

A Marxist Study of Green Industrialization and Sustainable Development in Pakistan through CPEC and Eco-Social Development

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Abstract

The China-Pakistan Economic Corridor (CPEC) is a game-changing economic project that will have a significant impact on Pakistan's future development. The China-Pakistan Economic Corridor (CPEC) is examined via an eco-socialist theoretical framework, with a focus on its potential to foster green industrialization and sustainable economic growth in Pakistan. Using a Marxist analytical lens, the paper examines the tensions between capitalist-oriented infrastructure expansion and ecological preservation, as well as potential red-green transition pathways. Although the original phases of CPEC focused on conventional energy and large-scale infrastructure, subsequent stages demonstrate a gradual connection with green development goals through renewable energy projects, sustainable agriculture collaboration, and rising green industrial regulations. Despite these attempts, CPEC mostly reflects profit-driven industrialization that exacerbates ecological degradation, fossil fuel dependence, and social displacement, deviating from eco-socialist objectives of ecological balance and worker wellbeing. This study uses a qualitative approach that incorporates document analysis, case studies, and stakeholder interviews to assess CPEC's economic, environmental, and social components in accordance to eco-socialist ideas. The study emphasizes the need to democratize economic planning, prioritize social use value above exchange value, and shift development from ecological modernization to metabolic restoration. The report is divided into five chapters that address theoretical foundations, economic context, environmental implications, and policy recommendations for establishing a transformative, community-centered model of sustainable development through CPEC.

Key words: Marxism, Ecological Manufacturing, Development that is Sustainable, The China-Pakistan Economic Corridor (CPEC), Environmental and Social Development

Introduction

Launched in 2015 as the centerpiece project of China's Belt and Road Initiative (BRI), the China-Pakistan Economic Corridor (CPEC) is a multibillion-dollar investment that spans industrial, transportation, and energy infrastructure projects throughout Pakistan. This huge project comes at a pivotal moment in Pakistan's history, as the country struggles with the twin issues of severe ecological vulnerability and economic development (Ye, 2020). Through large-scale energy and infrastructure projects, CPEC aims to transform Pakistan's economy, but its environmental effects

are still complicated and up for debate. The corridor's development parallels the increasing awareness on a worldwide scale that the current ecological crises necessitate drastic changes in economic structures and production methods this understanding is theoretically expressed in the burgeoning eco-socialism discourse. Eco-socialism, often known as ecological Marxism, is a synthetic theoretical framework that examines capitalism's basic incompatibility with sustainable human development by fusing ecological principles with Marxist criticisms of political economics (Lowy, 2002). This viewpoint becomes even more pressing in the context of Pakistan, where harsh weather, ecological degradation, and increased water scarcity all of which disproportionately impact working-class and peasant populations are manifestations of climate change. Since it highlights the conflict between the initiative's potential to reroute Pakistan's growth trajectory towards green industrialization and its concurrent reinforcement of capitalist development patterns that produce ecological contradictions, the eco-socialist lens proves especially pertinent for analyzing CPEC. Three main points are made in this essay. First, the core paradox of modern growth under late capitalism is embodied by CPEC: the simultaneous expression of "green" goals and environmentally damaging activities. Second, the initiative's new green elements, especially in its second phase, are a type of "ecological modernization" that preserves capitalist production relations rather than an ecological revolution. Third, a truly eco-socialist reorientation of CPEC is both conceivable and required, requiring the "metabolic rift" between human economic activity and natural systems to be closed, democratic control over production decisions, and the prioritization of social and ecological demands over profit. Through this analysis, the article presents the outline of an alternative, eco-socialist development paradigm and adds to larger theoretical arguments regarding the feasibility of sustainable development within capitalist parameters (Kalsoom Sumra, Hamza Iftikhar, Qudrattullah Omerkhel, & Humayra Siddique, 2025).

Methodology

In order to investigate the China-Pakistan Economic Corridor (CPEC) from a Marxist eco-socialist perspective, this study uses a qualitative methodology that combines document analysis, case studies, and interviews. The main goal is to evaluate the economic, environmental, and social aspects of CPEC, analyzing how its initiatives support or contradict eco-socialist ideals that place a high priority on social equality and environmental sustainability in state-led growth. With an emphasis on official narratives regarding economic goals, environmental policies, and social welfare, the analysis will start with a thorough examination of policy documents, government reports, and academic articles from Pakistani, Chinese, and international actors involved with or analyzing CPEC. To examine environmental costs and social outcomes, such as labor rights and local community development, in-depth case studies of representative CPEC projects such as Gwadar port development, energy generation initiatives, and industrial zones will be carried out. These case studies will assist in determining whether the development strategy of CPEC is truly sustainable and socially responsible or if it unintentionally perpetuates capitalist labor and resource dynamics. Disparities between declared objectives and actual effects will be revealed through the triangulation of documentary evidence with case-specific findings. Thematic analysis of the data will focus on key issues like social justice, labor exploitation, environmental sustainability, and economic growth. This framework will show how CPEC supports or contradicts eco-socialist development principles and will enable a critical evaluation of whether CPEC provides a workable model for equitable development and sustainable growth. If helpful, think about adding interviews to capture stakeholder viewpoints and enhance the analysis's interpretive depth.

Theoretical Frameworks: Eco-Socialism as Analytical Lens

Eco socialism places a strong emphasis on the necessity of developing an environmentally sound definition of the "good life." This entails adopting sustainable farming methods, encouraging

renewable energy, and reevaluating consumption trends (Albritton, 2019). The objective is to establish a new Eco socialist society that places equal emphasis on social and ecological well-being. Eco socialism promotes community involvement in economic decision-making through participatory democratic planning. By addressing local social and environmental issues, this democratic method promotes a sense of accountability and ownership for sustainable activities. At its core, Eco socialism promotes a vision of society where social and ecological justice is achieved through collective decision-making and democratic participation. The relationship between Eco socialism and participatory democracy is foundational to the Eco socialist framework, as it challenges traditional top-down governance and advocates for grassroots involvement in political, economic, and environmental decision-making (Lundmark, 1998). A strong theoretical framework for examining the ecological aspects of economic development projects like CPEC is provided by eco-socialism, which is the result of the synthesis of ecological principles and Marxist critique. Fundamentally, eco-socialism holds that capitalism is the primary cause of the ecological problem, contending that its unrelenting drive for expansion and profit inevitably leads to environmental deterioration (Ramay, 2020). This viewpoint contends that real sustainability requires a fundamental shift in socioeconomic relations, challenging conventional environmental policies that aim to balance ecological sustainability with ongoing capital accumulation. Marx saw how the nitrogen cycle was disrupted by capitalist agriculture, which moved food and fiber from the rural to the city, depleting soils and concentrating trash in urban areas. This idea extends to current ecological issues, such as the disruption of carbon metabolism caused by burning fossil fuels and the devastation of aquatic ecosystems due to industrial fishing, both of which are phenomena that are important to consider while examining the environmental effects of CPEC (Shahani, 2025). By generating tensions that cannot be reconciled within the framework of capitalism, the metabolic rift framework demonstrates how capitalist production inexorably threatens the ecological prerequisites of its own existence. The "Lauderdale Paradox," as called by John Bellamy Foster in honor of James Maitland, the eighth Earl of Lauderdale, who noted that capitalist systems simultaneously increase private wealth while destroying public wealth the natural commons upon which all life depends is another way that eco-socialism advances. The privatization of water through packaged drinking water boosts private profits while the aquifers and rivers that make up public wealth grow more contaminated and depleted. This contradiction is particularly evident in modern-day Pakistan. When applied to CPEC, this analytical framework sheds light on how, without deliberate planning to the contrary, the project may result in economic expansion (private wealth) and the possible degradation of ecological systems (public wealth). The catchphrase "system change not climate change" is used by eco-socialists to highlight the fact that technology fixes and capitalist policy changes alone will not suffice to solve the ecological catastrophe. The eco-socialist belief that capitalism's need for exponential growth what Marx called "capital's impulse towards self-expansion" inevitably clashes with Earth's limited ecological resources is reflected in this (Brewer, 1948). According to this viewpoint, real sustainability necessitates a shift to a socialist economy that prioritizes ecological integrity and human needs over profit maximization. This theoretical framework offers the crucial perspective for assessing the potential for green industrialization and the suitability of CPEC for sustainable development.

Table: Key Eco-Socialist Concepts and Their Relevance to CPEC Analysis:

Concept	Theoretical Meaning	Relevance to CPEC
Metabolic Rift	Disruption of society-nature interchange under capitalism	Analyzing environmental impacts of CPEC infrastructure

Lauderdale Paradox	Inverse relationship between private riches and public wealth	Assessing resource commodification under CPEC
Social Metabolism	The pattern of society's material and energy exchange with nature	Evaluating CPEC's overall ecological footprint
Ecological Imperialism	Externalizing environmental cost to peripheral regions	Examining North-South dynamics in China-Pakistan relationship

CPEC's Environmental Contradictions: A Metabolic Rift Analysis

This commitment to fossil fuel infrastructure represents a continuation of the carbon-intensive development model responsible for global ecological crisis, locking Pakistan into energy pathways that exacerbate rather than ameliorate climate change (Rohani, 2023). The physical infrastructure development under CPEC has similarly generated substantial ecological impacts, particularly through large-scale deforestation and habitat destruction. The construction of road and rail networks has necessitated widespread clearance of forested areas, with one report indicating that over 54,000 trees were felled in districts like Abbottabad and Nowshera in 2017 alone for CPEC-related transportation infrastructure. This deforestation not represents a direct loss of biodiversity but also undermines Pakistan's already limited carbon sequestration capacity while increasing vulnerability to climate-induced disruptions such as landslides and flooding. These developments exemplify the metabolic rift paradigm, as they disrupt local ecosystems while transferring environmental costs to marginalized communities and future generations (Kalsoom Sumra, Hamza Iftikhar, Qudrattullah Omerkhel & Humayra Siddique, 2025). CPEC projects have additionally intensified what Marx termed the "robbery of the soil"—the systematic depletion of natural resources without regard for ecological regeneration. Nowhere is this more evident than in water-stressed regions of Pakistan where CPEC industrial and agricultural projects operate. The initiative's potential to increase water demand for industrial processes, coal power generation, and expanded agricultural exports threatens to exacerbate Pakistan's already critical water scarcity (Brett Clark, John Bellamy Foster, and Daniel Auerbach, 2025). This dynamic reflects what eco-socialists identify as capitalism's inherent tendency to treat natural resources as "free gifts" to be appropriated without consideration of their regeneration cycles or ecological functions a fundamental contradiction in the capital-nature relationship (Burkett, 1999). The spatial reorganization of economic activity under CPEC further illustrates the metabolic rift concept. The development of Special Economic Zones (SEZs) and industrial corridors concentrates production in specific regions while dispersing environmental costs across wider territories. This spatial fix for capital's contradictions generates new ecological problems, including air quality deterioration from increased vehicular traffic along CPEC routes and industrial pollution from SEZs (Zeng, 2021). The transportation infrastructure, while facilitating economic connectivity, also enables more extensive resource extraction and commodity circulation, intensifying society's overall metabolic throughput despite efficiency gains in individual processes. Perhaps the most profound contradiction lies in the tension between CPEC's development model and Pakistan's extreme climate vulnerability. As one of the countries most threatened by climate change despite minimal historical contribution to global emissions, Pakistan faces the paradox of pursuing carbon-intensive development to address pressing economic needs while simultaneously confronting climate impacts that undermine development gains. CPEC's infrastructure projects in environmentally sensitive areas like Gilgit-Baltistan and coastal regions potentially increase disaster risks, including landslides, mudslides, and flood vulnerabilities. This contradiction exemplifies the broader global dilemma of pursuing development within a capitalist framework that systematically undervalues ecological integrity and climate resilience (Bahar Shah, Faisal Ahmad, & Sibtain Abbas, 2025).

Green Industrialization Under CPEC: An Eco-Socialist Evaluation

Though they are still limited by capitalist modernity, CPEC's changing trajectory shows growing engagement with green industrialization paradigms despite the major environmental constraints mentioned above. Projects like the Quaid-e-Azam Solar Park in Bahawalpur, one of Asia's largest solar facilities, which spans 6,500 acres with a 1,000 MW capacity, and wind power projects in Jhimpir, which greatly expand Pakistan's clean energy portfolio, demonstrate the second phase of CPEC's notable shift toward renewable energy. Since renewable energy is becoming more and more affordable, this shift satisfies both ecological and financial demands. However, as it preserves capitalism's core growth goal and productive linkages, this change is seen from an eco-socialist standpoint as "ecological modernization" rather than systemic change. Contradictory potentials are also reflected in CPEC's growing emphasis on green finance systems. Professionals like Shamshad Akhtar have argued that Pakistan's bilateral collaboration with China should prioritize "green finance as a national imperative" and have suggested cutting-edge tools like green bonds, debt-for-nature swaps, and green special economic zones (Muhammad Qamar Rasheed, Zhao Yuhuan, Abudl Haseeb, Zahoor Ahmed & Shah Saud, 2024). These techniques constitute what eco-socialists refer to as the financialization of nature the expansion of market logic and financial tools into ecological management even though they may be able to reallocate capital toward environmentally beneficial projects. Instead of addressing the underlying social relations of production, this approach runs the risk of limiting environmental preservation to a technical issue of efficient capital allocation. The conflict between systemic change and technology solutions is exemplified by the agriculture modernization component of CPEC. Chinese support for agricultural technology, such as cutting-edge irrigation systems, storage facilities, and market accessibility, may increase output and resource efficiency. This collaboration is best demonstrated by the red chili farming project, in which Chinese cultivars are grown on Pakistani model farms for sale to China (Ali Abid, Shang jie, & Saif Ullah, 2018). The potential for incorporating sustainability issues into large-scale infrastructure is demonstrated by the creation of green infrastructure projects under CPEC, such as the Matiari-Lahore Transmission Line, which provides clean electricity to about 10 million households. In a similar vein, projects like the landfill project and the Gwadar Smart Environment Sanitation System mark significant advancements in urban environmental management. The potential for incorporating sustainability issues into large-scale infrastructure is demonstrated by the creation of green infrastructure projects under CPEC, such as the Matiari-Lahore Transmission Line, which provides clean electricity to about 10 million households. In a similar vein, projects like the landfill project and the Gwadar Smart Environment Sanitation System mark significant advancements in urban environmental management. The complicated interaction of economic and environmental goals is exemplified by the promotion of electric cars (EVs) through CPEC, which includes collaborations with Chinese firms like BYD to set up production facilities in Pakistan. EV adoption replicates the automobile-centric transportation model and creates new environmental costs through the production and disposal of batteries, even though it may lessen urban air pollution and reliance on fossil fuels. A truly sustainable mobility transition, according to eco-socialists, would place more emphasis on infrastructure for bicyclists and pedestrians, public transportation, and urban planning that minimizes the need for transportation. These strategies more deeply challenge capitalist spatial organization than technological substitution within the same transportation paradigm.

Table: Contrasting Conventional versus Green Components in CPEC Project

Project Category	Conventional Approach	Green Transition	Eco-Social Critique
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Energy category	Thar coal-fired power plants	Quaid-e-Azam Solar Park ,Karot hydropower	Technological substitution without challenging energy consumption paradigm
Industrial Development	Conventional Special Economic Zones	Green SEZ's,eco-industrial parks	Maintains growth imperative and export-orient production
Transportation	Expanded highway networks	Electric vehicle manufacturing	Reproduces automobile dependency rather than transforming mobility systems
Agriculture Development	Commercial export-oriented models	Advanced irrigation technology	Reinforces metabolic rift without addressing production relations

Conclusion

According to this research, CPEC is an incongruous development project that both exacerbates ecological difficulties and may pave the door for more environmentally friendly industrialization routes. The corridor is the "spatial fix" for capital's conflicts, which David Harvey refers to as the geographical extension of capitalist development to momentarily alleviate its internal crises of excessive accumulation. But within the context of capitalism, this spatial fix creates new metabolic rifts and ecological conflicts that cannot be permanently fixed. Despite being significant ecological modernization initiatives, CPEC's green elements are nevertheless limited by a development model that places more emphasis on economic expansion within current capitalist relationships than on radically shifting production toward ecological integrity and human needs. CPEC's chances of undergoing a truly eco-socialist transition depend on a number of structural adjustments. First, in order to guarantee that economic activity serves social needs rather than capital accumulation, democratic control over investment choices and production goals would be necessary. This would entail the planning of CPEC projects, especially those with major environmental implications, with the active participation of workers, peasants, and impacted communities. Second, deliberate attempts to restore ecological cycles through regenerative agriculture, industrial symbiosis that emulates natural ecosystems and circular economy concepts would be necessary to close the metabolic chasm. Third, putting social use value ahead of exchange value will shift CPEC away from export-oriented production and profit-making and toward addressing fundamental human necessities including food, shelter, healthcare, education, and a clean environment. Pakistan is at a turning point in its history, with urgent development requirements and serious ecological risks. Although CPEC offers a great chance to change the course of the nation's development, its current shape is still limited by capitalist principles that lead to ecological inconsistencies. An eco-socialist strategy would essentially refocus China toward democratic, ecologically regenerative development while utilizing Chinese investment and collaboration. To do this, the productivity paradigm shared by capitalist and historical socialist development models would need to be questioned, with sufficiency, equality, and ecological integrity being given precedence over merely economic growth. This analysis's theoretical contribution is its application of eco-socialist ideas to a tangible development project, showcasing their capacity to explain the inconsistencies of modern growth under late capitalism. The "policy implications" of an eco-socialist approach to international development cooperation should be further explored in future studies, with particular mechanisms for democratic planning, metabolic restoration, and just transition in projects such as CPEC being articulated. The decision between green capitalism and true eco-socialism will grow more pressing as the ecological catastrophe worsens, with significant ramifications for Pakistan and the international community.

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