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Ecological Turn of Humanities, Science, and Technology with examples from Mexico's Conahcyt and China's Global Influence

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Abstract: ***This article emphasizes the importance of integrating humanistic knowledge into the ecological transformation within the fields of humanities, science, and technology, with a particular focus on how these ideas align with China's green development initiatives. The article critically explores the role of humanistic knowledge in fostering a sustainable relationship between humanity and nature, challenging the capitalist economic model that has historically alienated nature through the relentless exploitation of natural resources. This exploitation has prompted the development of new paradigms centered on sustainable growth, which prioritize environmental protection, the development of ecological industries, and the preservation of biodiversity. By using a comparative case study approach, the article analyzes the practices of Mexico's Conahcyt and China in global ecological governance, demonstrating how the adoption of these sustainable paradigms promotes a more inclusive approach to development. The ecological Marxism movement finds particular resonance in China's concept of Ecological Civilization, i.e., Eco-Marxism being Chinese in orientation. Additionally, the article examines how Mexico has integrated the humanities with science and technology through its Research and Development (R&D) initiatives, led by Conahcyt, to restore the balance between nature and society. The article further reviews the implications of these paradigms for global cooperation, highlighting China's Ecological Civilization Thinking as a guiding framework for global environmental governance, particularly during the 2021 Conference of the Parties to the Convention on Biological Diversity (COP15). This work underscores the need for innovative strategies that combine human knowledge with scientific and technological advancements to achieve sustainable development goals.***

Keywords: Humanistic Knowledge, Ecological Transformation, Ecological Marxism, Ecological Civilization.

1. Introduction

In the 1970s, amidst the rise of developed capitalism in the Western world, growing concerns over environmental pollution and the depletion of natural resources sparked a significant shift in public perception towards the importance of environmental protection. This period marked the beginning of a crucial "ecological turn" in the critique of traditional technology. A diverse group of thinkers—including scientists, economists, sociologists, philosophers, and politicians—began critically examining the environmental challenges posed by scientific and technological advancements. This examination eventually led to the proposal of an ecological civilization model, which aims to establish a more sustainable and harmonious relationship between technological progress and environmental preservation.

Several theoretical perspectives argue that the excessive veneration of science and technology is a primary cause of environmental degradation [1]-[4]. These perspectives suggest that the inherent alienation within the process of scientific and technological development under the capitalist production model has led to environmental pollution and ecological degradation by subjecting nature to relentless exploitation. On the other hand, neoliberal currents of thought argue that science and technology are merely neutral tools for the transformation and conquest of nature, and thus cannot be blamed for the ecological crisis [5]-[7]. According to this view, the root of the environmental crisis lies in the flawed assumption that humans can "control nature". Without a proper approach to nature, this assumption has led to the destruction of vital natural systems essential for human survival [8]-[11].

Empirical evidence, as highlighted by ecological Marxism, corroborates that the anti-ecological technological perspective inherent in the capitalist system has created an increasingly unbalanced relationship between humanity and the natural environment [12]. While industrial civilization has achieved notable material successes through the promotion of a "worship of technology", it has also precipitated the indiscriminate consumption of resources and environmental pollution. This unsustainable mode of operation, driven by short-term profit motives, has led to severe ecological consequences.

This scenario poses an unprecedented threat to human survival and development, culminating in a global ecological crisis. Latin America exemplifies this crisis through the exploitation of natural resources in critical sectors such as mining and intensive agriculture, which has led to biodiversity loss and ecosystem degradation. The case of lithium extraction in South America illustrates this phenomenon. In pursuit of maximizing short-term profits, the capitalist system has resorted to excessive deforestation, river contamination, and habitat destruction. These extractive practices, primarily driven by economic interests, have left a trail of negative impacts that transcend geographical borders.

The profound impact of this phenomenon on environmental equilibrium has also affected the cultural identity of local communities, whose survival depends on the integrity of their ecosystems. In response to the global eco-social crisis, China,

a rapidly modernizing nation, has undertaken the challenging task of reconciling scientific and technological progress with environmental protection imperatives. At the 18th National Congress of the Communist Party of China, the strategy of building an ecological civilization was identified as critical for the country's economic, political, cultural, and social development, marking a new era of ecological consciousness.

To explore these dynamics, this paper employs a comparative case study approach to conduct an in-depth analysis of the traditional knowledge systems in Mexico and China. The research draws primarily on historical documents, policy papers, and academic studies related to these knowledge systems. Utilizing the theoretical frameworks of ecological Marxism and epistemological pluralism, this study systematically analyzes the role and potential of humanistic knowledge in addressing contemporary environmental challenges. The chosen methodology aims to uncover how these knowledge systems are being revived within different cultural and political contexts and to explore their potential in facilitating an ecological turn in academic fields.

This visionary approach underscores the necessity of addressing the relationship between technological development and environmental preservation while considering specific national realities. A dialectical technological vision, rooted in the particular conditions of each country, must be established, transcending the mere critique and praxis of Western technological theory. This paper, informed by the theories presented and the new perspective of ecological civilization, analyzes how the capitalist system, in its pursuit of capital accumulation, inevitably acts as a force alienating nature. Additionally, it explores the potential of diverse humanistic knowledge to address the global eco-social crisis, while also considering the contributions of contemporary Chinese thought in providing a historical perspective on this issue.

2. The Ecological and Social Transformation in Mexico

The recent ecological and social transformations in Mexico reflect a shift toward a more integrated approach to sustainable development, one that marries scientific advancements with traditional knowledge and cultural practices. At the heart of this transformation is the work of the National Strategic Programs (Pronaces) of the National Council of Humanities, Sciences, and Technologies (Conahcyt). Following its mandate expansion to include the humanities, Conahcyt has positioned itself as a leader in fostering eco-social opportunities through an interdisciplinary framework that incorporates both modern and traditional knowledge systems.

Conahcyt's renewed focus on Research and Development (R&D) is now infused with a strong humanistic component, aiming to establish a new cooperation model grounded in the principles of the common good, distributive justice, and the circular economy. This shift marks a departure from the previous three decades, during which R&D was primarily oriented toward fostering cooperation among the state, social communities, citizen agents, and markets to advance scientific and technological development. These efforts, largely shaped by the neoliberal policies of the North American Free Trade Agreement (NAFTA) and other free trade agreements, emphasized efficiency and profit. However, they often fell short of achieving global economic growth, social welfare, and sustainable development, particularly for Mexico's most vulnerable populations.

The reorientation of Mexico's R&D towards a more inclusive and sustainable model is closely linked to the resurgence of traditional knowledge and practices. In this context, traditional ecological knowledge—embodied in practices such as the milpa agricultural system, water management techniques, and community-based resource management—plays a crucial role in informing contemporary strategies for ecological and social reform. The milpa, a polycultural farming system that has sustained Mesoamerican civilizations for millennia, is particularly illustrative of the ways in which traditional knowledge can contribute to modern sustainable practices. By promoting biodiversity, soil health, and food security, the milpa system offers a viable alternative to the monocultural practices often associated with industrial agriculture.

Incorporating traditional practices into contemporary ecological strategies aligns with the principles of ecological Marxism, which critically examines the contradictions of the capitalist system in relation to the common good and environmental stewardship. In Mexico, this perspective has gained traction as scholars and policymakers alike seek to establish principles for a new socioeconomic paradigm that reconciles human welfare with environmental sustainability. This approach is evident in Mexico's Sustainable Taxonomy, overseen by the Ministry of Finance and Public Credit, which aligns the country's economic, political, and environmental guidelines with the United Nations Sustainable Development Goals (SDGs).

One of the most significant areas where traditional knowledge intersects with contemporary ecological practices is in the management of urban solid waste (RSU). The Pronaii RSU project, developed under the auspices of Conahcyt, exemplifies this integration. This transdisciplinary research and resolution strategy for the national problem of RSU emphasizes the cultivation of traditional knowledge within society, alongside the development of innovative strategies for waste reduction. The project's goal is to build a new model for comprehensive urban solid waste management that is both healthy and sustainable, drawing on traditional practices of resource conservation and communal responsibility.

In this regard, the Pronaii RSU project collaborates closely with the Center for Research and Higher Studies in Social Anthropology of the Gulf (Ciesas-Golfo), Mexico. Together, they publish the monthly newsletter La Escoba, which disseminates research findings and promotes the project's objectives to a broader audience. This effort to bridge the gap between the academic community and the general public is critical to the success of Mexico's ecological and social transformation. By making scientific and technological knowledge accessible and relevant to everyday life, La Escoba embodies the principle of "first the poor", as emphasized by President Andrés Manuel López Obrador. This principle underscores the importance of deploying

editorial strategies that resonate with the general population, ensuring that the content is both comprehensible and impactful.

Moreover, the emphasis on traditional knowledge extends beyond the realm of scientific dissemination. Proverbs and other forms of traditional wisdom, deeply rooted in Mexico's cultural heritage, are increasingly being recognized as powerful tools for ecological education and social communication. The literary authority of Miguel de Cervantes' El ingenioso hidalgo don Quijote de la Mancha, for example, illustrates the enduring value of such knowledge. The wisdom of Sancho Panza, based on proverbs, and Don Quixote's eventual adoption of Sancho's behavior, highlight the potential of traditional knowledge to inform and guide contemporary practices.

This integration of traditional knowledge into the R&D discourse is further enriched by a new semantics that resonates with both specialized and non-specialized audiences. The challenge posed by ecological Marxism—to cultivate a competent humanistic, scientific, and technological culture through ecological literacy—is being met through the dissemination of knowledge that is not only scientific but also deeply cultural. The human-nature relationship, as understood within this framework, is informed by a profound comprehension of the causes of environmental problems and potential solutions, a comprehension that is rooted in both modern science and traditional wisdom.

The praxis of ecological Marxism in Mexico seeks to redesign the energy flows that characterize the capitalist system, directing them towards distributive justice and the circular economy. This approach is exemplified by the work of scholars like Escalera-Briceño, Ángeles-Villa, and Palafox-Muñoz (2018), who advocate for a critical examination of the capitalist metabolism [12]. Their analysis traces the historical development of productive forces and their impact on the planetary ecological crisis, from the 15th and 16th centuries—when capital began to foster a new understanding of the environment—to the modern era of the "Anthropocene", where human domination over Earth has generated significant environmental degradation.

Jean Robert's theoretical model further contributes to this discourse by critiquing the unfulfilled promises of capitalist modernity. In his concept of "chronographs", or time-devouring machines, Robert reflects on the continuous acceleration of time and its impact on urban spaces, driven by scientific and technological advancements. This acceleration, which limits the potential for sustainable coexistence with the environment, is countered by Robert's alternative model, which prioritizes the common good in relation to both humanity and nature.

The transformation of Mexico's ecological and social landscape, therefore, is not merely a matter of implementing new policies or technologies. It requires a fundamental shift in how knowledge—both traditional and modern—is valued and integrated into the national discourse. By reconnecting with traditional practices and reorienting the country's R&D efforts towards a more inclusive and sustainable model, Mexico is paving the way for a new era of ecological and social reform, one that is deeply rooted in its cultural heritage and committed to the principles of ecological Marxism.

3. Sustainability Strategies in China: Ecological Civilization through Belt and Road Initiative and the China-CELAC Forum

China's commitment to environmental protection emerged from the resource crises and environmental degradation that became apparent during the 1970s, driven by rapid industrialization and unbridled capitalist development. This period marked a significant shift in global ecological consciousness, where the optimism surrounding technological advancements and increased production efficiency began to be questioned. Environmental thinkers like Rachel Carson and Barry Commoner highlighted the adverse effects of industrialization, spurring global dialogue on the environmental costs of capitalism [1], [13].

China, recognizing the urgent need to address these challenges, has adopted a proactive approach to environmental protection, integrating ecological concerns into its national guidelines and international policies. Central to China's strategy is the concept of Ecological Civilization, which envisions a harmonious relationship between economic development and environmental conservation. This concept has been dynamics behind China's domestic and international initiatives, particularly through Belt and Road Initiative (BRI) and the China-CELAC Forum [14]-[15].

Belt and Road Initiative, launched in 2013, has been instrumental in promoting sustainable development across participating countries. China has made significant investments in green infrastructure, renewable energy, and environmental conservation projects along Belt and Road, emphasizing the need for eco-friendly practices in global development [16]. For instance, the China-Pakistan Economic Corridor (CPEC), a flagship BRI project, includes the construction of solar and wind energy plants, which are expected to significantly reduce carbon emissions and provide clean energy to millions of people [17].

In Latin America, China's collaboration through the China-CELAC Forum has furthered the goals of Ecological Civilization by fostering knowledge exchange and cooperation on sustainable development. The forum, established in 2014, has become a key platform for advancing China-Latin America relations, with a strong focus on environmental protection, economic sustainability, and cultural exchange [18].

On January 29, 2024, the Cooperation for Development and Knowledge Exchange between China and Latin America meeting was held in Beijing, marking the tenth anniversary of the China-CELAC Forum. This event underscored the importance of building a shared future in areas such as regional cooperation, trade, investment, infrastructure, and health education. Notably, it highlighted the integration of environmental concerns into these collaborative efforts. During the meeting, experts emphasized the need for expanding high-level cooperation and mutual benefits,

particularly in strategic alignment, scientific and technological collaboration, and cultural mutual learning [19]. These efforts aim to infuse more stability and momentum into modern development practices, aligning with the principles of Ecological Civilization.

China's efforts in promoting sustainable development extend beyond policy and infrastructure. The country has also made strides in integrating ecological education into its social and cultural fabric. For example, the Chinese government has incorporated environmental education into school curricula, stressing the importance of ecological awareness from a young age [20]. Additionally, public campaigns promoting green lifestyles and environmental conservation have gained traction, fostering a culture of sustainability across the nation [21].

In parallel, China's international collaborations have included a strong emphasis on ecological research and the exchange of traditional environmental knowledge. Through partnerships with Latin American countries, China has supported initiatives that protect biodiversity, combat climate change, and promote sustainable agriculture [22]. These collaborations are not merely about technology transfer but also involving learning from indigenous practices and local knowledge systems, which are often more attuned to environmental stewardship [23].

The integration of ecological concerns into China's international strategy is also evident in its leadership within global environmental forums. China has played a pivotal role in the Paris Agreement and has committed to reaching carbon neutrality by 2060 [24]. This ambitious goal reflects China's dedication to global environmental leadership, positioning itself as a model for sustainable development.

In the context of the China-CELAC Forum, these efforts have been mirrored in Latin American countries, where China's influence has encouraged the adoption of more sustainable practices. For instance, China's investment in renewable energy projects in countries like Brazil, Chile, and Argentina has contributed to a significant reduction in greenhouse gas emissions in the region [25]. The modernization of Metro Line 1 in Mexico City by CRRC Zhuzhou, a Chinese company, has largely reduced its energy consumption and noise pollution. Moreover, China has supported reforestation and conservation projects that protect vital ecosystems, such as the Amazon rainforest, which is crucial for global climate regulation [26].

Furthermore, China's commitment to Ecological Civilization is reinforced by its support for cultural and academic exchanges that promote environmental consciousness. The inclusion of indigenous narratives and traditional knowledge in these exchanges highlights the importance of a holistic approach to sustainability. In Mexico, for example, the collaboration between Chinese and Mexican scholars has led to the preservation and dissemination of traditional environmental knowledge, which is crucial for maintaining biodiversity and promoting sustainable practices [27].

As China continues to expand its global recognition through initiatives like Belt and Road and the China-CELAC Forum, the principles of Ecological Civilization remain at the forefront of its strategy. By integrating environmental conservation into its development pattern, China is not only addressing the ecological challenges of the present but also setting a precedent for future generations. The country's approach serves as a blueprint for other nations seeking to balance economic growth and environmental sustainability, demonstrating that a shift towards Ecological Civilization is not only necessary but achievable [28].

In conclusion, China's sustainability strategies, rooted in the concept of Ecological Civilization, offer a comprehensive framework for addressing global environmental challenges. Through Belt and Road Initiative and the China-CELAC Forum, China has demonstrated its commitment to promoting sustainable development on a global scale. By including technological innovation, traditional knowledge, and international cooperation, China is paving the way for a more sustainable and harmonious future, both domestically and internationally.

4. Philosophies and Practices of Sustainability in Mexico and China: An Interdisciplinary Perspective

Swiss thinker Jean Robert (2020), a disciple of Ivan Illich in Cuernavaca, Mexico, offers a profound reflection on sustainable development through the lens of Marxist ecology. Robert, with his background as a historian of space and architect, centers his reflections on the concept of "place". He challenges the conventional notion of space as an abstract, Euclidean entity that can be measured and quantified. Instead, he views "place" as a territory imbued with life, appropriated by men and women through their daily activities. The essence of those who work the land is deeply intertwined with the "place". Using metonymy, Robert describes this connection as "walking", where the feet symbolize the whole person, in contrast to the alienation induced by machinery that distances humans from the earth.

In critiquing motorized transport, gigantist urbanism, and transnational corporations detached from the ecosystem of a population's history, Robert emphasizes the yearning for rootedness in the land. In China, this rootedness is exemplified by the preservation and transmission of cultural practices that have endured for over 10,000 years, such as rice cultivation, an essential aspect of daily life. This cultural continuity underscores China's broader Ecological Civilization strategy, which emphasizes harmony between human activities and the natural environment.

The concept of "cleanliness", as it relates to the idea of "caring for the home," can be traced back to the etymology of the word "economy". Jean Robert's studies on the "milpa", a traditional Mesoamerican agricultural system, further illuminate this connection. Since the 1970s, as the resource crises caused by capitalist development and scientific-technological optimism became apparent, Robert, immersed in Mexico's political and intellectual life, highlighted the value of local traditions like corn cultivation. The rituals associated with planting and harvesting, which are closely tied to social and natural cycles, symbolize a harmonious relationship between humans and nature.

Similarly, in China, traditional agricultural practices, such as the "Three Fields System", which promotes soil conservation through crop rotation, exemplify the integration of ancient wisdom with modern ecological strategies.

This portrayal of Mesoamerican culture underscores the significance of corn cultivation for civilizations such as the Maya. In those distant centuries, far removed from the contemporary world, the destructive impact of the capitalist system, with its insatiable consumption of natural resources, was unimaginable. Robert's emphasis on rootedness in place challenges the capitalist model and aligns with the principles of Marxist Ecology and Green Development Thought, as seen in countries like China. The Chinese government's initiatives, such as the Grain for Green Program, which incentivizes farmers to convert cropland back into forest or grassland, reflect a similar commitment to ecological sustainability by restoring degraded ecosystems.

In his 2020 work, Robert elaborates on the distinction between "space" and "place". He argues that "space" is abstract and geometric, akin to a lifeless container. In contrast, "place" is defined by its singularity and uniqueness, being "inhabited by people and populated by gods" within an ecological economy of social coexistence. Drawing on Heidegger's concept of "dwelling" as the "fundamental characteristic of being", Robert applies this model to the Latin American, specifically Mexican, context, illustrating the lived experience of place. China's ecological civilization framework similarly emphasizes the importance of "beautiful countryside" (美丽乡村), which integrates the preservation of rural landscapes with the revitalization of rural economies, promoting sustainable development in line with traditional values.

The circular economy, which integrates resource management across water, energy, socio-ecological systems, human health, and urban solid waste, contrasts sharply with the capitalist linear trajectory. The latter transforms raw materials into market products that ultimately become pollutants. The circular economy seeks to replace this linear model with one where waste is repurposed as material for new goods, promoting sustainability. The goal of this model is not only to recycle or convert waste into new products or energy but also to prevent waste generation altogether. In China, this model is reflected in the government's push for "zero-waste cities", such as Shenzhen, where comprehensive waste management systems aim to eliminate landfill dependency by maximizing recycling and reuse efforts.

In this regard, García Barrios (2022, 1) notes that in Mexico, "the state will promote innovations with biological and organic products as inputs for agriculture and intensive agroecological practices that are safe for human health, the country's biocultural diversity, and the environment" [29]. Reflecting this commitment, a decree was issued on December 31, 2020, to promote sustainable and culturally appropriate alternatives to glyphosate use, protecting native corn, milpa systems, biocultural richness, and peasant communities. Similarly, China's Ecological Redline Policy, which delineates areas that must be protected from development to preserve biodiversity and water resources, exemplifies the country's commitment to maintaining environmental integrity.

Recent environmental and climate disasters, such as Hurricane Otis in Acapulco, Guerrero, have compelled the scientific community to reconsider how environmental resources are exploited. Vilchis Pérez (2023) emphasizes that the "lack of risk perception" is one of the major challenges faced by Latin America and the Caribbean, and indeed the world, in disaster prevention [30]. Effective disaster preparedness requires not only the dissemination of scientific information but also the modification of social risk perception to encourage proactive behaviors. The Sendai Framework for Disaster Risk Reduction 2015-2030 (United Nations, 2015) outlines the parameters for this transformation. In response to similar challenges, China has developed advanced disaster risk management systems, including early warning networks and climate-resilient infrastructure, which are integral to the country's broader ecological civilization strategy.

As Pollans (2021) points out, "waste is the true end of a global system of extraction, manufacturing, and consumption" [31]. In El régimen de residuos (The Regime of Waste), Pollans draws on Zsuzsa Gille's theory to examine the waste problem in cities like Boston and Seattle, highlighting a global issue that affects many more cities worldwide. Similarly, China's waste management reforms, such as the nationwide ban on single-use plastics, reflect the country's efforts to mitigate environmental degradation by reducing waste at the source.

In China, a growing interest in sustainable development and public administration of smart cities reflects the government's commitment to a new phase of economic growth that integrates sustainability and regional cohesion. China's cities are being reinvented with the help of data, artificial intelligence, and new technologies to enhance infrastructure and protect natural resources. The global debate on sustainable development, intensified by the human vulnerability exposed during the Covid-19 pandemic, has gained new urgency.

China's leadership in promoting the concept of Ecological Civilization was showcased at the 15th Conference of the Parties to the United Nations Convention on Biological Diversity (COP15) in 2021. This conference, convened by the United Nations and hosted by China, aimed to negotiate a global consensus on biodiversity protection for the coming decade. President Xi Jinping's philosophical framework of Ecological Civilization Thinking underpins China's efforts to construct a green economy and promote equitable biodiversity governance. This framework includes support for developing countries in adopting green and low-carbon energy, with China aiming to peak CO2 emissions before 2030 and achieve carbon neutrality by 2060 [32]. Additionally, China's Green Belt and Road Initiative, which promotes sustainable infrastructure development across participating countries, exemplifies the nation's commitment to global ecological stewardship.

5. Ecological Turn Perspectives: Humanities' Reflections on the Blind Spots of Capitalism in China and Mexico

The ecological turn in the social sciences and humanities

sheds light on the natural spaces and environmental issues often overlooked in capitalist societies. This shift in perspective is critical in an age where the urban metabolism—characterized by the cyclical processes of production and consumption—confines individuals to artificial environments, even those meant for leisure [33]. Under capitalism, nature is commodified, reduced to a resource that fuels the system's relentless pursuit of profit [34].

Capitalism's inherent tendency to commodify everything, including human beings, results in a disconnection between individuals and the environment [35]. This disconnect fosters a system that obscures the destructive consequences of its own practices, rendering the exploitation of nature invisible. These blind spots are rarely addressed in mainstream media, where the environmental costs of economic growth are often ignored or downplayed, further perpetuating the illusion that capitalism can sustainably meet human needs [36].

Literature and art have long served as critical tools in exposing these blind spots. The works of Latin American writers like Alejo Carpentier and Juan Rulfo offer profound insights into the hidden realities of capitalist societies. Carpentier's journey along the Orinoco River, for example, led him to encounter communities deeply connected to their natural surroundings, despite lacking modern scientific advancements [37]. This experience informed his literary works, where he juxtaposes the empirical knowledge of these communities with the destructive impacts of industrialization. Similarly, Rulfo's Pedro Páramo paints a bleak picture of Comala, a desolate town that symbolizes the barren promises of capitalism [38]. Through these narratives, literature reveals the harsh truths that capitalism often conceals, challenging the notion that material wealth alone can ensure a fulfilling life.

In China, the ecological turn has also gained momentum, particularly within the humanities and social sciences. Chinese scholars have begun to revisit traditional philosophies, such as the concept of "天人合一" (Harmony between Heaven and Man), which emphasizes the interdependence of humans and nature [39]. This ancient philosophy is being reinterpreted in light of contemporary environmental challenges, offering a valuable framework for addressing the ecological crises brought about by capitalist development. The integration of these ideas into China's green development policies reflects a growing awareness of the need to balance economic growth with environmental preservation [40].

One significant example of this integration is seen in China's Belt and Road Initiative, which has incorporated ecological considerations into its broader agenda [41]. As China extends its influence globally, including towards Latin America through initiatives like the Silk Road, it becomes increasingly important to critically evaluate and apply ecological values in these international engagements. This approach aligns with China's Reform and Opening-Up policies, which seek to promote sustainable development both domestically and abroad [42].

China's environmental awareness, particularly regarding the destructive impacts of capitalist development, began to emerge prominently during the 1970s. This period marked a crucial ecological shift in the country's critique of technology and its environmental implications [43]. Previously, the focus was primarily on the benefits of increased production efficiency and material abundance, driven by scientific and technological advancements. However, by the 1970s, philosophers, scientists, and policymakers began to question the environmental costs of such unchecked growth, leading to a broader recognition of the need for sustainable practices.

This shift in perspective has also influenced contemporary Chinese intellectuals and cultural critics, who are increasingly exploring the ecological implications of rapid urbanization and industrialization. For instance, the work of sociologist Fei Xiaotong has been instrumental in highlighting the importance of "cultural self-awareness" (文化自觉) in understanding the relationship between cultural heritage and sustainable development [44]. Fei's ideas have informed policies aimed at preserving traditional practices in rural areas while promoting ecological balance. His work underscores the relevance of traditional knowledge in addressing modern environmental challenges.

Another notable contribution comes from Chinese anthropologist Wang Mingming, whose research focuses on the adaptation of traditional ecological practices in contemporary contexts [45]. Wang emphasizes the need to maintain cultural continuity while addressing the ecological impacts of modernization. His work provides valuable insights into how traditional Chinese practices, such as community-based resource management, can be integrated into modern environmental governance frameworks.

In Mexico, a similar integration of ecological concerns within the humanities can be observed. The country's National Council of Science and Technology (Conahcyt) has embraced the ecological turn by incorporating indigenous knowledge and narratives into its initiatives. For example, La Noria Digital, a digital platform supported by Conahcyt, features indigenous stories that offer alternative perspectives on environmental stewardship [46]. These narratives challenge the exploitative tendencies of capitalist development and emphasize the importance of cultural and historical contexts in shaping sustainable practices.

The ecological turn in both Chinese and Mexican humanities reflects a broader global recognition of the limitations of capitalist development models. As Latin American nations once sought to reconstruct their national identities by reclaiming their pre-Hispanic past, today's challenge extends beyond historical memory. It involves cultivating a deep appreciation for the natural ecosystem and critically examining the blind spots of capitalism. This shift requires a reevaluation of the dominant capitalist paradigm and the development of more sustainable and humane alternatives [47].

China and Mexico, through their respective cultural and philosophical traditions, are contributing to this global dialogue on sustainability. Their experiences highlight the importance of integrating traditional ecological wisdom with modern practices, offering valuable insights into how societies can address the environmental crises of the 21st

century. By bringing the blind spots of capitalism into focus, the ecological turn in the humanities not only critiques the existing system but also provides a road map for a more balanced and sustainable future.

6. Final Reflections

This article offers a comprehensive analysis of the "ecological turn" across the fields of humanities, science, and technology, emphasizing how societies respond to global environmental crises. By focusing on the experiences of Mexico's National Council of Science and Technology (Conahcyt) and China's growing international influence, the study illustrates the integration of traditional knowledge with contemporary practices to effectively tackle environmental challenges. The comparative case study approach employed here underscores the importance of aligning technological advancement with environmental preservation within the unique cultural and national contexts of different countries.

The critique of capitalism's commodification of nature serves as a central theme in the article, highlighting how this process has exacerbated environmental degradation and led to numerous ecological crises. The article argues for a more nuanced technological vision—one that is not merely critical of Western technological theory but also deeply rooted in the particular conditions and needs of individual nations. This vision aims to cultivate a more sustainable and balanced relationship between humanity and the natural environment, moving beyond exploitative practices to foster genuine ecological stewardship.

The article draws attention to specific examples of how traditional practices can offer sustainable alternatives to industrial agriculture. In Mexico, the milpa agricultural system, and in China, various traditional farming methods, are highlighted as key examples. These practices contribute to biodiversity, improve soil health, and bolster food security, all while promoting a harmonious coexistence with nature. By integrating traditional ecological knowledge into modern ecological strategies, these practices reflect the principles of ecological Marxism, which advocates for the equitable distribution of environmental resources and the sustainable management of ecosystems.

China's proactive approach to environmental protection is further examined, particularly through its national and international policies that embed ecological concerns at the core of their objectives. Initiatives such as Belt and Road Initiative and the China-CELAC Forum are instrumental in promoting sustainable development on a global scale. These programs not only address current environmental challenges but also lay the groundwork for an ecological civilization that can serve as a model for future generations. China's efforts demonstrate that a significant shift towards ecological sustainability is both necessary and achievable.

The humanities play a pivotal role in this ecological turn, offering critical insights into the often-overlooked environmental issues within capitalist societies. Through literature, art, and philosophy, the humanities reveal the blind spots of capitalism, challenging the notion that material wealth is the sole path to a fulfilling life. The reinterpretation of traditional philosophies, such as "天人合一" in China, provides valuable frameworks for addressing contemporary environmental challenges. These philosophies emphasize the need for a balanced relationship between human progress and nature, advocating for a sustainable model of development.

The ecological turn observed in the humanities of both China and Mexico reflects a broader global recognition of the limitations inherent in capitalist development models. This recognition prompts a reevaluation of dominant paradigms and encourages the search for more sustainable and humane alternatives that are better suited to the complex environmental realities of the 21st century.

In conclusion, this article provides critical insights into how societies can confront the environmental crises of the modern era by blending traditional ecological wisdom with innovative practices. It underscores the indispensable role of the humanities in this transformative process, offering a holistic perspective on how nations can advance sustainable development while respecting and integrating traditional knowledge. The comparative analysis of Mexico and China not only reveals common challenges and solutions but also provides valuable lessons for global ecological governance, highlighting the importance of a cooperative and inclusive approach to addressing the world's most pressing environmental issues.

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