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Sustainability and Power in Transnational Infrastructure: The Environmental Politics of the Belt and Road Initiative

Lin Wang^a
Farhan Zaman^b

Abstract

The Belt and Road Initiative represents the People's Republic of China's most expansive economic undertaking and has commanded sustained international attention since its announcement in 2013. Infrastructure programmes unfolding in more than one hundred and forty partner states, many classified as developing or least-developed economies, are poised to recalibrate existing regimes of environmental governance. Guided by a polycentric analytical lens, this study traces the domestic institutional arrangements China has begun to assemble in support of a 'green' Belt and Road Initiative, foregrounding the contributions of governmental agencies, corporate actors, civil-society organisations, and financial institutions. Qualitative evidence reveals that the current governance architecture rests predominantly on voluntary corporate engagement: principles of self-regulation underpin a suite of bilateral and multilateral sustainability initiatives ranging from green financing standards to ecological management guidelines. Yet the realisation of stringent environmental objectives is contingent not only on priorities set in Beijing, but also on the political and economic agendas pursued by host governments. Misalignment between these priorities may dilute enforcement capacity and limit the diffusion of best practices. The paper, therefore, identifies a series of challenges confronting transnational environmental governance variability in regulatory stringency, uneven monitoring capabilities, and divergent accountability norms and recommends avenues for further inquiry. Future research should compare implementation trajectories, scrutinise financing mechanisms, and design accountability arrangements capable of reconciling ambitious growth imperatives with urgent ecological constraints, thereby deepening understanding for scholars and practitioners alike in the coming decade. Such work will be critical for evaluating whether the initiative can align large-scale development with sustainable planetary boundaries.

Keywords: Belt and Road Initiative, Environmental Governance, Green Finance, Transnational Sustainability

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1. INTRODUCTION

In 2013, President Xi Jinping of China unveiled the Belt and Road Initiative, a sweeping development strategy aimed at revitalizing the ancient Silk Road in order to boost intercontinental connectivity and promote robust trade relations between Asia, Europe, and Africa. The initiative encompasses extensive investments in the construction and modernization of transportation networks—including highways, railways, ports, and airports—as well as the expansion of energy infrastructure and digital connectivity throughout participating regions (NDRC, 2015; Summers, 2016). The Belt and Road Initiative incorporates both land-based economic corridors and maritime routes, facilitating more efficient logistics and greater regional integration (Hillman, 2018). The Belt and Road Initiative does not just end with building physical infrastructure but also aims at policy coordination, financial integration, international cooperation in scientific and technological innovation, and cultural exchanges among member countries (NDRC, 2015; Du & Zhang, 2018; Modibbo & Inuwa, 2020). A wide variety of funding sources have come together to support this ambitious agenda.

^a School of Economics and Management, University of Chinese Academy of Sciences, Beijing, China, phd.linwanglinor@ucas.ac.cn

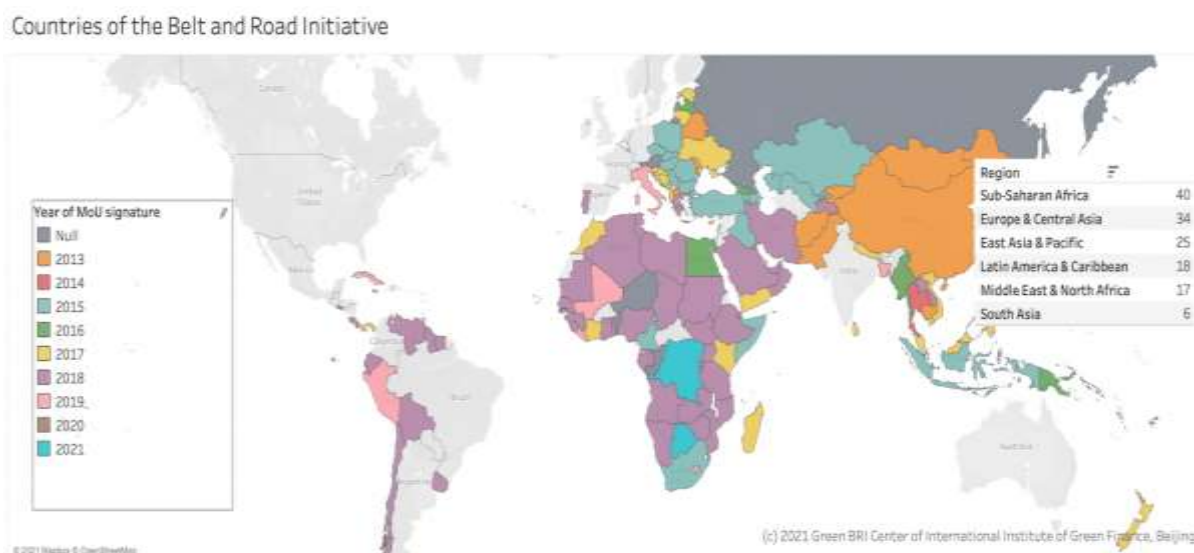
^b School of Economics and Management, University of Chinese Academy of Sciences, Beijing, China

Chinese state-owned banks, alongside private commercial lenders, international financial institutions, and the governments of partner nations, collectively provided more than 500 billion United States dollars in investment by 2018 (European Union Chamber of Commerce in China, 2020; Hurley et al., 2019). These financial flows are instrumental in catalyzing new development opportunities and enhancing the connectivity of Eurasian, Asian, and African economies.

Belt and Road Initiative projects have become central to China's recent international socio-economic engagement, significantly shaping its development partnerships with foreign countries (Zhang, 2018). By January 2021, the Chinese government had entered into more than two hundred cooperation agreements with approximately one hundred forty participating countries and thirty international organizations, underscoring the initiative's rapidly expanding reach (OECD, 2018; Xinhua, 2021). The scope of the Belt and Road Initiative continues to broaden as additional nations and stakeholders join, yet the absence of an official, centralized project registry within China complicates efforts to create a comprehensive inventory of all Belt and Road Initiative activities (Hillman, 2018). Consequently, accurately mapping the geographical extent and cataloging the full range of projects under the Belt and Road Initiative remains challenging for scholars and policymakers alike (Hurley et al., 2019). It is worth noting, however, that there are a few countries like Turkmenistan, which did not really create bilateral undertakings with China at first, but later came into the initiative and undertook several projects with it (Xinhua, 2017b; European Union Chamber of Commerce in China, 2020). These dynamic extensions indicate the active and adaptive multiprocessing nature of the Belt and Road Initiative concerning international cooperation.

The vast scale and quick implementation of development activities associated with the Belt and Road Initiative have increased scrutiny of their environmental effects from a growing number of scholars and international organizations alike (Ascensão et al., 2018; Dong et al., 2018; Raja & Iqbal, 2019; Adeel, 2019; Akbar & Hayat, 2020; Hughes et al., 2020; Russo, 2022; Ullah et al., 2022; Marc & Roussel, 2024). As Belt and Road Initiative infrastructure projects extend across diverse and often ecologically sensitive regions, the risk of environmental degradation—including habitat loss, biodiversity decline, and increased carbon emissions—poses a significant challenge to the realization of sustainable economic growth (Anees & Yan, 2019; Teo et al., 2020; Rehman & Malik, 2020; Fateh & Fakhri, 2021; Sun et al., 2022). The prospect of balancing accelerated development with effective environmental stewardship is particularly complex given the Initiative's reach into areas characterized by fragile climatic and ecological conditions (Chen et al., 2022; Marc et al., 2025; Mehdi et al., 2025). Recently, in response to increasing international criticisms and calls for climate responsibilities, various Chinese ministries have been establishing policy frameworks for the promotion of sustainability and the minimization of environmental footprints from activities under the Belt and Road Initiative. Some of these undertakings are aimed at promoting a "Green Belt and Road Initiative," which includes low-carbon infrastructure, conservation of natural habitats, and the imposition of environmental standards on the planning and implementation of projects (Ahmad et al., 2024; Belt and Road Portal, 2017a; Yang et al., 2022; Audi et al., 2025). Initiatives such as these are meant to situate Belt and Road Initiative development in the wider context of growing global trends favoring green growth and the transition to sustainable low-carbon economies, thereby responding to international concerns and granting legitimacy to the Belt and Road Initiative as a pathway to both economic and ecological advancement (Zhang et al., 2023).

Figure 1: Partner countries in BRI projects till Jan 2021



New contributions studying the geopolitical and economic angles of the Belt and Road Initiative focus specifically on the new role of China in the international economic system (Beeson, 2018; Gong, 2019; Zhou & Esteban, 2018) literature. Scholars agree one hundred percent that such a comprehensive realization of the aims of the Belt Road Initiative would perhaps change the geopolitical structures as a whole and, on a large scale, impact the whole globe (O'Neill, 2019; Rolland, 2017). Research has shifted its debate from a general focus on the potential transformations in geopolitical

structure to examining the new environmental emerging concerns that have gained recognition concerning the Belt and Road Initiative as a critical area of research. However, there is still a significant dearth and disaggregation in the specific academic literature that relates to the frameworks and effectiveness of environmental governance mechanisms for which the Belt and Road Initiative is framed (Ascensão et al., 2018; Hughes et al., 2020). This dissertation critically investigates the governance institutions of environmental management practices associated with Belt and Road Initiative projects being implemented in partner countries. The subjects of this architecture under study focus: a combination of government and private actors; the predominant types of political systems in countries of participation; and a collection of rules and decision-making procedures shaping environmental outcomes (Ullah, 2019; Coenen et al., 2021; Zhang et al., 2022). This thrust underscores the requirements for collaborative engagement between the Chinese government, partner countries of the Belt Road Initiative, and global governance bodies in achieving long-lived impacts of these widespread transnational projects on sustainable development (Zhai, 2018; Teng et al., 2022).

Now, considering all the autonomous and interrelated environmental institutions engaged in the Belt and Road Initiative, this analysis assumes the overall configuration of governance as the key focus of inquiry rather than judging the effectiveness of specific organizational measures in isolation. Following the approach suggested by Dauvergne and Clapp (2016), this research methodically selects its focus in the study of formalized institutional frameworks which purposively leaves out socio-cultural norms and value systems as elements under consideration to better understand the interaction and functional operations of formal governance institutions addressing environmental problems associated with large-scale infrastructural and developmental projects, ultimately contributing to the evolving discourse on transnational environmental governance and policy integration (Becquelin, 2019; Ginsburg et al., 2022).

The empirical foundation of this study is constructed from a comprehensive review of official documents, governmental publications, scholarly articles published in reputable international journals, and reports issued by leading global organizations, all of which are available in the English language. While it is recognized that primary Chinese-language sources might provide supplementary insights, the majority of critical policy data concerning the Belt and Road Initiative has been translated or is already accessible in English through official channels and internationally recognized organizations (Hameiri & Jones, 2020; Huang, 2019). The Belt and Road Initiative stands as an unprecedented transnational development undertaking, currently ongoing and poised to reshape the socio-economic and environmental dynamics of numerous regions across the world (Ferdinand, 2016; Yu et al., 2021). Given that the Belt and Road Initiative remains in an evolutionary phase, there is a pressing need for more extensive empirical research to evaluate its multifaceted impacts on development trajectories and environmental outcomes in partner countries (Huang, 2019; Ascensão et al., 2018). In the next sections, this analysis reviews the main environmental issues and prospects generated by the Belt and Road Initiative. It includes a discussion of how the governance structures are evolving, identifies the key challenges to effective governance, and analyzes how the Belt and Road will shape the broader architecture of global climate change governance (Zhang et al., 2022; Teng et al., 2022). The final section discusses avenues for further research and stresses that the environmental governance mechanisms of the Belt and Road Initiative should be continuously and critically assessed and systematically evaluated to inform policy and practice in this fluid and impactful arena of global development (Hughes et al., 2020; Ginsburg et al., 2022).

2. ENVIRONMENTAL IMPLICATIONS OF BRI

The analytical views regarding the Belt and Road Initiative as a conduit for sustainable development would thus broadly fall into two distinct camps. The first approach, espoused by various representatives from governments, policymakers, and academic researchers, views the Belt and Road Initiative as an efficient means to realize global sustainable development goals (Jin, 2018; Lewis et al., 2021). This view was widely enunciated by President Xi Jinping during the first Belt and Road Initiative Forum in 2017, where he highlighted the need for international cooperation in the preservation of ecology and environment and called for building a robust ecological system to achieve targets set by the 2030 Agenda for Sustainable Development (Xinhua, 2017). Further, the countries benefiting from the Belt and Road Initiative stand to gain from huge financial resources extended by major Chinese institutions, thus potentially assisting these countries in meeting their obligations under the Paris Agreement (Coenen et al., 2021; Malik & Ullah, 2024). Besides finance, China's global leadership in the production, deployment, and innovation of renewable energy technologies positions the country as a key partner for Belt and Road Initiative countries in unlocking their renewable energy development (Andrews-Speed & Zhang, 2018; Harlan, 2021). By sharing its technological expertise and exporting its equipment, China will assist in the adoption of renewable energy options so that its partner countries can decarbonize, while also helping to realize broader international climate policy goals (Yu et al., 2021).

On the contrary, the second group of analysts, which comprises independent analysts and environmental organizations, has expressed major reservations regarding the ecological integrity of the Belt and Road Initiative. Critics fear that the Belt and Road Initiative's large-scale infrastructural and trade projects could create adverse environmental externalities that might outweigh the anticipated economic benefits in the end (Hillman, 2018; Ahmad & Ullah, 2023; Li et al., 2017). Supporting evidence includes studies that state that development under the Belt and Road Initiative could worsen land degradation, promote deforestation, and change land-use patterns, creating widespread ecological repercussions (Shan et al., 2019; Latif & Ullah, 2024). The upsurge in construction activities, i.e., roads, bridges, and all forms of infrastructure, too, would be interconnected with increased GHG emissions that stand seriously against attempts toward global climate change mitigation (Zhou et al., 2018; Zhang et al., 2017). Lacking in the Belt and Road Initiative is a unified and enforced mechanism for addressing climate risks, looking more forlornly as a strong predictor for possible enhanced environmental

degradation by such projects than a pathway to sustainable development outcomes (Ascensão et al., 2018; Hughes et al., 2020). The heterodox perspectives thus reveal the difficulties and complexities in assessing the sustainability of the Belt and Road Initiative. On the path towards a successful interplay between economic growth and environmental protection, the readiness of stringent governance frameworks will lock in mechanisms to contain adverse ecological effects while amplifying development gains for beneficiary countries (Ginsburg et al., 2022).

As it points out, a recent extensive study by the Mercator Institute for China Studies indicates that since its start, over USD 50 billion has been poured into Belt and Road Initiative investments concerning completed projects, a large proportion of which has been afforded to energy. More specifically, this report indicates that it has been approximately USD 20 billion for renewable energy projects, USD 15 billion for fossil-fuel-based electricity generation projects, and USD 12 billion for the improvement and optimization of the grid infrastructure system (MERICS, 2023). The major concentration toward renewable energy projects is owing to the development of several large-scale hydropower schemes in partner countries, underpinning the strategic focus on increasing clean energy capacity in important areas (IEA, 2022; Yu et al., 2021).

This research adopts a systematic approach to map and assess both the extent and spread of these projects, using the Reconnecting Asia Database, commissioned by the Center for Strategic and International Studies, which gives the most detailed input on infrastructure investment under the Belt and Road Initiative. Analysis of the database shows that by 2020, 370 Belt and Road Initiative projects had been recorded in 51 participating countries, totaling more than USD 500 billion (CSIS, 2020). Sectoral breakdowns of these projects indicate that the transport sector holds the largest share, comprising 215 projects, followed by the energy sector with 159 projects.

Despite China's acknowledged leadership in the manufacturing and global dissemination of renewable energy technologies and equipment, the majority of energy investments under the Belt and Road Initiative remain concentrated in fossil-fuel-based projects, especially coal and natural gas power plants (Andrews-Speed & Zhang, 2018; IEA, 2022; Khan et al., 2025). This ongoing reliance on non-renewable energy sources is particularly pronounced in high-cost projects located in countries such as Pakistan, Russia, Bangladesh, and Belarus, where traditional energy infrastructure often prevails due to economic, technical, or policy constraints. These trends highlight the ongoing tension between ambitions for low-carbon development and the practical realities of energy investment patterns within Belt and Road Initiative frameworks (Tagliapietra, 2022; Yu et al., 2021).

3. ENVIRONMENTAL GOVERNANCE OF BRI

The physical infrastructure established through the Belt and Road Initiative is complemented by soft infrastructure initiatives, most notably articulated in the framework of the green Belt and Road Initiative. This paradigm aims to cultivate a holistic governance mechanism to stimulate project coordination and strengthen implementation with respect to the Belt and Road Initiative activities. This core goal of the governance mechanism is to have widespread participation from a broad spectrum of stakeholders, ranging from government agencies and private enterprises to civil society actors in their search for solutions to complex environmental and developmental challenges (Young et al., 2015). This study conceptualizes environmental governance as arrangements of regulatory processes, organizational structures, and institutional mechanisms through which political actors influence environmental decision-making and the outcomes thereof, as well as corresponding definitions present within the academic literature (Lemos & Agrawal, 2006).

Based on these theoretical foundations, our analysis interprets environmental governance in an institutional framework, where institutions are seen as durable and interrelated systems of formal and informal rules, practices, and norms that define expectations for behavior, restrict or enable action, and shape collective action dynamics (Keohane, 2020). The governance architecture behind Belt and Road Initiative projects is quite intricate, interweaving autonomous and interdependent actors from the public and private sectors of China and host countries, international organizations, and multilateral agencies.

Studies analyzing the governance systems of the Belt and Road Initiative have approached this complexity from differing analytical angles. One influential stream is the analysis of governance fragmentation, in which various overlapping and at times competing governance arrangements coexist, resulting in regulatory gaps or inconsistencies (Biermann et al., 2009; Kim, 2020). Another renowned approach, in contrast, stems from polycentric governance theory and draws attention to the self-organization by various actors at different scales and across jurisdictions (Cole, 2011; Dorsch & Flachsland, 2017). The notion of polycentric governance is especially useful when there are changing social-ecological systems with rapidly evolving actors, making it possible for scholars and practitioners to remain alert to changing governance dynamics (Folke et al., 2019). Highly transnational trade and investment flows ensuing from the Belt and Road Initiative necessitate strong collaboration of state actors, societal groups, and market players in dealing with and resolving a myriad of governance problems that typically arise in large-scale development (Challies et al., 2019). In this endeavor, we deploy the polycentric governance framework to analyze critically the environmental governance of the Belt and Road Initiative projects, looking carefully at the roles and interactions of national and international actors in influencing governance results and facilitating sustainable development.

4. GREEN BRI: GOVERNANCE IN CHINA

The governance of Belt and Road Initiative projects involves a diverse set of stakeholders who map onto the comprehensive and transnational reach of the Initiative. This includes several ministries and regulatory bodies in China, corporations partially or wholly owned by the government, large financial institutions such as national and regional banks,

and an increasing number of private sector companies. Conjoining these actors shapes, coordinates, and implements the diverse and complex policy landscape related to Belt and Road Initiative activities of their account (Ginsburg et al., 2022; Zhang et al., 2022). Besides, in addition to norms set down by governmental authorities, the industries taking part in Belt and Road Initiative projects adopt international best practices and guidelines prescribed by global organizations such as the Organization for Economic Co-operation and Development and the United Nations. There is a movement to consensually commit to these global policies in the industrial networks concerned with the Belt and Road Initiative, showing a unified commitment to the ideals of the green Belt and Road Initiative and sustainable development (Tagliapietra, 2022). These standards have historically been adopted in a voluntary manner under the traditional nomenclature of 'soft law'. The soft law is described in this literature as the processes and practices made in this sphere that enjoy broad support from industry and organizations but are for the greater part non-binding in character (Wang, 2019). Most of the Belt and Road Initiative agreements and treaties will instead function through the promotion and encouragement of cooperation and learning among interested parties in a non-legally binding manner (Zhai, 2018).

In respect of the foundational policy documents for the Belt and Road Initiative, mention is made of the 2015 publication entitled "Vision and Actions on Jointly Building Silk Road Economic Belt and 21st Century Maritime Silk Road", and of the "Vision for Maritime Cooperation under the Belt and Road Initiative" released in 2017 by the Chinese government (National Development and Reform Commission, 2015; Xinhua, 2017). Both documents state the need for ecological protection and environmental stewardship in the activities of the Belt and Road Initiative. However, it should be noted that these documents were more constructive in the nature of guiding principles and not binding or enforceable regulatory requirements, which means there was no common or enforceable rule set that stakeholders had to comply with. The governance model thus relies on informal agreements and voluntary commitments towards ecological sustainability, which may raise questions about the overall effectiveness and uniformity of environmental protection among BRI projects (Ascensão et al., 2018; Yu et al., 2021).

The strategic orientation of green development within the Belt and Road Initiative is articulated through two principal policy documents: the "Guidance on Promoting a Green Belt and Road" and the "Belt and Road Ecological and Environmental Cooperation Plan." These foundational texts outline the vision for environmentally sustainable growth in Belt and Road Initiative projects, emphasizing the imperative for low-carbon development pathways, robust protection of biodiversity, and responsiveness to the evolving realities of climate change (Belt and Road Portal, 2017). Central to both documents is the explicit alignment with the United Nations 2030 Agenda for Sustainable Development, positioning the Belt and Road Initiative as a conduit for advancing the Sustainable Development Goals through cross-border cooperation and innovation. Through these initiatives, China has sought to portray itself as a leading proponent of global climate governance, demonstrating its intent to contribute positively to the international environmental agenda (Zhou et al., 2018; Tagliapietra, 2022). Nevertheless, the operational aspects of these policy commitments are limited, as the published materials enumerate a list of 25 demonstration projects without providing substantive information about monitoring mechanisms, implementation strategies, or evaluation criteria. Plans for integrating additional environmental conservation initiatives into the Belt and Road Initiative by 2025 have been proposed, with the ambition of achieving elevated standards for environmental protection and making measurable progress towards the realization of Sustainable Development Goals by the year 2030 (Belt and Road Portal, 2017).

One of the notable provisions of the aforementioned policy documents is the emphasis on the establishment of a corporate environmental governance framework for Belt and Road Initiative participants. This framework underscores the responsibility of enterprises to adhere not only to international environmental norms and regulations but also to national guidelines promulgated by relevant ministries within China. Belt and Road Initiative firms are encouraged to adopt high social responsibility standards and adhere to the evolving set of green Belt and Road Initiative principles aimed at sustainable business conduct (Coenen et al., 2021).

China, however, has adopted a more sweeping approach in regulating overseas investments, considering their environmental performance beyond the precincts of Belt and Road Initiative-specific policy measures. Factors such as the increasing level of international scrutiny and instances of environmental non-conformity of Chinese firms abroad have contributed to this twin-track approach. In its response, the Chinese government has issued guidelines and notices to compel Chinese enterprises to respect and observe the environmental legislation of countries that host them (Percival & Zhang, 2020). The policies, however, have not been effective due to their voluntary nature, and without a hard law to enforce environmental accountability for Chinese investments outside China, they are quite ineffective. Since 2003, however, an Environmental Impact Assessment has been a statutory requirement for all construction-related activities within China, thus providing a clear legal mechanism for holding Chinese firms accountable on environmental issues domestically. But these domestic obligations do not extend to overseas operations, where the exercise of compliance depends on voluntary acceptance and self-regulation (Coenen et al., 2021; Zhou et al., 2018).

It has traced its steps since establishing landmark regulatory interventions that would affect environmental and social risk assessment in China's financial sector. The issuing of the 2012 "Green Credit Guidelines" signaled a shift in putting the onus on Chinese banking and financial institutions to develop systems for identifying, measuring, monitoring, and managing social and environmental risks associated with their lending activities (China Banking Regulatory Commission, 2012). Building on that foundation, the "Guidelines for Establishing the Green Financial System" issued in 2016 highlighted the government's commitment to the establishment of more sustainable and responsible banking, focusing on green finance, climate resilience, and environmentally friendly project support (People's Bank of China, 2016). Within China, compliance with those frameworks is mandatory and subject to monitoring. However, with regard to its overseas

investments under the Belt and Road Initiative, the application of Chinese environmental laws becomes drastically limited. The assessment of environmental and social risk arising from credit activities is assessed by the standards of the host country and not through the binding application of China's strict environmental standards (He, 2017; Tagliapietra, 2022). This split lends itself to a serious gap in governance over the environmental aspects of Chinese investments abroad. Regarding the green BRI, China has by now constructed an international and transnational governance system for the green Belt and Road Initiative beyond the issuance of environmental guidelines and regulatory frameworks for Chinese firms working abroad. This governance vision rests on a broad environmental cooperation network that is designed to enhance the efficacy of existing bilateral and multilateral arrangements, including those with regional organizations such as the Association of Southeast Asian Nations, Lancang-Mekong Cooperation Mechanism, and interregional platforms like the Euro-Asia Economic Forum (Maggio, 2019; Tillman et al., 2018). In this way, and through its strengthened cooperative linkages, China aims to encourage the infusion of environmental objectives in the planning and execution of BRI projects. In this strategic aim, securing external legitimacy and international recognition for Belt and Road Initiative projects remains a major concern for the Chinese government and especially through more reputable organizations such as the United Nations. This general vision has resulted from Chinese diplomacy, which has successfully partnered with over 25 different United Nations agencies and attracted participation of over 20 high-level United Nations officials, including the Secretary-General of the United Nations, to major events such as the Second Belt and Road Forum in 2019 (O'Neill, 2019). These diplomatic gestures are meant to convey China's commitment to sustainable development and to canvass broader international endorsement of its green development agenda.

In advancing the institutional framework for environmental cooperation with BRI host countries, China has established several centers and offices for environmental cooperation, such as the Lancang-Mekong Environmental Cooperation Center, the China-Cambodia Environmental Cooperation Center, and the China-Laos Environmental Cooperation Office (Maggio, 2019; Samiullah et al., 2021). These are intended to be platforms for policy dialogue, technical exchange, and the joint development of environmental standards and solutions that address the specific ecological problems of their partner countries.

Likewise, China has shown its commitment to building capacity not only at home but also abroad among partner nations with the Green Silk Road Envoys Program, initiated by the Ministry of Ecology and Environment in 2011. The program is designed as a targeted training, knowledge transfer, and skill development initiative for the environmental officials of countries participating in the Belt and Road Initiative, so that they develop competencies on policy formulation, best practices for environmental protection, and means for effective enforcement of environmental legislation (Dong et al., 2018). Since its inauguration, it has trained over one thousand environmental experts in around twenty countries, and plans are underway to train fifteen hundred more. Such initiatives testify to China's multi-faceted work around green governance along the Belt and Road Initiative, which takes into account policy harmonization and institution-building as well as capacity building for the support of global environmental sustainability.

Policy measures and domestic regulatory efforts, China promoted the Belt and Road Initiative, so that at least it became a model of green development through international cooperation arrangements at the behest of several international organizations and civil society organizations. Another major development in this direction is the International Coalition for Green Development on the Belt and Road, or simply BRIGC, which is a collaborative platform for environmental policy dialogue, technical exchange, and advocacy (Harlan, 2021). This coalition was first announced by President Xi Jinping at the first Belt and Road Forum, held in 2017, as a high-profile endorsement and commitment by the Chinese government towards the goals of such a platform (Xinhua, 2017).

As of August 2019, the coalition had widened its membership from 65 to 132 and included national ministries of environment, other intergovernmental bodies, international organizations, nongovernmental organizations, and private sector companies. The coalition is specifically aimed at providing comprehensive backing, guidance, and recommendations to partner countries that will allow for significant strides towards achieving the Sustainable Development Goals and the targets set in the Paris Agreement (BRIGC, 2019). Through all such initiatives, China would not only be trying to increase its soft power and improve its image as a responsible actor in global climate governance, but in fact will be positioning itself to be the thought leader and agenda-setter in the international environmental policy domain (Coenen et al., 2021; Zhou & Esteban, 2018; Maqbool et al., 2024).

Nevertheless, the open question remains: To what extent will the governance mechanisms of green Belt and Road Initiative projects be absorbed into or cut off from existing global environmental governance architectures? Current evidence indicates that China is pursuing a strategy of creating a second circle of institutional arrangements through bilateral, multilateral, and regional cooperation agreements (Wang, 2017). Such a strategy encompasses a willingness to become part of the international rule-making process as well as a desire to establish new norms, standards, and practices which, in turn, place China at the cusp of being both rule-taker and rule-maker in the evolving patterns of global environmental governance. Yet, many of these initiatives-including the International Coalition for Green Development on the Belt and Road-are still nascent. Their scope, institutional structure, and effectiveness are still in development and remain to be fully defined or tested in practice (Coenen et al., 2021; Maqbool et al., 2024). Thus, it is too early to tell if the governance arrangements will ultimately supplant, complement, or transform existing systems of environmental cooperation around the globe. Also, it remains uncertain if there will be a paradigm change in global environmental governance, moving from the traditional powers to the emerging actors, namely China and other countries of the Global South, with the long-term direction of these new institutions still being undecided.

5. GREEN BRI: HOST COUNTRY GOVERNANCE

China has employed a diverse array of strategies to position the Belt and Road Initiative as a flagship for sustainable development, yet gaps remain between policy intent and on-the-ground implementation, particularly concerning the establishment of robust environmental governance frameworks in Belt and Road Initiative host countries. Although explicitly emphasized in the guidelines given to Chinese companies engaging abroad, this method is effectively subject to the true will and institutional capacity of the partner states to develop, implement, and enforce sound environmental legislation (Ullah et al., 2024). Most importantly, strengthening environmental governance and legal systems in Belt and Road Initiative partner countries would significantly enhance the environmental integrity and international image of Belt and Road projects. Yet many countries engaged with the Belt and Road Initiative are low-income or developing countries that are often in an unstable economic situation, have limited institutional capacity, and are highly dependent on foreign direct investment for infrastructure development (Khan et al., 2019). In such a context, there is an extreme risk that environmental safeguards may not be respected or applied in order to allow for the easy and quick entry of external investment. The environmental governance settings of some Belt and Road Initiative nations have, unfortunately, often been characterized by ineffective regulatory frameworks, lack of transparency, and weak enforcement; thus, these areas remain highly vulnerable to environmental degradation and climate-related risks (Khalid & Ahmad, 2021; Tracy et al., 2017).

The second complexity is that most Belt and Road Initiative projects are characterized by complex contractual arrangements. These projects often involve several different stakeholders—these stakeholders can include international investors, contractors, technical consultants, operational entities, and government ministries, which magnify logistics and barriers for a comprehensive environmental oversight (Masood, 2019). While the official project documents usually state that an environmental impact assessment must be conducted as a condition for project approval, many of the host countries do not have the required technical capacity, financial resources, or institutional setups to carry out proper evaluations and steady environmental monitoring (Ahmad, 2015; Masood, 2019). The environmental impact assessment process is itself complicated, requiring enormous time and expertise to carry out successfully. Changes or mitigation measures put forward in the environmental impact assessment may lead to modifications in the original project plan, entailing further delays and increased costs. Stakeholders, from both Chinese and host countries, are often under immense pressure to push for an expedited project for political, economic, or strategic reasons, which results in avoiding or scaling down key environmental steps (Masood, 2019). This ongoing contradiction between the imperatives of immediate infrastructure development and the requirements for environmental due diligence poses some serious challenges to the real achievement of the green objectives of the Belt and Road Initiative.

The generalized building of highways under the Belt and Road Initiative has the intention to enhance trade connectivity and investment flows among those countries that participate. Nevertheless, this long journey into the infrastructure development industry can exert varied environmental impacts upon host nations. With China's domestic environmental laws becoming stringently applied, there is a concern that some Chinese enterprises might be seeking to shift their more polluting industries and outdated technologies into Belt and Road Initiative countries where such laws could be less rigorous (Harlan, 2021; Wu et al., 2021). The practice could hasten what has been referred to as the pollution haven effect, with firms moving to jurisdictions with weaker environmental standards, and thus appreciating pollution and undermining the sustainability agenda of the very host countries (Tracy et al., 2017).

Scholarly investigations have shown that such trends can contribute to a "race to the bottom," whereby countries competing for foreign direct investment may further relax environmental regulations, placing economic gains above ecological integrity (Kolosov et al., 2017). Several Belt and Road Initiative partner countries, i.e., Pakistan, Bangladesh, and Cambodia, are already regarded as highly vulnerable to climate change, with high ratings on the climate risk and vulnerability indices (Li et al., 2021). This raises the danger of these countries becoming pollution havens, where industries and activities acceptable in more tightly regulated environments can migrate. It becomes central for the Belt and Road Initiative countries to work together to develop coordinated legal and regulatory frameworks, thus reducing the opportunities for "jurisdiction shopping," in which companies aim for the strongest slackness of regulations for environmentally harmful practices. Effective coordination would not only help prevent the transboundary transfer of pollution-intensive industries but also strengthen regional environmental governance and promote sustainable development.

Conversely, the adoption of higher environmental standards and the implementation of eco-conscious trade practices among Belt and Road Initiative partners could potentially generate a "race to the top," where competitive advantage is achieved through sustainability leadership rather than regulatory laxity. Chinese policy papers on the Belt and Road Initiative have called for the integration of environmental protection provisions in all free trade agreements negotiated by China, reflecting an intention to elevate environmental performance within the initiative's framework (Belt and Road Portal, 2017a). Some scholars, such as Liu (2018), argue that China aspires to use the Belt and Road Initiative as a platform to promote the adoption of higher environmental standards among partner countries. Despite these policy aspirations, there remains a lack of empirical evidence indicating active intervention by China in the domestic environmental governance of Belt and Road Initiative partner countries, or reciprocal involvement by host nations in shaping China's environmental strategies abroad. The continuing expansion of the initiative all around the world increases the pertinence of this gap in the context of establishing future research about the precision of practical dynamics in conforming to the environmental governance and policy diffusion under the Belt and Road Initiative.

Under the well-established EU environmental governance frameworks, the Belt and Road Initiative is bound to penetrate deep into Europe. Therefore, this intersection introduces further layers of regulatory oversight and higher environmental standards that must apply to Belt and Road Initiative projects operating or partnering with European countries. An instance of such is the Pelješac Bridge construction in Croatia, a huge infrastructure project, financed by the EU, and built by a consortium of Chinese firms. This consortium ensured compliance with the tough environmental regulations of the European Union by establishing a special Safety Environment Protection Department and thus cooperating with the local Croatian companies, meeting standards of the European authorities (Xinhua, 2019).

The involvement of the European Union and other international organizations in such Belt and Road Initiative projects is such a big factor in preventing a downward spiral in environmental standards, termed “race to the bottom.” The supra-national laws and regulatory mechanisms of the European Union, which nearly always extend to projects outside its territorial boundaries if funded or regulated by the Union, ensure that environmental protections remain strong and are not sacrificed at the altar of rapid economic development. Through such a power of normative influence, therefore, international institutions can shape the behavior of participating states and companies by embedding environmental standards and sustainability requirements into the core of cross-border infrastructure projects. Moreover, this not only boosted the bargaining strength of Belt and Road Initiative host countries during the negotiations but also helped in formulating the rules concerning environmental, labor rights, and transparency. The opposite often happens whenever third parties such as the European Union, international financial institutions, and global governance bodies engage actively with Belt and Road Initiative host nations: more favorable terms regarding environmental protection, labor rights, and transparency are usually squeezed out of the latter. The example in other venues outside Europe includes the involvement of task forces based in the United States regarding Myanmar's special economic zone projects, which illustrate the promise of international pressure and monitoring to further human rights and environmental protections (Hughes et al., 2020). These examples underscore the significance of multi- and supra-national governance arrangements concerning the promotion of increasingly high standards and preventing the dilution of environmental regulations as the Belt and Road Initiative pursues a global expansion.

6. CHALLENGES FOR GREEN BRI GOVERNANCE

It is indeed a very complex scenario in which environmental governance structures concerning the Belt and Road Initiative's projects have matured; there is an entanglement of many national, regional, transnational, and international organizations with the same target. Thus, environmental issues in the context of the Belt and Road Initiative are complicated, with many different programs, frameworks, and agreements created on all levels by different organizations. Rather than being strictly bound within the top-down “command-and-control” regulatory paradigm, the governance approach in ‘Belt and Road Initiative’ promotes self-regulation in which companies and financial institutions are encouraged by incentives and voluntary standards to take responsibility for environmental protection and sustainability (Folke et al., 2019; Coenen et al., 2021). Reliance on self-regulatory mechanisms and soft law intends to promote basin-wide cooperation and multi-actor engagement in addressing transnational climate challenges and facilitating adaptive and flexible responses to changing conditions.

The BRI has potential as soft law and voluntary compliance mechanisms for making stakeholders aware and engaged; however, many barriers remain before it could be termed a genuine green BRI. A major challenge is the non-mandatory form of the guidelines—most, if not all, policy guidelines depend for their balm on voluntary access of companies, financiers, and host country governments rather than enforceable legal requirements. Without such strong, action-to-action regulations, the assumption of many policy documents about the Belt and Road Initiative, those fashioned can easily be shrugged off as just symbolic gestures or public relations exercises, not substantial steps toward meaningful improvement in environmental conditions (Tagliapietra, 2022). This also raised the scope of the Belt and Road initiative, which further increased capital and labor flow towards and increased economic activity in host nations. Hence, these events have created complex linkages across human and ecological systems, what in the literature has been described as telecoupling—that is, the phenomenon whereby distant socio-economic and environmental systems become directly linked, and impacts in one region can generate significant effects in others (Kissinger et al., 2011; Liu et al., 2013). In such cases, effects make governance strategies inefficient and often against the scope of conventional laws, as very seldom would such actions be unilateral. Hence, any increase in risky activities or weakening of regulatory regimes in a single host country would have adverse consequences regionally and, in turn, globally, further illuminating the need for integrated and enforceable frameworks for environmental management and cooperation. From that perspective, environmentally agitated policy outcomes far distant affect one another by their effects on different countries along the Belt and Road. Unsustainability of conditions in one part of the Belt and Road Initiative area is often made up for by developments occurring somewhere else, showing the impact that this interdependence has (Eakin et al., 2017; Friis et al., 2016). The most tangible instance of its practice is that of policy leakage: for the Belt and Road Initiative, stringent environmental regulations set within China's borders have led to the shifting of environmentally intensive activities to other countries involved in the Belt and Road Initiative. In this way, they do not meet the intent of China's domestic environmental governance and weaken the effectiveness of policy guidelines for its overseas investments (Lima et al., 2019).

One famous example is the commercial logging moratorium imposed by China, ending the speedy increase in timber imports from Belt and Road countries—the countries most affected were Russia and Southeast Asia. The amount of exported forestry products from Russia to China between 2013 and 2018 increased by eleven percent, indicating how

domestic regulatory changes have a domino effect on resource extraction and environmental impacts in partner countries (Kolosov et al., 2017; Han et al., 2018). The China-Mongolia-Russia Economic Corridor is another initiative through which the border between the countries has been reopened for easier delivery of roundwood and other timber products from Russia to China, leading to further deforestation in the regions supplying these raw materials (Simonov, 2018).

Add to the above the disparity between the national discussion on policies concerning the Belt and Road Initiative and the limited commitment or enforcement within host countries at the local government and business levels. While green development and environmental protection are issues that enjoy significant importance on the national agenda, there is still a chronic deficit in the effecting of such ambitions through concrete, enforceable actions at the project level under local conditions (Qi and Zhang 2014; Ullah et al., 2024). These national environmental policies are poorly implemented and enforced at the local level by local governments due to the common problem of institutional constraints, low capacity, or conflict with economic interests. The above factors serve to enhance the complexity of the environmental governance system within the Belt and Road Initiative by incorporating a wide-ranging cast of stakeholders with a spectrum of institutional and sociocultural differences that separate China from many of its partners (Eakin et al., 2017; Ullah, 2022). Even among neighboring countries, the types of differences seen in the legal, regulatory, and governance systems are extreme—from religion-based legal codes to ones based on common or civil law traditions. A culture that is so different makes it all the more difficult to synchronize environmental standards and practices in the Belt and Road Initiative region. To address these challenges, China should involve a more conscientious integration of the sustainability narrative into ground project realpolitik in partner countries while allowing for consideration of social, political, and institutional differences. This context-driven approach is the only credible pathway for the actualization of sustainable development objectives under the vast and diverse Belt and Road Initiative framework.

7. CONCLUSIONS

This study critically examined the environmental politics and governance of the Belt and Road Initiative, analyzing the interplay between China's policy ambitions and the diverse realities of transnational project implementation. Through a polycentric governance framework and detailed review of institutional arrangements, the research highlights that while the BRI aspires to position itself as a driver of sustainable global development, its governance architecture is shaped predominantly by voluntary, non-binding mechanisms and a fragmented landscape of regulatory and institutional actors. The proliferation of "soft law" instruments—such as guiding principles, best practice guidelines, and voluntary codes—has fostered a culture of corporate social responsibility, yet has not resulted in comprehensive, enforceable standards capable of consistently mitigating environmental risks across the full spectrum of BRI projects. Evidence from this study shows that BRI governance remains stridently uneven, dependent on the priorities, capacities, and enforcement practices of China and partner countries alike. Although China has built a rich array of domestic policy documents and green finance standards since 2016, its effectiveness in the international arena is largely undermined by the mostly voluntary nature of existing transnational agreements and the often-limited institutional capacities within host countries. The substantial risk remains that regulatory holes do appear, that policies leak, and that dirty industries relocate to countries with a weaker standard. The study proceeds to illustrate that BRI infrastructure expansion has provoked significant environmental impacts such as deforestation, land degradation, and emission of greenhouse gases, particularly in areas where legal enforcement and political monitoring are weak. Nonetheless, some good things have emerged from the BRI, including in technology transfer and investments in renewable energy, as well as for environmental training and policy exchange. Transnational environmental cooperation centers and the involvement of a variety of global actors—the European Union and United Nations agencies—provide important opportunities to seek reinforced sustainability standards and knowledge transfer. Yet, actors remain far from realizing these ambitions due to the discrepancies in political will, financial cycle priorities, and local enforcement capacities. The situation providing a good example of the complexity and far-flung effects of the BRI transnational footprint is called telecoupling, whereby domestic regulatory changes occurring in China yield unintended environmental effects in far-away partner countries. These findings lay direct emphasis on the necessity for scholars and practitioners to shift their focus from putting blood and flesh into mere symbolic or rhetorical commitments to creating concrete, enforceable governance mechanisms. A policy framework with coordination, delicate environmental safeguards appropriate in context, and sound monitoring systems is a basic requirement for resolving the conflict between infrastructure development and planet sustainability. The empirical studies must move ahead, comparing the implementation trajectories of different national contexts with a focus on financing, accountability arrangements, and local regulatory institution capacities for the adaptation and enforcement of environmental standards. Only through deliberate collaboration and sustained oversight can the BRI's promise of green development be realized and the risks of environmental externalities mitigated.

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