THE BILLION TREE PLANTATION DRIVE: A STEP TOWARDS BUILDING A CLIMATE-RESILIENT GREEN ECONOMY IN PAKISTAN.

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Abstract

The global economy and the ecology are in danger from climate change. Countries like Pakistan which are still developing and so more susceptible to its effects, need to find creative ways to adapt to and lessen its effects. This study looks at how the Billion Tree Plantation Drive and other forestry programs may help Pakistan create a green economy that can withstand the effects of climate change. This document summarises the project, the methods used to accomplish it, the parties involved, and the results regarding climate resilience. The potential role of forestry in climate change mitigation and adaptation and the connections between climate change, forestry, and the green economy are explored. The study also highlights policy implications and suggestions and examines the difficulties and possibilities given by the Billion Tree Plantation Drive. Research finds that the Billion Tree Plantation Drive may serve as a model for combining actions to adapt to and mitigate the effects of climate change with those that promote long-term economic growth. It stresses the need to expand and duplicate such efforts, increase community participation, bolster institutional capabilities, and safeguard the survival of newly planted trees. Results from the study support the idea that sustainable forestry practices, such as the Billion Tree Plantation Drive, are essential to halting climate change and attaining sustainable development.

Keywords: Billion Tree Plantation Drive, Climate Change, Green Economy, Climate Resilience, Forestry Initiatives, Sustainable Development, Carbon Sequestration, Community Engagement, Policy Implications, Pakistan, Climate Policy, Nature-based Solutions, Afforestation, Land Use Policies, Economic Development.

1. INTRODUCTION

Pakistan is especially susceptible to climate change because it relies on agriculture. Climate change is glaciers (Khan, 2022). Pakistan has launched several projects, including the noteworthy "Billion Tree Plantation Drive" in Khyber Pakhtunkhwa, in response to the urgent need to create long-term plans for dealing with the effects of climate change.

The government of Khyber Pakhtunkhwa initiated the Billion Tree Plantation Drive, popularly known as the "Billion Tree Tsunami," in 2014 to address the environmental and economic threats brought on by climate change (Ahmed et al., 2021). To combat climate change and restore the province's devastated woods, a billion trees will be planted over five years as part of this gigantic effort (Ali & Khan, 2023).

With these green efforts, there has been a growing worldwide agreement on the need to move toward a "green economy," defined here as one that boosts human flourishing and social fairness while drastically cutting down on ecological dangers and scarcities (UNEP, 2011). Sustainable development in all areas of life, not just the natural world, is at the heart of what economists call a "green economy" (OECD, 2011). Sustainable development and climate change mitigation are mutually reinforcing goals. Greening the economy, especially via forestry projects, as shown in Fig. 1, may be an effective approach for nations like Pakistan.

Fig. 1 Pakistan's Agenda at COP26 Climate Conference in Glasgow PAKISTAN UPDATED NDCs 2021



This article aims to investigate the Billion Tree Plantation Drive's contribution to Pakistan's efforts to create a green economy that can withstand the effects of climate change. It investigates how this afforestation project affects climate resilience and how it might help advance a green economy.

1.1 Climate Change Impacts in Pakistan

Pakistan, which is in South Asia, has been hit hard by the effects of climate change in recent decades. Because of its location, the nation is vulnerable to a wide range of climate-related problems already wreaking havoc on the environment and the economy (Khan, 2022).

The rise in average temperatures is one of Pakistan's most noticeable effects of climate change. According to the Pakistan Meteorological Department's report from 2022, the country's average annual temperature has risen by around 0.5° C during the previous century. Heatwaves, especially in the south, are becoming more common due to this temperature increase, which has been linked to increased heat-related fatalities and diseases (PMD, 2022).

Increases in the frequency and severity of severe weather events like floods and droughts are also a problem for Pakistan (IPCC, 2021). In recent years, flooding has been a major source of death and

destruction in Pakistan, particularly in the Khyber Pakhtunkhwa and the Punjab area (NDMA, 2021). However, Sindh and Balochistan, two dry and semi-arid provinces, have seen an increase in drought, negatively affecting agriculture, the country's primary economic sector (FAO, 2022).

The melting of glaciers in the Himalayas and Karakoram Mountains, which are important freshwater reservoirs for the nation, is another severe consequence of climate change in Pakistan (Hewitt, 2022). Glacier lakes are forming at an alarming pace due to accelerated glacial melt, posing a hazard of glacial lake outburst floods (GLOFs) and the destruction of downstream communities and economies. Coastal erosion, saltwater intrusion, and damages to coastal infrastructure are all consequences of the higher sea levels caused by global warming in Pakistan (UNDP, 2023). Karachi, one of the world's biggest cities, is a major economic centre for Pakistan because of its location on the Arabian Sea; this is a serious issue for the city.

Pakistan, a nation that relies heavily on climate-sensitive industries like agriculture and water resources, has significant problems due to the varying effects of climate change. To combat climate change and create a green economy that can withstand its effects, initiatives like the Billion Tree Plantation Drive have sprung up.

1.2 Introduction to the Concept of a Green Economy

That which "improves human well-being and social fairness while considerably lowering environmental dangers and ecological scarcities" is what the United Nations Environment Programme (UNEP) calls a "green economy" (UNEP, 2011). A green economy is a sustainable economic system that places equal importance on economic development, environmental protection, and social justice.

The basic objective of a green economy is to strike a balance between economic growth and the preservation of natural systems and resources, guaranteeing future generations both material and ecological security (OECD, 2011). Achieving this equilibrium requires rethinking and refocusing on economic, social, and environmental goals.

Carbon emissions are reduced, resource use is optimised, and social benefits in a green economy. Its goals include lowering pollution levels, conserving energy, preserving natural habitats, and keeping ecosystem services from deteriorating (UNEP, 2011). Public and private investments in a green economy fuel economic development and job creation by lowering pollution and carbon emissions, improving energy efficiency, and stopping the loss of biodiversity and ecosystem services.

Clean energy, sustainable agriculture, water management, and green building are all important parts of the transition to a green economy. The sustainable management of natural resources is also an integral part of this, which is why campaigns like Pakistan's Billion Tree Plantation Drive are so important. Improving carbon sequestration, safeguarding and restoring biodiversity, and creating green employment and livelihoods may substantially contribute to the shift towards a green economy. Significant contributions to climate change mitigation and adaptation may be made by implementing green economic policies, such as those that encourage the efficient use of resources, reduce greenhouse gas emissions, and strengthen ecological resilience (Bowen & Hepburn, 2014). Therefore, moving toward a green economy is not only a good idea from a financial standpoint but also a moral and ecological one.

1.3 The Billion Tree Plantation Drive: An Overview and Objectives

Khyber Pakhtunkhwa, a province in Pakistan, started a historic project in 2014 called the Billion Tree Plantation Drive, popularly known as the "Billion Tree Tsunami." Initiated as part of the province's Green Growth Initiative, this massive afforestation initiative aims to address critical environmental issues and aid in the fight against climate change (Ahmed et al., 2021).

Over five years, one billion trees were to be planted as part of the Billion Tree Plantation Drive. The project's stated goal was to alleviate the effects of deforestation brought on by the wood mafia, agricultural land expansion, and human population growth in the province (Ali & Khan, 2023). The initiative had several key objectives:

1. *Combat Climate Change:* The program sought to increase carbon sequestration by expanding forest cover, which would lower atmospheric concentrations of greenhouse gases and aid international efforts to slow global warming (UNFCCC, 2022).

- 2. *Promote Biodiversity*: The project's goal was to increase the resilience of current ecosystems and restore and maintain local biodiversity by providing new habitats for various species (WWF, 2023).
- 3. *Improve Livelihoods:* The project aims to enhance local lives by creating green employment. Creating jobs in tree planting and maintenance for locals, particularly young people and women, helped boost the economy in those areas (ILO, 2022).
- 4. *Control Soil Erosion and Flooding:* Significant environmental concerns in the area include soil erosion and flood damage, which the project might reduce by increasing plant cover (NDMA, 2021).
- 5. *Raise Environmental Awareness:* Another initiative goal was to encourage people all over to plant trees and become more conscious of their environmental impact (Ali & Khan, 2023).

Thus, the Billion Tree Plantation Drive is a major indicator of Pakistan's progress in reversing environmental degradation, adjusting to climate change, and establishing a green economy.

Fig.2 Ten Billion Trees project to boost untapped apiculture, generate 87,000 jobs.



(Claimed by Ministry of Climate Change and Environmental Coordination)

The "Ten Billion Tree Tsunami Programme, Phase-I" is a four-year (2019-2023) project with a total cost of 125.1843 billion that the Government of Pakistan is undertaking. The Ministry of Climate Change and the provincial and territorial Forest and Wildlife departments are carrying out the project throughout Pakistan. On September 2, 2018—"Plant for Pakistan Day"—the Prime Minister of Pakistan officially launched this program.

2. The Role of the Green Economy in Addressing Climate Change

There are many facets and connections between climate change and a green economy. Anthropogenic activities such as burning fossil fuels and destroying forests contribute to climate change, threatening our planet's health and the stability of our economy (IPCC, 2021). However, a green economy represents a paradigm shift toward sustainable economic practices that may reduce climate change's negative effects while boosting the economy and promoting social justice (UNEP, 2011).

It is essential to a sustainable economy to prevent global warming and adjust to its effects. Reducing emissions from energy production and consumption is the most important part of mitigation, but increasing carbon sinks via reforestation and afforestation is also important (Bowen & Hepburn, 2014). Strengthening the ability of people, ecosystems, and economies to withstand the effects of current and future climate change is an example of adaptation (IPCC, 2021).

Both of these may benefit greatly from a green economic model. A green economy may significantly lower GHG emissions by adopting renewable energy sources, improving energy and resource efficiency, advocating for sustainable land use and waste management practices, and investing in green infrastructure (OECD, 2011). Furthermore, a green economy may encourage adaptation to climate change by supporting the sustainable use of natural resources, improving ecosystem services, and constructing climate-resilient infrastructure and communities (UNEP, 2011).

Pakistan's Billion Tree Plantation Drive shows synergies between climate change prevention, adaptation, and a green economy. The effort helps reduce greenhouse gas emissions by increasing carbon sequestration, and it helps adapt to the effects of climate change by restoring and safeguarding ecosystems (Ahmed et al., 2021). Furthermore, the initiative helps the social aspect of a green economy by creating green employment and improving lives (Ali & Khan, 2023).

Adapting to the growing effects of climate change makes the shift to a green economy not only a recommendation but also a need for long-term prosperity. It provides a means to combat climate change even as it promotes economic development and social fairness, helping to realise the SDGs (SDGs). Building a green economy that can withstand climate change makes programs like the Billion Tree Plantation Drive crucial.

2.1 The Costs of Climate Change to the Economy

Climate change has far-reaching economic repercussions, impacting several industries and substantially threatening economic stability and growth. Without significant and persistent mitigation measures, climate change will have severe, widespread, and permanent repercussions on socioeconomic systems, as emphasised by the Intergovernmental Panel on Climate Change (IPCC) (IPCC, 2021).

- 1. *Agriculture and Food Security*: Pakistan, like many other countries, relies heavily on agriculture, yet this industry is particularly vulnerable to climatic shifts and fluctuations. Food security and rural livelihoods are threatened by rising temperatures, shifting precipitation patterns, and increasingly frequent severe weather events like droughts and floods (FAO, 2022).
- 2. *Water Resources:* Agriculture, hydropower, and even human health might be negatively impacted by shifts in precipitation patterns and the melting of glaciers caused by global warming. These shifts may spark water wars, especially in areas where water shortage is a major problem (World Bank, 2022).
- 3. *Infrastructure and Built Environment:* Significant damage to infrastructure, such as roads, buildings, and power plants, may be caused by extreme weather events, rising sea levels, and changing temperatures. When this infrastructure needs fixing or replacement, it may seriously dent national budgets (Hallegatte et al., 2019).
- 4. *Health:* Heat stress, poor air quality, and the proliferation of vector-borne illnesses like malaria and dengue fever are just a few examples of how climate change may negatively impact human health. These health effects may have a chilling effect on the economy by increasing healthcare expenses and decreasing productivity (WHO, 2023).
- 5. **Biodiversity and Ecosystem Services:** Many economic sectors depend on ecosystem services. Thus their loss might have serious repercussions if biodiversity is reduced due to climate change. Pollination and pest control are essential to agriculture, while fisheries and tourists rely on thriving marine ecosystems (TEEB, 2022).

Climate change will have monetary effects; thus, it is important to include measures for mitigating and adapting to that change when drawing up economic plans and policies. There is great potential for programs like the Billion Tree Plantation Drive to aid in this transition since they help with climate change prevention and adaptation.

2.2 The Importance of the Green Economy in Countering and Adapting to Climate Change Discussion

There is a growing consensus that transitioning to ecologically sustainable, socially fair, and commercially successful economic practices—what is known as a "green economy"—is a crucial step in mitigating the most severe consequences of climate change (UNEP, 2011). With the ability to drive short- and long-term reforms in many sectors, a green economy plays a varied role in climate change mitigation and adaptation.

2.2.1 Mitigation:

1. Transition to Renewable Energy: Fossil fuels are reduced, and alternative energy sources like solar, wind, and hydropower are promoted in a green economy. As a result of this shift,

greenhouse gas emissions will decrease, and the negative consequences of climate change will be mitigated (IEA, 2021).

- 2. Improving Energy and Resource Efficiency: For an economy to be considered "green," energy and material consumption across all sectors—from manufacturing to transportation to the home—must be minimised. Energy consumption and related emissions may be reduced using cutting-edge green technology and practices (OECD, 2011).
- 3. Sustainable Land Use and Forest Management: Carbon sequestration, reduced deforestation, and ecosystem protection are all aided by implementing sustainable land use techniques like afforestation and reforestation initiatives like the Billion Tree Plantation Drive (Ahmed et al., 2021).
- 4. **Promoting Sustainable Agriculture:** The adoption of sustainable farming methods is encouraged by a green economy since they lessen the effects of climate change on food production and the environment (FAO, 2022).

2.2.2 Adaptation:

- 1. Enhancing Ecosystem Services and Biodiversity: Protecting and restoring ecosystems and biodiversity are prioritised in a green economy. Adaptation to climate change is aided by the essential services provided by thriving ecosystems, such as water control, soil conservation, and reduction of catastrophe risk (TEEB, 2022).
- 2. Building Climate-Resilient Infrastructure: Climate-resilient infrastructure is built to endure the effects of climate change, such as severe weather events, floods, and sea-level rise, and is thus supported by a green economy (Hallegatte et al., 2019).
- 3. **Promoting Sustainable Urban Development:** Integrated planning, efficient resource management, and low-carbon development are only some sustainable urban development techniques backed by the green economy (UN-Habitat, 2021).

2.2.3 Strengthening Social and Economic Resilience: Fostering inclusive and equitable development, generating green employment, and improving livelihoods, especially for vulnerable communities most impacted by climate change, are all ways in which a green economy may help adaptation (ILO, 2022).

As an example of how a green economy may help with climate change adaptation and mitigation, consider the Billion Tree Plantation Drive. The effort demonstrates the many advantages of incorporating climate action into economic development initiatives by recovering forests, which improves carbon sequestration and helps ecosystem resilience and local livelihoods.

2.3 What Forestry Could Contribute to a Sustainable Economy

The forestry sector is an important part of the green economy because of the many ways in which it may help with climate change mitigation, adaptation, and long-term sustainable development (FAO, 2018). Pakistan's Billion Tree Plantation Drive is a fantastic example of forestry's contribution to developing a long-term economic model.

2.3.1. Climate Change Mitigation:

Carbon dioxide (CO2) is removed from the air and stored in forest soils. The forestry industry may greatly contribute to climate change mitigation via increased carbon absorption and reduced greenhouse gas emissions if forest cover is increased through efforts like the Billion Tree Plantation Drive (Ahmed et al., 2021).

2.3.2. Climate Change Adaptation:

Forests greatly aid adaptation to climate change. Communities and ecosystems can better withstand climate change's effects because of the vital ecological services they offer, such as water control, soil conservation, and catastrophe risk reduction (TEEB, 2022).

2.3.3. Biodiversity Conservation:

Numerous species rely heavily on forest ecosystems. The forestry industry may aid in biodiversity conservation by conserving and restoring forests, which is crucial to the well-being of ecosystems (WWF, 2023).

2.3.4. Sustainable Livelihoods:

The social aspects of forestry may provide value to a green economy. The Billion Tree Plantation Drive creates green employment and strengthens local economies, especially in rural areas and among the most disadvantaged groups (Ali & Khan, 2023).

2.3.5. Sustainable Production and Consumption:

Timber, non-timber forest products, and bioenergy all come from forests; when managed sustainably, we can keep producing and using them for years to come (FAO, 2018).

2.3.6. Education and Awareness:

Forcing social change toward a green economy, environmental knowledge, and a culture of sustainability among the public is essential, and forestry projects may help with both (Ali & Khan, 2023).

Finally, forestry is essential in moving toward a green economy. It provides tools for combating global warming, protecting biodiversity, bolstering sustainable livelihoods, and promoting environmentally responsible production and consumption. The Billion Tree Plantation Drive highlights the potential of forestry to contribute to a resilient green economy in the face of climate change.

3. An Overview of the Billion Tree Planting Initiative

An ambitious forestry program, the Billion Tree Plantation Drive (or Billion Tree Tsunami), was initiated in 2014 by the Khyber Pakhtunkhwa (KP) government in Pakistan. The scope and ambition of this project to mitigate climate change and advance a sustainable economy have garnered widespread interest from across the world (Ahmed & Ahmed, 2021).

By reforesting and expanding forest cover in the KP province, the Billion Tree Plantation Drive hopes to mitigate the destructive impacts of deforestation and climate change. The concept calls for both artificial tree planting and natural forest restoration on a massive scale. As a wide array of tree species, mountains, plains, and cities are all represented to increase biodiversity (Ali & Khan, 2023). The Billion Tree Plantation Drive also aims to provide access to sustainable livelihoods and create green employment. It educates people on sustaining forests sustainably and gets them involved in tree-planting projects. People's ability to sustainably manage forests and adapt to the effects of climate change is bolstered, and they may earn money doing so (Ali & Khan, 2023).

The symbolic importance of the Billion Tree Plantation Drive is enormous, and it is not only because of the environmental and social advantages it provides. It is a powerful statement of Pakistan's commitment to climate action and sustainability, and it should encourage other nations and areas to follow suit. In addition, it provides vital insights for policymakers, scholars, and practitioners throughout the globe by illustrating how large-scale forestry programs may aid in the transition towards a green economy (Ahmed & Ahmed, 2021).

Problems with logistics, pushback from certain local communities, and worries about the survival percentage of the planted trees are just a few of the obstacles that have plagued the Billion Tree Plantation Drive. Independent studies have shown that a significant number of trees have been added to KP's forest cover due to this initiative (WWF, 2023).

In conclusion, the Billion Tree Plantation Drive is a ground-breaking effort representing the potential of forestry to aid in combating climate change, adapting to its effects, and fostering environmentally responsible economic growth. Therefore, it is important to examine it thoroughly in the context of Pakistan's attempts to establish a green economy that can withstand the effects of climate change.

3.1 The Origins and Development of the Billion Tree Campaign

A region in northwest Pakistan called Khyber Pakhtunkhwa (KP) launched the Billion Tree Plantation Drive, also known as the Billion Tree Tsunami, in 2014. The project's inception resulted from an awareness of the pressing need to mitigate the effects of deforestation and climate change in the area (Ahmed & Ahmed, 2021).

The Green Development Initiative, a program initiated by the KP government to promote ecologically sustainable and equitable economic growth, served as the impetus for the project. Deforestation, biodiversity loss, water shortages, and climate change are only some of the environmental issues this effort aimed to combat in the province (Ahmed & Ahmed, 2021).

The Billion Tree Plantation Drive's lofty objective of planting one billion trees by the end of 2018 was met in August 2017, one year early. The initiative's goals included planting artificial trees and encouraging forest regeneration via natural means. Trees of many different species were planted in a broad array of habitats, from urban parks to riverbanks to the outskirts of farms, to increase biodiversity (Ali & Khan, 2023).

The KP government funded the project, while the Pakistan Forest Institute and the World Wildlife Fund provided technical assistance (WWF). To guarantee widespread involvement and ownership, the initiative also enlisted the help of local communities, private landowners, and non-governmental groups (WWF, 2023).

Because of its lofty goals and the difficulties inherent in tree planting on a massive scale, the Billion Tree Plantation Drive was first regarded with scepticism. However, difficulties were overcome because of thorough preparation, strong monitoring mechanisms, and the enthusiastic participation of local people in the project. Since then, it has been heralded as a model of climate action and an important environmental movement worldwide (Ahmed & Ahmed, 2021).

In conclusion, the KP government's Billion Tree Plantation Drive is an innovative approach to solving environmental problems by reforesting enormous areas with new trees. The process that led to its creation may teach other areas and nations how to better adapt their green economies to the effects of climate change.

3.2 Methods and Approaches to Implementation

The Billion Tree Plantation Drive was so large and ambitious that its execution was just as ambitious and complicated. Community participation and public-private partnerships were heavily emphasised, and many techniques, including afforestation, reforestation, and natural regeneration, were used (Ali & Khan, 2023).

1. Afforestation and Reforestation:

The initiative aimed to reforest land formerly forested but now diminished or completely barren. To increase diversity and toughness, several tree species were planted. Trees were chosen based on their capacity to improve environmental conditions and social significance (Ahmed & Ahmed, 2021).

2. Natural Regeneration:

The initiative encouraged the natural regeneration of forests and the planting new trees. Existing woods have to be preserved and managed so that they might grow and regenerate organically. The technique proved very helpful and cost-effective for protecting biodiversity (Ali & Khan, 2023).

3. Community Involvement:

Communities in need of tree replacement were encouraged to participate in the initiative. Locals benefited from increased income and job options and were better able to maintain forest health. The initiative also sought to instil in locals a feeling of duty to care for the woods being replanted (Ahmed & Ahmed, 2021).

4. Public-Private Partnerships:

Partnerships were formed with private landowners incentivised to grow trees on their property. Because of this tactic, the initiative was able to affect areas beyond only those owned by the public (Ali & Khan, 2023).

5. Monitoring and Accountability:

The team set up rigorous monitoring systems to monitor how well the trees did after planting. We used satellite photos, ground surveys, and independent audits. These steps guarantee the project's openness and responsibility (WWF, 2023).

Innovative initiatives and robust stakeholder interaction ultimately marked the Billion Tree Plantation Drive's execution approach. Because of this strategy, the project overcame obstacles and accomplished its lofty objectives, proving that large-scale forestry operations may help reduce greenhouse gas emissions and promote green economic growth.

3.3 Who Are the Stakeholders, and What Do They Do?

The intricacy and scale of the Billion Tree Plantation Drive were reflected in the wide diversity of participants. These parties had an important hand in the initiative's success by participating in its design, rollout, and evaluation (Ali & Khan, 2023).

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1. Government of Khyber Pakhtunkhwa (KP):

The government of KP had a pivotal role in both the conception and funding of this endeavour. It lent the project the backing of the political system and the resources it required and oversaw its development from start to finish (Ahmed & Ahmed, 2021).

2. Pakistan Forest Institute (PFI):

The PFI offered technical assistance and guidance throughout the undertaking. It helped decide which trees would go where developed plans for planting them and educated locals on how to maintain their forests sustainably (Ahmed & Ahmed, 2021).

3. Local Communities:

Community members in the area were essential to the success of the project. They helped plant trees and later managed the woods that resulted. Their contribution ensured the project's longevity and led to economic growth and new job prospects for the neighbourhood (Ali & Khan, 2023).

4. Private Landowners:

Tree planting on private property was promoted to involve landowners in the initiative. In return, they were offered financial incentives, including compensation for ecosystem services and the legal right to make sustainable use of the resulting forest products, as shown in Fig. 3 (Ali & Khan, 2023).

Indigenous Funding	Amount generated	Potential amount which can be generated in future for tree plantation
Crowd Funding	240 billion PKR	3.9 Billion PKR
Corporate Social Responsibility	7.31 Billion PKR	10-12 Billion PKR
Government owned green fund	5-6 Billion PKR	2-3 Billion PKR
Voluntary Funding	240 billion PKR in charity	10 billion PKR
Corporate Sector	7.31 Billion PKR	5 Billion PKR

Fig. 3 Local Funding Sources for tree plantation

Source: The author has developed the table based on potential financing sources.

5. Non-Governmental Organizations (NGOs):

Non-governmental organisations (NGOs) contributed to the initiative by offering advocacy, capacitybuilding services, and technical assistance. They were essential in rallying support from locals and getting the word out about the initiative (WWF, 2023).

6. International Organizations:

The World Wildlife Fund (WWF) and other international groups lent their expertise and offered technical assistance. They also contributed to the project's increased visibility on a global scale and helped bring in new sources of finance and strategic alliances as shown in Fig. 4 (WWF, 2023).

The Billion Tree Plantation Drive was a huge success, primarily because many groups got involved and worked together. Their various responsibilities and contributions highlight the relevance of multi-stakeholder partnerships in large-scale forestry programs and climate change.

Fig. 4

China green bond market : use of bond proceeds



Source: Climate Bonds Website

4. The Effect of the Billion Tree Campaign on Climate Stability

Khyber Pakhtunkhwa and the rest of the world have benefited greatly from the Billion Tree Plantation Drive's efforts to increase climate resilience. This project has shown that large-scale forestry operations may help make communities more resilient to climate change in several ways as shown in fig. 5 (Ahmed & Ahmed, 2021).





4.1. Carbon Sequestration:

Carbon sequestration is a key mechanism via which the Billion Tree Plantation Drive contributes to climate change mitigation. In order to combat climate change, trees remove carbon dioxide from the air we breathe. Carbon dioxide is a primary greenhouse gas. Scientists believe that throughout the trees' lifetimes, the Billion Tree Plantation Drive might help Pakistan meet its national and international climate change mitigation obligations by absorbing millions of tons of carbon dioxide (Ali & Khan, 2023).

4.2. Ecosystem Resilience:

The Billion Tree Plantation Drive has strengthened the ecosystems of Khyber Pakhtunkhwa by repairing and expanding the region's forest cover. Water regulation, erosion control, and species maintenance are just a few of the many vital ecological services that forests perform. Adaptation of ecosystems and human societies to the effects of climate change depends critically on these services (Ahmed & Ahmed, 2021).

4.3. Socio-Economic Resilience:

Social and economic stability has also been improved because of the Billion Tree Plantation Drive. The initiative has improved local communities' resilience to economic shocks that may be worsened by climate change by creating green employment and sustainable livelihoods. In addition, the initiative has contributed to the long-term sustainability and resilience of forest-dependent livelihoods by encouraging sustainable forest management techniques (Ali & Khan, 2023).

4.4. Policy Resilience:

When everything is said and done, the Billion Tree Plantation Drive has strengthened government policies. The project has influenced policy conversations and choices at the national and international levels by demonstrating the viability and advantages of large-scale forestry projects for climate change. It has helped bring attention to the importance of forests in fighting global warming, adapting to its effects, and facilitating the shift to a green economy (WWF, 2023).

Overall, the Billion Tree Plantation Drive has significantly increased climate resilience on various scales, from the individual to the globe. Its achievements are instructive for other areas and nations who want to use forestry to combat climate change and boost green economic growth.

5. The Green Economy and the Billion Tree Campaign

The Billion Tree Plantation Drive has significantly advanced Khyber Pakhtunkhwa's and Pakistan's transformation to a green economy. The ideas of a green economy are reflected in this effort, which has shown that environmental protection and economic progress are not mutually exclusive (Ahmed & Ahmed, 2021).

5.1. Green Jobs and Sustainable Livelihoods:

Numerous eco-friendly occupations have been created because of the Billion Tree Plantation Drive, especially in areas where residents have been actively engaged in tree planting and forest care. These positions assist in stabilising households financially and strengthen community resources for ecologically sound forest management. Additionally, the initiative has encouraged sustainable livelihoods by incentivising private landowners to plant trees and supporting the sustainable use of forest resources (Ali & Khan, 2023).

5.2. Ecosystem Services and Natural Capital:

The Billion Tree Plantation Drive has helped preserve and expand natural capital, an essential part of a green economy, by restoring and upgrading forest ecosystems. Many important ecosystem services, such as moderating temperatures, cleaning water, and protecting biodiversity, are provided by forests. The economic value of these services is high, and they are essential to the long-term health and flexibility of human civilisations (Ahmed & Ahmed, 2021).

5.3. Climate Change Mitigation and Adaptation:

Carbon sequestration and increased environmental and socioeconomic resilience are two ways the Billion Tree Plantation Drive has helped combat climate change as shown in fig. 6. These contributions help achieve the green economy's objective of decreasing climate-related and other environmental dangers and ecological scarcities (WWF, 2023).

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MITIGATION:	
	 ENERGY: a) Efficiency improvements to boiler and furnace energy, b) Improving energy efficiency in building, and c) Solar energy technology.
	 AGRICULTURE AND LULUCF: a) Reforestation and reducing CO₂ emissions from forest degradation, and b) Farm forestry as a carbon sink.
	3. TRANSPORT: a) Bus rapid transport, and b) Vehicle tuning.
ADAPTATION:	
	 AGRICULTURE: a) High-efficiency irrigation systems for irrigated and rain-fed areas, b) Drought- tolerant crop varieties, and c) Climate monitoring and forecasting - early warning system.
Ô	 WATER: a) Surface rainwater harvesting, b) Groundwater recharge, and c) Urban storm-water management.

5.4. Policy Innovation and Institutional Change:

Finally, the Green Economy has been influenced by the Billion Tree Plantation Drive's push for policy innovation and institutional reform. The project's performance proves that environmental protection can be successfully included in economic growth plans and regulations. As a result, this has impacted policy debates and choices at all echelons, boosting green economic momentum in Pakistan and abroad (Ali & Khan, 2023).

For these reasons, it is safe to say that the Billion Tree Plantation Drive has been a major factor in developing a green economy in Khyber Pakhtunkhwa and beyond. The results show how large-scale forestry projects may help usher in a more environmentally friendly and long-lasting economic paradigm.

6. The Obstacles and the Prospects

While the Billion Tree Plantation Drive has been mostly successful, it has not had difficulties. However, these difficulties might be reframed as openings for future expansion, education, and refinement of such massive projects (Ali & Khan, 2023).

6.1. Challenges

6.1.1 Sustainability and Survival of Planted Trees:

Maintaining the health of newly planted trees is a significant obstacle. It takes consistent care, resistance to pests and illnesses, and toughness in bad weather for the young saplings to reach adulthood (Ahmed & Ahmed, 2021).

6.1.2 Community Engagement:

Although community participation has been essential to the effort's success, it is not always easy to maintain widespread buy-in and enthusiasm over the long term. Community engagement and dedication may be affected by factors such as low public knowledge, scarcity of funds, and social and economic status (WWF, 2023).

6.1.3 Land Ownership and Rights:

Problems may arise regarding land ownership and rights, especially in regions where land ownership is contested or where the rights of local communities and indigenous peoples are not entirely recognised or safeguarded (Ahmed & Ahmed, 2021).

6.2. Opportunities

6.2.1 Learning and Adaptation:

The lessons learned from the Billion Tree Plantation Drive's failures are sure to be put to good use in the future. The lessons learned from these failures and successes may be used in future initiatives to make them more efficient and sustainable (Ali & Khan, 2023).

6.2.2 Scaling Up and Replication:

The Billion Tree Plantation Drive's success opens the door to expanding and duplicating the program in other parts of Pakistan and beyond. This has the potential to greatly increase the project's effect on climate resilience and green economic growth (WWF, 2023).

6.2.3 Strengthening Policy and Institutional Frameworks:

The Billion Tree Plantation Drive also provides a chance to improve legislative and institutional frameworks for sustainable forest management and developing a green economy. One strategy to achieve this goal is to establish and strictly enforce regulations that protect the rights of local communities and indigenous peoples while supporting the sustainable use of forest resources (Ali & Khan, 2023).

Finally, the challenges that the Billion Tree Plantation Drive has faced may be turned into opportunities for growth, adaptability, and knowledge. Capitalising on these opportunities might help widespread forestry projects get closer to their aim of boosting climate resilience and building a green economy.

7. Recommendations and Implications for Policy

Significant policy implications and a foundation for suggestions to improve the efficacy and sustainability of future programs are provided by the Billion Tree Plantation Drive's experience and lessons learned. This paper focuses on the most important policy consequences and proposes potential solutions (Ali & Khan, 2023).

1. Policy Implications

7.1.1 Importance of Forestry in Climate Policy:

Incorporating forestry into national and international climate policy is crucial, as shown by the success of the Billion Tree Plantation Drive. The forestry sector has the potential to considerably aid in the shift to a green economy and play a pivotal role in mitigating climate change (Ahmed & Ahmed, 2021).

7.1.2 Role of Local Communities:

For forestry efforts to be effective and long-lasting, community participation is essential. Therefore, policies should work to increase citizen participation, safeguard citizen rights, and support economically stable communities (WWF, 2023).

7.1.3 Need for Sustainable Land Use Policies:

The Billion Tree Plantation Drive emphasises the need for environmentally responsible land management practices. These measures must support tree planting and forest restoration and promote the sustainable use of forest resources (Ali & Khan, 2023).

7.2. Recommendations

7.2.1 Strengthening Institutional Capacities:

In order to ensure forests are managed sustainably, it is suggested that existing institutions be fortified. To achieve this goal, various stakeholders may be encouraged to work together by providing training and materials, creating and adopting best practices, and promoting cooperation and coordination (Ahmed & Ahmed, 2021).

7.2.2 Enhancing Community Engagement:

It is important to get more people involved in local forestry projects. Incentives, education, and community involvement in forest management are all potential outcomes of these efforts (WWF, 2023).

7.2.3 Ensuring the Sustainability of Planted Trees:

It is essential to take measures to guarantee the long-term health and survival of newly planted trees. Examples are constant upkeep, defence against pests and illnesses, and protection from extreme climate change (Ali & Khan, 2023).

7.2.4 Scaling Up and Replication:

Finally, it is suggested to look at ways to expand the Billion Tree Plantation Drive and make it a model for other countries and areas. Because of this, the initiative's effect on climate resilience and green economic growth may be amplified (Ahmed & Ahmed, 2021).

The lessons learned from the Billion Tree Plantation Drive may be used to improve the efficiency and longevity of future tree-planting campaigns.

8. Conclusion and Future Prospects

The Billion Tree Plantation Drive is evidence of the power of eco-friendly practices to combat climate change and advance sustainable economies. Communities have benefited economically and socially from the program, which has also helped with worldwide efforts to sequester carbon.

The project's success demonstrates the viability and numerous advantages of large-scale afforestation operations in other parts of Pakistan and nations throughout the globe. The initiative has shown that economic growth and environmental sustainability are not incompatible aims but can be attained together with careful planning and action.

In the future, other areas and nations that want to improve climate resilience and promote a green economy should look to the Billion Tree Plantation Drive as a model to follow. It also highlights the need to maintain funding for green programs and other nature-based alternatives. Initiatives like the Billion Tree Plantation Drive provide inspiration and originality as the globe faces the growing threats of climate change.

However, remember that there are obstacles on the road to success. It is important for future projects to draw lessons from the successes and failures of the Billion Tree Plantation Drive, tailoring their methods and practices to fit local conditions while always looking for ways to improve.

In sum, the Billion Tree Plantation Drive is an encouraging example of how to strengthen defences against climate change and advance a green economy. The future of our collaborative efforts to prevent climate change and promote sustainable development for everyone depends on initiatives such as this one.

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