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RESEARCH ARTICLE

Environmental Governance Pathways in Times of Crisis: Green Modernization in China and Green Reconstruction in Ukraine

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Abstract

Environmental governance is increasingly shaped by crisis conditions that alter policy priorities, institutional structures, and development trajectories. This article develops the concept of crisis pathways of environmental governance to explain how environmental policy evolves under different types of crises. It distinguishes between two analytical ideal types: structural ecological crises, produced by the gradual accumulation of environmental pressures associated with industrialization, urbanization, and resource-intensive development, and disruptive ecological crises, triggered by sudden shocks such as armed

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conflicts, infrastructure destruction, and large-scale environmental damage. The study employs a qualitative comparative design combining comparative case study analysis, policy analysis, and discourse analysis. The empirical material includes national environmental strategies, development plans, environmental legislation, policy documents, and reports by international organizations. China is examined as an illustration of a structural ecological crisis pathway, while Ukraine is analyzed as an illustration of a disruptive ecological crisis pathway. The findings show that China represents a state-led model of green modernization, in which environmental objectives are integrated into long-term development strategies, regulatory instruments, and technological upgrading, whereas Ukraine illustrates a pathway of green reconstruction, where environmental governance is linked to post-war recovery, institutional transformation, European integration, and external support. The article contributes by offering a comparative framework for understanding how different crisis dynamics shape environmental governance, policy responses, and green development pathways.

Keywords: environmental governance; green development; crisis pathways; ecological modernization; green reconstruction; crisis management; China; Ukraine.

Introduction

Over the past several decades, environmental governance has become a central theme in international development debates. Its importance becomes particularly evident under crisis conditions, when environmental risks intensify and governments must adapt their policy responses. While existing research has extensively examined environmental governance, green development, and crisis management, considerably less attention has been devoted to understanding how different types of crises shape environmental governance and development trajectories.

This article develops the concept of crisis pathways of environmental governance to explain how environmental policy evolves under different crisis conditions. It distinguishes between two analytical ideal types. Structural ecological crises emerge through the gradual accumulation of environmental pressures associated with industrialization, urbanization, and intensive resource use, whereas disruptive ecological crises result from sudden shocks such as armed conflicts, environmental disasters, or the destruction of critical infrastructure.

The study compares China and Ukraine as illustrative cases for applying the proposed analytical framework. The analysis focuses on how different crisis contexts generate distinct pathways of environmental governance, while political systems remain a secondary contextual factor and not the primary object of comparison.

The article addresses the following research question: How do structural and disruptive crisis pathways shape environmental governance and green development in China and Ukraine?

Its objective is to analyze how different types of crises influence the transformation of environmental governance and the emergence of distinct green development pathways. Through a comparative analysis of China and Ukraine, the study demonstrates how crisis conditions shape institutional responses and environmental policy trajectories.

The article contributes by proposing a comparative framework linking crisis dynamics with environmental governance.

Literature Review

The purpose of this section is to examine the main academic approaches to the study of green development and environmental governance and to identify the theoretical contribution of the present research. Over recent decades, issues of environmental sustainability, natural resource management, and ecological transformation have become central themes in development studies and public policy research. Existing scholarship has generated a substantial body of knowledge on green development, environmental governance, and the role of state institutions in addressing environmental challenges. However, considerably less attention has been devoted to understanding how different types of crises influence the transformation of environmental policy and the formation of environmental governance pathways. To address this issue, the present section reviews four interrelated strands of literature: green development, environmental governance, crisis governance, and comparative studies of environmental policy.

Environmental Governance and Green Development

Green development has become a central concept in development studies and environmental policy as an approach to reconciling economic growth with environmental sustainability (Foster, 2023; OECD, 2011; UNEP, 2011; Barbier, 1987; Pan, 2016). It is best understood as a broad umbrella concept encompassing several related perspectives.

The broadest foundation is sustainable development, which seeks to balance economic, social, and environmental objectives (WCED, 1987; Purvis et al., 2019). A more economically oriented perspective is green growth, which argues that environmental protection and economic development can be mutually reinforcing through technological innovation, resource efficiency, and low-carbon development (Kim et al., 2014; Adamowicz, 2022). Closely related is ecological modernization, which views environmental challenges as drivers of institutional reform, technological innovation, and improvements

in governance, not as obstacles to economic growth (Mol & Sonnenfeld, 2000; Hajer, 1995; Jänicke, 2008).

Critical scholarship, however, questions whether green growth and ecological modernization sufficiently address the structural causes of environmental degradation, arguing that they may primarily legitimize continued economic expansion without fundamentally transforming existing production and consumption systems (Hickel & Kallis, 2020; Parrique et al., 2019).

Despite this extensive literature, most studies examine environmental transformation under conditions of gradual ecological pressure associated with industrialization and resource exploitation. Much less attention has been devoted to understanding whether environmental governance follows different developmental pathways under disruptive crises such as armed conflicts or large-scale environmental destruction.

Environmental governance provides the institutional mechanisms through which green development is implemented. It has evolved from a state-centered concept emphasizing formal institutions (Lemos & Agrawal, 2006; Ulibarri, 2023) toward broader governance models incorporating multiple actors and levels of decision-making (Eckerberg & Joas, 2004; Feng, Zhang, & Li, 2022). Contemporary scholarship identifies centralized, multi-level, polycentric, participatory, and external governance as major approaches to environmental governance (Hooghe & Marks, 2003; Ostrom, 2010; Newig & Fritsch, 2009).

Scholars increasingly recognize that environmental governance is constrained by political, economic, and institutional structures, leading to a more comprehensive understanding of governance as a process of institutional transformation that extends beyond environmental regulation (Hensengerth & Lu, 2019; Aragón-Correa, Marcus, & Vogel, 2020; Felonyuk, 2021).

While research on green development and environmental governance is extensive, comparative analyses examining how different crisis conditions generate distinct governance pathways remain limited. Addressing this gap provides the point of departure for the present study.

Governance in Times of Crisis

The literature on crisis governance examines how various types of disruptions affect the functioning of state institutions, decision-making processes, and the implementation of public policy (Boin et al., 2005). Crises can expose institutional vulnerabilities, place additional pressure on the administrative capacity of governments, and require the rapid mobilization of resources, coordination among multiple actors, and the adaptation of existing governance mechanisms to new circumstances (Huan & Huan, 2022). As a result, crisis situations are often accompanied by the temporary centralization of decision-making, the accelerated implementation of policy measures, and the emergence of new forms of interaction among governmental institutions, the private sector, and civil society.

Despite the substantial body of research on crisis governance, the existing literature encompasses a broad range of crises, including economic shocks, political instability, environmental disasters, and armed conflicts (Conca & Dabelko, 2002; Ide et al., 2021). However, different types of crises exert distinct effects on environmental governance and generate different institutional challenges (Boin et al., 2005).

Despite growing scholarly interest in environmental governance under crisis conditions, the existing literature has largely examined these types of crises separately. Comparative studies investigating how different crisis pathways shape environmental governance and green development strategies remain limited. The present study seeks to address this gap through a comparative analysis of China and Ukraine as illustrative examples of distinct crisis pathways of environmental governance.

Structural versus Disruptive Ecological Crises

The existing literature on environmental governance addresses a wide range of environmental challenges, including environmental pollution, climate change, ecosystem degradation, the environmental consequences of armed conflicts, and the recovery of affected territories (Schandl et al., 2025). However, these phenomena are typically analyzed as separate categories of environmental problems, while considerably less attention has been devoted to differences in

the pathways of environmental governance that emerge under different types of crises.

This study proposes a distinction between two ideal types of ecological crises: structural ecological crises and disruptive ecological crises.

Structural ecological crises emerge gradually through the accumulation of environmental pressures associated with industrialization, urbanization, environmental pollution, and intensive resource exploitation (Loorbach et al., 2017). Such crises rarely result in the sudden breakdown of state institutions or infrastructure. Instead, they generate sustained pressure on existing governance systems, encouraging the gradual adaptation of environmental policies, the development of environmental regulation, and the adoption of technological innovations (Scoones et al., 2020; Bennett et al., 2019). Under these conditions, environmental governance typically evolves through processes of ecological modernization aimed at integrating environmental objectives into existing models of economic development.

Disruptive ecological crises differ in both origin and dynamics. They arise from large-scale shocks such as armed conflicts, technological disasters, or extensive infrastructure destruction (Conca & Dabelko, 2002; UNEP, 2023). Unlike structural ecological crises, they are characterized by sudden disruptions to social, economic, and institutional systems (Kvach et al., 2025; Felonyuk, 2021). The environmental consequences of such crises may include territorial contamination, ecosystem destruction, infrastructure damage, and a reduced capacity of state institutions to conduct environmental monitoring and regulation (Anghel & Džankić, 2023). Under these circumstances, environmental governance increasingly becomes embedded within processes of recovery and reconstruction.

It is important to emphasize that structural and disruptive ecological crises are not mutually exclusive categories. In practice, many countries face multiple environmental challenges of different types simultaneously. The distinction proposed here should therefore be understood as an analytical tool designed to identify the dominant mechanisms through which environmental governance is transformed in different contexts.

From the perspective of green development, these two crisis types are associated

with different governance pathways, which are examined comparatively in the following sections.

China, Ecological Civilization, and Ecological Modernization

China represents one of the most significant examples of large-scale environmental transformation under conditions of rapid economic growth and industrialization (Wei et al., 2020). Over several decades, the country's economic development has been accompanied by serious environmental challenges, including air and water pollution, land degradation, biodiversity loss, and high levels of greenhouse gas emissions. The intensification of environmental pressures has gradually transformed environmental protection from a secondary policy concern into one of the strategic priorities of state governance.

In the academic literature, China's environmental policy is frequently analyzed through the lens of state-led environmental governance, in which the central government plays a pivotal role in defining environmental priorities, developing regulatory frameworks, and coordinating environmental policy at the national level (Zhou et al., 2025; Hensengerth & Lu, 2019; Ma, 2025). Unlike many liberal-democratic systems, where substantial authority is exercised by civil society actors and local governments, the Chinese model of environmental governance relies heavily on strategic state planning and administrative coordination.

A central component of contemporary Chinese environmental policy is the concept of Ecological Civilization (*shengtai wenming*, 生态文明). Within official political discourse, this concept is presented as a long-term strategy for integrating environmental objectives into processes of economic and social development (Wei et al., 2020). Scholars have argued that Ecological Civilization functions not only as an instrument of environmental policy but also as an important political discourse through which the state constructs visions of desirable development and legitimizes environmental reforms (Geall & Ely, 2018). Ecological Civilization can be understood simultaneously as a practical framework for environmental governance and as an ideological construct that shapes the direction of environmental transformation.

A number of scholars interpret China's environmental policy through the concept

of authoritarian environmentalism. According to this perspective, a strong state and a high degree of political centralization enable the rapid adoption and implementation of environmental policies, facilitate resource mobilization, and support the coordination of large-scale environmental programs (Li & Shapiro, 2020; Gilley, 2012; Beeson, 2010). Proponents of this approach argue that centralized political systems may possess certain advantages in addressing environmental challenges that require policy continuity and substantial investments.

However, the effectiveness of authoritarian environmentalism remains a subject of ongoing debate. Critics point out that ambitious national environmental goals do not necessarily guarantee successful implementation at the local level (Foster, 2023; Huan et al., 2022). One of the most frequently discussed challenges is the gap between environmental priorities established by the central government and their implementation by regional and local authorities. For many years, local governments were evaluated primarily on the basis of economic growth performance, which often created incentives to weaken environmental enforcement and only partially implement environmental regulations (Guo, 2023; Zhang et al., 2023). Environmental governance in China represents not only a case of strong state regulation but also a complex process of negotiation and coordination among different levels of government.

From a theoretical perspective, the Chinese experience is closely associated with the concept of ecological modernization. This perspective assumes that environmental challenges can stimulate institutional reforms, technological innovation, and improvements in governance mechanisms without requiring the abandonment of economic growth. Within this framework, environmental pressures are viewed as drivers of modernization within the existing development model, while environmental policy is understood as a mechanism for the gradual integration of environmental objectives into the economic system.

Ukraine, European Integration, and Green Reconstruction

In contrast to China, environmental governance in Ukraine has evolved within the context of post-socialist transformation, institutional reform, and gradual integration into the European political and regulatory space. Following independence, Ukraine inherited a substantial environmental legacy from the

Soviet period, including high levels of industrial pollution, an environmentally unsustainable economic structure, deteriorating infrastructure, and limited regulatory capacity in environmental protection (OECD, 2023). Environmental policy has long faced challenges associated with insufficient funding, weak institutional capacity, and inadequate enforcement of environmental legislation (Ráti, 2025; European Commission, 2024).

In the academic literature, environmental governance in Ukraine is frequently analyzed through the lens of post-socialist transformation (Shyrokykh et al., 2025). Scholars note that the transition from a centrally planned economy to a market-based system was accompanied by extensive institutional changes affecting environmental agencies, regulatory mechanisms, and environmental monitoring systems (Golubovska-Onisimova et al., 2023). Unlike the Chinese model of state-led environmental governance, environmental policy in Ukraine developed within a more fragmented institutional framework that combined elements of state regulation, market mechanisms, and international cooperation (Pietrzyk-Reeves et al., 2024).

Since the early 2000s, European integration has become an increasingly important driver of environmental policy development. In the literature, this process is often conceptualized as a form of external environmental governance, whereby the norms, standards, and policy mechanisms of the European Union exert significant influence on the environmental policies of partner states (Lavenex, 2015; Freudlsperger & Schimmelfennig, 2022). For Ukraine, integration with the European Union has served as an important source of institutional reform, including the harmonization of environmental legislation, the adoption of European regulatory standards, and the development of environmental monitoring mechanisms. Following the signing of the Association Agreement between the European Union and Ukraine, environmental policy became increasingly aligned with the requirements of the European environmental acquis (EU–Ukraine Association Agreement, 2014; European Commission, 2022a).

Despite progress in environmental integration, Ukraine's environmental governance continued to face numerous challenges, including industrial pollution, waste management problems, land degradation, high energy intensity, and limited environmental enforcement capacity (European Commission,

2025). Many of the country's environmental challenges predated the full-scale war and were embedded within processes of post-socialist transformation and institutional development.

The full-scale Russian invasion of Ukraine in 2022 fundamentally altered the conditions of environmental governance (UNEP, 2023). Unlike the gradual environmental pressures commonly associated with ecological modernization processes, the armed conflict resulted in extensive infrastructure destruction, contamination of soils and water resources, damage to industrial facilities, ecosystem degradation, and the emergence of new environmental risks (Anghel & Džankić, 2023; Leal Filho et al., 2024). The consequences of the war affected not only the natural environment but also the capacity of state institutions to conduct environmental monitoring, enforcement, and environmental policy implementation (Meaza et al., 2024).

Contemporary scholarship increasingly views the environmental consequences of war as an integral component of post-war recovery processes (UNEP, 2023; Leal Filho et al., 2024). In this context, the concept of green reconstruction has gained particular significance. Green reconstruction refers to the integration of environmental principles into the recovery of infrastructure, the economy, and state institutions (Meaza et al., 2024; Golubovska-Onisimova et al., 2023). Unlike conventional reconstruction models, which focus primarily on restoring pre-war conditions, green reconstruction seeks to establish more sustainable, energy-efficient, and environmentally resilient systems of development.

Comparative Environmental Governance

The effects of crises on environmental governance are not uniformly positive. Some studies suggest that crises can stimulate institutional reforms, accelerate the adoption of environmental innovations, and create opportunities for ecological modernization or sustainable reconstruction (Patterson et al., 2017). Alternative perspectives, however, emphasize that crises may also weaken environmental regulation, reduce funding for environmental programs, and shift governmental priorities toward security concerns, economic stabilization, or the restoration of basic infrastructure (Boin et al., 2017; Leal Filho et al., 2024). Consequently, crises do not automatically lead to stronger environmental governance; their effects depend on political institutions, state capacity, and the socio-political context.

Analytical Framework of Crisis Pathways of Environmental Governance

Type of crisis →Institutional pressure → Governance response →Development pathway

It is important to distinguish between the crisis itself and the governance response to the crisis. The destruction of ecosystems, infrastructure, and institutional mechanisms constitutes the crisis condition, whereas ecosystem restoration, infrastructure modernization, and the development of green reconstruction strategies represent governance responses to that condition.

Table 1. Crisis Pathways of Environmental Governance: Analytical Framework

Mechanism Stage	Structural Ecological Crisis	Disruptive Ecological Crisis
Type of crisis	Accumulated environmental pressure	War, disaster, infrastructure destruction
Institutional pressure	Gradual decline in the effectiveness of existing governance mechanisms	Disruption or weakening of institutional functioning
Governance response	Regulation, institutional adaptation, technological modernization	Crisis response, recovery, reconstruction
Role of external actors	Limited or supportive	Significant: donors, international organizations, external norms
Development pathway	Green modernization	Green reconstruction

Environmental Governance Framework

The concept of environmental governance is commonly understood as a system of processes, institutions, and regulatory mechanisms through which political and societal actors influence environmental decision-making and its outcomes (Zhou et al., 2025). The emergence of this concept was closely associated with growing global environmental challenges, including resource depletion, degradation of common goods, biodiversity loss, increasing environmental pollution, declining groundwater levels, and expanding desertification processes (Rockström et al., 2009).

The shift toward environmental governance reflected a departure from the narrower and more traditional understanding of environmental policy as an activity conducted exclusively by the state. Instead, attention increasingly focused on a range of actors and mechanisms that shape environmental outcomes.

Environmental governance is analyzed through several key dimensions. First, institutional structures determine the distribution of authority among governmental agencies, the degree of centralization in decision-making, and the mechanisms through which environmental policies are coordinated (Lemos & Agrawal, 2006). Second, policy instruments include regulatory measures, economic incentives, strategic planning mechanisms, and environmental monitoring systems (Birkland, 2005).

Third, particular attention is given to state capacity, which determines the ability of governments to formulate and implement environmental strategies effectively (Olsson et al., 2014). Finally, the logic of policy implementation represents a crucial aspect of environmental governance, since its effectiveness depends largely on how policy decisions are translated into practice (Hryhorczuk et al., 2024; USAID Global Environment Center, 2001).

Accordingly, the environmental governance framework enables the analysis not only of formal environmental objectives and policy strategies but also of the institutional mechanisms through which these objectives are implemented.

Crisis Governance

The second theoretical component of this study is the concept of crisis governance. Within this perspective, crises are viewed not merely as extraordinary events but as conditions capable of reshaping institutional environments, policy priorities, and patterns of resource allocation (Boin et al., 2016). Different crisis conditions generate distinct forms of institutional pressure, thereby shaping governance responses, policy priorities, and institutional dynamics (Eckerberg & Joas, 2004; Ulibarri, 2023).

Within the context of environmental governance, crises affect the capacity of governments to formulate and implement environmental policy by reshaping policy instruments and the roles of state and non-state actors. This perspective

provides the analytical basis for analyzing governance pathways under different crisis conditions.

Development Studies Perspective

The third component of the analytical framework is the development studies perspective, which conceptualizes environmental policy as part of socio-economic transformation. From this perspective, environmental governance is examined not only as a matter of environmental protection but also as an element of modernization, institutional reform, and recovery strategies.

From a development studies perspective, green development should not be understood solely as an environmental agenda. Rather, it represents a development model in which environmental objectives are integrated into wider socio-economic strategies, including economic modernization, institutional reform, and international integration (Feng et al., 2022; Lemos & Agrawal, 2006; Freudlsperger & Schimmelfennig, 2022).

Adopting this perspective makes it possible to conceptualize green development as a pathway shaped by specific political and crisis contexts (Huan & Huan, 2022). It therefore provides the analytical foundation for examining environmental governance under contrasting crisis conditions.

Methodology

This study employs a qualitative comparative research design to examine how environmental governance and green development evolve under different crisis conditions. The primary methodological approach is a comparative case study, which is particularly suitable for investigating complex institutional and policy processes across different political and socio-economic contexts (Yin, 2018).

The selection of China and Ukraine as comparative cases is theoretically grounded in the analytical framework developed in this study. The use of a most-different systems design is justified by the substantial differences between China and Ukraine in terms of political regimes, institutional arrangements, levels of economic development, and international positioning. Despite these differences, both cases allow for the examination of a common

theoretical question: how do different types of crises influence the development of environmental governance? The object of comparison is not the countries themselves but rather the mechanisms linking crisis conditions, institutional pressures, governance responses, and environmental development pathways.

The study combines three complementary qualitative methods: comparative case study analysis, policy analysis, and discourse analysis. In this article, the term "comparative analysis" is used in its general qualitative sense and does not refer to the formal methodology of Qualitative Comparative Analysis (QCA).

Policy analysis focuses on national development strategies, environmental programs, and regulatory frameworks. Discourse analysis is employed to examine how key policy concepts and narratives are articulated in official documents and political statements (Fairclough, 2013). Particular attention is given to concepts such as Ecological Civilization and green developme**nt** in the Chinese context, and green reconstruction, sustainable recovery, and European environmental integration in the Ukrainian context.

Document analysis was conducted through thematic coding (Braun & Clarke, 2006). Initial coding was based on analytical categories derived from the study's theoretical framework, followed by refinement and comparison of categories across the two cases. Key coding categories included crisis type, governance mechanisms, the role of the state, the participation of external actors, environmental priorities, policy instruments, and pathways of green development. Documents were grouped by source type and analyzed in terms of how they represented environmental governance mechanisms, policy priorities, and development strategies. In addition, key discursive categories were identified to capture different understandings of the objectives and directions of environmental transformation.

The empirical dataset consists of five categories of documents: (1) national development and environmental policy strategies of China and Ukraine; (2) environmental legislation and policy documents related to environmental protection; (3) European Union documents related to Ukraine's environmental integration; (4) documents concerning Ukraine's recovery and reconstruction, including green recovery plans; and (5) analytical reports produced by international organizations such as UNEP, UNDP, the World Bank, the European

Commission, and the OECD. The use of multiple document types allows for the comparison of official policy objectives, institutional mechanisms, and international approaches to environmental governance.

This study has several limitations. First, the analysis relies primarily on documentary sources and does not incorporate primary empirical data such as interviews or fieldwork. Second, the crisis contexts examined in the two cases differ substantially in nature, which may affect the comparability of specific policy outcomes. Finally, the study does not seek to provide a quantitative assessment of policy effectiveness but instead focuses on identifying and comparing governance pathways.

Nevertheless, documentary analysis is appropriate for the objectives of this study, as the article seeks to examine official models of environmental governance, institutional mechanisms, and policy narratives reflected in strategic plans, legislation, and policy documents. Given the study's focus on comparing governance pathways at the national level, official documents constitute the most relevant source of data.

The methodology is designed to provide a theoretically grounded comparison of environmental governance under different crisis conditions and to contribute to a better understanding of how different types of crises generate institutional pressures, shape governance responses, and influence pathways of green development. Accordingly, the findings should be interpreted as a conceptual analysis of governance pathways based on policy documents and institutional mechanisms, not as a comprehensive assessment of the practical effectiveness of environmental policy in either country.

China: Green Development and the Concept of Ecological Civilization

Conceptual Foundations of Ecological Civilization

Ecological Civilization functions as the principal framework guiding China's environmental governance. Broadly understood, the concept promotes a pathway of modernization in which economic growth, technological development,

and environmental protection are treated not as competing objectives but as interdependent components of a single long-term development strategy. In this respect, Ecological Civilization represents more than an environmental policy agenda; it constitutes a framework through which a new logic of interaction among the state, the economy, and the natural environment is articulated (Hensengerth & Lu, 2019; Foster, 2023).

At the same time, a number of scholars argue that Ecological Civilization serves not only as a framework for environmental governance but also as a mechanism of political legitimation. In this context, environmental rhetoric contributes to reinforcing perceptions of the state's capacity to address socio-environmental challenges through centralized governance and strategic planning.

Architecture of Environmental Policy

China's environmental policy constitutes a multi-level and institutionally integrated system in which the state plays a central coordinating role (Huang & Westman, 2021). It combines environmental legislation, national planning through the Five-Year Plan system, regulatory instruments, and state policy initiatives that collectively shape the direction of environmental governance (Xi, 2023).

A defining feature of this model is the integration of environmental objectives into the system of state planning. Over time, environmental policy has evolved from general regulatory frameworks toward more specific, measurable, and binding targets embedded within national development strategies (World Economic Forum, 2022). The incorporation of environmental indicators into planning and governance processes has strengthened vertical coordination and enhanced administrative accountability (Xi, 2017; Zhou et al., 2025).

In practice, this integration is reflected in the incorporation of environmental objectives into successive Five-Year Plans. For example, the Thirteenth and Fourteenth Five-Year Plans established specific targets related to reducing energy intensity, expanding renewable energy capacity, and decreasing pollutant emissions (The State Council of the PRC, 2016; The State Council of the PRC, 2021). An additional milestone was the announcement of the national goals of achieving peak carbon emissions before 2030 and carbon neutrality before

2060 (Xi, 2020), which further reinforced the orientation of environmental governance and ecological modernization (Huan & Huan, 2022).

Regulatory instruments constitute another key component of this policy architecture. Mechanisms such as environmental impact assessments, emissions permitting systems, and pollution control measures provide the institutional foundation for managing environmental outcomes (Ma, 2025; Zuo & Li, 2016).

In recent years, environmental regulation has been complemented by the increasing use of market-based mechanisms. The most significant example is the national Emissions Trading System (ETS) (International Energy Agency, 2024), which has gradually expanded the use of market instruments to achieve climate objectives. Officially launched in 2021, the national ETS is the world's largest carbon market in terms of covered emissions and is regarded as one of the key instruments for achieving China's climate goals. An additional layer of environmental governance is provided by the system of central environmental inspections, introduced to strengthen oversight of environmental compliance by regional and local authorities (Kostka & Zhang, 2018; Zhou et al., 2025). Together, these mechanisms reflect the state's effort to combine administrative control with market-based regulatory instruments.

State support for green technologies has also become an important dimension of ecological modernization. China has emerged as a global leader in the production of solar panels, battery technologies, and electric vehicles, viewing the development of environmental technologies not only as an instrument of environmental policy but also as a source of economic competitiveness and industrial upgrading (IEA, 2024; Foster, 2023).

Model of Environmental Governance

The model of environmental governance in China is characterized by a strong central state and a high degree of institutional coordination. Strategic environmental objectives are defined at the national level, while implementation is carried out by regional and local authorities within a vertically coordinated governance system (Ma, 2025; Zhang et al., 2017; Foster, 2023).

A number of scholars interpret this model through the concept of Authoritarian Environmentalism, according to which a high degree of centralization and state control can facilitate the adoption and implementation of environmental policies (Beeson, 2010; Gilley, 2012). Proponents of this perspective emphasize the advantages of a strong state in addressing complex environmental challenges, whereas critics highlight the risks associated with limited public participation and insufficient transparency in decision-making processes.

An important feature of this governance model is the integration of environmental objectives into performance evaluation mechanisms, which strengthens incentives for local governments to comply with national environmental priorities (Huan et al., 2022).

The implementation of environmental policy in China is not always uniform. Despite the growing importance of environmental indicators in the evaluation of local government performance, regional differences in levels of economic development and industrial structure continue to shape environmental policy implementation. Existing studies point to a persistent gap between the environmental objectives established by the central government and their practical implementation at the local level, particularly in regions where economic growth and employment remain dependent on resource-intensive industries (Ran, 2013).

A key feature of China's environmental governance model is its high level of state capacity, which enables the implementation of large-scale environmental and infrastructural projects (Hensengerth & Lu, 2019; Zhou et al., 2025). This includes substantial investments in green technologies, the ecological modernization of industry, and the development of environmentally sustainable infrastructure.

Environmental Challenges and the Crisis Dimension

Despite significant progress in environmental policy, China continues to face major structural environmental challenges resulting from decades of rapid industrialization, urbanization, and resource-intensive growth (Ma, 2025). These challenges—including persistent air and water pollution, resource depletion, and increasing climate-related risks—reflect deeper contradictions within the country's development model.

As environmental pressures accumulated, their effects extended beyond environmental degradation to influence public health, quality of life, and the broader functioning of the socio-economic system (Hensengerth & Lu, 2019). In turn, they placed growing pressure on state institutions to strengthen environmental regulation, improve pollution control, and maintain social stability, thereby creating incentives for institutional reform (Zhang et al., 2017; Foster, 2023).

These pressures reinforced the role of Ecological Civilization as the principal framework guiding environmental governance and ecological modernization.

Analytical Findings

China's model of environmental governance demonstrates both significant strengths and important limitations. Among its principal strengths are the large scale of environmental programs, a high degree of policy coordination, and substantial state capacity for implementing long-term strategic initiatives. The integration of environmental objectives into national development planning, combined with strong administrative coordination, has enabled the state to pursue ambitious environmental reforms and large-scale ecological modernization projects.

The model is characterized by several important limitations. A high degree of centralization may contribute to a predominantly top-down approach to policy implementation, while regional variation in implementation creates challenges for the consistent application of environmental policies across different local contexts (Kostka & Nahm, 2017; World Economic Forum, 2022).

The central tension within this model lies in the relationship between economic growth and environmental sustainability. This tension is particularly evident in the energy sector. Despite extensive investments in renewable energy and green technologies, China remains both the world's largest consumer of coal and the largest investor in renewable energy (International Energy Agency, 2024). Furthermore, the continued construction of new coal-fired power capacity in certain regions illustrates the ongoing coexistence of ecological modernization and a traditional model of industrial development (Global Energy Monitor, 2024). The simultaneous promotion of green modernization and the persistence of

substantial dependence on coal-based energy generation reflect an enduring tension between environmental transformation objectives and the imperatives of economic growth and energy security (Hensengerth & Lu, 2019; Foster, 2023).

Overall, the Chinese case demonstrates a governance pathway characterized by gradual institutional adaptation rather than abrupt institutional change.

Ukraine: Environmental Governance in the Context of War, Recovery, and European Integration

Environmental governance in Ukraine has evolved under conditions of a large-scale disruptive crisis shaped by war, infrastructure destruction, recovery efforts during an ongoing conflict, and preparations for future post-war reconstruction, while simultaneously being influenced by processes of European integration. This combination creates a distinctive context in which environmental policy is closely linked to recovery, institutional transformation, and alignment with European Union standards (United Nations, 2023; Shyrokykh et al., 2025).

In practical terms, this influence is reflected in the adaptation of environmental legislation to the environmental acquis of the European Union, including the implementation of requirements related to Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), waste management, climate policy, and biodiversity conservation (European Commission, 2024; OECD, 2023; EU–Ukraine Association Agreement, 2014). European integration influences not only the substantive content of environmental policy but also the institutional mechanisms through which it is implemented (Freudlsperger & Schimmelfennig, 2022; Lavenex, 2015).

General Orientation of Environmental Policy

Ukraine's environmental policy is increasingly shaped by two interconnected processes: European integration and recovery under conditions of ongoing war, with a strong orientation toward future post-war reconstruction. Even prior to the outbreak of the full-scale war, the alignment of environmental standards with those of the European Union required gradual institutional and legal adaptation (Freudlsperger & Schimmelfennig, 2022; Shyrokykh et al., 2025). However, the

war has significantly accelerated this process, transforming environmental policy into a central component of recovery and structural modernization.

It should be noted that Ukraine's environmental governance faced a number of institutional challenges even before the full-scale invasion, including limited administrative resources, insufficient enforcement capacity, and the need for further harmonization of legislation with EU environmental standards (OECD, 2023; European Commission, 2024; Golubovska-Onisimova et al., 2023). The war did not create environmental governance challenges from scratch; rather, it intensified and interacted with pre-existing institutional weaknesses.

European integration serves as a key driver of environmental governance transformation, guiding the process of aligning national policy with EU norms and principles of sustainable development (Lavenex, 2015; Anghel & Džankić, 2023).

Environmental policy in Ukraine extends beyond the boundaries of a traditional regulatory domain and has become a framework that integrates environmental objectives with institutional reform, economic recovery, and the transition toward a more sustainable model of development (Aleksieeva & Malkova, 2023).

The Crisis Dimension of Environmental Policy

Ukraine's environmental policy is increasingly shaped by the conditions of a large-scale military conflict that has resulted in extensive environmental destruction and systemic disruption (Leal Filho et al., 2024). Military activities have caused widespread ecosystem degradation, contamination of air, water, and soils, destruction of industrial facilities and critical infrastructure, and damage to protected natural areas (Hryhorczuk et al., 2024). These impacts extend far beyond immediate physical destruction, generating long-term environmental risks for public health, agricultural production, ecosystem recovery, and sustainable development.

According to the Ministry of Environmental Protection and Natural Resources of Ukraine, more than 8,000 cases of war-related environmental damage had been documented by 2025, with total losses estimated at €85–108 billion (Euronews, 2025). International organizations similarly emphasize that the environmental consequences of the war may create a long-lasting "toxic legacy"

that will continue to affect national recovery for decades after the cessation of hostilities (UNEP, 2022, 2023; UNDP, 2025). Studies conducted in affected regions have identified elevated concentrations of heavy metals and hydrocarbons in soils and water resources, illustrating the long-term character of these impacts (Ovchinnikov, 2025).

These developments have transformed the context of environmental governance and cannot be understood as isolated environmental incidents. The war has shifted policy priorities toward environmental security, ecosystem restoration, risk management, and the integration of environmental considerations into broader recovery strategies (Aleksieeva & Malkova, 2023).

The destruction of the Kakhovka Dam in 2023 provides a particularly illustrative example of these governance challenges (Kvach et al., 2025). Beyond extensive flooding and infrastructure damage, the collapse of the reservoir altered the regional hydrological regime, disrupted water supply systems, affected agricultural production, generated transboundary environmental risks, and initiated complex ecological changes, including the emergence of new ecosystems within the former reservoir (UNEP, 2023; European Commission, 2024; United Nations, 2023). The disaster also required coordination among environmental, infrastructural, and humanitarian institutions, demonstrating the close interdependence between environmental governance, security, and post-war recovery (UNDP, 2024; OECD, 2023).

Accordingly, the Kakhovka case illustrates the analytical sequence proposed in this study:

Crisis event → Institutional pressure → Governance adaptation →Emergence of new environmental policy priorities

More broadly, the Ukrainian case demonstrates how environmental governance evolves under conditions of large-scale disruption, where recovery and institutional adaptation become integral components of environmental policy.

Institutional Structure of Environmental Governance

The institutional system of environmental governance in Ukraine is based on constitutional provisions, sectoral legislation, and national sustainable development strategies (Verkhovna Rada of Ukraine, 2023a; Verkhovna Rada of

Ukraine, 1996).

A central role in environmental governance is played by the Ministry of Environmental Protection and Natural Resources of Ukraine, whose activities are complemented by the State Environmental Inspectorate, regional authorities, and specialized monitoring institutions. In recent years, cooperation between national institutions and international organizations has become an increasingly important component of environmental governance.

The Constitution of Ukraine establishes the fundamental principles of environmental policy by defining environmental protection and the maintenance of ecological balance as core responsibilities of the state, while simultaneously guaranteeing citizens the right to a safe environment and imposing obligations regarding the responsible use of natural resources (European Commission, 2023b; Environment-People-Law, 2021). These constitutional provisions provide the normative foundation upon which environmental governance is built.

Building upon this foundation, Ukraine has gradually developed an institutional framework aimed at regulating natural resource use and environmental protection. Since the early 2000s, environmental policy has been shaped around several strategic priorities, including strengthening the legal framework, developing state institutions responsible for environmental governance, and expanding public participation and environmental monitoring mechanisms (Verkhovna Rada of Ukraine, 1996). This process has contributed to the establishment of a comprehensive regulatory system governing interactions between society and the natural environment.

Environmental governance in Ukraine has been significantly influenced by the incorporation of sustainable development principles into public policy. The adaptation of the United Nations Sustainable Development Goals (SDGs) has contributed to elevating the importance of climate action, ecosystem protection, and resource management, thereby integrating environmental concerns into socio-economic development strategies (Shyrokykh et al., 2025; Schwartz, 2020; EU–Ukraine, 2014).

A defining feature of Ukraine's institutional transformation has been the growing influence of European integration. Under the framework of the EU–Ukraine Association Agreement, environmental governance reforms have increasingly been oriented toward the harmonization of national legislation

with European Union standards (European Commission, 2022a; Leal Filho et al., 2024). This process extends beyond formal legal approximation and includes the gradual adoption of new regulatory approaches, policy instruments, and governance practices.

As a result, environmental governance in Ukraine has evolved toward a hybrid institutional model, in which domestic legal and administrative structures are combined with external regulatory frameworks and international commitments. This process of institutional hybridization shapes both the direction of environmental reforms and the mechanisms through which they are implemented.

The institutional structure of environmental governance in Ukraine represents a multi-level system that integrates constitutional principles, national policy frameworks, and international influences. Environmental governance can be understood as an integral component of institutional transformation and sustainable development.

Environmental Recovery and Green Reconstruction

Environmental recovery in Ukraine is increasingly framed within the concept of green reconstruction. Although this approach has received considerable attention from international organizations, donors, and Ukrainian state institutions, its practical implementation remains incomplete and continues to evolve under conditions of ongoing conflict.

The scale of environmental and infrastructural destruction demonstrates that reconstruction cannot be limited to the physical restoration of damaged assets (Aleksieeva & Malkova, 2023). The war has disrupted not only ecosystems but also resource governance arrangements, requiring a systemic approach that integrates environmental considerations, climate resilience, institutional adaptation, and revised governance practices into post-war development (Freudlsperger & Schimmelfennig, 2022).

The destruction of the Kakhovka Dam provides a particularly illustrative example of these dynamics (Kvach et al., 2025). This case demonstrates that post-war reconstruction must account for changing ecological realities and cannot be reduced to the restoration of pre-war conditions.

Accordingly, Ukraine's green reconstruction can be understood as a transition

from restoring what existed before the war toward a strategy of "building back better and greener." This approach integrates environmental principles into infrastructure, energy systems, and economic recovery while emphasizing sustainability, resilience, and the reduction of future environmental risks.

Green reconstruction is also closely connected with the process of European integration, which provides the institutional framework for aligning national governance with broader standards of sustainable development and strengthens incentives for environmental transformation.

At the same time, important trade-offs remain. Under conditions of limited resources, continuing security threats, and the urgent need to rebuild infrastructure, environmental standards may be perceived as obstacles to rapid implementation. Consequently, reconstruction simultaneously creates opportunities to strengthen environmental governance and pressures to relax environmental safeguards in favor of speed, security, and economic efficiency.

Analytical Findings

The Ukrainian case demonstrates that environmental governance under conditions of crisis performs multiple interconnected functions. It operates not only as a system of environmental regulation but also as a mechanism for addressing environmental damage, supporting post-war recovery, and facilitating institutional transformation.

A defining characteristic of this model is its hybrid nature. It combines domestic institutional structures with external regulatory frameworks, particularly those associated with European integration, shaping both the direction of environmental reforms and the mechanisms through which they are implemented (Lavenex, 2015; Shyrokykh et al., 2025).

The war has transformed environmental governance into an integral component of recovery, institutional adaptation, and long-term reconstruction.

Overall, the Ukrainian experience illustrates how a disruptive ecological crisis can transform environmental governance into a multifunctional and adaptive system embedded in recovery, institutional convergence, and long-term development.

Comparative Analysis and Discussion

The comparison demonstrates that environmental governance follows different development pathways shaped by contrasting crisis contexts. Rather than political systems alone, the findings suggest that the nature of crisis pressures constitutes an important factor influencing institutional responses and environmental policy.

Normative Understandings of Green Development

A fundamental difference between the two cases lies in how green development is conceptualized.

In China, green development is embedded within a modernization strategy centered on the concept of Ecological Civilization, where environmental protection is integrated with economic transformation, technological innovation, and long-term state planning. Environmental objectives therefore support economic development instead of constraining it.

In Ukraine, by contrast, green development is framed through the concepts of green recovery and green reconstruction. Environmental policy is integrated into recovery during an ongoing conflict and preparations for post-war reconstruction, instead of functioning primarily as a modernization strategy. Consequently, its primary objective is not the gradual modernization of existing institutions but the rebuilding of infrastructure and governance systems while aligning them with European environmental standards.

Table 2. Comparison of Environmental Governance in China and Ukraine

Analytical Dimension	China	Ukraine
Type of crisis	Structural ecological crisis	Disruptive ecological crisis
Source of pressure	Accumulated environmental pressures of industrialization	War-related destruction and environmental damage

Institutional pressure	Need to adapt the development model	Need for crisis response and recovery
Role of the state	Central coordination and strategic planning	Coordination of recovery and adaptation
Role of external actors	Limited	Significant (EU, donors, international organizations)
Main policy instruments	Five-Year Plans, ETS, environmental inspections, green technologies	Harmonization with the EU acquis, EIA, SEA, recovery programs
Development pathway	Green modernization	Green reconstruction
Pace of environmental transformation	Gradual	Accelerated and crisis-driven

Institutional Architecture of Environmental Governance

Table 2 highlights the contrasting institutional organization of environmental governance in the two cases. China relies primarily on centralized state coordination, whereas Ukraine combines domestic governance with external institutional support associated with European integration and international cooperation. These institutional differences shape the implementation of environmental policy but do not fully explain the observed variation in governance pathways.

Crisis Pathways as an Explanatory Framework

The comparison suggests that institutional differences alone cannot fully explain variation in environmental governance. Crisis dynamics provide an additional explanatory dimension by influencing how institutions adapt and environmental policy evolves under different conditions. The proposed mechanism is summarized in Figure 1.

Figure 1. Crisis Pathways of Environmental Governance: From Crisis Conditions to Development Pathways

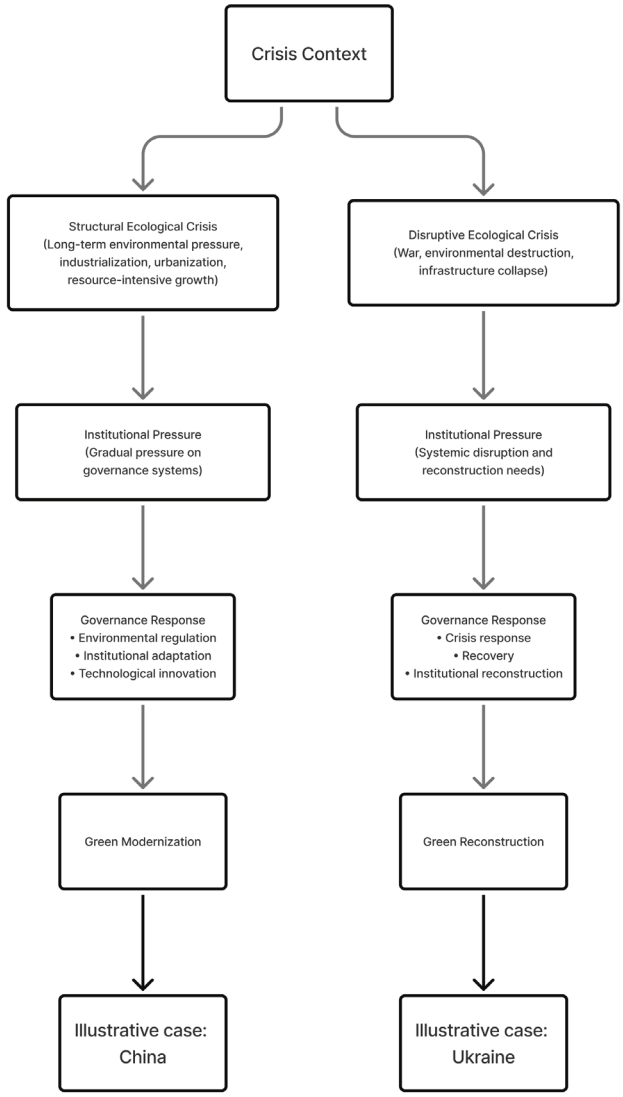

Figure 1 summarizes the analytical logic linking crisis conditions, governance responses, and development pathways.

Comparative Discussion

The findings should not be interpreted as evidence of a universal causal relationship. Based on two comparative cases, the proposed framework is intended as a conceptual model whose broader applicability requires further testing.

The principal contribution of this study is to demonstrate that crisis dynamics constitute an additional explanatory dimension for understanding variation in environmental governance. This perspective extends existing approaches to green transition by showing that different crisis types generate distinct governance pathways.

More broadly, the framework links environmental governance to wider development trajectories by showing how crisis contexts shape the conditions under which green development is defined and implemented. In this sense, it offers a basis for future comparative research across different political, environmental, and post-conflict settings.

It is particularly relevant for contexts of war, destruction, and post-conflict reconstruction, where environmental governance develops under conditions that differ fundamentally from gradual ecological modernization.

Ethics Statement

This study did not involve human participants or animals and therefore did not require ethical approval.

Use of Generative AI

The author used ChatGPT solely to assist with English language editing and improve the clarity and readability of the manuscript. No AI tools were used to generate the scientific content, analysis, or conclusions of this study. All AI-generated suggestions were carefully reviewed, revised, and verified by the author, who takes full responsibility for the content and the final version of the manuscript.

Conflict of Interest

The author declares no conflict of interest.

Author Contributions

This manuscript is solely written by Valeriia Tarasenko. The author is also the corresponding author.

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