

Article

Eco-Civic Communities: Ecological Democracy and Multilevel Governance in an Era of Planetary Interdependence

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Abstract

This article explores Eco-Civic Communities (ECCs) as a potential framework for integrating ecological governance with democratic participation across multiple scales of political organization. Drawing on scholarship in ecological democracy, deliberative governance, polycentric institutional theory, civic ecology, and multilevel governance, the article examines how localized participatory structures may contribute to broader ecological coordination amid growing planetary interdependence. The study develops a conceptual and analytical model of ECCs as territorially grounded, participatory, ecologically oriented, and institutionally integrated governance formations. It further proposes an analytical framework for evaluating ECCs based on criteria such as democratic depth, ecological effectiveness, inclusiveness, accountability, institutional feasibility, scalability, and resilience. Through comparative analysis, the article situates ECCs alongside existing governance initiatives, including ecovillages, Transition Towns, participatory budgeting, eco-districts, and community-based sustainability projects. The paper also examines possible pathways for institutional integration within multilevel governance systems while acknowledging important risks, constraints, and implementation challenges. Rather than presenting ECCs as definitive solutions, the article argues that they may provide a useful framework for investigating how ecological transformation and democratic renewal can become more systematically interconnected.

Keywords: ecological democracy; multilevel governance; participatory governance; polycentric governance; civic ecology; sustainability transitions; Eco-Civic Communities

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1. Introduction

The accelerating convergence of climate change, biodiversity collapse, ecosystem degradation, and resource insecurity has exposed profound structural weaknesses in environmental governance. Although ecological processes operate across interconnected planetary systems, political authority remains fragmented among sovereign states, whose institutional capacities and strategic priorities often diverge sharply. This mismatch between ecological interdependence and political fragmentation has produced what many scholars call a crisis of governance scale: environmental problems are increasingly global in scope, while decision-making structures remain predominantly territorial and nationally bounded [1,2]. Existing international arrangements have enabled important coordi-

nation, yet they often lack the coherence, democratic legitimacy, and enforcement capacity needed to sustain long-term ecological transformation across governance levels.

At the same time, debates on ecological governance increasingly emphasize that environmental sustainability cannot be reduced to technocratic management alone. Ecological transition is not solely a scientific or administrative challenge but also a democratic one. Scholarship on ecological democracy argues that legitimate and durable environmental governance depends on institutional arrangements that integrate ecological knowledge, public deliberation, social justice, and citizen participation into collective decision-making [3–5]. Within this perspective, democratic legitimacy emerges not merely from electoral authorization but from the ongoing capacity of citizens and affected communities to participate meaningfully in shaping ecological priorities and negotiating socio-environmental trade-offs.

Recent developments in deliberative democratic theory reinforce this broader understanding of governance. The literature on deliberative systems conceptualizes democracy as an interconnected network of communicative arenas—including formal institutions, civil society organizations, scientific bodies, local communities, and transnational publics—that collectively generate legitimacy and accountability [6,7]. From this systemic perspective, ecological governance requires not only vertical coordination across governance levels but also horizontal civic engagement that embeds ecological responsibility in everyday social practices. Yet despite growing recognition of participatory governance, many mechanisms remain largely consultative rather than genuinely co-decisional. As Sénit [8] argues in her analysis of civil society participation within the Sustainable Development Goals framework, public inclusion often operates at the procedural margins of governance rather than as a constitutive element of institutional authority.

These limitations are especially evident at the local level. Municipal and regional governments increasingly play a strategic role in climate adaptation, sustainability planning, and ecological innovation [9]. Yet local institutions often face structural constraints that limit their transformative capacity. Electoral cycles encourage short-term policy horizons; fiscal dependence restricts autonomy; administrative fragmentation undermines policy coherence; and public participation mechanisms often offer limited influence over substantive decisions [10,11]. Moreover, local governance systems are embedded within national political economies that continue to prioritize economic growth and competitive development over ecological resilience and long-term sustainability. The result is a persistent institutional gap between ecological objectives and the democratic infrastructures needed to implement them effectively in everyday social life.

Concurrently, a wide range of civic and community-based ecological initiatives has emerged across regions worldwide. Ecovillages, transition towns, urban commons initiatives, participatory ecological planning processes, community energy cooperatives, and local resilience networks demonstrate growing societal efforts to reconnect democratic participation with ecological stewardship [12–14]. These initiatives demonstrate important capacities for collective learning, local innovation, and community-based sustainability. However, most remain fragmented, weakly institutionalized, and insufficiently integrated into broader governance architectures. While they often generate valuable localized outcomes, their broader political scalability and systemic coordination remain uncertain.

This article argues that the current literature insufficiently addresses the institutional relationship between localized ecological participation and coherent multilevel democratic governance. Existing scholarship has extensively examined participatory democracy, polycentric governance, civic ecology, urban sustainability, and deliberative environmental governance in isolation. Yet comparatively little attention has been devoted to developing an integrated conceptual framework linking local ecological agency to

broader systems of regional, national, and potentially global coordination. This gap becomes increasingly significant as ecological crises intensify across scales and require governance that is simultaneously participatory, adaptive, and institutionally coherent.

To address this gap, the article develops the concept of Eco-Civic Communities (ECCs) as a potential framework for democratic ecological governance. Rather than presenting ECCs as a definitive institutional solution, the article explores their potential as territorially grounded, participatory, and ecologically oriented governance structures that can strengthen the link between local civic engagement and broader ecological coordination. Situated within a multilevel and polycentric governance perspective, ECCs are analyzed as intermediary democratic formations that may help integrate ecological responsibility, deliberative participation, and institutional coordination across governance scales.

Methodologically, the article adopts a conceptual and comparative approach. It synthesizes scholarship from ecological democracy, deliberative governance, civic ecology, and multilevel governance theory to develop an analytical framework for evaluating ECCs. The article also compares ECCs with existing local ecological and participatory initiatives—including ecovillages, transition towns, eco-districts, and participatory governance mechanisms—to clarify their distinctive institutional characteristics and potential contributions. The analysis is therefore not intended as empirical validation of a finalized model but as a theoretically grounded exploration of an emerging governance framework that warrants further empirical investigation and comparative research.

The article proceeds in seven stages. The next section reviews the principal theoretical traditions underpinning ecological democracy and participatory ecological governance. The third section defines ECCs conceptually and introduces the analytical criteria used throughout the article. The fourth section examines historical antecedents and contemporary governance experiments that anticipate elements of ECCs. The fifth section compares ECCs with existing local ecological governance models. The sixth section explores how ECCs could function within broader multilevel governance arrangements, including relationships with municipal, national, and transnational institutions. The seventh section proposes potential pathways for institutional scaling and examines limitations, implementation risks, and future research directions. The conclusion reflects on the broader implications of ECCs for democratic ecological transformation in an increasingly interdependent world.

2. Literature Review and Theoretical Foundations

2.1. Ecological Democracy

The concept of ecological democracy emerged from the recognition that environmental crises are not merely technical regulatory failures but manifestations of deeper structural tensions among ecological limits, economic organization, and democratic governance. Traditional liberal-democratic institutions were largely designed in a historical context that treated nature as an external resource domain rather than as a constitutive condition of political and social life. As ecological degradation intensified globally, scholars increasingly questioned whether conventional representative systems—organized around short electoral cycles, territorial sovereignty, and growth-oriented political economies—could address long-term environmental risks and intergenerational justice [4].

In this context, ecological democracy emerged as a normative and institutional framework that seeks to reconcile democratic legitimacy with ecological sustainability. Dryzek [3] argues that ecological governance requires forms of public reasoning that integrate scientific knowledge, ethical pluralism, and participatory deliberation into environmental decision-making. Rather than reducing ecological policy to expert administration or market coordination, ecological democracy emphasizes communicative processes through which citizens collectively negotiate competing environmental values and socio-

ecological priorities. Democratic legitimacy, in this perspective, depends not only on procedural representation but also on governance systems' capacity to facilitate reflexive learning and ecological accountability.

Eckersley [4] extends this argument by challenging the anthropocentric foundations of modern sovereignty and proposing a "green state" model in which ecological stewardship is a central constitutional principle. Her analysis highlights the structural incompatibility between territorially bounded political authority and ecological systems that transcend national borders. Therefore, ecological democracy requires governance arrangements that operate across scales while remaining democratically accountable to affected populations.

Similarly, Schlosberg [5] broadens ecological democracy beyond distributive environmental concerns by emphasizing recognition, participation, and capabilities as integral to environmental justice. From this perspective, ecological governance must address not only environmental outcomes but also the unequal social structures that produce ecological harms and political exclusion. This approach is especially relevant to contemporary sustainability transitions, in which questions of democratic inclusion, procedural fairness, and civic empowerment increasingly intersect with ecological transformation.

Together, these contributions establish ecological democracy as a multidimensional framework linking environmental sustainability with democratic participation, institutional accountability, and socio-ecological justice. However, while the literature provides substantial normative foundations, less attention has been devoted to the institutional forms through which ecological democracy can be operationalized at the local, national, and transnational levels.

2.2. Polycentric and Multilevel Governance

Alongside debates on ecological democracy, scholarship on polycentric and multilevel governance has sought to explain how complex environmental problems may be governed across interconnected institutional arenas. Environmental challenges such as climate change, biodiversity loss, and water governance are characterized by high levels of uncertainty, interdependence, and cross-scale interaction. Centralized governance systems often lack the flexibility and contextual sensitivity needed to address these dynamics effectively, while fragmented local initiatives frequently struggle to achieve broader coordination and policy coherence.

Elinor Ostrom's work on polycentric governance is a foundational contribution in this regard. Challenging the assumption that environmental commons require either centralized state control or privatization, Ostrom [14] shows that multiple interacting centers of decision-making can, under appropriate institutional conditions, produce adaptive, resilient collective governance. Polycentric systems enable experimentation, local learning, and institutional diversity while reducing the risks associated with single hierarchical authority structures. Importantly, Ostrom argues that global environmental governance should not rely exclusively on top-down international agreements but should instead combine multiple governance levels that can interact dynamically across scales.

The broader literature on multilevel governance further develops this perspective by examining how authority is distributed across supranational, national, regional, and local institutions. Hooghe and Marks [15] argue that contemporary governance increasingly operates through overlapping jurisdictions rather than through strictly hierarchical state structures. Environmental governance, in particular, often involves complex interactions among public institutions, civil society actors, scientific networks, and transnational organizations. This shift reflects the growing inadequacy of purely state-centric governance models for addressing cross-border ecological interdependence.

Jordan et al. [16] likewise emphasize that effective climate and sustainability governance depends on coordination among multiple governance centers that integrate flexibility, participation, and institutional integration. Yet polycentric arrangements also create important tensions. Institutional fragmentation may produce inconsistencies, accountability deficits, and uneven implementation capacity across regions. Moreover, governance networks with dispersed authority may lack sufficient democratic legitimacy if participatory mechanisms remain weak or inaccessible.

Consequently, although polycentric and multilevel governance theories offer important insights into institutional complexity and adaptive coordination, they do not fully explain how democratic ecological participation can be coherently embedded across governance scales. The challenge remains to link localized civic agency to broader institutional architectures that can sustain both long-term ecological coordination and democratic legitimacy.

2.3. Participatory and Deliberative Democracy

The literature on participatory and deliberative democracy offers an additional theoretical foundation for understanding how ecological governance may gain democratic legitimacy beyond traditional representative mechanisms. Participatory democratic theory emerged, in part, in response to concerns that electoral representation alone offers insufficient opportunities for meaningful citizen influence over public decisions, particularly in complex policy domains characterized by technocratic expertise and institutional distance [17].

Deliberative democratic theory further developed this critique by emphasizing the importance of public reasoning, communicative exchange, and collective learning for democratic legitimacy. Habermas [18] argues that democratic authority derives not merely from voting procedures but from inclusive processes of rational deliberation, through which citizens justify norms and policies to one another under conditions of communicative equality. In this framework, deliberation enables legitimacy to form through argumentation, reflexivity, and reciprocal justification rather than through the mere aggregation of pre-existing preferences.

These insights have become increasingly influential in environmental governance scholarship because ecological issues often involve scientific uncertainty, long-term consequences, and competing ethical values that are difficult to resolve through market mechanisms or majoritarian voting alone. Deliberative forums may facilitate the integration of expert knowledge, local experience, ethical reflection, and public participation, thereby strengthening legitimacy and policy adaptability [19].

Fung and Wright [20] contribute to this literature by introducing the concept of “empowered participatory governance,” which emphasizes decentralized problem-solving institutions grounded in practical participation and deliberative coordination. Their approach is particularly relevant to ecological governance because it links citizen participation to concrete institutional capacities rather than treating deliberation as purely discursive. Similarly, Fishkin [21] shows that structured deliberative processes can improve public reasoning and democratic competence by enabling citizens to engage substantively with complex policy issues.

Nevertheless, participatory and deliberative governance mechanisms often remain institutionally marginal. Participatory forums are often advisory rather than decision-making bodies, and deliberative processes may suffer from unequal participation, resource asymmetries, and limited policy impact. Consequently, the literature increasingly recognizes that meaningful democratic participation requires institutional structures that embed deliberative practices within broader governance systems, rather than treating participation as an isolated procedural supplement.

2.4. Civic Ecology and Community-Based Sustainability

Alongside these theoretical developments, a growing body of scholarship has examined community-based ecological practices as sites of social learning, resilience-building, and democratic experimentation. Civic ecology research focuses on how local communities organize collectively to restore ecosystems, manage shared resources, and develop sustainable social practices in response to environmental disruption [22]. These initiatives often stem from bottom-up civic action rather than centralized government planning, reflecting a growing societal interest in localized sustainability transitions.

The literature on urban commons likewise emphasizes collective governance of shared ecological and social resources through participatory institutions. Building on Ostrom's commons theory, scholars have examined how communities manage public spaces, urban agriculture, energy cooperatives, and shared infrastructure through collaborative governance arrangements that integrate ecological stewardship and civic participation [23]. These initiatives often foster social cohesion, local empowerment, and adaptive capacity that are difficult to replicate through purely centralized administration.

Related scholarship on resilience and socio-ecological transitions underscores the importance of local experimentation and institutional diversity for responding to environmental uncertainty [24]. Transition Towns, ecovillages, eco-districts, and regenerative urban initiatives have been examined as examples of grassroots innovation that foster alternative models of production, consumption, and community organization [12,13]. These initiatives often integrate ecological sustainability with participatory governance, local economic resilience, and collective learning.

Despite their innovative potential, community-based sustainability initiatives often remain fragmented and weakly connected to broader governance systems. Many rely heavily on volunteer participation, operate with limited institutional authority, or remain vulnerable to political and economic marginalization. Moreover, while these initiatives may succeed locally, their scalability and long-term integration into multilevel governance architectures remain uncertain. Existing scholarship has therefore identified an important tension between localized ecological experimentation and the broader institutional coordination needed for systemic ecological transformation.

Recent research on climate governance further suggests that successful environmental transitions depend not only on local ecological initiatives but also on the quality of the broader institutional environments in which they operate. Governance effectiveness, administrative capacity, public accountability, policy implementation, institutional stability, regulatory quality, and rule-of-law frameworks have been identified as key factors shaping environmental performance and climate action outcomes [25–29]. Studies examining the relationship between financial innovation and environmental performance likewise suggest that technological and economic instruments are most effective when supported by transparent regulatory systems and stable institutional conditions [30]. These findings reinforce the argument that ecological transformation requires not only technical environmental interventions or community-based experimentation but also robust democratic and institutional foundations that support coordination, learning, adaptation, and collective action across multiple levels of governance. Consequently, a growing body of scholarship views ecological governance as a challenge that requires integrating civic participation, institutional quality, adaptive capacity, and multilevel coordination rather than relying on any single governance mechanism.

2.5. Research Gap and Conceptual Contribution

A central challenge that remains insufficiently addressed in the literature concerns the relationship between the normative aspirations of ecological democracy and the institutional logic of polycentric governance. Ecological democracy prioritizes inclusiveness,

public deliberation, environmental justice, and democratic accountability, whereas polycentric governance emphasizes adaptive coordination, institutional diversity, and distributed decision-making authority. These objectives are not always fully compatible. Highly participatory governance arrangements may slow decision-making, while polycentric systems may lead to coordination problems, uneven accountability, and unequal participation across jurisdictions.

The ECC framework is proposed as an exploratory effort to bridge these tensions rather than eliminate them. ECCs aim to combine the democratic legitimacy of ecological democracy with the adaptive capacities of polycentric governance by embedding participatory institutions within nested coordination systems. In this sense, ECCs are conceived not as a synthesis that resolves all normative and institutional conflicts, but as a governance framework for managing, negotiating, and empirically evaluating these tensions.

3. Defining Eco-Civic Communities: Conceptual Model and Analytical Framework

3.1. From Grassroots Ecological Initiatives to Institutional Governance

The proliferation of grassroots ecological initiatives in recent decades reflects an important transformation in the relationship among citizenship, sustainability, and governance. Across diverse geographical and political contexts, communities have increasingly organized around renewable energy cooperatives, urban agriculture, participatory budgeting, ecological restoration, cooperative housing, local food systems, and resilience-building projects [12,13]. These initiatives demonstrate that ecological transition is not solely dependent on centralized state intervention or market incentives but may also emerge through collective civic action rooted in local participation and shared stewardship.

At the same time, most community-based sustainability initiatives remain institutionally fragmented and structurally constrained. Many operate as voluntary or semi-formal networks with limited legal authority, uncertain financial capacity, and limited integration into broader governance systems. While such initiatives frequently yield important localized outcomes—including reduced ecological footprints, strengthened social cohesion, and increased civic engagement—their broader scalability and long-term transformative potential often remain constrained by institutional marginality and political vulnerability [31]. Consequently, the challenge is not merely to multiply isolated ecological projects but to assess whether more coherent institutional forms can connect localized civic agency with broader systems of democratic ecological governance.

In this context, ECCs are proposed as an attempt to theorize a more institutionally integrated model of ecological democracy. ECCs are not conceived as entirely unprecedented entities or as replacements for existing municipal or representative institutions. Rather, they are proposed as intermediary governance formations that seek to institutionalize the participatory and ecological capacities already visible in many contemporary grassroots experiments and to embed them within broader multilevel governance architectures.

Unlike many localized sustainability initiatives that operate primarily as voluntary associations or advocacy networks, ECCs are conceptualized as durable civic governance structures that integrate ecological stewardship, democratic participation, and institutional coordination. Their significance lies not only in promoting sustainable practices at the community level but also in potentially strengthening democratic infrastructure that may enable ecological transformation to be collectively organized across scales.

3.2. Conceptual Definition of Eco-Civic Communities

For analytical purposes, ECCs may be defined as territorially grounded, participatory, ecologically oriented, and institutionally recognized civic governance structures through which citizens collectively manage local socio-ecological systems while remaining integrated into broader multilevel governance frameworks.

This definition highlights five interrelated dimensions.

First, ECCs are territorially grounded. They operate within identifiable social and ecological spaces—urban neighborhoods, municipalities, districts, rural regions, or metropolitan sectors—where environmental practices and collective decision-making directly intersect with everyday life. Territorial grounding is important because ecological sustainability depends on concrete relationships among communities, resources, infrastructure, and ecosystems rather than on purely abstract policy commitments.

Second, ECCs are participatory and deliberative. Their legitimacy derives not only from electoral representation but also from ongoing citizen engagement, collective deliberation, and shared decision-making. Participation in ECCs extends beyond consultative procedures to more substantive forms of civic co-governance that include residents, associations, cooperatives, scientific actors, and local institutions.

Third, ECCs are ecologically oriented. Ecological sustainability is a constitutive rather than a secondary dimension of their governance purpose. Unlike conventional local administrative structures, whose ecological responsibilities may remain fragmented across policy sectors, ECCs integrate ecological objectives directly into community planning, resource management, local economic organization, and social development strategies.

Fourth, ECCs are institutionally recognized. Although rooted in civic participation, they are not conceived merely as informal grassroots movements. Rather, ECCs require varying degrees of legal recognition, administrative coordination, and governance integration to ensure continuity, accountability, and policy effectiveness over time.

Finally, ECCs are embedded within multilevel governance systems. They are neither isolated autonomous enclaves nor fully centralized administrative units. Instead, they operate within nested governance arrangements that connect local participation to municipal, regional, national, and potentially transnational coordination mechanisms. Their role is therefore both local and systemic.

This conceptualization distinguishes ECCs from several existing governance models. Unlike ecovillages, ECCs are not primarily intentional residential communities. Unlike participatory budgeting processes, ECCs are not confined to isolated decision-making. Unlike neighborhood associations, ECCs have explicit ecological mandates and broader governance functions. Unlike transition initiatives that operate mainly through voluntary activism, ECCs seek institutional continuity and formal integration into governance systems. Their distinctive feature is the combination of ecological stewardship, democratic participation, institutional durability, and multilevel coordination within a unified governance framework.

3.3. Core Characteristics of Eco-Civic Communities

To improve analytical clarity, Table 1 summarizes the key dimensions and characteristics of ECCs.

Table 1. Core Characteristics of Eco-Civic Communities (ECCs).

Dimension	ECCs Characteristic
Governance	Participatory and deliberative civic co-governance
Ecological Orientation	Sustainability targets integrated into planning and decision-making
Economic Organization	Promotion of local circular and regenerative economies
Social Dimension	Inclusion, social cohesion, and civic empowerment
Institutional Structure	Formal or semi-formal legal and administrative integration
Scale	Nested within multilevel governance systems
Knowledge Systems	Integration of scientific, local, and experiential knowledge
Temporal Orientation	Long-term ecological resilience and intergenerational responsibility

These dimensions should not be construed as rigid institutional requirements but as analytical characteristics that collectively distinguish ECCs from narrower forms of local participation or sustainability initiatives. Different institutional contexts may yield diverse ECC configurations, shaped by legal traditions, civic cultures, ecological conditions, and governance capacities.

Importantly, the inclusion of institutional integration and multilevel coordination distinguishes ECCs from many existing grassroots sustainability models. The objective is not merely to encourage localized ecological experimentation but to examine how community-based ecological governance might be structurally linked to broader democratic systems that can coordinate environmental transformation across scales.

3.4. Methodological Basis for Dimension Selection

The analytical dimensions proposed in this framework were derived through an interpretive synthesis of the principal theoretical traditions reviewed in Section 2. Rather than being selected independently, they emerged from recurring themes across the literature on ecological democracy, deliberative governance, polycentric governance, civic ecology, participatory democracy, and multilevel governance. The objective was to develop a parsimonious yet comprehensive set of criteria for evaluating ECCs from democratic and ecological perspectives.

Democratic depth, inclusiveness, and accountability were primarily drawn from ecological and deliberative democratic scholarship, which emphasizes participation, representation, transparency, and public justification as central to democratic legitimacy. Ecological effectiveness captures the environmental objectives that motivate ecological governance approaches and assesses how governance arrangements contribute to sustainability and ecosystem stewardship. Institutional feasibility and scalability were informed by the multilevel and polycentric governance literature, which highlights the importance of implementation capacity, coordination across jurisdictions, and the ability of governance innovations to function beyond isolated local contexts. Finally, resilience was incorporated as a cross-cutting dimension, reflecting the growing recognition that governance systems must possess adaptive capacity to respond to social, ecological, and institutional change.

Taken together, these dimensions aim to balance normative concerns about democratic legitimacy with practical considerations of governance performance and long-term sustainability. While alternative frameworks are possible, the selected dimensions are those most consistently emphasized across the theoretical traditions that inform the ECC model.

3.5. Analytical Framework for Evaluating Eco-Civic Communities

Because ECCs are proposed here as a conceptual governance framework rather than an empirically validated institutional model, a systematic analytical framework is necessary to assess their potential capacities and limitations. Existing discussions of ecological participation often rely on normative aspirations without establishing sufficiently clear evaluative criteria. To avoid this limitation, the present article uses eight analytical dimensions to compare ECCs.

Democratic Depth

Democratic depth is the extent to which citizens exercise meaningful influence over collective decisions rather than remaining passive recipients of policy outcomes. This includes the quality of deliberation, the accessibility of participation mechanisms, the transparency of decision-making, and the degree of civic co-governance embedded in institutional structures.

Ecological Effectiveness

Ecological effectiveness concerns the capacity of ECCs to meaningfully contribute to sustainability goals, including emissions reduction, ecosystem restoration, biodiversity protection, resource efficiency, resilience-building, and long-term environmental stewardship.

Inclusiveness

Inclusiveness assesses whether participation and governance capacities are equitably distributed across social groups. Ecological governance systems may reproduce inequalities if marginalized populations face barriers related to class, education, digital access, gender, ethnicity, or political representation.

Institutional Feasibility

Institutional feasibility assesses whether ECCs can realistically operate within existing or reformable legal and administrative systems. This includes questions about jurisdictional authority, administrative coordination, governance competencies, and compatibility with municipal and national institutions.

Accountability

Accountability concerns the mechanisms that keep ECC decision-makers and participatory bodies publicly accountable. Without adequate accountability structures, participatory governance risks informal concentration of influence, elite capture, or opaque decision-making.

Financial Autonomy

Financial autonomy measures the extent to which ECCs have stable, diversified resource bases capable of sustaining long-term ecological and participatory initiatives. Heavy reliance on external funding may undermine institutional continuity and democratic independence.

Scalability

Scalability refers to the potential for ECCs to expand, replicate, network, or coordinate across larger governance systems without compromising democratic functionality or ecological coherence. This dimension is especially important because many local sustainability initiatives remain isolated and difficult to institutionalize.

Resilience and Adaptive Capacity

Resilience is the ability of ECCs to respond adaptively to ecological, economic, political, and social disruptions while maintaining institutional continuity and democratic le-

gitimacy. Adaptive governance capacities are increasingly important amid climate uncertainty and accelerating socio-ecological change.

Together, these dimensions provide a structured framework for comparing ECCs in subsequent sections of the article. They also enable a more balanced assessment by considering both opportunities and potential limitations, rather than treating ECCs as inherently successful or universally applicable.

4. Historical Antecedents and Contemporary Precedents

The concept of ECCs does not arise in an institutional or intellectual vacuum. Although ECCs are proposed here as a distinct conceptual framework for democratic ecological governance, many of their constitutive principles—collective stewardship, participatory self-government, territorial responsibility, cooperative organization, and multilevel coordination—have antecedents in earlier civic, communal, and ecological traditions. Examining these precedents is important for two reasons. First, it shows that ECCs are not an abstract, utopian construct detached from historical practice. Second, it reveals that many contemporary ecological governance experiments already embody partial elements of the institutional logic underlying ECCs, even if they do not integrate these dimensions into a coherent and scalable governance architecture.

Historical traditions of democratic localism, cooperative self-organization, ecological stewardship, and federative governance have long addressed questions central to contemporary ecological democracy. Gandhi's concept of *gram swaraj* emphasized self-governing village communities capable of meeting basic social needs while participating in broader federative structures [32]. Cooperative movements, communal experiments, and kibbutzim likewise sought to combine local participation, collective responsibility, and economic self-management [33,34]. Later, ecological thinkers such as Bookchin [35] developed theories of decentralized municipal democracy that linked local self-government with broader confederal coordination. Indigenous governance traditions likewise articulated forms of territorial stewardship, reciprocity, and collective decision-making grounded in enduring socio-ecological relationships [36].

At the same time, it is important to avoid conflating historical precedents with the ECC model itself. None of the initiatives or traditions discussed below fully aligns with the institutional framework proposed in this article. Rather, they offer partial inspiration, governance lessons, and conceptual trajectories that illuminate how ecological participation and democratic coordination have been imagined and practiced across contexts.

4.1. Historical Communitarian and Civic Traditions

4.1.1. Commons Traditions and Collective Stewardship

One of the deepest historical antecedents of ECCs lies in traditions of commons governance. Across numerous societies, communities developed institutional arrangements for the collective management of forests, fisheries, irrigation systems, grazing lands, and other shared resources. These systems often relied on locally embedded norms of reciprocity, mutual obligation, and participatory regulation rather than on centralized state administration or purely market-based allocation [37].

Commons governance traditions are significant because they demonstrate that collective ecological stewardship can arise from decentralized civic institutions that balance local autonomy with shared responsibility. Historical commons systems often combined ecological sustainability with social coordination through mechanisms such as monitoring, conflict resolution, and participatory rule-making. Although many commons institutions were later displaced by state centralization, enclosure, and industrialization, they

continue to provide important theoretical and empirical foundations for contemporary debates about participatory ecological governance.

Importantly, traditional commons governance was typically localized and resource-specific. ECCs differ in that they are conceived not merely as systems for managing discrete common-pool resources but as broader civic-governance structures that integrate ecological stewardship with democratic participation, social coordination, and multilevel institutional integration.

4.1.2. Municipalism and Local Democratic Self-Government

The historical tradition of municipal self-government is also a major antecedent of ECCs. From medieval communes to modern municipalist movements, cities and local communities have often served as laboratories for civic participation, public accountability, and collective administration. Municipal governance has historically provided institutional spaces in which citizens could exercise political agency more directly connected to everyday social life than that of distant centralized authorities.

Earlier traditions of democratic localism also anticipated elements of this vision. As noted above, Gandhi's concept of *gram swaraj* envisioned networks of self-governing village republics that exercised substantial local autonomy while remaining connected through broader federative arrangements [32]. Although developed in a very different historical and cultural context, this model shared with later municipalist traditions an emphasis on local self-government, civic responsibility, and the diffusion of political authority across multiple levels of governance.

In the twentieth century, these traditions were revitalized by various currents of democratic municipalism. Murray Bookchin's theory of libertarian municipalism was particularly influential, proposing decentralized municipal assemblies linked through confederal structures to coordinate broader political and ecological decision-making [38]. Bookchin argued that ecological sustainability and democratic participation required reconstructing political life at the local level, enabling citizens to engage directly in deliberative self-government while remaining connected to larger cooperative federations.

Although ECCs do not fully replicate Bookchin's institutional proposals, his emphasis on the relationship among ecological responsibility, participatory citizenship, and confederal coordination anticipates several core dimensions of the ECC framework. At the same time, ECCs differ in that they place greater emphasis on integrating with existing governance systems rather than on entirely replacing representative institutions.

4.1.3. Cooperative Movements and Economic Democracy

The historical development of cooperative movements also provides important precedents for ECCs. Since the nineteenth century, worker cooperatives, mutual aid societies, community associations, and collective ownership models have sought to democratize economic organization through participatory governance and shared ownership [39].

Twentieth-century cooperative and communal experiments further tested these principles in practice. Worker cooperatives, mutual-aid associations, agricultural collectives, communes, and kibbutzim sought to organize economic and social life through participatory governance, shared ownership, and collective responsibility [33,34]. Although their objectives and institutional structures varied widely, these experiences demonstrated the potential of democratic forms of economic organization to strengthen community cohesion and reduce dependence on centralized control.

Cooperative traditions are especially relevant because ecological transformation increasingly requires alternative economic arrangements that balance production, social equity, and sustainability. Community energy cooperatives, cooperative housing initiatives, local food networks, and solidarity economies demonstrate how democratic economic in-

stitutions can strengthen local resilience and reduce dependence on highly centralized, extractive economic systems.

Moreover, cooperative movements have historically linked local participation to broader federative coordination structures. Cooperative federations frequently emerged to coordinate production, finance, education, and mutual support across multiple local units. This federative dimension offers important institutional lessons for understanding how localized ecological participation may scale without losing its democratic rootedness.

Nevertheless, most cooperative structures historically focused primarily on economic organization rather than on integrated ecological governance. ECCs go beyond economic democracy alone by incorporating ecological stewardship and multilevel civic coordination as core institutional principles.

4.1.4. Indigenous Governance Traditions and Relational Ecologies

Indigenous governance traditions are another important source of institutional and philosophical inspiration for ecological democracy. Many Indigenous political systems developed governance forms grounded in relational understandings of territory, reciprocity, collective responsibility, and ecological interdependence. Rather than treating nature as an external object to be exploited, these traditions often conceptualized human communities as embedded within broader socio-ecological relationships [40].

For example, Andean *ayllu* systems integrated territorial stewardship, communal labor, reciprocity, and collective decision-making across shared ecological landscapes [41]. Similarly, many Indigenous governance systems in North America emphasized consensus-building, intergenerational responsibility, and relational accountability within decentralized, confederal structures [42].

These traditions are significant not because ECCs seek to appropriate or replicate Indigenous governance systems, but because they challenge assumptions embedded in modern industrial governance models—particularly the separation of political organization from ecological relations. Indigenous perspectives often foreground long-term ecological responsibility, communal stewardship, and relational governance, which resonate strongly with contemporary ecological-democratic concerns.

At the same time, caution is necessary to avoid romanticizing Indigenous governance traditions or abstracting them from their historical and political contexts. ECCs are not presented here as equivalent to Indigenous governance systems. Rather, these traditions offer important epistemological and institutional insights into alternative ways of organizing socio-ecological relationships beyond narrowly technocratic or market-centered frameworks.

4.2. Contemporary Ecological Governance Experiments

Contemporary sustainability initiatives extend many of these historical trajectories into present-day ecological governance. Transition Towns, ecovillages, urban commons initiatives, community energy cooperatives, regenerative-city projects, and participatory governance experiments all represent efforts to reconnect ecological sustainability with democratic participation, territorial stewardship, and community resilience [12,23,43]. While these initiatives differ substantially in scale, purpose, and institutional form, they collectively demonstrate growing interest in governance arrangements that integrate ecological action with civic engagement and local capacity-building.

4.2.1. Transition Towns and Community Resilience

Among contemporary ecological governance initiatives, the Transition Towns movement is a clear example of community-based sustainability experimentation. Originating in Totnes, United Kingdom, in the mid-2000s, Transition initiatives sought to strengthen

local resilience to climate change, energy insecurity, and economic vulnerability through community-led action [12].

Transition projects typically promote local food systems, renewable energy cooperatives, repair economies, ecological education, and participatory community planning. Their importance lies not only in advancing environmental sustainability but also in fostering civic participation, collective learning, and localized adaptive capacity. In this sense, Transition initiatives prefigure several dimensions later incorporated into the ECC framework, particularly the integration of ecological action with participatory civic organization.

However, Transition Towns generally operate as voluntary civil society networks rather than as institutionally embedded governance structures [31]. Their capacity to influence broader policy systems, therefore, remains uneven and highly dependent on local political conditions.

4.2.2. Ecovillages and Intentional Sustainable Communities

The ecovillage movement likewise offers important precedents for ECCs. Ecovillages worldwide, consolidated through the Global Ecovillage Network (GEN), aim to integrate ecological sustainability, participatory governance, community living, and alternative economic practices in intentionally organized settlements [44].

Ecovillages have demonstrated practical experimentation with renewable energy systems, ecological architecture, agroecology, circular economies, and participatory social organization. Many serve as sites of innovation and ecological education, generating valuable knowledge on sustainable lifestyles and community governance.

Nevertheless, ecovillages often remain socially selective, relatively small-scale, and institutionally peripheral. Their intentional and semi-autonomous character distinguishes them from ECCs, which are conceived as governance structures operating within broader, more socially heterogeneous territorial contexts.

4.2.3. Eco-Districts, Regenerative Cities, and Urban Sustainability

Urban ecological governance initiatives have also established important institutional precedents. Eco-districts and regenerative urbanism projects aim to integrate sustainability objectives into neighborhood planning, energy systems, mobility infrastructure, waste management, and public space design [45].

Similarly, regenerative city frameworks emphasize the capacity of urban systems not only to reduce ecological harm but also to actively restore ecological and social resilience through integrated planning and participatory governance [46]. These approaches increasingly recognize that ecological sustainability requires systemic coordination across infrastructure, governance, economic organization, and civic participation.

Yet many eco-district and regenerative city initiatives remain heavily technocratic or planner-driven. Public participation is often treated as secondary to infrastructure modernization and sustainability metrics. ECCs differ in how they position democratic participation and civic co-governance as constitutive institutional dimensions rather than complementary policy instruments.

4.2.4. Participatory Budgeting and Democratic Innovation

Participatory budgeting initiatives offer another relevant precedent, demonstrating how citizens can directly influence public resource allocation through deliberative processes. Originating in Porto Alegre, Brazil, participatory budgeting has spread internationally as a mechanism to enhance civic participation, transparency, and democratic legitimacy in local governance [47].

These initiatives are significant because they demonstrate that participatory governance can be institutionalized within formal administrative systems rather than operating exclusively through informal activism. Participatory budgeting processes have frequently strengthened civic engagement, increased public accountability, and improved responsiveness to local social needs.

However, participatory budgeting generally remains confined to specific fiscal procedures rather than to broader ecological governance functions. ECCs build on this participatory logic and extend it toward more comprehensive socio-ecological governance capacities.

4.2.5. Community Land Trusts and Territorial Stewardship

Community Land Trusts (CLTs) also offer important institutional lessons for ECCs. By removing land from speculative real-estate markets and placing it under collective or community stewardship, CLTs support affordable housing, ecological preservation, and long-term territorial sustainability [48].

The relevance of CLTs lies in their ability to institutionalize collective stewardship through durable legal and governance mechanisms. They demonstrate how communities can exercise long-term territorial responsibility while balancing local participation with institutional continuity.

Nevertheless, CLTs typically focus on specific land-governance functions rather than on broader ecological-democratic coordination systems. ECCs could adopt similar stewardship principles and integrate them into broader participatory governance architectures.

4.3. Distinguishing ECCs from Eco-Municipalities

Among contemporary governance innovations, eco-municipalities are among the closest institutional analogues to the ECC framework. Both approaches aim to advance ecological sustainability through citizen engagement, long-term planning, and locally grounded action. Nevertheless, important differences distinguish the two models.

Eco-municipalities are typically formal units of local government that integrate sustainability principles into municipal planning, public service delivery, environmental management, and local development strategies. Their authority stems from established governmental structures and administrative competencies exercised within a defined territorial jurisdiction.

ECCs, by contrast, are conceived as governance formations rather than governmental entities. Although they may operate within a municipality, they are not defined by administrative boundaries or governmental authority. Instead, their primary function is to facilitate collaboration among public institutions, civil society organizations, community initiatives, and other stakeholders in ecological governance.

This distinction has important implications. Whereas eco-municipalities focus primarily on improving sustainability outcomes within a particular locality, ECCs are designed to strengthen connections among actors, initiatives, and governance processes across different scales. Their role extends beyond environmental management to include deliberation, coordination, knowledge exchange, collective learning, and the articulation of local ecological priorities within broader governance systems.

The two approaches should therefore be understood as complementary rather than competing models. Eco-municipalities may provide supportive institutional environments in which ECCs can emerge and operate, while ECCs can enhance the participatory and collaborative dimensions of local sustainability governance. The distinctive contribution of ECCs lies not in replacing municipal institutions but in strengthening the networks,

relationships, and governance capacities that link local ecological action to broader systems of decision-making and coordination.

4.4. From Historical Precedents to an Integrated Governance Framework

Taken together, the historical traditions and contemporary initiatives discussed above show that many core elements associated with ECCs already exist in diverse forms. Commons institutions exemplify collective stewardship of shared resources; municipalist traditions emphasize participatory self-government; cooperative movements demonstrate democratic forms of economic organization; Indigenous governance traditions foreground relational understandings of ecological responsibility; and contemporary sustainability initiatives offer practical examples of community-based ecological action.

These experiences offer valuable lessons for ecological governance, yet they also reveal persistent limitations. Many remain confined to specific sectors, territories, or policy domains. Others rely heavily on voluntary participation, have limited institutional authority, or struggle to influence broader political and economic structures. Consequently, their capacity to contribute to large-scale socio-ecological transformation often remains constrained.

The ECC framework's significance lies less in proposing entirely new governance principles than in integrating institutional capacities that are often treated separately. Existing approaches often emphasize one dimension of ecological governance while giving less attention to others. Polycentric governance focuses on the distribution of authority across multiple decision-making centers; civic ecology highlights community-based environmental action; participatory governance promotes citizen involvement in public decision-making; and cooperative traditions emphasize collective self-organization. Each offers important insights, yet none alone fully addresses the challenge of linking ecological stewardship, democratic participation, institutional coordination, and long-term resilience within a single governance architecture.

ECCs are proposed as a conceptual framework for the more systematic integration of these complementary capacities. Their purpose is not to replace existing institutions or initiatives but to explore how localized ecological action, civic participation, and multi-level coordination can be connected within more coherent systems of democratic ecological governance. In this sense, ECCs are best understood as an effort to synthesize institutional trajectories that already exist in partial form and to examine how they might collectively contribute to more integrated and adaptive responses to contemporary socio-ecological challenges.

The preceding discussion has situated ECCs within a broader landscape of historical traditions and contemporary governance experiments. As argued above, the ECC framework's distinctive contribution lies not in any single institutional innovation but in its effort to integrate ecological stewardship, democratic participation, institutional continuity, and multilevel coordination within a more cohesive governance architecture.

However, whether this integrative ambition offers meaningful advantages can be assessed only through systematic comparison with existing governance models. The following section, therefore, examines ECCs alongside a range of contemporary local governance approaches, not to establish their superiority, but to clarify their distinctive characteristics, potential contributions, and possible limitations within the broader field of democratic ecological governance.

5. Comparative Analysis: Eco-Civic Communities and Existing Local Governance Models

The diversity of local governance experiments that has emerged in recent decades reflects growing efforts to advance ecological sustainability, democratic participation, community resilience, and institutional innovation across a range of organizational forms. As noted above, participatory budgeting initiatives, ecovillages, eco-districts, Transition Towns, neighborhood councils, community development corporations, and smart-city programs each offer distinct approaches to these challenges.

Building on the conceptual discussion in the previous section, this comparative analysis examines how ECCs relate to existing governance models across key institutional dimensions. Rather than demonstrating the superiority of any particular model, the analysis aims to identify the strengths, limitations, and governance orientations of different approaches. Through this comparison, the distinctive features of ECCs can be more clearly situated within the broader landscape of democratic ecological governance.

5.1. Participatory Governance and Democratic Depth

One of the most significant distinctions among local governance models concerns the extent and quality of citizen participation. Participatory budgeting initiatives, first institutionalized in Porto Alegre in the late twentieth century, were an important innovation that enabled citizens to deliberate directly on portions of the municipal budget [49]. These processes demonstrated that participatory governance could improve transparency, civic engagement, and responsiveness to local social priorities.

Nevertheless, participatory budgeting mechanisms often remain limited in scope. In many cases, participation is confined to relatively minor budget categories, while strategic planning, infrastructure investment, and broader policy priorities remain under conventional administrative control. Moreover, participatory mechanisms often depend heavily on political support from municipal authorities and may weaken or disappear after elections.

Neighborhood councils and local advisory boards also provide spaces for citizen deliberation and community representation. However, they often function primarily as consultative bodies with limited binding authority, constrained fiscal capacity, and uneven influence over substantive policy outcomes [20]. As a result, their democratic potential is frequently constrained by institutional factors.

ECCs differ conceptually in that participation is not treated as an auxiliary mechanism that supplements pre-existing governance structures, but rather as a constitutive dimension of governance itself. In the ECC framework, deliberative participation, ecological planning, and community co-governance are institutionally integrated rather than procedurally peripheral. At the same time, ECCs would still face many challenges identified in the participatory governance literature, including unequal participation, civic fatigue, and the risk of informal concentration of power. Their democratic effectiveness would therefore depend heavily on institutional design, accessibility, accountability mechanisms, and long-term civic capacity.

5.2. Ecological Orientation and Sustainability Integration

Existing local governance models also differ substantially in the extent to which ecological sustainability is central to their institutional objectives.

Transition Towns and ecovillages place ecological transition at the core of their organizational identity. Transition initiatives emphasize local resilience, community adaptation, renewable energy, local food systems, and post-carbon social organization [12]. Ecovillages likewise experiment with sustainable living practices, agroecology, ecological

architecture, and cooperative economies [44]. These initiatives demonstrate strong capacity for ecological innovation and social learning.

However, many such initiatives remain relatively small-scale, voluntary, and socially selective. Their capacity to influence broader urban systems or regional governance structures is often limited. Furthermore, because they frequently operate outside formal governance systems, their long-term continuity may depend on activist commitment and on favorable political conditions.

Eco-districts and regenerative urban projects pursue ecological objectives through infrastructure modernization, green architecture, energy efficiency, and sustainable urban planning [45,46]. These initiatives have significantly advanced experimentation in urban sustainability, particularly in transportation systems, renewable energy integration, and circular resource management.

Yet, as discussed earlier, eco-district governance often remains technocratic or planner-driven. Ecological priorities are often implemented through expert-led planning processes or public–private partnerships, in which citizen participation remains secondary. Consequently, ecological modernization may proceed without substantial democratization of governance structures.

ECCs, in principle, aim to integrate ecological sustainability and democratic participation more systematically. Ecological stewardship is treated not merely as a technical planning objective but as a civic and institutional responsibility embedded in collective decision-making. Its distinctive contribution lies less in proposing new sustainability technologies than in linking ecological transition to participatory governance and territorial co-responsibility.

5.3. Institutional Integration and Governance Capacity

Another major distinction among governance models concerns their relationship to formal institutional structures.

Many grassroots sustainability initiatives operate largely through informal or semi-formal civic networks. Their flexibility enables experimentation and innovation, but their limited institutional authority may constrain their capacity to implement policy and ensure long-term continuity. Conversely, highly institutionalized governance structures often possess stronger administrative resources while limiting civic participation and adaptive flexibility.

Smart-city governance initiatives illustrate this tension particularly clearly. Smart-city frameworks increasingly integrate digital infrastructure, data-driven management systems, and technological optimization into urban governance [50]. These approaches may improve administrative efficiency, infrastructure coordination, and resource management.

However, critics argue that smart-city governance often prioritizes managerial optimization and technological surveillance over democratic participation and social inclusion [51]. Decision-making may become increasingly centralized within technocratic or corporate networks, limiting opportunities for substantive civic co-governance. Moreover, smart-city models often emphasize efficiency rather than broader ecological or democratic transformation.

Business Improvement Districts (BIDs), community development corporations, and related urban governance arrangements likewise exhibit both institutional strengths and democratic limitations. These initiatives have often mobilized investment, improved infrastructure, and coordinated local development projects [52]. Yet they have also been criticized for privileging commercial interests, reinforcing socio-spatial inequalities, and limiting accountability to broader resident populations [53].

ECCs are conceptually positioned between these two poles. Unlike purely informal grassroots initiatives, they seek formal or semi-formal institutional recognition to ensure continuity, coordination, and administrative capacity. At the same time, unlike technocratic or market-centered governance models, ECCs emphasize participatory legitimacy, ecological stewardship, and civic inclusion as core institutional principles. Their proposed contribution, therefore, lies in combining institutional durability with democratic and ecological orientation.

5.4. Economic Organization and Community Resilience

Economic governance is another area of significant differentiation. Many contemporary local governance initiatives operate within broader market-oriented development frameworks that prioritize competitiveness, investment attraction, and urban growth. While such approaches may generate economic revitalization, they can also intensify inequalities, ecological pressures, and displacement.

Community-based ecological initiatives often address these limitations by promoting alternative economic practices, including cooperative ownership, local food systems, renewable energy cooperatives, circular economies, and solidarity networks [54]. These initiatives aim to strengthen local resilience by reducing reliance on highly centralized, environmentally intensive economic systems.

ECCs build on these approaches by integrating local economic resilience into broader ecological-democratic governance structures. Their objective is not economic autarky or complete local self-sufficiency, but rather the development of more territorially embedded, participatory, and sustainable forms of economic coordination. In this sense, ECCs share affinities with cooperative and regenerative economic traditions and extend those traditions into broader governance frameworks.

Nevertheless, important questions remain regarding economic feasibility, fiscal sustainability, and the distribution of resources across communities. Wealthier regions may have significantly greater capacity to develop participatory ecological infrastructure than economically marginalized areas. Consequently, any realistic ECC framework would require mechanisms for redistributive coordination and multilevel support to mitigate territorial inequalities.

5.5. Comparative Framework

Table 2 summarizes the comparative strengths and limitations of ECCs relative to several prominent local governance models, using the analytical dimensions developed earlier.

Table 2. Comparative Analysis of Eco-Civic Communities (ECCs) and Existing Local Governance Models.

Governance Model	Governance	Ecological Orientation	Economic Organization	Social Dimension	Institutional Structure	Scale	Knowledge Systems	Temporal Orientation
Ecovillages	High within community	High	Often regenerative and cooperative	Strong internal cohesion but sometimes socially selective	Low to moderate formal integration	Limited	Strong integration of local and experiential knowledge	Strong long-term sustainability orientation
Transition Towns	Moderate to high	High	Strong emphasis on local resilience and relocalization	Generally inclusive but variable	Low institutional integration	Limited to moderate	Combines local knowledge and sustainability	Strong future-oriented resilience focus

								bility exper- tise
Eco-Districts	Moderate	High	Variable	Variable	High formal integration	Moderate to high	Frequently expert-driven	Long-term sustainability planning
Participatory Budgeting	Moderate	Usually indirect	Limited economic focus	Often inclusive	Moderate	Moderate	Citizen input integrated into decision-making	Usually linked to short- and medium-term policy cycles
Neighborhood Councils	Moderate	Usually low or indirect	Limited	Variable	Moderate	High local scalability	Primarily local knowledge	Variable
Smart-City Governance	Low to moderate	Variable	Often innovation-oriented	Frequently uneven	High	High	Strong reliance on technical and scientific expertise	Medium- to long-term planning focus
ECCs (conceptual model)	Potentially high	Integrated and constitutive	Regenerative and circular economic orientation	Intended broad inclusion and civic empowerment	Potentially high through formal or semi-formal integration	Intended multilevel integration	Integration of scientific, local, and experiential knowledge	Explicit commitment to long-term ecological resilience and intergenerational responsibility

Note: The governance models in this table represent diverse institutional arrangements documented in the literature. The ratings and descriptions are illustrative and intended to facilitate conceptual comparison rather than provide definitive empirical assessments. ECCs differ from the other models in that they present a proposed conceptual framework rather than an empirically established governance arrangement. Consequently, descriptions of ECCs reflect their intended design characteristics and anticipated governance capacities rather than empirically validated outcomes.

The table shows that no existing governance model fully resolves the tensions among democratic participation, ecological effectiveness, institutional capacity, and scalability. Rather than viewing ECCs as categorically superior, the comparative analysis suggests they may offer a framework for integrating dimensions that are often kept separate across initiatives.

5.6. Comparative Insights and Structural Limitations

The comparative analysis highlights the practical implications of the integrative framework discussed in the previous section by showing how different governance models address specific ecological, democratic, economic, and institutional challenges.

Although fully developed ECCs do not yet exist as formally recognized governance arrangements, many of the capacities identified in the comparative analysis are already evident in contemporary governance initiatives. Transition Town networks illustrate localized ecological participation and community resilience-building. Certain Swedish municipalities demonstrate the integration of sustainability objectives into local governance structures. Participatory environmental councils in Brazil exemplify institutionalized citizen involvement in ecological decision-making, while community energy cooperatives across Europe illustrate mechanisms through which local ecological action can contribute to broader sustainability transitions. These initiatives do not constitute ECCs in their entirety, but they demonstrate that elements of the proposed framework already exist in practice and could be combined into more integrated ecological-democratic governance arrangements.

Viewed comparatively, the potential contribution of ECCs lies in their capacity to connect capacities that are often institutionally separated, thereby strengthening links among local ecological action, participatory governance, and multilevel coordination. Their potential strength derives not from any single institutional innovation but from their proposed capacity to integrate ecological stewardship, democratic participation, institutional continuity, and multilevel coordination within a unified governance architecture.

At the same time, significant uncertainties remain. ECCs may face many of the same structural limitations as existing governance experiments, including unequal civic capacities, institutional overlap, financial dependence, administrative complexity, and the risk of elite capture. Their viability would depend heavily on the political context, legal frameworks, civic culture, resource distribution, and broader governance support systems.

Consequently, ECCs are best understood not as finalized institutional solutions but as conceptual governance models whose practical feasibility and democratic effectiveness require further empirical investigation, comparative experimentation, and institutional refinement.

6. Integrating Eco-Civic Communities Within Multilevel Governance

The viability of ECCs ultimately depends not only on their internal democratic and ecological capacities but also on their integration into broader governance systems. Community-based ecological initiatives often struggle when isolated from supportive institutional environments, while highly centralized governance systems often fail to mobilize meaningful civic participation or adapt effectively to local ecological conditions. The challenge, therefore, is not simply to strengthen local participation or global coordination in isolation, but to examine how governance structures across multiple levels can become more coherently interconnected.

This section analyzes ECCs within the framework of multilevel and polycentric governance. Rather than treating local, national, and global governance as mutually exclusive spheres, the ECC model conceptualizes them as interdependent and overlapping dimensions of ecological democracy. From this perspective, ECCs are not intended to replace municipal governments, national states, or international institutions but to serve as intermediary civic-governance formations that strengthen coordination, participation, and ecological responsiveness across scales.

Importantly, the argument advanced here is analytical rather than deterministic. The claim is not that any single institutional arrangement is the exclusive solution to ecological governance challenges. Rather, the analysis suggests that more federal or strongly coordinated multilevel governance arrangements may offer greater capacity to link localized ecological participation with broader democratic coordination amid growing planetary interdependence.

6.1. Local Governance Functions of Eco-Civic Communities

At the local level, ECCs are conceived as participatory governance structures through which citizens collectively engage in ecological planning, community coordination, and democratic deliberation. Their primary significance lies not merely in implementing isolated sustainability projects but in institutionalizing ecological responsibility across the everyday practices of civic governance.

6.1.1. Ecological Planning and Territorial Stewardship

One of the central functions of ECCs would be to coordinate ecological planning at the territorial level. This may include renewable energy transitions, local food systems, biodiversity restoration, climate adaptation strategies, circular economy initiatives, water management, mobility systems, and ecological land-use planning. Because ecological

challenges often manifest locally yet connect to broader environmental systems, territorially embedded governance structures can play an important role in translating broader sustainability objectives into context-sensitive practices.

Unlike purely technocratic environmental administration, ECCs aim to integrate ecological planning with participatory deliberation. Ecological governance is therefore conceived not only as a matter of expert management but also as a democratic process in which communities collectively negotiate sustainability priorities, distributive implications, and long-term territorial responsibilities.

This participatory dimension may strengthen policy legitimacy and public engagement by incorporating local ecological knowledge, which is often overlooked in centralized governance systems. At the same time, participatory ecological planning also introduces challenges related to expertise, coordination, and conflicting interests. Consequently, ECCs would require institutional mechanisms that balance technical knowledge with democratic deliberation.

6.1.2. Citizen Deliberation and Civic Participation

A second core function of ECCs is to institutionalize citizen deliberation and participatory governance. Existing democratic systems often confine citizen participation to periodic elections, leaving most ecological and infrastructure decisions within administrative or technocratic domains. ECCs, in principle, aim to expand opportunities for continuous civic engagement within local governance processes.

Such participation may include deliberative assemblies, participatory planning forums, cooperative governance mechanisms, citizen panels, community budgeting procedures, and collaborative monitoring systems. The objective is not direct democracy in a purely plebiscitary sense, but rather the creation of structured spaces where citizens, associations, experts, and local institutions can collectively shape ecological and social priorities.

Importantly, deliberative participation also serves broader democratic functions beyond policy formation. Participatory governance can strengthen civic trust, public accountability, social cohesion, and democratic learning [20]. In contexts marked by rising political polarization and declining institutional confidence, localized participatory structures may help rebuild democratic legitimacy and collective problem-solving capacity.

Nevertheless, the effectiveness of deliberative governance depends heavily on institutional inclusiveness. Participation processes may reproduce existing inequalities if barriers related to time, education, digital access, income, or social marginalization are not adequately addressed. ECCs would therefore require deliberate inclusion strategies and accountability safeguards to prevent them from being dominated by highly organized or socially privileged actors.

6.1.3. Community Resilience and Adaptive Coordination

ECCs may also help strengthen local resilience amid accelerating ecological and social instability. Climate change, resource pressures, public health crises, and economic disruptions increasingly expose the limitations of highly centralized, rigid governance systems. Localized governance structures can often respond more quickly and in context to evolving conditions, while mobilizing social networks and collective capacities that distant administrative systems lack.

Within the ECC framework, community resilience extends beyond emergency preparedness. It encompasses adaptive capacities for ecological restoration, food security, energy decentralization, social solidarity, public health coordination, and local economic resilience. By embedding ecological governance in participatory community structures,

ECCs may strengthen communities' collective capacity to adapt to long-term socio-ecological transformations.

At the same time, resilience should not be romanticized as local self-sufficiency. Many ecological challenges exceed local capacities and require broader coordination, redistributive mechanisms, scientific expertise, and infrastructure. Consequently, ECC resilience depends significantly on effective integration into broader governance systems.

6.2. *Eco-Civic Communities and Municipal/National Governments*

The relationship between ECCs and existing governmental institutions is one of the most important questions regarding their practical feasibility. Community-based governance initiatives often face tensions over jurisdiction, authority, resource allocation, and institutional overlap. For ECCs to function effectively, they would need to complement, rather than simply duplicate or compete with, municipal and national governance structures.

6.2.1. Competencies and Functional Differentiation

ECCs are not intended as substitutes for representative governments or conventional public administration. Municipal governments would continue to exercise broader responsibilities for infrastructure, public services, regulatory authority, and territorial coordination. National governments would likewise retain essential functions related to constitutional order, macroeconomic policy, redistribution, national legislation, and international representation.

Rather, ECCs may serve as intermediary governance structures that focus on participatory ecological coordination and localized civic engagement. Their competencies would likely vary by institutional context but could include advisory and co-governance roles in areas such as local sustainability planning, community energy systems, ecological restoration, participatory budgeting, resilience coordination, and local resource stewardship.

This functional differentiation reflects the principle of subsidiarity, which holds that governance responsibilities should be exercised at the most immediate level compatible with effective action, with larger-scale institutions intervening where broader coordination is necessary [55]. Subsidiarity does not imply local isolationism but rather seeks to balance local autonomy with systemic coordination.

6.2.2. Coordination and Institutional Integration

For ECCs to contribute meaningfully to governance systems, institutional coordination mechanisms are essential. Without clear coordination structures, participatory governance initiatives risk fragmentation, duplication, or jurisdictional conflicts. Effective integration would therefore require legal recognition, procedural clarity, administrative cooperation, and mechanisms to resolve conflicts across governance levels.

Polycentric governance theory provides an important analytical framework for understanding these dynamics. Rather than concentrating authority within a single hierarchical structure, polycentric systems feature multiple overlapping centers of decision-making that operate at different scales and remain partially coordinated [14]. Such arrangements may enhance adaptability, experimentation, and responsiveness in complex environments.

ECCs may be understood as potential nodes within broader polycentric governance systems. Their role would not be to centralize authority locally but to strengthen democratic and ecological coordination across multilevel governance networks linking municipalities, regions, states, civil society actors, and transnational institutions.

The specific institutional form of ECCs would necessarily vary across political and administrative contexts. In some jurisdictions, they might function primarily as advisory or consultative bodies linked to municipal governments, while in others they could assume co-governance responsibilities through formal partnerships with public authorities, civil society organizations, community associations, and ecological stakeholders. Regardless of their institutional form, democratic legitimacy would depend on clear accountability mechanisms, including transparent decision-making procedures, publicly accessible records, periodic evaluations, opportunities for community review, and clearly defined responsibilities among participating actors. Such safeguards would be especially important in multilevel governance systems, where overlapping authorities may otherwise create ambiguity about responsibility and oversight.

Importantly, polycentric governance does not automatically confer democratic legitimacy or ensure effective coordination. Overlapping authorities can also create confusion, inequality, and accountability deficits. Consequently, the institutional design of ECC integration would remain a critical issue requiring further empirical and constitutional analysis.

6.2.3. Fiscal Relations and Resource Capacities

A recurring limitation for participatory and community-based governance initiatives is uneven access to financial resources. Even highly participatory governance arrangements may struggle to sustain ecological programs when funding is uncertain, fragmented, or tied to short-term political priorities.

For ECCs, the central fiscal challenge is not merely securing funding but ensuring adequate resources are available across territories with varying economic capacities. Wealthier communities may have greater fiscal autonomy, stronger tax bases, and more developed administrative infrastructure than economically disadvantaged regions. Without compensatory mechanisms, ecological governance initiatives risk reinforcing existing territorial inequalities.

Consequently, ECCs would likely need to be embedded within broader systems of intergovernmental fiscal coordination that balance local initiative and redistributive solidarity. Municipal, regional, and national authorities would continue to play important roles by providing financial support, equalization mechanisms, and legal frameworks that enable meaningful participation regardless of local economic conditions.

The long-term viability of ecological democracy therefore depends not only on civic engagement and institutional innovation but also on fiscal arrangements that foster equitable participation and ecological stewardship across diverse territorial contexts.

6.3. *Eco-Civic Communities Within Polycentric and Global Governance*

The growing interdependence of ecological systems poses governance challenges that transcend local and national boundaries. Climate change, biodiversity loss, ocean degradation, migration pressures, and transboundary pollution all involve systemic interactions that isolated governance units alone cannot effectively address. At the same time, highly centralized global governance structures often suffer from democratic deficits, limited legitimacy, and weak capacity for implementation.

In this context, ECCs may contribute to wider discussions on polycentric and multi-level ecological governance by providing institutional links between localized participation and larger-scale coordination systems.

6.3.1. Ecological Coordination Across Governance Scales

One of the central insights of polycentric governance theory is that complex ecological problems often require governance arrangements that operate simultaneously across

multiple scales rather than relying exclusively on centralized or decentralized models [14]. Localized participation may enhance contextual responsiveness and democratic legitimacy, while higher levels of governance provide coordination, redistribution, scientific expertise, and regulatory coherence.

ECCs conceptually fit within this framework as localized participatory units nested within broader governance architectures. Their role would involve translating sustainability frameworks into territorially grounded practices and transmitting local knowledge, priorities, and democratic feedback upward into regional, national, and transnational governance processes.

This multilevel perspective aligns with scholarship on ecological democracy and Earth system governance, which increasingly emphasizes the need to link democratic participation to planetary coordination mechanisms [1]. The challenge is not merely to scale up local participation mechanically but to develop governance arrangements capable of reconciling ecological interdependence with democratic pluralism.

6.3.2. Democracy as Connective Infrastructure

In multilevel ecological governance systems, democracy serves a connective rather than merely procedural function. Democratic legitimacy is essential for coordinating diverse actors, scales, and knowledge systems amid ecological complexity and political diversity.

Deliberative democratic theory increasingly conceptualizes democracy as a distributed system of communicative interaction among institutions, publics, civil society actors, and governance networks, rather than as a single institutional locus [6]. From this perspective, legitimacy emerges through ongoing processes of participation, contestation, justification, and accountability across multiple governance arenas.

ECCs may contribute to such deliberative systems by serving as localized democratic nodes where ecological governance is embedded in everyday civic practice. Their significance, therefore, lies not only in environmental administration but also in their potential to strengthen the democratic infrastructure needed for long-term ecological coordination.

At the same time, democratic governance amid planetary interdependence remains institutionally unresolved. Existing global governance systems continue to face major challenges in accountability, representation, enforceability, and coordination. Consequently, proposals for stronger multilevel or federal governance arrangements are increasingly emerging in debates on global environmental governance and planetary politics [2,56].

Rather than claiming that any single institutional model is the exclusive solution, the present analysis suggests that more strongly coordinated multilevel governance arrangements—including potentially federal forms of ecological coordination—may better reconcile local democratic participation with broader ecological interdependence. ECCs may contribute to these arrangements by strengthening the participatory foundations on which larger governance systems ultimately depend.

6.3.3. Reconciling Democratic Participation and Polycentric Coordination

A central challenge in contemporary ecological governance is reconciling the normative aspirations of ecological democracy with the institutional logic of polycentric governance. As noted above, although both traditions emerged in response to the limitations of centralized and technocratic models of environmental management, they emphasize different dimensions of governance and are not always fully compatible.

Ecological democracy is primarily concerned with legitimacy. It seeks to ensure that environmental decisions are shaped by inclusive participation, public deliberation, transparency, accountability, and consideration of long-term ecological and intergenerational

interests [3–5]. Within this tradition, democratic legitimacy depends not only on policy outcomes but also on the quality of the processes by which collective decisions are reached. Ecological governance is therefore viewed as inseparable from questions of justice, representation, civic empowerment, and public accountability.

Polycentric governance, by contrast, focuses primarily on institutional adaptability and problem-solving capacity. As Ostrom and subsequent scholars emphasize, complex environmental challenges often require multiple interacting centers of decision-making capable of experimentation, learning, and adaptation across scales [14,16]. Polycentric systems can enhance flexibility and resilience by distributing authority among diverse governance actors rather than concentrating decision-making power within a single hierarchical structure.

Yet the strengths of each approach may also create tensions. As discussed before, highly participatory governance arrangements can be time-consuming, resource-intensive, and difficult to coordinate across large territories. Conversely, polycentric systems may improve adaptive capacity while creating fragmentation, uneven participation, accountability gaps, or disparities in institutional effectiveness across jurisdictions. In some cases, the pursuit of governance flexibility may conflict with demands for democratic consistency, while extensive deliberation may slow institutions' responses to urgent ecological challenges.

The ECC framework seeks to address these tensions by combining the normative foundations of ecological democracy with the institutional advantages of polycentric governance. Rather than treating participation and coordination as competing objectives, ECCs are conceived as intermediary governance structures that connect localized democratic engagement with larger systems of ecological governance. Their role is not to replace existing governmental institutions but to create participatory nodes within multi-level governance arrangements, enabling local ecological stewardship to inform decision-making at wider territorial and political scales.

Nevertheless, the tensions between democratic participation and institutional coordination cannot be fully eliminated. Ecological governance inevitably involves trade-offs among inclusiveness, efficiency, responsiveness, expertise, and accountability. The objective of ECCs is therefore not to permanently resolve these tensions but to provide institutional mechanisms through which they can be managed more constructively.

Several governance principles are particularly relevant in this regard. The principle of subsidiarity holds that decisions should be made at the lowest effective level, with higher authorities intervening only when coordination across jurisdictions becomes necessary. Accountability mechanisms help ensure that decentralized governance structures remain publicly answerable and resistant to elite capture. Transparency strengthens public trust and facilitates coordination among diverse governance actors. Finally, nested governance arrangements, in which local institutions operate within wider multilevel systems, may help reconcile local autonomy with the realities of ecological interdependence.

From this perspective, ECCs should be understood not as institutional solutions that eliminate the inherent tensions of ecological governance but as experimental governance structures that seek to balance democratic legitimacy and institutional adaptability within increasingly complex socio-ecological systems. Their ultimate effectiveness will depend on how successfully these competing governance objectives are reconciled across diverse political, legal, and cultural contexts.

6.4. Implications for Multilevel Ecological Democracy

The preceding discussion suggests that the significance of ECCs extends beyond the local scale at which they operate. Their potential contribution lies not primarily in environmental management or community participation considered separately, but in their

capacity to strengthen the democratic foundations of ecological governance across inter-connected levels of decision-making.

From this perspective, ECCs represent one institutional pathway through which ecological democracy may evolve from isolated participatory initiatives toward more integrated forms of multilevel governance. By embedding ecological stewardship in ongoing civic practice and linking local experience to broader governance processes, ECCs may help address one of the central challenges of contemporary environmental politics: how to maintain democratic legitimacy amid growing ecological interdependence.

Whether such arrangements can be institutionalized successfully remains an open empirical question. Their practical viability will depend on political, legal, cultural, and economic conditions that vary widely across contexts. Nevertheless, the concept of ECCs underscores the importance of developing governance institutions that link democratic participation, ecological responsibility, and coordination across scales in ways that reinforce rather than undermine one another.

7. Scaling Pathways: Institutional Design, Transition Mechanisms, and Policy Scenarios

The preceding discussion has examined the normative rationale and governance implications of ECCs. The remaining question concerns implementation: how such arrangements might emerge, develop, and operate across different institutional conditions. This section explores potential developmental phases, transition mechanisms, policy instruments, and evaluation criteria that may inform future experimentation and empirical research.

7.1. Phases of Development

For analytical purposes, the development of ECCs can be understood as a sequence of overlapping phases. These phases are not intended as a rigid model or universal trajectory. Different communities may move through them at different speeds, combine elements from multiple phases, or follow alternative pathways, depending on institutional, political, and ecological conditions.

7.1.1. Pilot and Experimental Phase

The initial phase would likely involve localized pilot initiatives emerging in municipalities, neighborhoods, districts, or regional communities. These early-stage ECC experiments could focus on specific ecological and participatory objectives, such as renewable energy cooperatives, climate adaptation planning, participatory ecological budgeting, food sovereignty initiatives, biodiversity restoration, or community resilience coordination.

At this stage, ECCs would primarily serve as experimental governance spaces where communities test participatory ecological practices, institutional procedures, and collaborative decision-making mechanisms. Their primary contribution would not necessarily be large-scale ecological transformation but rather the generation of institutional learning, civic capacity, and demonstrative legitimacy.

Pilot phases are especially important because they enable governance experimentation without requiring immediate systemic restructuring. As Ostrom [14] emphasizes in polycentric governance theory, smaller-scale institutional experimentation can enhance adaptive learning and reduce the risks of centralized policy uniformity.

7.1.2. Municipal Integration Phase

If localized ECC initiatives demonstrate practical viability and public legitimacy, subsequent development may entail greater integration into formal municipal governance systems. Municipal governments could begin to recognize ECCs as advisory, deliberative, or co-governance institutions that participate in ecological planning, coordination of community resilience, or participatory budgeting.

This phase would likely require clearer legal definitions, mechanisms for procedural integration, and administrative coordination structures. Municipal integration could provide ECCs with greater institutional continuity, fiscal support, and policy influence, while strengthening democratic participation within local governance systems.

At the same time, institutional integration introduces significant tensions. Increased formalization may improve stability while reducing flexibility, spontaneity, and grassroots autonomy. Balancing institutional durability with participatory openness would therefore be a central governance challenge at this stage.

7.1.3. Regional Networking and Inter-Community Coordination

As ECC initiatives expand, horizontal coordination among communities may become increasingly important. Regional networks could facilitate knowledge exchange, policy learning, cooperative resource sharing, ecological coordination, and joint advocacy across municipalities and territories.

This networking phase reflects the broader logic of polycentric governance systems, in which multiple governance units remain partially autonomous while coordinating through cooperative relationships rather than strict hierarchical control [14]. These multi-level coordination mechanisms also align with broader Earth system governance approaches that emphasize institutional diversity, cross-scalar interaction, and distributed governance capacities in response to planetary ecological interdependence [2]. Dense inter-community networks may strengthen resilience by enabling communities to share institutional innovations, technical expertise, and participatory practices and adapt them to diverse territorial contexts.

Regional coordination may be especially important for ecological systems that span municipal boundaries, such as watershed management, regional mobility infrastructure, biodiversity corridors, energy grids, and climate adaptation strategies.

7.1.4. National Recognition and Policy Integration

A more advanced stage of development would entail broader legal and policy recognition at the national level. National governments could establish enabling legal frameworks that recognize ECCs as participatory entities in ecological governance and define their competencies, fiscal relations, accountability standards, and coordination mechanisms.

National integration may also include ecological transition funds, cooperative financing programs, participatory planning mandates, or multilevel governance councils that connect local ecological participation to broader policy frameworks. Importantly, national coordination could help reduce territorial inequalities by redistributing resources to communities with weaker economic or administrative capacity.

Nevertheless, national institutionalization may also create political tensions. Central governments may resist decentralization, viewing it as administratively disruptive or politically destabilizing. Similarly, ideological conflicts over ecological regulation, participatory governance, or territorial autonomy may shape how ECCs are politically interpreted and implemented.

7.1.5. Transnational and Global Coordination

As ecological interdependence intensifies, more advanced forms of transnational coordination may eventually emerge among ECC networks, municipalities, regional coalitions, and international institutions. Existing examples—including transnational municipal climate networks and global urban sustainability coalitions—demonstrate that local governance actors increasingly participate in global environmental governance [9].

In this scenario, ECCs could contribute to broader systems of multilevel ecological coordination by transmitting local ecological knowledge, democratic feedback, and participatory legitimacy to regional and global governance arenas. Their role would not involve replacing national governments or creating a centralized planetary administration, but rather strengthening the participatory foundations on which broader ecological coordination increasingly depends.

This perspective aligns with emerging discussions on democratic Earth system governance and multilevel ecological federalism, which emphasize linking local democratic participation to planetary governance capacities amid global ecological interdependence [1,2,56].

7.2. Institutional Mechanisms

The transition from isolated local experimentation to more durable ecological-democratic governance systems would require a range of institutional mechanisms to support participation, coordination, accountability, and continuity. Moreover, reflexive governance scholarship suggests that institutional resilience increasingly depends on mechanisms that enable continuous learning, adaptive coordination, and iterative policy revision amid ecological complexity and uncertainty [57].

7.2.1. Legal and Constitutional Frameworks

One important mechanism is the development of legal frameworks that recognize participatory ecological governance structures within broader institutional systems. Legal recognition may provide ECCs with procedural clarity, institutional legitimacy, and administrative continuity, and it may define their relationships with municipal and national authorities.

Possible legal mechanisms include municipal charters, participatory governance statutes, ecological planning mandates, community stewardship agreements, and constitutional provisions recognizing participatory ecological governance principles. The specific institutional form would likely vary considerably across political systems and legal traditions.

The legal status of ECCs would necessarily vary across political systems and constitutional traditions. In consolidated democracies, ECCs could serve as legally recognized participatory governance bodies with advisory, consultative, or co-decisional roles linked to municipal and regional authorities. In federal systems, they could be integrated into existing subsidiarity-based governance arrangements. In more centralized or hybrid political systems, ECCs might initially emerge through administrative, community-development, or environmental planning mechanisms rather than through formally devolved political authority.

Consequently, the ECC framework should not be interpreted as a uniform institutional template. Rather, it is intended as a flexible governance model, with its specific legal powers, competencies, and organizational forms varying with broader constitutional, political, and administrative contexts.

7.2.2. Participatory Assemblies and Deliberative Structures

Deliberative institutions would constitute another central mechanism in ECC development. Participatory assemblies, citizen forums, ecological councils, and deliberative planning bodies may offer structured spaces for collective decision-making, public reasoning, and civic accountability. From a systemic deliberative perspective, democratic legitimacy emerges not from isolated participatory forums alone but from interactions among multiple deliberative sites distributed throughout the broader governance system [6].

Deliberative structures are especially important because ecological governance often entails long-term trade-offs, distributive conflicts, and uncertainty that demand ongoing public justification rather than purely technocratic administration. Institutionalized deliberation may therefore strengthen both democratic legitimacy and collective learning.

Empirical research on environmental governance further indicates that public participation serves multiple functions beyond procedural legitimacy, including knowledge integration, conflict mediation, trust-building, and improved policy implementation [58].

At the same time, participation mechanisms require careful institutional design to prevent domination by highly organized actors, procedural fatigue, or symbolic consultation lacking substantive influence.

7.2.3. Ecological Budgeting and Fiscal Mechanisms

Fiscal mechanisms are equally important for institutional viability. Participatory ecological governance cannot be durable if it depends solely on temporary grants or volunteer labor. Stable financing structures are therefore necessary to support ecological planning, civic participation, resilience infrastructure, and administrative coordination.

Potential mechanisms may include ecological budgeting processes, municipal sustainability funds, cooperative financing institutions, climate transition programs, or participatory allocation procedures tied to ecological indicators. These mechanisms could strengthen democratic accountability by directly linking public deliberation to resource allocation.

7.2.4. Digital Platforms and Participatory Technologies

Digital platforms may also support ECC coordination by enabling participatory communication, collaborative planning, public transparency, and inter-community networking. Digital tools can expand access to deliberation, enhance information sharing, and strengthen participatory monitoring systems across scales of governance.

However, digital governance also poses significant risks, including surveillance, technological dependence, algorithmic bias, unequal access, and the exclusion of populations without digital literacy or infrastructure. Consequently, digital participation should complement, rather than replace, face-to-face deliberative institutions and community-based engagement. These concerns are especially relevant in contemporary democracies, where tensions are rising among technological modernization, democratic responsiveness, and post-participatory governance, as identified by Blühdorn [59].

7.2.5. Cooperative Finance and Community Economies

Finally, cooperative financial mechanisms may strengthen local resilience and democratic economic participation within ECC systems. Community energy cooperatives, mutual credit systems, solidarity finance networks, and cooperative investment structures may support territorially embedded ecological transitions and reduce dependence on highly centralized financial systems.

Such arrangements may also help achieve a more equitable distribution of ecological transition benefits within communities. Nevertheless, cooperative economic systems

would still require broader regulatory and redistributive frameworks to address structural inequalities across regions.

7.3. Risks, Constraints, and Structural Challenges

Any realistic assessment of ECCs must also acknowledge the substantial risks and limitations of participatory ecological governance. Community-based governance initiatives are not inherently democratic, inclusive, or effective merely because of local participation. Several structural challenges may significantly constrain ECCs' viability.

7.3.1. Elite Capture and Unequal Participation

One major risk is elite capture. Participatory institutions may be dominated by socially privileged groups with more time, education, organizational capacity, or political influence. Without adequate safeguards, ECCs could reproduce rather than reduce existing inequalities in political participation and access to resources.

Similarly, participation inequalities based on gender, ethnicity, class, age, disability, or digital access can distort deliberative processes and undermine democratic legitimacy.

7.3.2. Civic Fatigue and Participation Overload

Sustained participation requires considerable time, emotional labor, and organizational commitment. Communities facing economic precarity or social fragmentation may struggle to sustain long-term participatory engagement. Excessive reliance on continuous civic mobilization may therefore lead to participation fatigue, declining engagement, or the concentration of responsibilities among small activist minorities. These dynamics may reinforce what Blühdorn [59] describes as the structural contradictions of contemporary democracies, in which expectations of participation rise even as social fragmentation, economic precarity, and institutional distrust weaken sustained civic engagement.

7.3.3. Administrative Overlap and Governance Complexity

Polycentric governance systems may also lead to institutional fragmentation and administrative complexity. Overlapping authorities, unclear competencies, and duplicated procedures can undermine accountability and create governance inefficiencies. Effective coordination mechanisms would therefore remain essential.

7.3.4. Equity, Capacity, and Territorial Inequalities

Financial sustainability is only one dimension of a broader challenge involving the unequal distribution of resources, organizational capacity, technical expertise, and civic participation across communities. Wealthier communities often have stronger institutional networks, greater administrative capacity, and higher levels of civic engagement, enabling them to participate more effectively in ecological governance initiatives than economically marginalized communities.

Without appropriate safeguards, ECCs could unintentionally reproduce or even amplify existing socioeconomic inequalities. Communities with greater resources may be better positioned to develop ecological infrastructure, secure external funding, influence decision-making, and sustain long-term participation. As a result, opportunities for ecological self-governance may be unevenly distributed across regions.

To mitigate these risks, ecological-democratic governance frameworks would likely require mechanisms that promote both equity and participation. Such measures may include targeted capacity-building programs, technical assistance, redistributive funding, requirements for inclusive representation, and institutional support for historically marginalized communities. Higher levels of government may also play an important role by

providing resources and coordination mechanisms to help ensure that meaningful participation is not determined primarily by local wealth or organizational capacity.

Consequently, equitable ecological governance requires attention not only to participation itself but also to the social, economic, and institutional conditions that enable it.

7.3.5. Political Resistance and Institutional Inertia

Participatory ecological governance may encounter resistance from political actors, administrative institutions, or economic interests that view ECCs as threats to existing power structures or development models. Institutional inertia, partisan polarization, and ideological opposition may therefore significantly affect implementation trajectories.

These risks do not invalidate the ECC framework, but they underscore the need to treat ECCs as contingent institutional experiments requiring careful design, ongoing evaluation, and adaptive governance capacities, rather than as idealized solutions.

7.3.6. Participation–Efficiency Trade-Offs During Ecological Crises

A further challenge concerns the relationship between inclusive participation and decision-making efficiency during emergencies. Ecological crises such as floods, wildfires, pandemics, infrastructure failures, or extreme weather events often require rapid responses that may be difficult to reconcile with extensive deliberative processes. Participatory governance systems can strengthen legitimacy and public trust, but they may also lengthen decision-making time and increase procedural complexity.

For this reason, ECCs should not be viewed as substitutes for emergency management institutions. A more realistic approach would distinguish between ordinary governance conditions, in which deliberative participation plays a central role, and emergency situations, in which previously authorized executive procedures may be activated, subject to subsequent public accountability and review. Balancing democratic legitimacy with operational effectiveness remains one of the most important design challenges for any ecological-democratic governance framework.

7.4. Indicators for Future Empirical Research

Because ECCs remain primarily a conceptual governance model, future empirical research will be essential to assess their practical effectiveness and institutional viability. Developing measurable indicators may help enable comparative analysis across contexts and governance experiments.

Therefore, potential indicators for future research are listed in Table 3. The comparative assessment below applies all eight analytical dimensions introduced in Section 3. Although the indicators and ratings remain illustrative and exploratory rather than definitive, they demonstrate how the ECC framework may be operationalized in future empirical research. The objective is not to prescribe a fixed measurement system but to provide a foundation for comparative qualitative, quantitative, and mixed-methods assessments of ecological-democratic governance arrangements across institutional contexts.

Table 3. Indicators for Future Research.

Dimension	Illustrative Indicators
Governance	Participation rates; deliberative diversity; civic engagement continuity; decision-making inclusiveness
Ecological Orientation	Local carbon reduction; biodiversity restoration; renewable energy adoption; ecosystem health metrics
Economic Organization	Local cooperative activity; circular economy practices; community investment capacity; local employment generation

Social Dimension	Representation of marginalized groups; accessibility of participatory processes; social cohesion indices; equity outcomes
Institutional Structure	Degree of formal/legal recognition; administrative integration with public authorities; institutional stability; regulatory embedding
Scale	Coordination effectiveness across municipal, regional, national, and transnational levels; degree of vertical and horizontal policy coherence
Knowledge Systems	Integration of scientific, local, and experiential knowledge; participatory knowledge co-production; uptake of evidence in decision-making
Temporal Orientation	Long-term policy orientation; intergenerational planning mechanisms; persistence of ecological commitments over time; durability of governance reforms

Such indicators would not provide definitive measures of ecological democracy, but they may contribute to more systematic evaluation frameworks that move beyond purely normative or aspirational governance discourse.

Although ECCs remain a conceptual governance model, several initiatives discussed in this article provide preliminary empirical reference points for future comparative research. Transition Towns, participatory budgeting programs, community energy cooperatives, ecovillages, eco-districts, and community land trusts each exhibit institutional features that align with specific dimensions of the ECC framework. Future research could use the analytical indicators in Table 3 to conduct comparative case studies of democratic participation, ecological outcomes, institutional integration, and resilience across these initiatives. Such research would help determine whether ECC-like governance arrangements yield measurable advantages over existing models.

7.5. From Conceptual Proposal to Institutional Experimentation

The scaling of ECCs should therefore be understood not as a linear blueprint for institutional transformation but as a field of evolving governance experimentation situated within broader debates about ecological democracy, resilience, reflexive governance, and multilevel Earth system governance [2,57]. As noted above, the ECC framework is not intended to prescribe a single institutional model applicable universally across contexts but to explore how participatory ecological governance capacities might be more systematically integrated into existing and emerging governance architectures.

The significance of ECCs extends beyond their potential role as localized participatory institutions. Their broader contribution is to serve as connective governance infrastructures that help bridge the persistent gap among citizen participation, ecological stewardship, and multilevel democratic coordination. Many contemporary environmental governance systems remain fragmented: local initiatives often operate in relative isolation from broader decision-making processes, while higher-level institutions frequently lack effective mechanisms for citizens to influence ecological policies affecting their communities. ECCs seek to address this disconnect by creating institutional pathways that link local knowledge, civic engagement, and ecological action to wider governance processes.

In this sense, ECCs may be understood as institutional catalysts rather than merely administrative structures. Their value stems not only from the decisions they facilitate but also from the relationships they cultivate among citizens, civil society organizations, public authorities, and ecological systems. By fostering deliberation, collective learning, and

collaborative problem-solving across governance levels, ECCs may help develop more adaptive and democratically legitimate forms of environmental governance.

This connective role grows increasingly important as ecological challenges transcend conventional administrative boundaries. Climate change, biodiversity loss, water governance, food-system resilience, and ecosystem restoration all involve interactions between local actions and broader regional, national, and global processes. Yet governance arrangements that link these scales while preserving democratic legitimacy remain underdeveloped. The ECC framework offers an institutional response to this challenge by combining participatory democratic practices with multilevel governance mechanisms.

The long-term significance of ECCs therefore lies not only in improving local environmental management but also in contributing to the gradual emergence of more integrated forms of ecological democracy. Their potential value lies in strengthening the connections among ecological stewardship, civic participation, and multilevel governance while remaining sufficiently flexible to adapt to diverse political and institutional contexts.

Whether ECCs can move beyond localized experimentation remains an open empirical question. Their long-term viability will depend on political conditions, institutional design, civic cultures, resource distribution, and broader governance support systems. Nevertheless, mounting pressures from ecological interdependence, democratic fragmentation, and governance complexity suggest that new forms of multilevel ecological participation may become increasingly necessary. ECCs represent one possible pathway through which such institutional experimentation may contribute to the development of more integrated and democratically legitimate forms of ecological governance.

8. Limitations and Directions for Future Research

The ECC framework developed in this article should be understood primarily as a conceptual and analytical contribution rather than a fully validated institutional model. The paper seeks to synthesize insights from ecological democracy, deliberative governance, polycentric institutional theory, civic ecology, and multilevel governance to explore how participatory ecological governance structures might contribute to broader democratic and ecological transformation. While this conceptual integration offers a possible analytical framework for examining emerging governance innovations, several important limitations must be acknowledged.

First, the present study remains largely theoretical. Although the article draws on historical precedents, contemporary governance experiments, and comparative institutional literature, it does not provide systematic empirical testing of ECCs as operational governance structures. ECCs are therefore proposed as an analytical model informed by existing practices rather than as empirically demonstrated institutional solutions. The absence of longitudinal case studies, quantitative evaluation, or comparative field research necessarily limits the extent to which the framework's practical effectiveness can be assessed at present.

An additional limitation concerns the evaluative framework proposed throughout the article. Although the analytical dimensions and indicators presented in Sections 3 and 7 provide a structured basis for assessing ECCs, they remain preliminary and have not undergone systematic empirical testing. The indicators were developed as heuristic tools to facilitate future comparative analysis rather than as validated measures of ecological-democratic performance. Consequently, no conclusions can be drawn at present about their reliability, predictive value, or applicability across different governance contexts. Future research should therefore undertake comparative case studies, mixed-methods investigations, and longitudinal analyses to test both the proposed indicators and the broader ECC framework across diverse political, institutional, and socio-ecological settings. Such

empirical work will be essential for determining whether ECCs can move beyond conceptual plausibility toward demonstrable governance effectiveness.

Second, the article relies heavily on interpretive synthesis across multiple bodies of literature from distinct theoretical traditions. Ecological democracy, deliberative systems theory, civic ecology, polycentric governance, resilience studies, and federalist approaches to multilevel governance do not always share normative assumptions, institutional priorities, or conceptions of democratic legitimacy. Although the ECC framework seeks to integrate these perspectives coherently, tensions remain regarding scale, authority, expertise, participation, and institutional coordination. Future scholarship may therefore refine, revise, or contest aspects of the synthesis presented here.

Third, the institutional feasibility of ECCs would likely vary significantly across political, legal, cultural, and socioeconomic contexts. Governance arrangements that work well in highly decentralized democracies with strong civic infrastructure could face substantial obstacles in contexts with weak local institutions, centralized administrative traditions, authoritarian political systems, limited fiscal capacity, or low levels of public trust. Consequently, the ECC framework should not be assumed to be universally transferable without contextual adaptation. Institutional design would necessarily depend on existing governance traditions, legal systems, territorial structures, and civic cultures.

Relatedly, the article does not fully address several practical governance questions central to real-world implementation. These include the precise legal status of ECCs, the allocation of competencies across governance levels, mechanisms for democratic accountability, fiscal sustainability, rules for representation, conflict-resolution procedures, and safeguards against elite capture or unequal participation. While the article identifies many of these challenges analytically, substantial institutional design work remains before ECCs can be translated into stable governance architectures.

The article also remains limited in its treatment of political economy constraints. Ecological governance transitions unfold within broader systems of economic power, global markets, state interests, and geopolitical asymmetries that may substantially shape the viability of participatory ecological governance models. Existing political and economic structures may resist the decentralization of governance, ecological redistribution, or participatory reforms perceived as threatening entrenched institutional or market interests. Future research would therefore benefit from a more detailed analysis of the relationship between ECCs and broader political–economic dynamics, including capitalism, state restructuring, technological transformation, and ecological inequality.

Another limitation concerns the scale and complexity of coordination. While the article argues that polycentric and multilevel governance arrangements may enhance ecological responsiveness and democratic participation, the coordination challenges of highly distributed governance systems remain only partially addressed. Large-scale ecological crises often require rapid decision-making, technical expertise, and coordinated policy implementation, which decentralized participatory structures may struggle to provide consistently. Future research should therefore examine more carefully the conditions under which participatory ecological governance can remain both democratically inclusive and operationally effective across scales.

Similarly, the article only briefly addresses the risks inherent in participatory governance. Deliberative and civic institutions do not automatically ensure equitable participation or democratic legitimacy. Inequalities in participation, civic fatigue, digital exclusion, informational asymmetries, organizational dominance, and procedural complexity can significantly affect governance outcomes. Empirical research will therefore be necessary to evaluate how ECCs function amid social inequality, political polarization, and institutional fragmentation.

Despite these limitations, the ECC framework may still serve as a useful heuristic for future research on the relationship between ecological transformation and democratic governance. Several avenues for further investigation appear especially important.

One priority is to conduct empirical case-study analyses of existing governance initiatives that partially resemble ECC characteristics. Comparative studies of ecovillages, Transition Towns, participatory ecological planning initiatives, community energy cooperatives, eco-districts, Indigenous stewardship systems, and municipal deliberative assemblies may help identify the institutional conditions under which participatory ecological governance succeeds or fails. Such research could provide valuable insight into governance effectiveness, inclusion, resilience, accountability, and long-term institutional durability.

Second, future research could develop more systematic comparative metrics to evaluate ecological-democratic governance systems. The analytical criteria proposed in this article—including democratic depth, ecological effectiveness, institutional feasibility, inclusiveness, accountability, resilience, and scalability—could serve as a foundation for comparative assessment frameworks. Operationalizing these dimensions with measurable indicators would enable more rigorous empirical evaluation across governance contexts.

Third, legal and constitutional scholarship may substantially advance understanding of how participatory ecological governance structures could be integrated into existing institutional systems. Questions regarding legal recognition, subsidiarity, multilevel coordination, fiscal competencies, democratic accountability, and constitutional legitimacy remain underexplored in the current governance literature. Comparative analysis of decentralized governance systems, participatory constitutional reforms, and multilevel environmental governance arrangements may help clarify these institutional possibilities.

Fourth, additional research is needed on the role of digital technologies in participatory ecological governance. While digital platforms may enhance communication, coordination, and transparency, they also pose significant risks, including surveillance, exclusion, algorithmic governance, and technological dependency. Future studies should therefore examine how digital infrastructures affect democratic participation, ecological coordination, and equity in community-based governance systems.

Finally, future scholarship should examine the broader relationship between localized participatory governance and planetary ecological coordination. The growing interdependence of socio-ecological systems raises unresolved questions about how to balance democratic legitimacy, ecological responsibility, and multilevel governance amid global environmental interdependence. ECCs are only one possible approach within this broader debate. Their ultimate significance will depend not only on local institutional experimentation but also on the evolution of larger governance architectures that can reconcile ecological coordination with democratic pluralism across scales.

The present article should therefore be understood less as a definitive institutional proposal than as an invitation to further theoretical and empirical investigation. Its principal contribution is to examine how ecological democracy might become more deeply embedded in multilevel governance systems through participatory civic institutions that connect local ecological action with broader democratic coordination structures.

9. Conclusions

This article has explored ECCs as a potential framework for reconnecting ecological governance with democratic participation across multiple scales of political organization. Drawing on scholarship in ecological democracy, deliberative governance, polycentric institutional systems, civic ecology, and multilevel governance, the analysis argues that current environmental governance challenges cannot be understood solely as technical or

regulatory problems. They also raise structural questions about participation, legitimacy, institutional coordination, and the relationship between citizens and increasingly complex governance systems.

The concept of ECCs was developed here not as a finalized institutional blueprint but as an analytical model for examining these interconnected challenges. ECCs were defined as territorially grounded, participatory, ecologically oriented, and institutionally integrated governance structures that link localized civic engagement to broader ecological coordination systems. The article proposed that their significance lies less in any single institutional form than in their potential to integrate ecological stewardship, democratic participation, and multilevel governance within a common analytical framework.

The comparative analysis further suggested that existing local governance models—including ecovillages, Transition Towns, participatory budgeting initiatives, eco-districts, and neighborhood councils—each offer important insights into participatory ecological governance while also exhibiting structural limitations in scale, institutional durability, inclusiveness, or coordination capacity. In this context, ECCs were presented as a conceptual attempt to synthesize and extend some of the strengths of these initiatives rather than to replace or supersede them categorically.

Similarly, the discussion of multilevel governance emphasized that ecological transformation increasingly requires coordination across local, regional, national, and transnational scales. Yet the analysis also underscored that broader coordination mechanisms may struggle to maintain democratic legitimacy if ecological governance becomes detached from meaningful civic participation and territorial realities. The ECC framework, therefore, sought to examine how localized participatory structures might contribute to more coherent ecological governance without reducing democracy to either purely technocratic administration or isolated localism.

At the same time, the article acknowledged important limitations and unresolved challenges. ECCs remain largely conceptual and require substantial empirical investigation, comparative analysis, institutional experimentation, and legal clarification before their practical viability can be adequately assessed. Questions about participation inequalities, governance complexity, fiscal sustainability, political resistance, institutional overlap, and coordination effectiveness remain central to future research.

For this reason, the article does not claim that ECCs constitute a definitive solution to ecological or democratic crises. Rather, it suggests that they may offer a promising analytical and institutional framework for examining how ecological governance and democratic participation can be more systematically interconnected. Their relevance lies in their effort to bridge domains often treated separately in governance scholarship: ecological sustainability, civic participation, institutional coordination, and multilevel democratic legitimacy.

More broadly, the analysis points to a theoretical implication. Ecological transformation may ultimately require institutional innovations that reconnect citizens, communities, and governance systems across scales of political organization. As ecological interdependence deepens, the challenge for contemporary governance systems is not merely to regulate environmental problems more efficiently but to cultivate forms of democratic coordination that link local participation with shared ecological responsibility in a context of planetary interdependence.

In this sense, ECCs should be understood less as a fixed institutional prescription and more as part of an evolving inquiry into how democratic societies might reorganize governance in response to twenty-first-century ecological realities.

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Abbreviations

The following abbreviations are used in this manuscript:

ECCs	Eco-Civic Communities
GEN	Global Ecovillage Network
CLTs	Community Land Trusts
BIDs	Business Improvements District

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