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China–Pakistan Economic Corridor (CPEC) and Environmental Security Challenges: Policy Responses

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Pakistan is highly at risk due to its fragile climate, which requires immediate attention when developing infrastructure along the China–Pakistan Economic Corridor (CPEC), a prominent project of the Belt and Road Initiative proposed by the Chinese government. This study focuses on environmental security risks arising from major CPEC projects, including coal-fired power generation, expansion of transportation systems, deforestation, changes in land use, and lax enforcement of regulations. The qualitative research design approach was undertaken using secondary data, including peer-reviewed articles, policy documents from relevant governments, environmental legislation, and reports on the development challenges facing CPEC for the period 2015 to 2025. The research is carried out from a perspective of both green politics and environmental security and seeks to connect the varied and sometimes contradictory stakes in corridor governance in the economic sphere. The results indicate that it is not development per se that is the root of the issue, but rather a lack of integration between the environmental assessment, monitoring, and enforcement processes in project planning and implementation. The article thus recommends that the implementation of EIA be tightened, that alternative uses of clean energy be promoted, that monitoring at the project level be strengthened, and that ecological governance by communities be strengthened for a greener CPEC .

***Keywords*:** CPEC, environmental governance, ecological security, environmental impact assessment, sustainable development

As part of Pakistan's extensive development initiatives, the CPEC stands out as one of the most crucial transport corridors, connecting infrastructure development, energy initiatives, and wider regional connectivity under the Belt and Road Initiative. However, it is not possible to measure its importance solely in economic terms. The corridor also has significant environmental issues associated with electricity from fossil-fuel facilities, transport emissions, land-use change, and impacts on ecologically sensitive areas. This article presents three core arguments: CPEC, in its environmental dimensions, needs to be critically analysed in the context of environmental governance. The ecological concern isn't just the pressure from large projects, but the lack of progress in developing environmental protection, monitoring, and enforcement regulations as projects rush

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forward. The paper therefore examines how CPEC has produced environmental security challenges and what policy responses are needed to address them in a more sustainable way.

Figure 1

Figure 1. Map of Pakistan and neighboring states

Figure 1 shows Pakistan's regional location in relation to surrounding countries relevant to the CPEC corridor.

This road network was supposed to make trade cost and time-efficient by decreasing the expenditure and time to transport merchandise, to China from the Gwadar Port, which were taking 11 to 16 days more through the route of South China Sea and Straits of Malacca (Ashraf & Shiyuan, 2022).

In 2016, the mutual space and satellite projects between China and Pakistan under the umbrella project CPEC were announced. CPEC, is a vital part of the bigger BRI project for boosting communication, connectivity, collaboration, and trade amongst the states of Eurasia (Khan, 2019; Khan, 2020). As Marshall Plan was used for the reconstruction of Europe after WWII in terms of its probable impact on the region and the interest displayed by several states in partaking in the initiative is also sometimes compared with CPEC (Rauf, 2017). CPEC is an expedition of fiscal incorporation of Eurasia, particularly for Pakistan; it includes around $62 billion in energy, trade, infrastructure, and other development projects (Hussain et al., 2021; Rehman, Khan, & Jaffry, 2017). Yet, this mega project involves three probable ecological hazards, ramifications of which can aggravate climate change and vulnerabilities for unstable Pakistan's economy.

The main environmental apprehension associated with CPEC is regarding the energy plans since three-quarters of the new intended energy would be produced from conventional coal-fired power plants, which are the key suppliers of CO2 emissions and pollution, eventually causing global warming and weather change. The second vital environmental concern is associated with the enormous removal of trees to lay several huge road networks from China to Pakistan. Tree cutting can cause a huge concentration of CO2 emissions alongside road networks. The third grave environmental peril of CPEC is automobile trafficking since it is intended for the Karakorum highway to bear up to 7000 trucks every day that has discharge up to 36.5 million tons of CO2. Nevertheless, the CPEC permits Pakistan to handle the energy crisis and improve worn-out infrastructure regardless of all the environmental menace involved in it, but once this project is over, Pakistan will have become a chief contributor to CO2 discharge and might rank worst in the global climate risk index provided no suitable corrective measures are planned to reduce the environmental perils. For that reason, it is highly critical for Pakistan to evaluate the probable environmental effects of the energy, infrastructure, and transportation projects of CPEC. Besides, scientists from both Pakistan and China should team up to cope with the environmental outcomes of CPEC projects (Kouser, Subhan, & Abdullah, 2019). This paper analyzes the impact

of CPEC as an SEZ on the environment of Pakistan and how Pakistan and China should work together on this grave issue.

Theoretical Framework

This study uses green politics and environmental security as complementary analytical lenses. Green politics questions development models that treat nature as secondary to economic growth and draws attention to the political choices behind environmental harm. Environmental security is an important part of understanding the potential long-term health, livelihood, water and growth risks to local security caused by ecological degradation related to infrastructure, energy production, transport corridors, and land-use change. As regards CPEC, such theories are applicable, as environmental harms are not necessarily created by the projects themselves but rather result from poor governance, insufficient control, and a higher priority given to the speedy delivery of economic benefits. The framework therefore links corridor development with the institutional and political conditions that produce ecological insecurity in Pakistan.

Model Green Belt and Road Initiative

The green theory enables IR students and thinkers to re-evaluate the link between the country's economy as well as the environment. International Relations usually set this in the perspective of globalization perceived from the inadequate standpoints of the nations. However, the process of globalization also generates better chances for raising mutual comprehensive ecological principles (Stephen McGlinchey, 2021). Besides, the Green theory can fundamentally challenge the notion of autonomous nation-states competing with each other and is, therefore, part of the "post-Westphalian" trend in International Relations contemplation. The larger role the green theory plays, or its capability for a serious commitment with IR, certainly is because of its diverse origins, considering the environmental ecosystem a preliminary point and rising above our existing political-economic configurations. Green theory not only offers an unusual depiction of our world but also a unique reason for grasping it and what can we do to reform it. IR theory is probable to be reshaped by green theory, but not because the greens would beat the disagreements but since the IR philosophers will unavoidably have to offer a logical description of the solution of living sustainably on the earth, which shows that hypothesize about the state-centric 'international relations/order might stop one day, and we would have to seek after a "different political point of reference" in human liaisons, for example, social movements or policy networks, etc. (Dyer, 2018). CPEC does affect the environment, so the Green Politics theory is applied in this article.

Method

This study adopts a qualitative research design to examine the environmental security implications of CPEC. The analysis is based on secondary sources, including peer-reviewed journal articles, official government documents, environmental laws and policy frameworks, reports by national and international organizations, and selected media sources used for policy context. The study focuses on the CPEC period between 2015 and 2025, with particular attention to the launch and implementation of the major CPEC projects. Sources were chosen for four themes based on relevance: energy projects, transport infrastructure, change of use, and environmental regulation. Thematic content analysis is applied in this study, which consists of three steps. First, sources were reviewed to identify common environmental issues related to CPEC. Second, these concerns were aggregated into themes, including: Coal Dependence, Transport Emissions, Deforestation, Environmental Assessment, and Institutional Enforcement. Third, an interpretation of the findings was made within the context of green politics and environmental security to evaluate the impact of governance decisions on ecological outcomes.

CPEC as Part of BRI

CPEC must be seen as part of the larger Belt and Road Initiative; however, the focus here is not solely on its geographic description but also on its environmental dimension. CPEC is considered a flagship connectivity project, encompassing four areas: energy production, transportation infrastructure, logistics systems, and industrial development. Its presence not only has economic implications but also strains land use, water quality, health, and ecological services. Thus, the relevance of BRI in this article is not limited to historical or strategic contexts, but rather arises when infrastructure projects can increase environmental risk through insufficient regulatory and assessment processes – especially on a large scale.

In 2013, during the ASEAN summit in Indonesia, Xi pronounced his plans for the Maritime Silk Road for the 21st century. China will finance or invest in port expansion and growth alongside the Indian Ocean, from the Asian Southeast to East Africa and other parts of Europe, to adjust to the rising marine trade. Presently, above sixty states making up two-thirds of the total population of the world have shown curiosity in being part of this venture (Alam, Bibi, & Waheed, 2023). It has been estimated that the largest profit so far is $60 billion. An estimated $200 billion on these efforts has already been invested by China, and Morgan Stanley has estimated that by 2027, the general expenditure of China for BRI can reach $1.2–1.3 trillion, albeit calculations from different sources vary (Chatzky & McBride, 2020).

Figure 2

Belt and Road Initiative geographic spread.

Figure 2 illustrates the wider regional setting within which CPEC is located.

CPEC Routes

The route structure of CPEC matters because it passes through diverse ecological and socio-economic zones. Instead of listing route details at length, it is more important to note that road expansion, freight mobility, and associated construction activity can accelerate deforestation, soil disturbance, emissions, and pressure on local ecosystems. The environmental significance of the routes therefore lies in their cumulative ecological footprint rather than in their geographic description alone.

Initially, Pakistan was in favor of building a CPEC route from Western Pakistan by way of Zhob and Quetta to help develop Baluchistan and Khyber Pakhtunkhwa. However, later, it was decided that the CPEC Eastern route would cross Rawalpindi, Faisalabad, Multan, and Pindi Bhatia, whereas the Western Route would run through Northeastern Baluchistan from the towns of Kalat Quetta and Zhob. The key CPEC route begins from Xinjiang, China, to Karachi, Pakistan, and the main objective of this corridor is to target easy trade

alongside a path linking Gwadar and Kashgar through the laying optical fiber, highways, railways, and oil and gas pipelines. Pakistan and China both have teamed up to fortify the amity, particularly at the deepwater port of Gwadar (Khan, 2019). which is meant to facilitate convenient international trade, especially in Arabian and Asian states (Rahman et al., 2022; Furqan, 2018).

Special Economic Zones (SEZ) in Pakistan and SEZ Act (2012)

The SEZ framework is relevant to this study because industrial zones under CPEC may intensify environmental pressures if environmental regulation is treated as secondary to investment facilitation. While the legal and institutional structure of SEZs supports industrial growth, the environmental question is whether waste management, emissions control, land-use regulation, and compliance monitoring are adequately built into zone planning and operation. This concern makes SEZ governance central to the environmental assessment of CPEC.

In 2010, the SEZs Act was formulated to encourage the development of SEZs in Pakistan, and later in 2016, it was amended and is now known as the SEZs (Amendment) Act 2016. The fundamental purpose of the amendments was to embolden the development of SEZs and make them more business-friendly and inviting for investors.

The Mechanism for SEZ Development

The Amendment Act 2016 on SEZ allows the private parties to institute the SEZs, while Federal or Provincial Governments can inaugurate them, or the government can also collaborate with the private parties through a partnership, i.e Public Private Partnership (PPP). Pakistani government persuades the development of SEZs via PPP to gratify the concerns of stakeholders about lucidity, security, impediments, etc. SEZs (Amendment) Act 2016 entitles the BOA to approve the zone application put forward by every provincial SEZ authority through the Board of Investment (BOI). Different provinces might have named PIPA differently, such as the Sindh Board of Investment or Punjab Board of Investment and Trade; it is supposed to work as the main body to endorse national and international investment. It can also help enterprises and zone developers regarding miscellaneous matters.

SEZ Act (2012) allows the provincial governments to form SEZ authority in each province of Pakistan (Khan & Khalid, 2018). The zone developers and select industries will submit applications to the SEZ authorities in their respective provinces and forward the application to BOI. The responsibility of providing the utilities and infrastructure such as electricity, waste disposal, gas, water, etc., is also the liability of SEZ authority, and it must seek approval of its rules and regulations by BOA. Under the 2016 SEZ Amendment Act, Provincial SEZ authorities have been designed in all provinces that are in working condition. Following are the names of SEZs Provisional Authority:

1. “Special Economic Zone Authority” (SEZA), Sindh, under the leadership of Chief Minister Sindh
2. “Baluchistan’s Special Economic Zone Authority”
3. “Special Economic Zone Authority”, Punjab
4. Khyber Pakhtunkhwa Economic Zone Development and Management Committee

BOI under the SEZ Act is supposed to create sync between SEZ authority and BOA in addition to assisting the zone developers, SEZ authorities, and zone enterprises and endorsing the SEZs.

Infrastructure Facilities

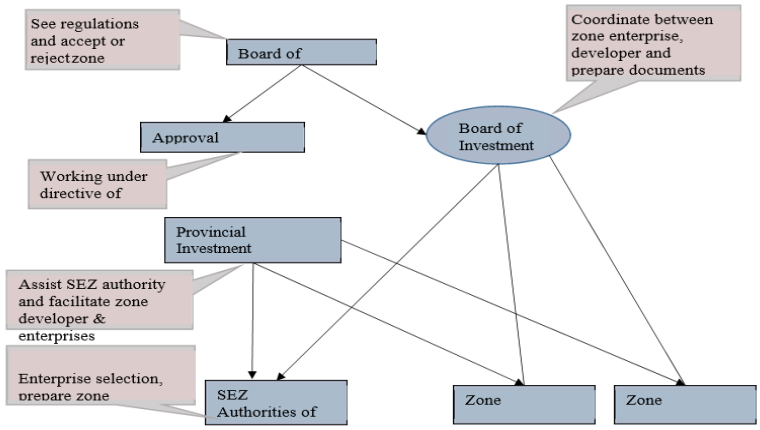
The amendment Act of SEZ 2016 makes the Provincial and Federal Governments liable to take necessary measures for the community or public utilities and infrastructure to the SEZs whose developers can set up electric power generation plants to meet the increasing need for electricity within the region.

Inducements in SEZ Amendment Act 2016

These inducements are additional to the current profits usually valid under international agreements of Pakistan, for example, FTA and treatment under GATT and GATS, etc. These incentives are intended for people the specific economic zones by enticing fresh and current industries and repositioning feasible Chinese plus other overseas businesses. The list of incentives for the zone developers and enterprises is declared in the act, and this is a major factor in creating the value proposition for SEZs. The details of incentives for both are as follows.

Figure 3

SEZ incentives for developers and enterprises.



This figure summarizes the main incentives associated with the SEZ framework discussed in the text.

Incentives for Enterprises

1. "One-time immunity from taxes and customs duties on importing plants and machinery into SEZ except for products/goods listed under Chapter 87 of the Pakistan Customs Tariff, which need verification by the BOI for setting up in that zone.
2. For the next ten years, exemption from all taxes on income for the firms starting commercial production by the 13th of June 2020 in the SEZs. On 13th June, the enterprises that are starting commercial production in the zones will be entitled to the exemption for the next five years.

Incentives for Developers, Special Purpose SEZs, Industries

The further advantages will only be awarded after the BOA finds them to be reasonable on account of an economic impact assessment;

The BOA is authorized to prepare an economic impact assessment of an SEZ within five years from the date the contract is signed and within the first year of the functioning of a firm"

Labor laws

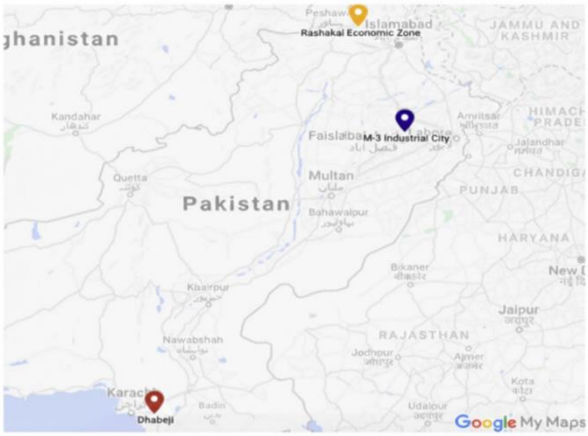
According to the Act, the already existing labor and employment laws of Pakistan are applicable in SEZs. This will decrease the business expenditure and attract fresh investments to Pakistan. Enticements for SEZs announced by the government are another step to attract international investments in priority SEZs (Abbas & Ali, 2017).

SEZs under CPEC

SEZs under CPEC are often discussed in terms of industrial opportunity, employment, and regional development. However, their environmental implications require equal attention. When industries are concentrated in corridor linked areas, the environmental effect can be put under stress if environmental standards are not consistently enforced – causing issues for the environment, including land, water systems, waste and air quality. The environmental performance of SEZs needs to be measured beyond the investment results in terms of compliance, monitoring, and ecological protection measures will also be taken.

Figure 4

Locations of selected SEZs in Pakistan



As seen in figure 4, there are a number of major SEZs linked with the CPEC framework with a spatial distribution.

CPEC and Environment

The environmental aspect of the CPEC cannot be sidelined and is integrated with the other aspects of the project. The biggest concerns are emissions from coal-fired power generation, transportation emissions, land clearance, and inadequate environmental protection. These problems accumulate and compound. They will not come solely from one project, but from the cumulative impacts of energy, road, and industrial growth within a governance model that ensures a level playing field for the environment. Thus, the analysis of CPEC must pay attention to the externalisation of environmental costs of the development priorities to communities and ecosystems, where compliance is weak.

It is a three-phase project. The first phase was to eradicate communication and infrastructure blockage that included several hydro, coal, and various new energy projects. As stated by the International Energy Agency in its most recent coal report, Pakistan possesses more than 4GW of fresh, custom-made coal power plants, and almost the same number of power plants are in the pipeline. It was anticipated that by 2024 the coal consumption will grow at 9 percent per annum. Besides, a new highway from Gwadar has to be built across the country to the Khunjerab pass, the northern border with China. By now, the first phase is over, and in the second phase, which has started, the emphasis is on industrialization and agriculture along with other sectors for Pakistan's economic boom. But the question is, can any of these CPEC projects contribute to the climate crisis? The Mauna Loa observatory in Hawaii documented the atmospheric carbon concentrations and found them over 400 parts per million before such excessive carbon was found in the atmosphere of the Earth for over 2.5 million years. The intensity of the climate crisis is far imaginable, and it's getting graver day by day, and the global biodiversity damage is speeding up at an extraordinary rate. The temperature increase has made the Hindu Kush and Himalayan region shifted than formerly imagined (Beg, Baig, & Khan, 2018). The difference between a global average temperature rise of 2C and 1.5C could be 50 percent of their glacial melting instead of 35 percent

By 2020, Carbon emissions should be reduced by 2.7 percent per annum only to meet the Paris Agreement target of 2C. This reduction is three times more speedy than what states agreed to. According to a study in *nature*, the difference between 1.5C and 2C of warming has caused 150 million deaths, mainly in Africa and Asia. On account of the excessive usage of the petrol, coal, diesel, and furnace oil consumed in a non-industrial economy, Pakistan is already facing deadly air pollution, which is expected to get worse when more power plants are constructed in compliance with a substantial portion of the first phase of CPEC and if the government fails to take corrective measures regarding the substandard diesel and petroleum products obtainable in the state, the old heavy vehicle on the planned Khunjerab Gwadar highway will continue to be a key factor of this health crisis. By the end of this century, global temperatures may supposedly go up as much as 4.9 C, and in that scenario, there will be no agriculture in most of Pakistan by that time. At the 2017 "World Economic Forum", China pleaded with the global leaders to abide by the Paris Agreement; however, in the CPEC, environmental commitment has been overlooked (Alam, 2020). Pakistan must take appropriate and in-time action to ensure the deterrence of ecological dilapidation or its people might face grave repercussions owing to the undesirable environmental impacts that can be widespread.

Some of the more challenges concerning Pakistan's environment regarding CPEC are given below:

- Road Management in Pakistan
- Road Constructions and its effects on the environment
- Deforestation for Road Construction and their impact on the environment in the future
- Transport
- Coal Consumption and its effect
- Global Warming
- Agriculture runoff
- Emission of CO2

A Legal Framework of "Environmental Impact Assessment (EIA)"

Environmental impact assessment (EIA) is essential under China and Pakistan's laws and the Declaration on Environment and Development to mitigate project adverse effects and protect ecosystems. EIA recommends measures for ecological concerns under CPEC. Introduced by Pakistan's 1983 Environmental Protection Ordinance, EIA required supporters to submit ecological impact reports at project start. The 1997 Pakistan Environmental Protection Act (PEPA) replaced it, mandating EIA submission before construction. However, Pakistan lacks legal provisions for SEA policies. Non-compliance with Section 12 and related rules can incur fines up to one million rupees and an additional hundred thousand rupees per day.

Mehmood Akhter Cheema, the Country representative of the International Union for Conservation of Nature (IUCN), made a powerful observation and expressed his speculation regarding the technical competence of environmental protection agencies to execute EIAs. This organization has been focusing on various ecosystems and protected areas. Furthermore, it has been working on sustainable development and biodiversity conservation in Pakistan, since 1985 (IUCN Pakistan). Also, he is unsure about the ecological footprint of this particular project which he believed is ambiguous. He added, saying that the government has not published what measures are to be taken to guarantee incessant progress, or else the government owns any better environmental supervising and reporting strategy. He urged the government to collaborate with IUCN and similar organizations for the provision of technical lapse regularly for all EIAs that must have been done before a venture commences. (Ali & Askari, 2023). Adil Najam, the dean of the "Fredrick S. Pardee School of Global Studies" at "Boston University", stressed the requirement of the fundamental regulators that includes "provincial and federal environmental protection agencies", as well as the climate ministry to accomplish EIAs

so that the government can formulate the most appropriate technology and standards to be implemented for every project (Durani & Khan, 2018).

Coal Power Projects under CPEC

Coal power projects remain one of the strongest sources of environmental concern under CPEC because they increase emissions and deepen dependence on carbon-intensive energy at a time when Pakistan is already highly vulnerable to climate stress. The problem is not only technical or economic. It is also regulatory and strategic, because energy choices shape long-term environmental risk. The heavy reliance on coal in the development model can offer temporary relief through the easy availability of energy, but can also undermine ecological security, public health, and climate commitments if it isn't paired with a real effort to transition to cleaner sources.

China has also acknowledged its excessive use of coal which causes ruthless and harmful environmental blows. The latest data reveals some cutback in the usage of coal for the third year on the trot. Nonetheless, a current report by the “Natural Resources Defense Council" revealed that $25 billion was invested by China in coal plans internationally between 2007 and 2015. This report castigated China and the rest of the G20 states for the investments, which violate the Paris Agreement’s climate pledge. This reveals the major countries causing pollution are exhibiting their interest in curtailing climate-changing carbon emissions domestically but blatantly investing in fossil fuel projects globally. This is exactly the picture of Pakistan, which stopped using coal after being part of most international financial institutions, but soon Pakistan collaborated with China in setting up the new coal power plants. Under the 2015 CPEC initiative, the Chinese intended to sponsor different corporations and companies to invest US$27.6 billion in infrastructure and energy ventures in Pakistan under CPEC, whereas Pakistan is financing US$18.1 billion. According to the “Ministry of Planning and Development, and Reform of Pakistan”, the coal-fired plants with the ability of 7,560 MW will be built as CPEC-energy main projects (Saeed, 2017).

Green Politics and CPEC

Green politics strengthens the analysis of CPEC by showing that environmental harm is not an accidental by-product of development. It often happens because of political decisions that prioritise growth, speed, and investment over ecological protection. In this character, the CPEC demonstrates a broader development logic, whereby environmental costs are often syncretised in the aftermath. When applied to CPEC, green politics can help shed light on the reasons for insufficient environmental protection and the need for institutional reforms, while also providing language to promote sustainability.

Institutional arrangements, environmental governance capacity, and mechanisms for enacting environmental policies manifest significant differences between green politics in Pakistan and China. In Pakistan, multiple forces can shape environmental governance, including state institutions, environmental laws, judicial activism, civil society groups, and climate adaptation efforts. In the past, as in recent times with programs such as the Billion Tree Tsunami Project and other climate adaptation strategies, governments have increasingly focused on environmental sustainability. Nevertheless, environmental protection agencies still face challenges with funding, technical skills, inter-agency coordination, and enforcement capacity (Ali & Askari, 2023; IUCN, 2022).

On the other hand, China has introduced environmental sustainability as part of its national development under the concept of “Ecological Civilisation,” and has increasingly promoted the Belt and Road Initiative (BRI) as part of its international commitments on the environment. These are some of the specific features of the Chinese model that afford far greater implementation capacity than most developing countries can, namely, long-term planning, strong monitoring systems, and centralised governance. However,

sustainability issues persist in the context of overseas infrastructure development programs, such as those under the BRI, that clash with economic objectives (Aftab, 2020; Chatzky & McBride, 2020).

Analysis of Pakistan and China illustrates that the environmental outcomes of CPEC are influenced by both policy commitments and the capacity of governance, regulation, monitoring, and stakeholders. Although Pakistan has taken some strides in raising environmental consciousness and formulating climate policies, their implementation remains hampered by challenges. Although China's strengths in institutional capacity offer lessons to other developing countries on environmental monitoring and compliance, the challenge of balancing economic development and ecological protection remains common to both countries. Instead, Green Politics should be seen as more than a normative concept but also an operational tool for assessing the success of environmental governance processes in major infrastructure projects.

Both the states, Pakistan and China, took certain actions on the environmental threats, (Jaleel & Habibullah, 2021) and according to news reports, China and Pakistan have come to terms to convert the CPEC project into an exemplary "green belt and road scheme" to preserve and guard the regional natural environment. A meeting between a Chinese three-member delegation including the "Chinese Ambassador to Pakistan Nong Rong and Malik Amin Aslam, Special Assistant to the Prime Minister (SAPM) on climate change" was held to take this decision (Aftab, 2020). This meeting also brought under discussion numerous vital green schemas, including climate adaptation, ecological safeguard, green economic revival, pure energies, air quality, and decline of calamity hazards and water preservation. SAPM Amin, while addressing the meeting, shared the objective of the government about the 'Clean Green Pakistan Index'; and highlighted that the project intends to enhance the protected area of Pakistan to above 15 percent from the present 13 percent and produce 5,000 green jobs opportunities also. Besides, it was claimed by the Chinese ambassador that China was determined to support the apparition of Pakistan's leader Imran Khan, and his initiative of a green economic revival plan after COVID-19 to reinstate the incomes of the people (Hasan, 2020).

Discussions

The main finding of this study is that the environmental challenge of CPEC is fundamentally a governance challenge. Corridor development has moved forward more quickly than the institutions meant to assess, monitor, and regulate its ecological effects. The use of coal for energy generation, the rapid growth of road transport, change of land use and the industry cluster puts a combined strain on the environment. This suggests that the environmental future of CPEC will depend less on development rhetoric and more on the quality of environmental regulation, inter-agency coordination, and project-level compliance. The paper therefore shifts the debate from whether CPEC is beneficial in general to how it can be governed in a more ecologically responsible way.

The comparative analysis of Pakistan and China, and the subsequent findings, also indicated that institutional planning and implementation mechanisms are crucial to achieving environmental governance success in the context of the CPEC. While values for the environment, sustainability, and demands for ecological justice have received significant emphasis in the literature on Green Politics, there is also a need to examine the capacity of political institutions to adopt environmental policies. Environmental governance in Pakistan has taken a positive turn as a result of the government's actions in climate adaptation and environmental law; however, enforcement of these measures is hampered by administrative and resource gaps. However, environmental concerns can be sacrificed in the interests of winning over domestic or international investors and financial partners when implementing environmental policy, as has not been the case in China, where its relatively stronger capacity and monitoring systems have enabled better protection. (Ali & Askari, 2023; Aftab, 2020).

The results suggest that environmental security threats arising from CPEC are not entirely attributable to infrastructure development. Instead, they stem from the dynamic interplay between development processes and institutional arrangements to manage environmental flows. They are, on the contrary, the result of the dynamics between developmental processes and institutions' capacities to address environmental impacts. So the efficiency of Green Politics cannot be judged solely on environmental hyperbole; it should be measured by measurable results: compliance with regulations, environmental monitoring, public involvement, transparency, and policy enforcement, etc. This approach will enable a more realistic assessment of sustainable development within the CPEC framework.

Export Processing Zones (EPZs), also called Special Economic Zones (SEZs), are geographic areas inside a state that are targeted to turn into a bustling economic activity zone by introducing policy or other support/aid, that is not offered to the economy of a country on the whole. EPZs may be useful in obtaining this by emphasizing enticements that decrease the costs to firms, but they can enhance the imports without boosting the trade balance other than encouraging directness, which is crucial to deem EPZ's effects on net exports.

To protect the country's climate, it is of extreme significance to recognize the fact that Pakistan is the 7th highest most affected country in the world, and the impacts of CPEC will be drastic. The regional economic and social growth must match the rules of ecological steadiness and sustainable progress. Durani & Khan. (2018) conducted a study and found that the carbon emissions of present coal-based power production plants have astounding consequences. The findings are worthy of citation here and have been listed in the table below: (Fatima, Salman, & NEDIM, 2017). Considering the findings of the study, several way-outs can be used to overcome the Environmental Challenges faced by the CPEC. Political parties should cooperate in the construction of CPEC; there should be compromised for their mutual benefit at the country-wise level; the details of the CPEC Project should be shared with all the political parties in the country to understand the nature of CPEC's success. Also, it includes the support to the foreign CPEC workers by the government and expedites the CPEC work for its territorial safety from external threats

Recommendations

Recommendations for policies should be prioritised following three criteria based on this study and the comparative discussion and evaluation of environmental governance capacity of Pakistan and China: (1) feasibility to implement the policy, (2) needed institutional capacity to implement the policy, and (3) environmental importance of the policy. This prioritisation approach acknowledges the principles of Green Politics, as it is based on achievable environmental outcomes rather than aspirational policies.

- Strengthen project-level Environmental Impact Assessment by requiring independent review, public disclosure, and post-approval monitoring for major CPEC projects.
- All the details of the CPEC Project should be shared with all the political parties in the country to understand the nature of CPEC's success to save it from environmental challenges and threats.
- The multi-dollar benefit must be discussed by the government with all the provinces to take their cooperation for CPEC to sustain it from environmental issues.
- There must be full support to the foreign CPEC workers by the government.
- The CPEC work must not be delayed by the government in order to escape the terrorists and other militants' hurdles in completion.
- The latest technologies must be utilized to control all kinds of pollution to maintain the CPEC environment stable and continuing.
- To secure the planet, we must raise the afforestation of planting more trees.

- Introduce Strategic Environmental Assessment for corridor planning so that the cumulative effects of roads, SEZs, and energy projects are considered together.
- Gradually shift future CPEC energy investment from coal toward solar, wind, and hydropower where feasible.
- Create a joint environmental monitoring mechanism involving federal and provincial agencies, local authorities, and independent experts.
- Enforce National Environmental Quality Standards more consistently in industrial and energy zones linked to CPEC.
- Include local communities in consultation, monitoring, and grievance procedures, especially in ecologically sensitive areas.
- Require regular environmental performance reporting for completed and ongoing projects to improve accountability and policy learning.

Methods and Solutions for Mitigating Climate Crises under CPEC:

Three practical directions are especially important for mitigating environmental harm under CPEC. First, afforestation and landscape restoration should be linked to project planning in areas affected by road expansion and land clearing. Second, cleaner production technologies and improved systems for controlling generated waste should become part of the compliance requirements for projects in the industrial and energy sectors. Third, environmental protection is the official's responsibility, not an afterthought or policy goal. Third, environmental protection is an official responsibility, not an afterthought or policy goal.

These measures are most effective when backed by monitoring, enforcement, and transparent reporting.

The most vital point to remember is that the future of our earth depends on trees. To secure the planet, we are in dire need of planting more trees. It is known to everybody that the projects included in CPEC are meant for the development of the northern areas of Pakistan; thus, the government must devise a policy to exclusively cater to the expansion and safety of its flora and fauna. If cutting a tree is indispensable for the progress of this project, planting more trees must be ensured to help filter the air and protect the land. Taking preventive measures by the government can help preserve the environment shun the loss of biodiversity and manage the floods in the region. Enormous forest area reduces the chances of landslides and soil erosion.

Use of Modern Technology

To control all kinds of pollution, the latest technologies must be utilized. The factories' chimneys should be lined with specific sheets so that the harmful pollutants would stick to them, in that way reducing the poisonous discharges into the air. Opting for the process of burning with the chimneys to control the pollution even further will be commendable. Most up-to-date methods of the disposal of waste and technologies should be implemented. The ultra-supercritical technology has been employed by China at its coal plants to produce energy which is the latest strategy of China to procure clean energy. The harmful effect of emission of energy obtained from coal is drastically lessened in the high-efficiency coal-fired power plant, but regrettably, Pakistan is deprived of this latest technology while several projects are being constructed, and a few are in the pipeline. Sadly, this side of the Environmental Impact Assessment (EIA) has been forgotten.

Environmental Protection Regulatory Framework (EPRF)

The factories and people working in the area have been provided with the guidelines for environmental regulations, and adopting and enforcing them must be mandatory. The implementation of these rules must be ensured by the government and the policymakers to evade carbon dioxide gas emissions more than the approved greatest quantity. The "National Environmental Quality Standards (NEQS)" recommended by the

"environmental legislators" must be enforced. Guidelines must be strictly followed to abandon the waste produced by the factories with appropriate dealing, to protect the marine life, air, and the whole general ecosystem. Managing industrial waste like harmful gases, residue, and liquids must be sternly administered, and it's appropriate dumping should be checked to keep them within a controllable stage, those who break the rules must be dealt with firmly. By establishing and implementing straightforward guidelines and standard operating procedures (SOPs) for throwing away waste utmost emission levels by all industrial/power generation facilities can be ensured, and the reproduction units that breach the rules must be profoundly castigated (Durani & Khan, 2018).

Conclusion

CPEC has major economic significance for Pakistan, but its environmental effects require much stronger analytical and policy attention. The study finds that the key problem lies in the weak integration of environmental governance into corridor planning and implementation. Coal dependence, transport emissions, land-use change, and uneven enforcement of environmental safeguards together create long-term ecological security risks. The article subsequently concludes that a more robust EA process, cleaner energy options, solid enforcement of regulations and increased community engagement are important. Without these measures, the developmental gains of the corridor may come with lasting ecological costs.

Pakistan must plan to generate energy from solar, wind, and hydro that are environmentally friendly and has fewer or no climatic hazards. Pakistani provinces such as Khyber Pakhtunkhwa and Gilgit have great potential to produce almost 5,000 MW through hydro. The study gave a framework to handle the environmental challenges and threats to CPEC by means of diverse parameters. The Government of Khyber Pakhtunkhwa government proposed the central government new projects that would produce 6,000 MW; however, the central government declined it (Baloch, 2018). The development most often always plays havoc with nature and the environment. Bearing in mind Gwadar, its natural beauty, and its undamaged beaches, Pakistan must go for environment and nature-friendly projects to avert the catastrophic blows of progress.

Future Implications

Future research should move beyond broad policy description and examine environmental change at the project and community levels in corridor-affected areas. Greater attention is needed to implementation gaps in EIA practice, institutional capacity, and the comparative environmental outcomes of coal-based and renewable projects. Field-based and participatory studies would also help explain how local communities experience environmental risk and governance failures under CPEC.

Additionally, there is limited knowledge about the effectiveness of institutions in environmental governance related to CPEC projects. In future research, attention needs to be given to the implementation of EIAs not only as policy but also in practice, with a focus on mitigating gaps in regulatory enforcement and on how contractors and project developers behave when it comes to compliance. There should be comparative case studies to understand the differences in environmental outcomes between coal-based energy projects and renewable energy projects under the framework of CPEC.

We need to further develop a theoretical framework on Green Political Theory and Environmental Security in the context of the national-scale transnational infrastructure regime (such as the Belt and Road Initiative). How development-related environmental trade-offs are argued to be necessary should be a subject of future scholarship, for example, by examining and challenging the forms of state discourse that tend to naturalize environmental trade-offs as a prerequisite for development in developing countries like Pakistan.

In methodological terms, future research needs to prioritize participatory methods with local actors, civil society organizations, and natural environment specialists as data sources, to move beyond state and elite sources. This would provide a more nuanced understanding of how people perceive environmental risk, how they adapt, and their socio-ecological resilience in corridor regions.

Lastly, there is an urgent need to monitor cumulative ecological changes over a longer timeframe to assess the long-term ecological impacts of coal emissions, deforestation, and alterations in land use patterns associated with SEZ development. However, unless the critical issues are studied properly, policy will revert to a reactive rather than a preventive mode, thereby reducing the effectiveness of environmental governance along the CPEC.

References

Abbas, A., & Ali, S. (2017). Nine proposed priority SEZs under CPEC and SEZ Act: An approach to industrial development. *Centre of Excellence for CPEC*, 1–18.

Aftab, N. (2020, December 15). CPEC to be turned into model green belt initiative. *The News International*. https://www.thenews.com.pk/print/758878-cpec-to-be-turned-into-model-green-belt-initiative

Ahmed, W., Tan, Q., Solangi, Y. A., & Ali, S. (2020). Sustainable and Special Economic Zone Selection under Fuzzy Environment: A Case of Pakistan. *Symmetry, 12*(2), 1–23. https://doi.org/10.3390/sym12020242

Alam, A. R. (2020, 01 03). Why don't CPEC projects factor in the climate crisis? *China Dialogue*: https://chinadialogue.net/en/business/11750-why-don-t-cpec-projects-factor-in-the-climate-crisis/

Alam, A., Bibi, K., & Waheed, A. (2023). CPEC is Blessing for Regional Peace and Prosperity. *Global Strategic & Securities Studies Review, VIII*(II), 1–8. https://doi.org/10.31703/gsssr.2023(viii-ii).01

Ali, T. Z., & Askari, M. U. (2023). Impacts of the China-Pakistan Economic Corridor on the natural environment of Pakistan. *Pakistan Social Sciences Review, 7*(4), 653–663.

Ashraf, M., & Shiyuan, Z. (2022). Transportation costs and time impact of the China-Pakistan Economic Corridor. *International Journal of Regional Development, 9*(1), 1–17. https://doi.org/10.5296/ijrd.v9i1.19519

Baloch, S. M. (2018, 04 18). CPEC's Environmental Toll. *The Diplomat*: https://thediplomat.com/2018/04/cpecs-environmental-toll/

Beg, S., Baig, T., & Khan, A. (2018). Impact of China-Pakistan economic corridor (CPEC) on human security and the role of Gilgit-Baltistan (GB). *Global Social Sciences Review, 3*(4), 17-30.

Chatzky, A., & McBride, J. (2020, 01 28). China's Massive Belt and Road Initiative. *Council on Foreign Relations*: https://www.cfr.org/backgrounder/chinas-massive-belt-and-road-initiative

Durani, M. Q., & Khan, M. B. (2018). The environmental impact of the China–Pakistan Economic Corridor (CPEC): A case study. *Abasyn Journal of Social Sciences, 11*(1), 201–221.

Dyer, H. (2018, January 7). Introducing green theory in international relations. *E-International Relations*. https://www.e-ir.info/2018/01/07/green-theory-in-international-relations/

Fatima, N., Baig, A., & Shah, B. A. (2019). China-Pakistan Economic Corridor (CPEC): Fostering the trade, investment and economic globalization. *Global Social Sciences Review, 4*(2), 283-290.

Fatima, N., Salman, A., & Nedim, M. (2017). Environmental cost of China-Pakistan economic corridor. *Sochi Journal of Economy, 11*(2), 99-106.

Furqan, M. (2018, 01 05). CPEC Route – A Complete Guide to CPEC and its Significance. *CPEC bulletin*: https://cpecbulletin.com/2018/01/05/cpec-route-a-complete-guide-to-cpec-and-its-significance/

Gul, S., Ishaque, W., & Asghar, M. F. (2021). Impact of China-Pakistan Economic Corridor (CPEC) on national development and integration in Pakistan. *Global Political Review, VI*(I), 50–65. https://doi.org/10.31703/gpr.2021(vi-i).05

Hasan, H. (2020, December 15). CPEC to be developed as model green belt and road initiative. *Zameen News*. https://www.zameen.com/news/cpec-model-green-belt-and-road-initiative.html

Hussain, S., Khan, F., & Ayaz, M. (2021). Politico-economic implications of CPEC on Pakistan. *FWU Journal of Social Sciences*, *15*(4), 147-162.

IUCN. (2022). Pakistan. https://iucn.org/our-work/region/asia/countries/pakistan

Jaleel, S., & Habibullah. (2021). China-Pakistan Relations under CPEC. Global *International Relations Review, IV*(III), 15–21. https://doi.org/10.31703/girr.2021(iv-iii).03

Javed, M., & Mustafa, G. (2026). Economic integration and geopolitical implications of the China–Pakistan Economic Corridor (CPEC). *Global Foreign Policies Review, 9*(1), 1. https://doi.org/10.31703/gfpr.2026(ix-i).01

Khan, H. U. (2019). Regional security threats to CPEC: a strategic overview. *Journal of the Research Society of Pakistan, 56*(1), 181.

Khan, H. U. (2020). BRI & CPEC: Strategic & economic depth for Pakistan. *South Asian Studies, 35*(01), 217-236.

Khan, H. U. (2020). China, the emerging economic power: options and repercussions for Pak–US relations. *International Politics* (Hague, Netherlands), 1.

Khan, H. U., & Khalid, I. (2018). CPEC and federalism: An analysis. *J. Pol. Stud., 25*, 207.

Khan, H. U., Khalid, I., & Shah, S. A. (2018). The CPEC: connector or divider. *Journal of Research Society of Pakistan*, 270-281.

Khan, N., Ahmad, R., & Xing, K. (2018). China Pakistan Economic Corridor (CPEC): Regional Development, Employment Opportunities and Policy Challenges. *Global Political Review, 3*(1), 12-23.

Kouser, S., Subhan, A., & Abedullah. (2019). Uncovering Pakistan's Environmental Risks and Remedies under the China-Pakistan Economic Corridor. *Environmental Science and Pollution Research, 27*(5), 4661–4663. https://doi.org/10.1007/s11356-019-07428-5

McGlinchey, S., Walters, R., & Scheinpflug, C. (2021, February 12). Green theory and climate change. *LibreTexts Social Sciences*. https://socialsci.libretexts.org/Bookshelves/Sociology/International_Sociology/Book%3A_International_Relations_Theory_(McGlinchey_Walters_and_Scheinpflug)/11%3A_Green_Theory/11.02%3A_Green_Theory_and_Climate_Change

Naureen, S., & Shahnawaz, M. (2017). Regional economic development and environmental sustainability: Assessing the patterns of ecological balance. *Journal of Economic and Social Development*, *14*(2), 45–58.

Rahman, Z. U., Naeem, M., & Ishaq, M. (2022). The geo-economics and geopolitical significance of Gwadar Port in the changing maritime scenario. *FWU Journal of Social Sciences*, *16*(4), 121-132.

Rauf, S. (2017, August 4). China-Pakistan Economic Corridor (CPEC). *Encyclopaedia Britannica*. https://www.britannica.com/topic/China-Pakistan-Economic-Corridor

Rehman, M. Z., Khan, A., & Jaffry, Q. R. (2017). Emerging political economy of CPEC future dynamics and perspectives for Pakistan. *Global Social Sciences Review, 2*(2), 24-40.

Saeed, F. (2017, 03 30). In China and Pakistan's coal romance, where's the love for the climate? *South Asia Journal*: http://southasiajournal.net/in-china-and-pakistans-coal-romance-wheres-the-love-for-the-climate/