Theoretical Essay

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Ecological and environmental anthropology: history, concepts, and analytical perspectives

Antropologia ecológica e ambiental: história, conceitos e perspectivas analíticas

Fábio Freitas dos Santos[1], *Laércio Fidelis Dias*[1]

ABSTRACT

Environmental transformations observed in recent decades have intensified debates about the relationships between human societies and ecological systems, highlighting the need for analytical approaches capable of integrating cultural, political, and ecological dimensions of socio-environmental dynamics. Within the field of Ecological and Environmental Anthropology, different theoretical traditions have sought to interpret these interactions through diverse analytical perspectives. This theoretical essay critically examines three central approaches — Cultural Ecology, Political Ecology, and Bioculturality — discussing their conceptual foundations, historical trajectories, and analytical contributions to understanding the relationships between nature and culture. From a methodological standpoint, the study is characterized as a theoretical essay grounded in an interpretive literature review and conceptual analysis, based on the selection of classical and contemporary works in environmental anthropology and socio-ecological sciences. It prioritizes contributions with well-established theoretical relevance that are widely cited in debates within the field. The analysis shows that these perspectives illuminate complementary dimensions of socio-ecological dynamics. More specifically, Cultural Ecology emphasizes adaptive processes between cultural practices and environmental conditions; Political Ecology analyzes power relations and inequalities that structure access to what are conventionally referred to as natural resources; and the biocultural approach highlights the interdependence between biological and cultural diversity in socio-ecological systems. Comparative analysis indicates that integrating these perspectives provides a more comprehensive interpretive framework for addressing contemporary challenges related to sustainability and environmental management.

Keywords: cultural ecology; political ecology; bioculturality; socio-ecological systems; environmental governance.

RESUMO

As transformações ambientais observadas nas últimas décadas têm intensificado os debates sobre as relações entre sociedades humanas e sistemas ecológicos, evidenciando a necessidade de abordagens analíticas capazes de integrar as dimensões culturais, políticas e ecológicas das dinâmicas socioambientais. No campo da Antropologia Ecológica e Ambiental, diferentes tradições teóricas buscaram interpretar essas interações a partir de perspectivas analíticas diversas. Este ensaio teórico examina criticamente três abordagens centrais desse campo – Ecologia Cultural, Ecologia Política e Bioculturalidade – e discute seus fundamentos conceituais, trajetórias históricas e contribuições analíticas para a compreensão das relações entre natureza e cultura. Sob o ponto de vista metodológico, o estudo caracteriza-se como um ensaio teórico fundamentado em revisão bibliográfica interpretativa e em análise conceitual, com base na seleção de obras clássicas e contemporâneas da antropologia ambiental e das ciências socioecológicas, priorizando contribuições de relevância teórica consolidada e recorrentes nos debates do campo. Argumenta-se que essas perspectivas iluminam dimensões complementares das dinâmicas socioecológicas. De forma mais específica, a Ecologia Cultural enfatiza os processos adaptativos entre práticas culturais e condições ambientais; a Ecologia Política analisa as relações de poder e desigualdade que estruturam o acesso ao que, convencionalmente, se denomina recursos naturais; e a abordagem biocultural destaca a interdependência entre a diversidade biológica e a diversidade cultural nos sistemas socioecológicos. A partir da análise comparativa dessas tradições teóricas, sustenta-se que a articulação entre essas perspectivas oferece um arcabouço interpretativo mais abrangente para compreender os desafios contemporâneos da sustentabilidade e do manejo ambiental.

Palavras-chave: ecologia cultural; ecologia política; bioculturalidade; sistemas socioecológicos; governança ambiental.

[1]São Paulo State University (UNESP) – Sorocaba (SP), Brazil.
Corresponding author: Fábio Freitas dos Santos – Instituto de Ciência e Tecnologia de Sorocaba – Programa de Pós-Graduação em Ciências Ambientais (PPGCA). Av. Três de Março 511, Bairro Alto da Boa Vista – CEP 18087-180 – Sorocaba (SP), Brazil. E-mail: fabio.f.santos@unesp.br
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Introduction

In the early decades of the twenty-first century, the intensification of global environmental transformations has made it evident that contemporary ecological problems cannot be understood solely as isolated biophysical phenomena. Processes such as climate change, accelerated biodiversity loss, ecosystem degradation, and the expansion of extractive economies operating at scale reveal dynamics that are deeply intertwined with social, political, and cultural structures shaping the relationships between human societies and natural environments. Within this analytical framework, understanding environmental issues requires approaches capable of integrating multiple scales of interpretation and encompassing ecological, institutional, and cultural dimensions of socio-environmental interactions (Rattner, 1995; Fabinyi et al., 2014; Scoones, 2016).

Within this interpretive horizon, Ecological and Environmental Anthropology has become established as an interdisciplinary field dedicated to understanding how different societies perceive, use, and transform the environments in which they are embedded. By investigating cultural practices, knowledge systems, and social institutions associated with how different societies relate to natural environments – understood not merely as resources, but as ecological, symbolic, and relational dimensions – this field contributes to overcoming traditional dichotomies between nature and culture, emphasizing the interdependence between ecological processes and social practices (Strang, 2005; Ingold, 2018).

Historically, various theoretical currents have emerged within anthropology to interpret interactions between humans and environments. Among these approaches, three perspectives stand out as particularly influential: Cultural Ecology, Political Ecology, and Bioculturality.

Cultural Ecology, in dialogue with earlier traditions such as Human Ecology – which was responsible for structuring the first systematic analyses of interactions between society and environment – focuses on the analysis of adaptive processes between cultural practices and specific environmental conditions. Political Ecology, in turn, emphasizes the power relations and inequalities that structure access to what are conventionally referred to as natural resources and shape socio-environmental conflicts. The biocultural approach, for its part, highlights the interdependence between biological diversity and cultural diversity.

Despite the contributions of these approaches, much of the literature tends to treat them in a relatively isolated manner. From this standpoint, the present essay is based on the hypothesis that integrating these three analytical traditions allows for the construction of a more comprehensive interpretive framework for understanding the relationships between nature and culture.

From a methodological standpoint, this work is characterized as a theoretical essay, understood as a form of academic production oriented toward critical reflection, conceptual integration, and interpretive analysis of complex phenomena through dialogue among different theoretical traditions. Unlike empirical research based on the collection of primary data or field investigation procedures, the theoretical essay prioritizes the analytical reconstruction of debates and the development of interpretations grounded in specialized literature. The literature selection included classical and contemporary works in ecological and environmental anthropology, prioritizing authors with well-established theoretical relevance, widely cited in debates within the field, and with direct contributions to problematizing the relationships between nature and culture, as well as to the integration of Cultural Ecology, Political Ecology, and Bioculturality.

In this sense, the original contribution of this essay lies in proposing an analytical integration of Cultural Ecology, Political Ecology, and Bioculturality as a unified interpretive framework for understanding contemporary socio-ecological dynamics. By integrating these three theoretical traditions — often treated as dissociated in the literature — the study seeks to highlight their conceptual convergences and their combined explanatory potential, contributing to the advancement of discussions on sustainability, environmental governance, and the relationships between nature and culture within the field of Ecological and Environmental Anthropology.

Historical foundations of the nature–culture relationship in ecological anthropology

Anthropological reflection on the relationships between nature and culture constitutes one of the structuring axes of theoretical development in the social sciences. Since the emergence of anthropology as a scientific discipline in the late nineteenth century, different schools of thought have sought to understand how human societies relate to the environments in which they are embedded.

During the early period of anthropology, interpretations influenced by evolutionist and determinist perspectives predominated. In this context, some authors argued that environmental factors — such as climate, resource availability, and geographical characteristics — directly influenced the cultural development of human societies. In contrast to this rigid determinism, Arnold J. Toynbee (1947) proposed that the environment should not be understood as a fixed form, but rather as a "challenge" that requires a creative cultural "response." For the author, the flourishing of a civilization depends on society's capacity to respond to geographical adversities, rather than on the mere availability of resources. These interpretations, associated with so-called environmental determinism, were later criticized for oversimplifying the complexity of the relationships between environment and culture and for ignoring the historical and social dynamics that structure human practices. From this perspective, such formulations contributed to shift the interpretation of environment–culture relations from a logic of direct causality to a more dynamic and historically situated approach, later consolidated in critiques of environmental determinism.

From the early twentieth century onward, important transformations took place in the anthropological field, particularly with the development of historical particularism and cultural anthropology. Authors such as Franz Boas emphasized that human cultures should be understood within their specific historical contexts, rejecting universalist explanations based on environmental determinism. This shift in perspective opened space for more complex interpretations of the relationships between society and nature (Boas, 1941; Boas, 2014).

Over the following decades, growing concern with environmental issues led to the emergence of anthropological approaches specifically oriented toward analyzing interactions between humans and ecosystems. In this context, the field of Ecological Anthropology became established, with its primary concern being to understand how cultural practices, knowledge systems, and forms of social organization influence interactions between human societies and natural environments[1]. At this turning point, historical ecology also offered relevant contributions by emphasizing the historicity of landscapes and the co-production between human action and ecological change (Crumley, 1994).

Among the authors who contributed to the development of this perspective, Julian Steward is particularly noteworthy; his proposal of Cultural Ecology sought to analyze adaptive processes between cultural systems and specific ecological conditions. Subsequently, new approaches expanded this interpretive horizon by incorporating political, historical, and symbolic dimensions of socio-environmental relations. In parallel, reflections on spatiality and the social production of space reinforced the idea that ecological relations are also territorially mediated, which helps explain the centrality of space in contemporary formulations of environmental anthropology (Mattos, 2021).

In this process, two theoretical currents have played a particularly relevant role: Political Ecology and the biocultural approach. While the former emphasizes the power relations that structure access to natural resources, the latter highlights the interdependence between biological diversity and cultural diversity within socio-ecological systems.

Thus, the historical evolution of environmental anthropology reveals a progressive process of theoretical complexification. Whereas initially the relationships between nature and society were interpreted through determinist or adaptive models, the subsequent development of the field came to recognize the multiplicity of factors — ecological, cultural, political, and symbolic — that shape socio-environmental dynamics.

Cultural ecology: adaptation, subsistence, and socio-ecological interactions

Cultural Ecology constitutes one of the principal theoretical foundations of contemporary environmental anthropology. Developed by Julian Steward in the mid-twentieth century, this approach sought to understand how different societies organize their cultural practices in response to the ecological conditions of their environments. In contrast to earlier determinist perspectives, Steward proposed that the relationship between culture and environment should be analyzed in a dynamic and contextualized manner, recognizing both the constraints imposed by ecosystems and the human capacity to transform them (Steward, 1955).

At the core of this approach lies the concept of cultural adaptation, understood as the set of strategies through which societies adjust their economic, technological, and social practices to environmental conditions. These strategies may include agricultural systems, forest management techniques, hunting and fishing practices, as well as forms of social organization related to the distribution and use of natural resources (Moran and Ostrom, 2009).

One of the most influential concepts introduced by Steward was that of the cultural core. This concept refers to the set of cultural practices most directly related to subsistence and interaction with the environment, such as food production systems and resource management technologies. According to Steward, these practices tend to exert a strong influence on other aspects of social organization, including settlement patterns, division of labor, and forms of economic cooperation (Keesing, 1974).

Another central element of Cultural Ecology is the notion of multilinear evolution. Unlike classical evolutionary theories, which assumed a universal trajectory of cultural development, Steward argued that different societies could follow distinct evolutionary paths depending on their ecological conditions and particular histories. This perspective allowed for the recognition of the diversity of adaptive strategies developed by different cultures over time (Gil, 2010).

Based on these theoretical formulations, Cultural Ecology came to play a fundamental role in the analysis of traditional subsistence systems. Studies conducted in different regions of the world have shown that Indigenous communities and traditional populations often develop sophisticated forms of environmental management based on ecological knowledge accumulated over generations. Such systems may include practices such as shifting cultivation, agroforestry, fisheries management, and forest conservation, often contributing to the maintenance of biodiversity (Moran and Ostrom, 2009; Neves, 2024). Conversely, analyses of environmental vulnerability associated with productive intensification, such as that of Soares et al. (2020), show that intensive land-use models may compromise ecological resilience, reinforcing the continued relevance of Cultural Ecology for the critique of contemporary management systems.

[1] In this work, Environmental Anthropology is understood as a broader and more contemporary field that incorporates and reconfigures the contributions of Ecological Anthropology in light of current debates on socio-ecological relations, environmental governance, and biocultural diversity. Environmental Anthropology: A Historical Reader, edited by Dove and Carpenter (2008), is a compilation of historically relevant texts, from the beginning of the 20th century to the beginning of the 21st century, concerning the intercultural study of the relationships between people and their environment, and how and why the term was coined over the decades.

However, despite its contributions, Cultural Ecology has also been subject to criticism over time. Some authors have argued that this approach tends to place excessive emphasis on the material and ecological aspects of cultural practices, neglecting the political, historical, and symbolic dimensions of human–environment relations. These critiques contributed to the emergence of new theoretical approaches, such as Political Ecology, which began to incorporate more explicitly power relations and economic structures into socio-environmental analyses (Fabinyi et al., 2014).

Nevertheless, Cultural Ecology remains a fundamental reference for understanding interactions between cultural practices and ecosystems. Its main contribution lies in demonstrating that human societies are not merely determined by their natural environments, but actively participate in the construction and transformation of the ecological systems in which they are embedded. This perspective paved the way for the development of more complex approaches to the relationships between nature and culture, in which adaptation, transformation, and interdependence constitute central dimensions of socio-ecological dynamics.

Political ecology: power, territory, and socio-environmental conflicts

Political Ecology became established in the 1970s and 1980s as a critical approach focused on analyzing the interactions between power, economy, and the environment. Unlike Cultural Ecology — which primarily emphasized adaptive processes between societies and ecosystems — Political Ecology began to stress the historical and institutional structures that shape access to, control over, and distribution of natural resources.

This shift in focus represented a significant expansion of the analytical horizon of environmental anthropology. Whereas earlier approaches concentrated on cultural adaptation to specific environments, Political Ecology argued that contemporary environmental problems should be understood as phenomena deeply rooted in power relations and in historical processes of social inequality (Little, 2006; Escobar, 2008). In the Latin American context, this shift also resonates with formulations such as those of Costa and Loureiro (2016), which articulate political ecology, critiques of development, and social struggles.

A central element of this perspective is the understanding that the use of natural resources does not occur in a social and political vacuum. On the contrary, it is embedded in historical contexts marked by colonialism, capitalist expansion, state policies, and territorial disputes. Such processes often reconfigure traditional systems of environmental management, displacing local communities and profoundly transforming relationships between society and nature (Scoones, 2016). More recent studies, such as Sodikoff (2021), further demonstrate how labor, conservation, and forests can be embedded within historical regimes of exploitation and regulation that extend colonial logics into contemporary contexts.

Within this framework, Political Ecology devotes particular attention to socio-environmental conflicts, understood as disputes among different social actors — local communities, states, corporations, and international organizations — over the control and use of natural resources. These conflicts frequently reveal profound asymmetries in the distribution of power and environmental benefits.

In Latin America, for example, numerous studies have shown how mining projects, agro-industrial expansion, and large-scale infrastructure developments have generated intense territorial conflicts involving Indigenous communities and traditional populations. These conflicts reveal not only material disputes over natural resources but also confrontations between different conceptions of territory, nature, and development (Aráoz, 2014; Ávila-García, 2016). In the same vein, Krenak (2018) argues that the contemporary ecological crisis also expresses a civilizational crisis grounded in the rupture between humans and the Earth.

Political Ecology has also contributed to highlighting the limits of development models based on the intensive exploitation of natural resources. By analyzing the socio-environmental impacts of global economic policies, this approach shows that processes of globalization often deepen environmental inequalities and shift ecological costs onto vulnerable populations (Escobar, 2008).

However, despite its analytical relevance, Political Ecology has also been subject to criticism. Some authors argue that this approach tends, at times, to place excessive emphasis on the political and structural dimensions of socio-environmental relations, leaving ecological processes themselves in the background. In this sense, recent debates have sought to integrate political and ecological analyses in a more balanced manner, bringing Political Ecology closer to other perspectives within environmental anthropology. This critique was classically formulated by Vayda and Walters (1999), who argue that an exclusive emphasis on power relations may obscure the causal specificity of certain ecological processes.

Nevertheless, its main contribution remains fundamental: it demonstrates that environmental issues are inseparable from the power relations that structure societies. By revealing the political dimensions of environmental degradation and territorial conflicts, Political Ecology significantly expands the interpretive capacity of the social sciences to understand the challenges of contemporary sustainability.

Bioculturality: cultural diversity, traditional knowledge, and socio-ecological systems

The biocultural approach represents a relatively recent development in the field of environmental anthropology and the socio-ecological sciences. This perspective emerged from the recognition that biological diversity and cultural diversity are often deeply interconnected across different regions of the world.

Research conducted in recent decades has shown that areas of high biodiversity tend to coincide with territories inhabited by Indigenous peoples and traditional communities. This correlation suggests that cultural practices, knowledge systems, and forms of social organization play a fundamental role in the conservation and maintenance of complex ecosystems (Crate and Nuttall, 2009).

In this context, the notion of biocultural diversity is used to describe the interdependence between biological diversity, cultural diversity, and linguistic diversity. This perspective emphasizes that biodiversity conservation cannot be separated from the preservation of cultural practices and knowledge systems associated with the management of natural resources.

A central element of this approach is the recognition of the value of traditional ecological knowledge. Unlike modern scientific conceptions, which are often grounded in analytical and experimental methods, traditional knowledge systems arise from historical processes of observation and ongoing interaction with ecosystems.

Such knowledge may include detailed information about climatic cycles, species behavior, soil management, and forest regeneration. In many cases, this knowledge has been transmitted orally across generations, constituting environmental management systems grounded in the accumulated experience of communities (Nelson and Stathers, 2009; Neves et al., 2015). In contexts of rapid environmental transformations, studies such as Moerlein and Carothers (2012) show that such knowledge is crucial for the adaptation of fishing and subsistence communities in the face of climate change and social transitions.

Beyond its ecological dimension, the biocultural approach also emphasizes the symbolic and cosmological aspects of human–nature relations. In many Indigenous cultures, for example, ecosystems are not perceived merely as sources of material resources, but as entities endowed with spiritual meanings and moral relationships. These conceptions profoundly influence environmental management practices and help maintain reciprocal relationships between human societies and natural environments (Ingold, 2018). This dimension can be further developed both by Rappaport's (1968) classic formulation, which shows the ecological function of rituals, and by more interdisciplinary perspectives on sensory and human experience, such as those of Stork and Echevarría (2011).

Another relevant aspect of the biocultural perspective is its contribution to contemporary debates on climate change and socio-ecological adaptation. Recent studies show that traditional communities often develop adaptive strategies based on local knowledge that allow them to respond relatively flexibly to environmental variations (Nelson and Stathers, 2009). In this context, Bassi et al. (2017), drawing on insights from ethnoecology, emphasize that the links between people, landscapes, and knowledge systems are crucial for understanding local ways of inhabiting and managing the environment.

However, the biocultural approach also faces important challenges. One of the main challenges concerns the translation of such knowledge and cultural practices into public policies and institutional instruments for environmental management. In many cases, modern governance structures still face difficulties in recognizing and integrating traditional knowledge systems into formal decision-making processes.

Despite these limitations, the biocultural perspective offers a fundamental contribution to understanding the relationships between nature and culture. By emphasizing the coevolution of biological and cultural diversity, this approach significantly expands the understanding of socio-ecological systems. It reinforces the importance of conservation strategies that simultaneously consider ecological and sociocultural dimensions.

Theoretical convergences between cultural ecology, political ecology, and bioculturality

Although Cultural Ecology, Political Ecology, and Bioculturality emerged in distinct intellectual contexts and emphasize specific analytical dimensions of the relationships between society and nature, their contributions reveal important points of convergence. When considered together, these approaches show that socio-ecological systems are complex configurations in which ecological processes, cultural practices, and political structures interact.

A first point of convergence concerns the recognition that human–environment relationships cannot be understood in a deterministic or unilateral manner. Whereas nineteenth-century environmental determinism attributed a direct causal role to the environment in shaping human societies, contemporary approaches emphasize the relational and dynamic nature of these interactions. In this sense, Cultural Ecology, Political Ecology, and the biocultural approach all share the premise that socio-ecological systems result from historical processes of interaction and mutual transformation between societies and ecosystems (Escobar, 2008; Moran and Ostrom, 2009; Ingold, 2018).

A second point of convergence lies in the recognition of the importance of local knowledge and cultural practices in the management of natural resources. Cultural Ecology has shown that traditional subsistence systems often incorporate complex adaptive strategies that enable relatively sustainable use of natural resources. The biocultural perspective expanded this understanding by showing that such practices are often associated with symbolic systems, cosmologies, and specific ways of relating to the environment. Political Ecology contributed by demonstrating that the marginalization of such local knowledge frequently results from historical processes of political and economic domination (Little, 2006; Crate and Nuttall, 2009).

A third element of convergence concerns the multiscale approach to socio-environmental dynamics. While Cultural Ecology has traditionally focused on the analysis of local systems of subsistence and adaptation, Political Ecology broadened this analytical scope by examining how global processes — such as market expansion, state policies, and colonial dynamics — influence the use of natural resources.

The very notion of "natural resources," however, must be critically examined. Far from constituting a neutral category, the term expresses a historical and political construction that tends to frame nature within a utilitarian and instrumental logic. In this sense, different approaches within environmental anthropology have emphasized that what is defined as a "resource" is shaped by social, cultural, and economic processes that attribute value and meaning to nature. This problematization is essential for understanding that socio-ecological dynamics involve not only the use of natural elements but also ontological and political disputes over what nature itself is and how human societies should relate to it.

The biocultural approach, in turn, shows that biodiversity conservation often depends on local cultural practices embedded within broader socio-ecological contexts.

Integrating these perspectives shows that socio-ecological systems operate simultaneously across different scales. Global economic structures may deeply influence local environmental management processes. At the same time, political decisions made at national or international levels may produce direct impacts on cultural practices and specific ecosystems.

Moreover, these approaches converge in recognizing the centrality of power relations in shaping environmental dynamics. Although Cultural Ecology initially emphasized adaptive processes, subsequent research has shown that such processes do not occur neutrally, but are often conditioned by broader political and economic structures. Political Ecology deepened this analysis by demonstrating how social inequalities, territorial disputes, and economic interests shape access to natural resources. Similarly, analyses of water governance show that the management of water resources involves disputes among different social actors, highlighting that access to water is mediated by power relations, institutions, and socio-economic inequalities (Ávila-García, 2016).

In this context, the biocultural perspective adds a further dimension by emphasizing that environmental transformations also imply cultural transformations. The loss of biodiversity is often associated with the erosion of traditional knowledge and the disruption of cultural systems of environmental management. In contexts of rapid environmental change, research on subsistence fishing communities shows that local ecological knowledge plays a central role in adaptation to climate change and socio-economic transitions, highlighting the empirical relevance of interactions between culture and ecosystems (Moerlein and Carothers, 2012).

Thus, the convergence of these three approaches enables the construction of an integrated, multiscale analytical framework that more comprehensively and relationally captures the interactions between nature and culture. While Cultural Ecology provides tools for analyzing adaptive processes between cultural practices and ecosystems, Political Ecology highlights the power structures that shape these interactions. The biocultural approach, in turn, integrates ecological, cultural, and symbolic dimensions, emphasizing the interdependence between biological and cultural diversity.

This theoretical integration becomes particularly relevant in light of contemporary sustainability challenges. Current environmental problems — such as climate change, deforestation, and biodiversity loss — result from complex interactions among ecological processes, cultural practices, and global political structures. Understanding them requires approaches capable of integrating these different dimensions.

Thus, the convergence between Cultural Ecology, Political Ecology, and Bioculturality does not imply the dissolution of the specificities of each approach, but rather the construction of a more comprehensive analytical framework. This integration enables the development of more complex interpretations of socio-environmental dynamics and provides more robust theoretical foundations to guide sustainability and environmental management strategies.

Implications for sustainability and environmental management

The integration of Cultural Ecology, Political Ecology, and Bioculturality offers important contributions to debates on sustainability and environmental governance. By integrating ecological, cultural, and political dimensions of socio-environmental relations, this perspective shows that sustainability cannot be reduced solely to technical criteria of environmental management. This understanding resonates with classic interdisciplinary formulations that have long emphasized the need to overcome sectoral approaches to environment and development (Rattner, 1995).

From the perspective of Cultural Ecology, traditional environmental management practices demonstrate that many communities have developed natural resource use systems grounded in ecological balance and knowledge accumulated over generations. These systems include diversified agricultural techniques, community-based forest management, and conservation strategies that contribute to the maintenance of biodiversity (Moran and Ostrom, 2009).

However, Political Ecology highlights that the viability of these practices often depends on the institutional and political conditions in which they are embedded. In many contexts, processes such as economic expansion, land privatization, and development policies may undermine traditional environmental management systems and intensify territorial conflicts (Escobar, 2008).

The biocultural approach, in turn, highlights the need to consider cultural diversity as a central element of conservation strategies. The preservation of biodiversity is often associated with the continuity of specific cultural practices and the intergenerational transmission of traditional knowledge (Crate and Nuttall, 2009).

Accordingly, sustainability strategies that ignore these sociocultural dimensions tend to produce limited results. Effective environmental policies must consider not only ecological criteria, but also the

social and cultural contexts in which environmental management systems are embedded.

Final considerations

This essay was based on the hypothesis that integrating Cultural Ecology, Political Ecology, and Bioculturality could provide a more comprehensive analytical framework for understanding interactions between human societies and ecological systems within the field of Ecological and Environmental Anthropology. The argument developed throughout the text supports this proposition by showing that these three approaches illuminate complementary dimensions of contemporary socio-ecological dynamics.

From this perspective, understanding the relationships between nature and society is central to current debates in environmental anthropology. The growing complexity of global socio-environmental crises — evident in accelerating climate change, rapid biodiversity loss, and the expansion of economic models grounded in the intensive exploitation of nature — calls for analytical approaches that coherently and systematically integrate ecological, cultural, and political dimensions.

Within this framework, examining the contributions of Cultural Ecology, Political Ecology, and the biocultural approach highlights how these theoretical traditions offer complementary perspectives on human–environment interactions. Although they emerged in distinct intellectual contexts and emphasize different analytical scales, they converge in their critique of reductionist interpretations of environmental dynamics and in their emphasis on relational approaches.

Cultural Ecology contributes to this debate by demonstrating that societies develop complex adaptive strategies in interaction with the ecosystems in which they are embedded. By analyzing subsistence systems, productive practices, and forms of social organization, this perspective shows that processes of cultural adaptation are foundational to socio-ecological dynamics. Moreover, studies grounded in this approach indicate that traditional communities often develop sophisticated environmental management practices rooted in ecological knowledge accumulated over generations.

At the same time, understanding these interactions remains limited when ecological and cultural processes are examined in isolation from the broader social and political structures that condition access to what are conventionally referred to as "natural resources". In this regard, Political Ecology broadens the analytical scope by demonstrating that this category is not neutral, but historically constructed and shaped by power relations that define uses, appropriations, and disputes over nature. Incorporating these dimensions reveals that contemporary environmental problems are not only ecological phenomena but also expressions of political and economic processes.

The biocultural perspective, in turn, adds a crucial dimension by emphasizing the interdependence between biological and cultural diversity. Research in this field shows that regions of high biodiversity frequently coincide with territories inhabited by Indigenous peoples and traditional communities, suggesting that cultural practices, knowledge systems, and forms of social organization play a significant role in ecosystem conservation.

Taken together, these perspectives support the development of a multiscale analytical approach to socio-ecological dynamics. Cultural Ecology emphasizes adaptive processes between cultural practices and local environments. Political Ecology highlights the historical and institutional structures that shape access to and control over what are conventionally described as "natural resources" — a historically constructed category that frames nature in utilitarian terms and whose critical examination is essential for understanding the political and ontological disputes surrounding socio-ecological systems. The biocultural approach integrates ecological, cultural, and symbolic dimensions of human–nature interactions, underscoring the relevance of traditional knowledge systems in ecosystem management. Considered jointly, these perspectives expand analytical capacity and support a critical, relational, and multiscale interpretation of society–nature interactions, aligned with contemporary sustainability and environmental governance challenges.

This convergence is particularly significant in current sustainability debates, as it shows that the development of effective environmental management strategies depends on the integration of diverse knowledge systems, social institutions, and decision-making scales. Accordingly, integrative approaches are essential for addressing the challenges of managing natural resources in contexts characterized by high levels of social and ecological complexity.

This theoretical synthesis also opens important avenues for future research. These include empirical studies exploring the integration of these three approaches in specific socio-environmental contexts, as well as research focused on environmental governance processes that bring together scientific and traditional knowledge systems. In addition, the proposed convergence can inform analyses of the impacts of global transformations — such as climate change and the expansion of extractive economies — on socio-ecological systems across different scales. Advancing these agendas will contribute to the development of interdisciplinary approaches capable of addressing the complexity of contemporary sustainability challenges.

In this context, these developments reinforce the relevance of the theoretical integration proposed here and highlight its heuristic potential for analyzing socio-ecological systems.

Ultimately, the main theoretical contribution of this essay lies in demonstrating that integrating Cultural Ecology, Political Ecology, and Bioculturality not only enhances the explanatory capacity of these approaches when considered in isolation but also establishes a comprehensive, critical, and multiscale analytical framework capable of capturing the complexity of socio-ecological systems and informing interdisciplinary debates on sustainability and environmental governance.

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