warren, 2014).

Other research has indicated that most land conflicts are related to boundary disputes, inheritance rights, access to land and natural resources, illegal occupation of land, and water disputes. Conflicts may be violent or nonviolent, short- or long-term, and be at varying geographical scales, from plot to provincial levels. Finally, this diversity of land conflicts has been further exacerbated by externally driven illegality for natural resources, as with mining, timber, and poppy, and global events such as war, international trade, and climate (Roe and Deschamps 2009; Brown and Blankenship 2013; Finaz 2015; UNEP 2012).

Land disputes have long driven violent conflict in Afghanistan. Widespread poverty and a scarcity of productive land generate intense competition among communities, ethnicities, and tribes for land and resources. Disputes over access to land and water are a major source of inter-communal and intra-communal conflict and can have violent ramifications. (Wily, L. A., 2013) In an Oxfam International security survey of five hundred respondents in 2008, however, half of those interviewed said that land was a major cause of insecurity. Studies of dispute resolution mechanisms in particular provinces have tended to find that between 50 and 70 percent of disputes involve land and property (Wily, L. A., 2013).

MATERIALS AND METHODS

To guarantee the success of this study, numerous sources have been consulted, including books, journals, and special reports (UNFCCC, FAO, IPCC, IFG, Land Portal special reports on sustainable land management and climate change). To determine which land is most vulnerable, and to find solutions for managing land and changing it into sustainable land, we will use high-resolution satellite Images, Geographic Information System (GIS) and Quantum Geographical Information System (QGIS) tools, statistical analyses, interviews, and surveys will be conducted.

The article attempted to summarize the basic principles of sustainable land management (SLM), climate change mitigation, reducing land conflicts, the major causes of land degradation, which is a challenge to the future of the common planet, and climate change. The review also compared the different views and issues that need to be considered for the sustained management of land resources.

The main causes of poor land management

In the last 50 years, Afghanistan has witnessed various changes and wars that have destroyed various systems, and there has been no political, and economic stability in Afghanistan. The main causes of poor land management are:

- These changes, caused by frequent wars and the collapse of governments, had a profound effect on land management.
- Another factor that caused poor management of land, conflicts of land, and degradation of land was the lack of attention by the authorities to this sector. Only during the time of the first president of Afghanistan, Mohammad Dawood Khan was 33% of the land of Afghanistan surveyed, and now this survey is used as a basis in the Cadaster departments for land information and solving disputes. (Colleins, 2013)
- Land disputes are a primary driver of conflict in Afghanistan. It can take the form of non-violent inheritance disputes among siblings, or it can be a long-standing provincial-level violent conflict between tribal groups. (Vigier, 2009)

We processed the Landsat data from 1990 up to 2022 for Kandahar City, to show the situation of land change. It shows a huge difference between agriculture, green, water, mountain, and residential areas. Agriculture and green areas decreased from 23.59% to 21.47%; therefore, the residential area increased from 19.91% to 45.52%.

Table 1. shows the growth of agricultural and green lands

| The growth of agricultural and green lands | | |
|--|-------|------------|
| Number | Years | Percentage |
| 1 | 1990 | 23.59% |
| 2 | 2000 | 25.63% |
| 3 | 2010 | 27.03% |
| 4 | 2022 | 21.47% |

Table 2. Shows the growth of residential land

| The growth of residential land | | |
|--------------------------------|-------|------------|
| Number | Years | Percentage |
| 1 | 1990 | 19.91% |
| 2 | 2000 | 24.90% |
| 3 | 2010 | 34.25% |
| 4 | 2022 | 45.52% |

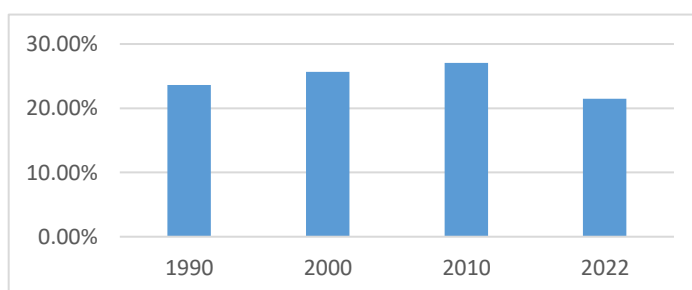


Chart 1. Shows the growth of agricultural and green lands

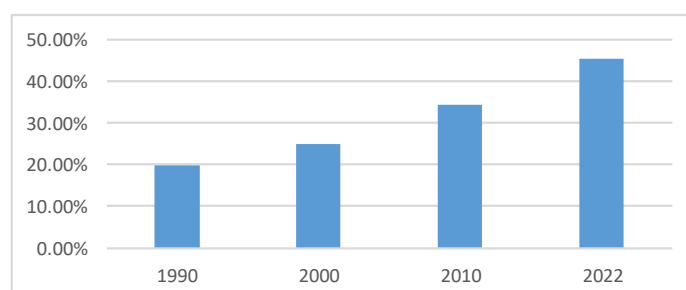


Chart 2. Shows the growth of residential land

- The expansion of residential areas and the concurrent reduction of agricultural and green lands is a growing global phenomenon with profound implications for climate change. As more people migrate to cities, demand for housing and infrastructure increases, often at the expense of fertile farmlands. More people around the world are moving to cities in search of better opportunities, and as a result, urban areas are expanding rapidly. The expansion of residential areas often involves converting agricultural and green lands into residential lands.
- Another problem is a lack of documentation. In the 1960s and 1970s, the Afghan state tried to formalize land ownership, but the effort was limited and primarily urban. Most of the documentation created has since been destroyed, lost, or deliberately falsified. No more than 20 percent of land in Afghanistan is accurately titled. As it reduces access to land and damages the livelihoods of small producers, landless rural populations, and the urban poor, it can increase poverty and hunger. The higher property values, together with a weak land administration system, general insecurity, and corruption, have created an enabling environment for widespread land grabbing by powerful government officials and their affiliates. (Gosten, 2015)

- Also, other factors that have weakened land management include the weakness of the subordinate departments, a lack of professional cadres, a lack of attention to the consequences of poor land management, the lack of corresponding laws to ensure proper implementation, land mines and unexploded ordnance, a land-use plan, resource scarcity, no provisions for public monitoring, customary law, the lack of public awareness, and other factors.

CLIMATE CHANGE AND LAND RELATIONSHIPS

The 17 Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. Land plays an important part in achieving many of these SDGs. Healthy and productive land plays a vital role as an engine of economic growth and a source of livelihood for billions of people worldwide, including the most vulnerable. (UN, 2015)

Land represents the primary basis for human livelihoods and well-being, supplying food, fresh water, and multiple other elements, as well as being the cradle of biodiversity. Afghanistan, like many other regions, is experiencing the impacts of climate change, and land-related issues play a significant role in these changes. (Koochafkan, (2011), The link between land use and climate is complex. First, land cover, as shaped by land use practices, affects the global concentration of greenhouse gases. Second, while land use change is an important driver of climate change, a changing climate can lead to changes in land use and land cover. For example, farmers might shift from their customary crops to crops that will have higher economic returns under changing climatic conditions.

A variety of factors contribute to the impacts of climate change on the land:

- **Desertification:** This phenomenon threatens food security and exacerbates poverty in the affected regions. 2.6 billion people (44%) are affected by desertification.
- **Land Degradation:** Land degradation, including soil erosion and loss of fertile land, impacts the country's ability to grow crops and support livestock.
- **Deforestation:** Clearing land for agriculture or development releases stored carbon in trees and soil, contributing to higher atmospheric CO₂ levels.
- **Sea-Level Rise:** Rising global temperatures cause the polar ice caps to melt and result in sea-level rise. This submerges coastal land, displaces communities, and impacts their livelihoods.
- **Urbanization:** Expanding cities and infrastructure can lead to the removal of natural vegetation and the creation of heat islands, which can increase local temperatures.
- **Vulnerable Communities:** Many rural communities in Afghanistan are particularly vulnerable to the impacts of climate change, as they often rely on rain-fed agriculture and have limited resources to adapt to changing conditions.
- **Impacts on Agriculture:** Agriculture is a significant part of Afghanistan's economy, and climate change affects crop yields, food security, and livelihoods.

RESULTS

The research underscores the importance of addressing land health as a key component in climate change mitigation strategies. Quantitative analyses using satellite imagery and GIS mapping provide a spatial understanding of land-use changes. The study also explores the socioeconomic dimensions of poor land management, emphasizing its disproportionate impact on vulnerable communities. Findings indicate that marginalized populations often bear the brunt of environmental degradation, highlighting the need for equitable and socially just solutions.

Moreover, the research evaluates the effectiveness of existing land management policies and identifies gaps that hinder sustainable practices. Policy recommendations are drawn from the results, emphasizing the importance of stringent regulations against deforestation, the promotion of SLM, and the implementation of incentives for afforestation efforts.

Overall, the research results provide a comprehensive understanding of the intricate relationship between PLM and climate change, offering valuable insights for policymakers, land managers, and communities to implement informed strategies for a more sustainable future.

The research outcomes also emphasize the effectiveness of certain mitigation strategies. Afforestation initiatives exhibit promise in offsetting deforestation impacts and contributing to carbon sequestration.

DISCUSSION

The research findings underscore poor land management's significant and multifaceted impact on climate change. Deforestation emerges as a primary contributor, leading to increased greenhouse gas emissions and biodiversity loss. Soil degradation, another consequence of poor land management, amplifies the vulnerability of ecosystems and exacerbates climate-related challenges.

The discussion also delves into the interconnected nature of these issues, emphasizing the need for holistic approaches. Integrated land-use planning emerges as a crucial strategy, as it addresses the complex relationships between urbanization, agriculture, and natural ecosystems.

Community engagement proves vital in this context; as local stakeholders play a pivotal role in implementing sustainable land management practices. Educational initiatives become essential to foster a collective understanding of the challenges and solutions. Additionally, technology adoption, such as satellite monitoring and precision farming, emerges as a promising avenue to enhance land management efficiency and inform evidence-based decision-making.

The discussion concludes by stressing the dynamic nature of the research area, advocating for ongoing monitoring and adaptation of strategies based on emerging scientific insights and evolving environmental conditions. In essence, the research underscores the urgency of addressing poor land management practices to mitigate their adverse impact on climate change and build a more sustainable future.

CONCLUSION

In conclusion, the research discussions indicate that land stakeholders must address poor land management practices as soon as possible so that climate change can be mitigated as quickly as possible. The key to achieving sustainable land management (SLM) and a resilient future lies in the implementation of a holistic approach that combines scientific insight, technological advancements, policy reforms, as well as community engagement, to achieve a holistic approach that helps achieve sustainable land management, to mitigate climate change, and a resilient future.

RECOMMENDATIONS

- **Implement Sustainable Land-Use Policies:** Advocate for and implement policies that promote sustainable land management practices, emphasizing reforestation, soil conservation, and eco-friendly agriculture.
- **Research and Monitoring:** Support ongoing research to continually assess the relationship between land management practices and climate change. Regular monitoring and data collection will provide valuable insights for adapting strategies over time.
- **Technology Integration:** Investigate the integration of advanced technologies (such as remote sensing, machine learning, and precision agriculture) to monitor land use, predict changes, and guide adaptive management practices.
- **Community Engagement and Education:** Foster community awareness and participation in sustainable land management. Educational programs can empower local communities to make informed decisions regarding land use and conservation.
- **International collaboration** is deemed necessary to address global land management challenges, recognizing the interconnectedness of ecosystems across borders.

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