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The roots of transition scaling: how territory powers citizen ecological initiatives (France, Netherlands)

Nathalie Blanc [a,*], Hugo Rochard [c], Cyria Emelianoff [b]

[a] CNRS Ladyss Paris Cité University Building Olympe de Gouges Place Paul Ricoeur, 75205 Paris cedex 13, France
[b] Rennes 2 University, ESO UMR 6590 CNRS, Place Recteur Henri Le Moal, 35 000 Rennes, France
[c] Toulouse 2 University, UMR 5193 LISST, 5, allées Antonio-Machado 31058 Toulouse Cedex 9, France

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ABSTRACT

In what ways and how territory functions as a scaling operator for citizen-led socio-ecological transition initiatives? The territory is defined here as the material, relational, and institutional configuration through which collective ecological action is organized and scaled. Far from being a mere framework or a backdrop, territory is conceptualized as playing an active role in scaling processes. By re-examining forms of scaling through the lens of territorial dynamics—scaling out, up, and deep—we identify four mechanisms through which the territory operates: ecological anchoring, relational densification, cultural deepening, and institutional territorialization. Drawing on an in-depth analysis of three citizen initiatives in middle- and working-class urban contexts—in Paris, Massy, and Arnhem—the analysis demonstrates that these mechanisms connect. Territory is first and foremost a target of citizen action, which seeks to transform grounded ecological and social living conditions. It then acts as a lever: the initiatives deployed within a territory interconnect, produce visible transformations that encourage new actions, and give rise to local arenas of debate whose multiplier effect strengthens the capacities of engaged members. This incremental process broadens and tends to break down the boundaries of action, in favor of a more systemic and grounded approach to ecological issues. On a theoretical level, the paper argues that the territory is not merely the site of scaling but its agent: being simultaneously material, relational, and institutional, it enables—and directs—the scaling of civic action, within the limits of the space ultimately conceded by political authorities in neoliberal cities.

1. Introduction

The inadequacy of mitigation and adaptation policies in the face of climate disruption and biodiversity loss, against a backdrop of planetary boundaries being exceeded (Rockström et al., 2009; Richardson et al., 2023), underscores the urgency of transformative pathways (Leach et al., 2012; Perry et al., 2024). Supranational actors (IPCC, 2023) are thus calling for an ecological transition involving civil society, highlighting the potential of citizen initiatives (Hossain, 2016). These can be defined as collective actions originating from civil society, understood as the sphere of collective action situated beyond the state and the market, encompassing both formal organizations and informal groups through which citizens mobilize around shared concerns, produce alternative practices, and participate in the transformation of their territories. They experiment, at various scales, with responses to environmental challenges (Seyfang and Smith, 2007), acting both symbolically (Castells, 1983) and materially—for example, around the "right to the city" (Harvey et al., 2008) or collective resilience (Braun, 2014; Tidball and Krasny, 2014; DeVerteuil et al., 2021). Their often local roots, however, raise questions about their scalability and their impact on economic, sociocultural, and political systems (Seyfang and Longhurst, 2016), as well as that of their "strategic scope of action"—those social spaces where individual and collective actors interact and engage in collective action (Fligstein and McAdam, 2011).

The scaling processes of citizen initiatives have given rise to various typologies (Lam et al., 2020; Van Lunenburg et al., 2020; Moore et al., 2015; Westley et al., 2014). The dominant institutional approach analyzes the transformation of public policy based on local practices that become seen as models (Westley et al., 2014). The Multi-Level Perspective (Seyfang and Longhurst, 2013; Geels et al., 2023) introduces an evolutionary interpretation, in which innovation niches contribute to unlocking socio-technical systems. Civic tech, for its part,

* Corresponding author at: CNRS LADYSS UMR 7533, University Paris Cité, Building Olympe de Gouges, Place Paul Ricoeur, 75205 Paris cedex 13, France.
E-mail address: nathali.blanc@wanadoo.fr (N. Blanc).

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views scaling up as low-cost dissemination and replication via digital means (Benkler, 2016). Other approaches emphasize the role of local contexts in the emergence of innovations (Kohler et al., 2019), or their political and cultural dimensions, particularly in studies of grassroots innovations and social movements (Seyfang and Smith, 2007; Amacher et al., 2022; Escobar et al., 2002).

Building on these perspectives, Moore et al. (2015) propose a three-dimensional typology—scaling out, up, and deep—linking diffusion, institutional influence, and cultural transformation. However, the geographical dimension of these processes remains largely unexplored (Feola and Butt, 2017). Existing research tends to abstract scaling from its territorial dynamics. Drawing on three case studies—Paris and Massy in France and Arnhem in the Netherlands—we analyze how territorial practices contribute to scaling processes (out, up, deep). We define the territory as a configuration that is at once material (biophysical), relational (social, cultural, and symbolic), and institutional (political, legal) and that plays an active role in collective ecological action and scaling processes. Consequently, our research question is as follows: How does territory, in its material, cultural, and political dimensions, contribute to the scaling of citizen-led ecological transition initiatives?

We formulated two hypotheses. First, the territory is a central focus of civic action: initiatives aim to transform the conditions of community life on the ground. This local focus is not merely a matter of localism, but can serve as a springboard to other levels of action (Featherstone, 2008). Second, territory acts as a lever for scaling: the visible and collective transformation of a space produces ripple effects. While the literature on power dynamics and empowerment within citizen initiatives is abundant (Raj et al., 2022; Tuckey et al., 2023), few studies approach territory as a constitutive element of collective agency—whether material, cultural, or institutional. The relational dimension of territory, in particular, has not yet been theorized as a systemic driver of the agency of citizen initiatives. This work aims to fill this gap.

2. Theoretical framework. Scaling and territory

2.1. Scaling: a long story

In line with critical Marxist approaches, the multiscalar nature of urban environmental issues is central (Swyngedouw et al., 2004). At the same time, defining the scale of a problem is a political act, as it determines which actors are legitimate to address it. These approaches have, however, been criticized for their rigidity. Massey (2005) emphasizes the relational and fluid nature of scales. From this perspective, the concept of scalar politics (Moore, 2008; MacKinnon, 2011; Lawon and Patel, 2013) focuses on the relationships between the practices and discourses that produce scales and their material manifestations. Escobar (2008), drawing on a Latin American tradition, shifts the focus toward ontological grounding in place: for him, territory is not primarily a scalar construction but a way of being in the world, whereas the multiscalar approach (Swyngedouw et al., 2004) tends to neglect situated, bodily, and affective knowledge. The transition to scale thus appears as a fundamentally political process, in which territory plays an active role.

2.2. Linking scaling and territory

In this article, territory is conceived as the material, relational, and institutional framework through which collective action is organized and carried out. We draw on three complementary strands of thought.

The first, stemming from Anglo-American political geography, conceives of territory as a relational and political construct (Elden, 2010; Antonsich and Skey, 2017), produced by practices of power, control, and legitimation. Territory is not merely a surface or a given jurisdiction: it results from historical and technical processes that make it a political object. It also constitutes a symbolic resource, mobilized by actors to legitimize their claims and construct forms of belonging. From this perspective, ecological citizen initiatives do not operate within a neutral framework: they actively participate in the production and reconfiguration of territory.

The second strand, rooted in Francophone approaches (Raffestin, 1980, 2012; Di Méo, 1998), emphasizes territory as both the product and the medium of social action (Pachoud et al. 2022). Territory differs from space in that it results from an appropriation—material or symbolic—by actors, always traversed by relations of power and interdependence. It thus articulates an objective dimension (resources, infrastructure, ecosystems, metabolism) and a subjective dimension (representations, identities, memories). This dual dimension makes it a lever for action: by transforming physical spaces, citizen initiatives also transform the meanings and senses of belonging associated with them. However, the biophysical dimension of territory often remains undertheorized, which calls for moving beyond a strictly "surface-level" conception of politics (Usher, 2020; Gonin et al., 2025) as may be enabled by post-materialist-oriented approaches (Shlosberg, 2019).

The third strand, drawing on Latin American scholarship in political ecology and feminist geography, conceptualizes urban territories as spaces suited to collective struggle, innovation, and situated governance (Clare & Habermehl, 2025; Zaragocin & Caretta, 2021; Schwarz & Streule, 2024). These works highlight the co-production of social and material structures in urban contexts, emphasizing the contested and plural nature of territory. Zaragocin and Caretta (2021) introduce the concept of "body-territory" to claim that territory is first and foremost experienced bodily, and that struggles for its preservation are inseparable from struggles for recognition and subsistence. Schwarz and Streule (2024), for their part, demonstrate how ordinary urban practices—the occupation of a space, the transformation of a brownfield, the organization of a market—constitute forms of bottom-up territorialization, which can generate scaling dynamics without necessarily passing through dominant institutional channels. This line of research enriches our analytical framework by highlighting the ontological and bodily dimensions of territory, which are often absent from English- and French-language approaches.

Taken together, these three perspectives provide a more relational and dynamic understanding of territory, one that moves beyond its characterization as a fixed spatial or institutional framework. They invite us to consider territory not only as something that is governed or represented, but also as something that is continuously produced through social practices, political relations, and processes of attachment. By bringing these three perspectives together, we move beyond a conception of territory as a mere context, backdrop, or place. While place is defined by affective values, territory emerges as an active agent of scaling: a space that is simultaneously biophysical, political, and symbolic, shaped by power relations, representations, and practices. It serves as a site for the projection and negotiation of collective identities, which citizen initiatives, in turn, contribute to transforming. Fundamentally dynamic and multiscalar (Binz et al., 2020), territory is not confined to the local level but extends from the neighborhood to the urban region and even to the national level.

This understanding of territory as a dynamic and multiscalar dimension of social change calls for an analytical framework capable of capturing the different ways in which initiatives expand, travel, and transform across space and over time. Rather than treating scaling as a linear process of geographical expansion, we approach it as a multidimensional process in which institutional change, spatial diffusion, and transformations in meanings and practices are intertwined with territorial dynamics. To operationalize this perspective, we draw on the typology proposed by Moore et al. (2015), which distinguishes between scaling up, scaling out, and scaling deep.

2.3. An analytical framework

To analyze the scaling of initiatives by considering the territory in its complexity, we use the three-dimensional typology of Moore et al.

(2015)—scaling up, out and deep—linking diffusion, institutional influence, and cultural transformation. Scaling up refers to the institutionalization of an innovative policy or practice, enabling its adoption on a larger scale. Scaling out primarily refers to spatial and horizontal dissemination, based on the export and exchange of practices and the sharing of expertise, with a focus on preserving local specificities to avoid the risk of standardizing initiatives. Finally, scaling deep refers to a more profound transformation of narratives, imaginaries, social representations, and cultures—a transformation that is both cultural and systemic, achieved through the desectorization of the initial action. Lam et al. (2020) adopt this typology from a more geographical analytical perspective, classifying amplification processes without, however, specifying how territories intervene in these processes. An analysis of the spatial and temporal structure of transition initiatives reveals how these initiatives spread beyond the local level, without remaining confined to a niche effect (Wolfram, 2017), and helps characterize the ripple effects in terms of addressing socio-ecological challenges at the regional level (Lam et al., 2020). It is precisely in this gap—between the typology of Moore et al. and the geography of transitions by Lam et al.—that our contribution aims to situate itself, by making territory a central operator in scaling processes, —i.e., whether territory *enables, constrains, redirects, mediates,* or *transforms* scaling.

On the one hand, scaling models developed in the field of Sustainable Transition Studies do not sufficiently acknowledge the role of citizen initiatives in systemic transformations, whether social or ecological (Seyfang & Longhurst, 2016; Seyfang & Smith, 2007). On the other hand, recent geographical research highlights the lack of consideration given to the geographical anchoring and situated dimension of initiatives, as well as to the logics of territorial differentiation (Binz et al., 2020). These two gaps are linked: it is because territory is absent or under-theorized in scaling models that the mechanisms through which citizen initiatives contribute to systemic transformations remain poorly understood.

The concept of territory—or certain aspects of it, such as place-making—is nevertheless gradually gaining ground in the analysis of socio-ecological transformations. Several themes emerge from the existing literature. Some studies focus on how socio-ecological transformations draw upon and mobilize territorial resources (Buclet, 2021; Barreteau et al., 2016), or on the political, cultural, and social characteristics of territories where social movements or citizen initiatives emerge (Nicholls, 2007; Longhurst, 2013; Feola & Nunes, 2014; Nicolosi & Feola, 2016). The impact of the territorialized networking of initiatives on scaling processes is highlighted (Blanc et al., 2017; Bailey et al., 2010; Campbell et al. 2022; Pradels et al., 2022), as is the unequal distribution of initiatives at the national and transnational levels (Feola & Butt, 2017). The role of social and geographic proximity is frequently emphasized (Nicholls, 2007; Strang & Soule, 1998; Feola & Nunes, 2014), as is attachment to place as a driver of civic engagement (Nicolosi & Corbett, 2017; Toomey et al., 2021). Other studies emphasize the phenomena of cross-pollination between citizen movements (Nicolosi et al., 2021), and the importance of mobilizing resources from outside the local area (Nicholls, 2007).

However, these conceptions of territory have two limitations. The first relates to their scope: many of these studies focus on areas where alternative movements within specific social spaces are emerging (Nicolosi, 2020), while the diverse manners that citizen initiatives shape territories in more ordinary settings—particularly urban settings—remains understudied, despite their significance (Schlosberg, 2019). Urban citizen dynamics deserve special attention, particularly with regard to their engagement and efforts to build a just transition (Perry et al., 2024), by opening up spaces for collective learning (Ornetzeder & Rohracher, 2013), and by intervening in working-class neighborhoods (Gupta, 2012; Milbourne, 2019). The second, more fundamental limitation is theoretical: the underestimation or lack of understanding of the processes by which territories themselves—and not just social actors or the cultural environment—become levers in favor of scaling. The material dimension of territorial transformations is notably absent from analyses, whether they focus on relational or non-relational factors of diffusion (Shawki, 2013).

This article aims to address this twofold gap. We propose to analyze the dynamics of scaling by relating them to the evolving materiality of the territories and actions involved, as well as to the processes of empowerment at work in the interplay between citizens' capacity for action and the socio-ecological transformations of the territory. The initiatives we study employ diverse types and modalities of scaling, in a phase preceding national or transnational adoption, and all construct new territories of action and new material territories with distinct characteristics. The territoriality of scaling processes is the result of a back-and-forth between material transformations and sociocultural transformations, mediated by citizen initiatives.

3. Methodology

We conducted case studies over an extended period during two successive research projects. We cross-examined the methods and motivations behind the scaling of three citizen-led initiatives in the cities of Paris and Massy (France), and Arnhem (Netherlands). The analyses of different territories where transformative actions have been undertaken allows for a transverse analysis of socio-ecological transformation, starting from territorial dynamics and examining the conditions for scaling. Each case study exemplifies a specific dynamic, while revealing the territorial dimensions of scaling processes.

Qualitative surveys were carried out in three urban and peri-urban areas in France and the Netherlands (Table 1), where citizens' initiatives scaled and transformed the territory. Thirty-three semi-structured interviews were conducted with leaders and members of citizen initiatives, local residents and public-sector partners. Analysis of institutional and association documents, and a documentary survey on the history and geography of the area was also undertaken. Several group meetings for each case study were organized with the interviewees to discuss the subject of scaling. The aim was not only to gather points of view, but also to study initiatives concerning the transformation of living environments and the lived environment. From the outset, our approach was to pay attention to situated commitments and to the territory of action.

The two case studies from the Paris region (Paris and Massy) were conducted as part of the Civic Act 2 research program (2019–2022), which analyzed the rise of associative initiatives that were both social and environmental, at a time when new local political discourses on the need for ecological transition arose. Participatory observations were carried out with citizen collectives and residents. In the 18th arrondissement of Paris, we attended meetings of the collective of residents, and participated in the various stages of the mapping of citizen initiatives. In Massy, our participation in several collective planting operations enabled us to make contact with both members of the citizen collective and local residents.

The survey work in the Spijkerkwartier district of Arnhem was carried out in two phases, in 2007 and in 2023, in order to capture the long-

Table 1
Survey methods used for case study analysis.

Case studies	Main survey methods	Survey periods
Ecoplan 18, Paris, 18th arrondissement, France	- Semi-structured interviews (n=11) - Participant observations	2021 and 2022
Greengroup Arnhem, Spijkerkwartier district, Netherlands	- Semi-structured interviews (n=12) - On-site observations, visits to adjacent neighbourhoods	2007 and 2023
Haie Magique, Massy and the southern Paris region, France	- Semi-structured interviews (n=10) - Participant observations	2019, 2020 and 2021

term transformations brought about by citizen initiatives. The first research visit took place within the framework of a project on environmental transformation by inhabitants of everyday territories (Europe, Russia, USA). Six interviews with the leaders of the neighborhood greening initiative and with residents gardening in public spaces enabled us to analyze the dynamics of mobilization and the transformation of spaces by residents. The second visit to Arnhem, at the end of 2023, examined how this dynamic had evolved, expanded, and branched out. Six interviews were conducted with key members of the original citizen collective and other citizen initiatives born its wake, as well as with a municipal official, while visits to adjacent neighborhoods enabled us to evaluate the spread of the initiative.

Interviews in French and English were recorded and transcribed. A content analysis was carried out using an analysis grid to divide the interviews into sections reflecting the main issues. The results obtained were then discussed for the Paris case with the interviewees and the municipal departments concerned.

The three case studies mobilize a territorial approach to shed light on scaling processes. Thus, by re-reading the forms of scaling through the lens of territorial dynamics — scaling out, up, and deep — it becomes possible to identify four interdependent mechanisms through which territory operates: relational densification; ecological anchoring; cultural deepening; and institutional territorialization.

3.1. Mapping transition initiatives: relational densification and institutional territorialization through scaling up

This case study illustrates a process of scaling up, understood as the capacity of a citizen initiative to move from micro-local actions to an institutionalized territorial network. The citizen initiative behind Écoplan in Paris's 18th arrondissement, a social mapping initiative, uses a traditional territorial representation tool - cartography - to make visible and federate a territory of citizen initiatives (http://ecoplan.info). By structuring networks of players (residents, shopkeepers, associations, SMEs, municipal actors) to participate in or expand these initiatives, it sought to overcome the fragmentation of local initiatives. The approach was supported by the neighborhood council, which then proposed extending it to another Parisian arrondissement.

The Ecoplan 18 project was conceived at the start of 2019, at a public meeting organized by the Conseil de quartier, a local democracy body. The project was the result of the collaborative work of a group initially comprising four residents, an employee of an association, and the coordinator of neighborhood councils and the participatory budget of the borough's Local Democracy department. The first mechanism of scaling up concerned visibility. By listing and promoting ecological initiatives in the arrondissement, and by involving Parisian municipal actors (elected officials and administrative officer responsible for citizen participation), Écoplan 18 transformed scattered, often isolated actions into a legible collective network: solidarity thrift shops, fablabs, bicycle self-repair workshops, organic and fair-trade shops, shared gardens, planting, composting, soft mobility, citizen advocacy and popular education associations, etc. This cartographic representation did more than describe reality: it had a scaling effect on representations, allowing both citizens and institutions to perceive these initiatives as part of a broader socio-ecological dynamic at the scale of the arrondissement. In this sense, the map functions as both a cognitive and practical resource, encouraging engagement and facilitating access to local alternatives.

The second mechanism was relational densification. Far from being a simple inventory, the process of producing the map involved active fieldwork: identifying initiatives, verifying information, engaging with actors, and collectively defining categories and criteria relevant for mapping. This work fostered direct relationships and trust between participants and local organizations, transforming a simple inventory into a network-building process but local initiatives. Scaling up therefore occurred not only through representation, but also through the thickening of social ties across the territory.

The production of a map that enables anyone to access the website and meet the associations and collectives identified (see Fig. 1 and Fig. 2), is also a resource for learning about the wide variety of alternatives in the area, as one interviewee explained: "*We have a definition of ecological transition that is really focused on taking action, not being about concepts, Ecoplan enables us to move from theory to practice*" (Volunteer 1 Ecoplan, February 2021).

The third mechanism is institutional territorialization. By collaborating with municipal actors and embedding the initiative within existing local governance structures (e.g., neighborhood councils), Écoplan contributes to the recognition and legitimization of these citizen practices. The extension of the project to another arrondissement illustrates this dynamic: the map becomes a transferable tool that can be adopted by public authorities, thereby integrating grassroots initiatives into institutional frameworks. Scaling up here implies a shift from informal citizen action to acknowledged components of local public policy.

However, this process is not neutral. While networking various initiatives across a Parisian arrondissement, participants define an ethical and militant territory. The participants selected, assessed and evaluated the initiatives operating in the area, and constructed criteria for the ecological transition, based on situated knowledge and value systems. The inventory work was structured around several thematic categories related to a daily life register: food, circular economy, soft mobility, education and awareness-raising, nature in the city, collective composters, and environmental protection associations.

Observation of the collective's meetings indicated that the networking activity was both deeply embodied and experimental. The structuring of the network revealed the forging of close ties between the referenced initiatives and was part of a process of trial and error: during the preliminary work of identifying initiatives in the area in 2020, team members divided up the themes of commitment (urban greening, citizen advocacy, waste management and reuse, etc.) to carry out investigations, question shopkeepers or association members, verify information, adjust the categorization, and reduce uncertainties when certain contradictions were noted between the association aims and the actual organization of the activity.

The same work was conducted when pooling observations and data, when a referenced initiative raised questions. These discussions revealed tensions between competing visions of transition and lead to processes of both visibilization and invisibilization. The resulting map therefore reflects a situated and normative geography, shaped by values and power relations.

This activity has not failed to give rise to a process of politicization, articulating a conflictualization of the issues (recognition of cleavages on the ecological question), with a linking to societal issues (Haderer, 2020). The members of Ecoplan questioned the dominant norms and definitions of transition and articulated the micro-local scale with that of macroeconomic structures. The co-production of interpretative framings about ecological transition appeared to be a journey fraught with pitfalls, punctuated by multiple controversies. The socio-environmental debates that ran through the construction of the cartography, during the classification of initiatives and the construction of criteria, crystallized in particular around the logics of commodification and relocalization: they questioned the place of private players in the ecological transition, the coincidences or contradictions between profitability and militancy, the definitions of "local" (short circuits, made in France, made in Europe), the differentiation between cooperatives and classic companies, the interferences between social and solidarity economy and circular economy.

These debates have shown that citizens' assessments of transition bring into tension the scales of action attached to ecological initiatives, just as much as they assess their social contribution and ethical dimension in terms of dignified working conditions and remuneration for small-scale producers. Geographical scales are thus particularly important in valuation processes. They are the subject of interpretive

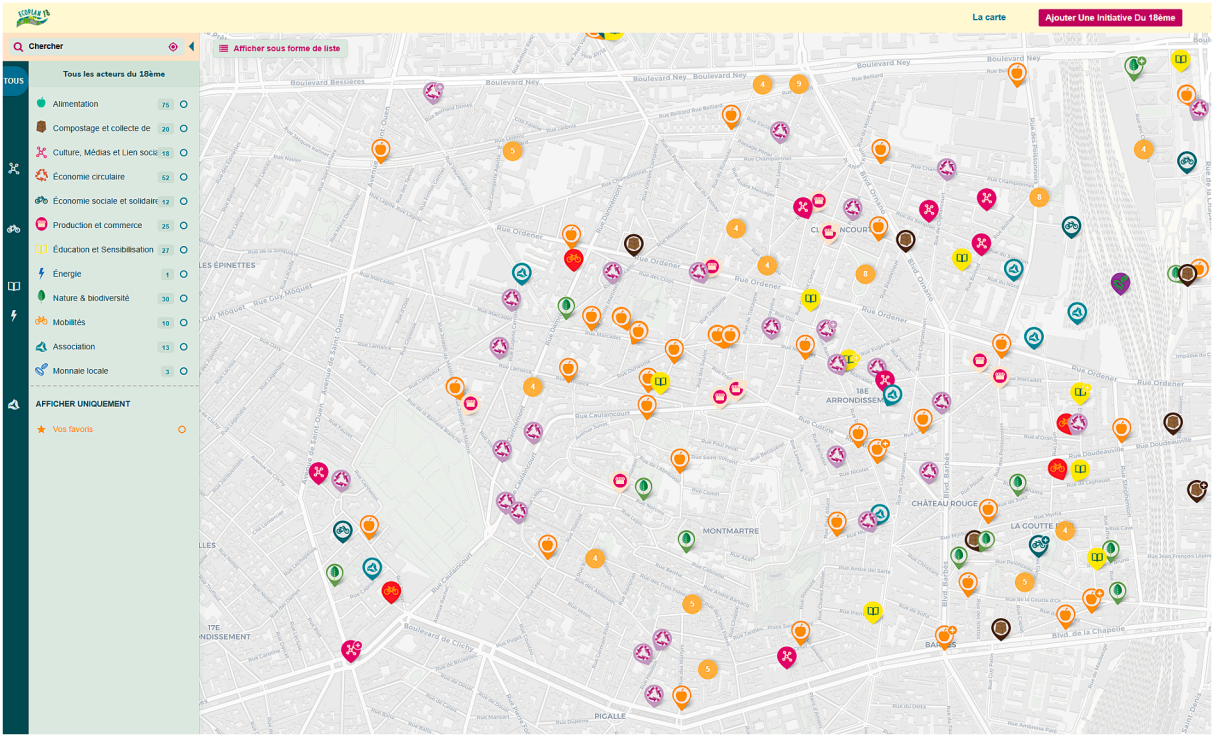


Fig. 1. Screenshot from the Ecoplan 18 website. Source: www.ecoplan18.gogocarto.fr/March 2025

struggles and constitute an element of controversy in drawing the boundary between initiatives included and excluded from the map. Invisibilization processes have accompanied the work of visibilization, with regard to initiatives classified as "green capitalism", such as fair trade or organic chains which are subsidiaries of major international groups. In the end, the cartographic activity created a militant and situated geography of transition, supported by local authorities who recognized and legitimized it. Cartography has become a tool for making visible the seeds of a territorial transition and building a representation of said transition, in a concrete or more deliberative way.

3.2. 60,000 trees for an urban hedgerow landscape: ecological anchoring through scaling out

The Massy case study illustrates a process of scaling out in which a citizen-led initiative expanded geographically while becoming materially embedded in the socio-ecological fabric of the territory.

Haie Magique ("Magic Hedgerow") is a collective founded in 2014 by two residents of the town of Massy, located south of Paris. Based on an initial partnership with the municipality, these two residents came up with the concept of a hedgerow landscape that would diversify planting in public spaces deemed too uniform by the stakeholders they met. Based on forestry training of one of the founders, the idea was to create multi-layered hedgerows, made up of shrubs, trees, and herbaceous species, with a preference for local species. Most of the collective's planting projects involved local residents. The project aimed to encourage ordinary biodiversity by creating plots within the urban fabric where ecological, low-intervention management was practiced. The association's project also aimed to mobilize and raise awareness among local players, notably via social centers, condominium organizations, and schools, for the preservation of wasteland areas conducive to urban biodiversity. One of the objectives stated by the association leaders was to contribute to the development of ecological networks on a territorial scale. In the space of 10 years, the collective has intervened in 150 sites in 50 municipalities in the south of the Île-de-France region, planting almost 60,000 trees.

The core of the project is the diffusion of a replicable ecological form—the hedgerow—across multiple urban sites: "*So what we do is homeopathic, but in the truest sense of the word, in relation to the surfaces to be treated. I'm never going to replace the municipal technical services. That's not my wish, because the nature we install is dedicated to biodiversity and a certain number of other ecosystem services, so how can I put this, it's really at odds with what people, the inhabitants, are used to seeing around them.*" (Haie Magique manager, February 2021)

Through this replication, the collective has contributed to the institutionalization of the urban hedgerow as a legitimate form of nature in the city, according to an employee of the Massy municipality: "*Before the projects of Haie Magique and their partners, I don't think there were necessarily many people interested in hedgerows in the city. So, I think they're the driving force behind the current movement [...] Haie Magique's idea is what we now call urban hedgerow landscape.*" What began as an experimental practice has progressively been recognized by local authorities and integrated into public action frameworks. This demonstrates that scaling out is also a process of norm diffusion based on an ecological landscape structure, whereby a marginal practice becomes standardized within planning policies.

The expansion of the initiative relies on a dual dynamic. On the one hand, it follows formal channels. Our survey has shown that the expansion of these hedgerow sites, a scattered mosaic across the regional scale, follows, first and foremost, the procedures of responding to calls for projects launched by local institutions. On the other hand, it follows the development of an acquaintance network of association leaders, most often following participation in public events such as the *Assises Nationales de la Biodiversité* organized in Massy, or during local *Assises de la transition*, where the urban hedgerow landscape model is presented. Dissemination of the urban hedgerow planting model therefore takes the form both of a service offered to municipalities and of a social project that brings together local stakeholders more informally (including elected representatives, technicians, residents, and social center managers). In addition, the Haie Magique collective has mapped the sites transformed into hedgerows now inscribed at regional level in many institutional schemes, such as the Biodiversity Charter and the Ile de

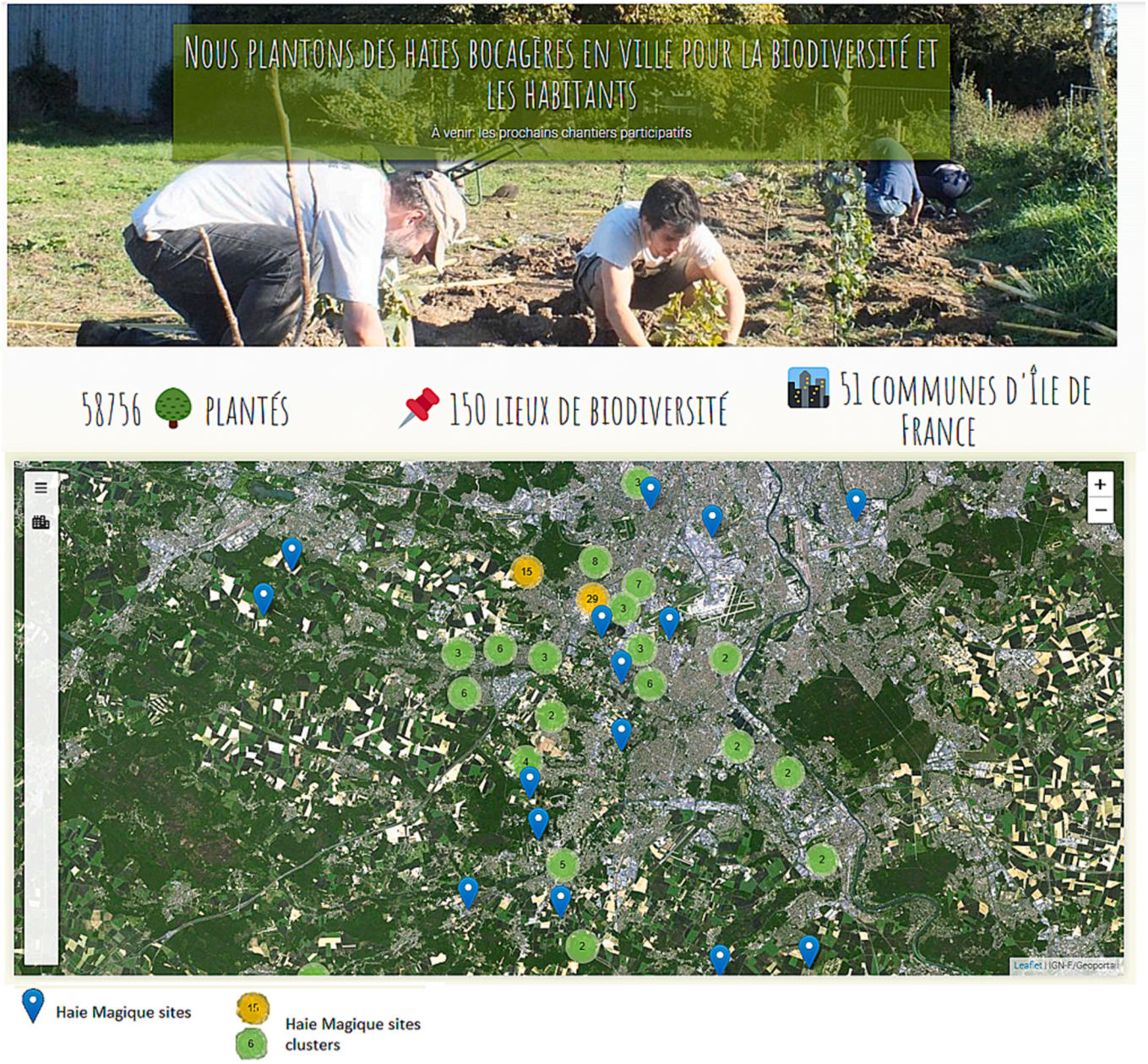


Fig. 2. Screenshot from the Haie Magique collective's website showing the impact of its action on ecological networks. Source: https://haie-magique.org/, March 2025. Last accessed 19 April 2025.

France regional "Planting Hedges" program.

As for residents and citizens, participation in collective events takes place through the network of acquaintances of the collective's founders. This mobilization is also achieved through partnerships with several social centers and neighborhood associations, which relay the call to participate in citizen plantings. A significant degree of participation is required for planting and upkeep of these ecological spaces in the city. In return, these hedgerows are designed to be nourishing, with fruit trees and shrubs. Users and residents are invited to grow and harvest fruit and berries, such as apple trees and goji berry trees at the foot of social housing blocks in Massy.

In addition, a study of the ecological network has shown the positive impact of this initiative on the ecological connectivity of the landscape on a regional scale, particularly for insect species (Rochard et al., 2025). Indeed, the hedgerows planted by the collective locally increase the movement potential of shrub species, such as insects, particularly in areas fragmented by transport infrastructure in that region. The physical transformation of sites by the collective therefore has a knock-on effect on the modification of biological flows, which also contribute synergistically to the transformation of the environment. Other studies have also highlighted the fact that initiatives aimed at rehabilitating urban biodiversity, such as certain collective ecological gardening practices, contribute to strengthening the ecological network on a regional scale (Goddard et al., 2010). The argument, therefore, is that scaling out in this case operates through a socio-ecological feedback loop: the multiplication of local interventions modifies ecological processes at a larger scale, which in turn reinforces the relevance and visibility of this type of intervention. The mapping of hedgerow sites and tree counting by the collective further supports this process by making the network legible and demonstrating its cumulative impact. This case shows that here scaling out is not only a matter of replication across sites, but also of ecological anchoring, achieved through living infrastructures—urban

hedgerows—that reshape both ecological processes and social practices.

3.3. From citizen plantations to a neighbourhood blue economy: cultural deepening through scaling deep

A final example of scaling through ecological anchoring, relational densification and cultural deepening was studied in Arnhem, a Dutch city of 152,000 inhabitants. Over the past thirty years, the Spijkerkwartier, a de-industrialized, dense red-light district, has become a green, intensely vegetated neighborhood, thanks to a group of residents determined to halt the degradation of the area. Former warehouses, leather factories, printing works, orphanages, schoolyards, and some rubble-filled building courtyards have become gardens, under the aegis of the "Greengroup", a group of around a hundred residents, mainly homeowners, senior citizens, and people not in full-time employment. Streets that were once devoid of vegetation are now lined with flowerbeds and trees. Following extensive neighborhood debates, asphalt was removed, along with parking spaces and car traffic.

This transformation unfolded in several stages. In the mid-1970s, residents began by installing window boxes and planters as a way to reclaim public space. They then moved on to planting street trees, motivated in part by a desire to prevent the neighborhood from further social degradation. A key turning point came in 1983, when residents opposed a municipal construction project planned for a courtyard. A biology professor proposed an alternative ecological garden, mobilized local support, and successfully forced the municipality to abandon its project. This episode is widely regarded as the founding moment of the Greengroup's structured action, which led to the creation of eleven gardens in an originally deprived and stigmatized district. The gardens are characterized by endemic plants and areas of dense vegetation. Their irregular topography created micro-places and differing biotopes.

Initially conflictual, relations with the municipality calmed down in the face of the vigorous citizen dynamic. The Greengroup received a small annual subsidy to buy plants, seeds and tools. In the early 1990s, a study commissioned by the town identified numerous municipal plots for potential gardening activities. Residents were also granted the right to plant around the bases of trees and along walls. The municipality contracted with the gardeners to guarantee the upkeep of the space and encourage biodiversity. The spread of the initiative within the district, starting with the first "green streets", was due to the numerous events and communication work (press, social networks) deployed by the Greengroup to ensure that the approach was understood and shared. Street and garden coordinators were communally appointed, in a process of self-organization.

Eleven lush gardens have been laid out. They function as small centralities of social life and are used for a wide variety of purposes: gardening, discussions, communal meals, parties, concerts, open-air cinema, exhibitions, or more intimately, for reading, prayer, and martial arts. These "little greens" are also playgrounds for children and sites for environmental education for schools. As Milbourne (2019) observes in UK, for some of the Spijkerkwartier' residents the environment is a medium of social life and not always a cause to be defended. While the transformation has fostered relational densification, it has also involved negotiation and occasional tensions, particularly regarding the removal of parking spaces. The neighborhood has undergone gentrification, with the decline of illicit activities since the 2000s, yet it retains a degree of social diversity, with two thirds rental housing, student residents, ethnic shops, and varied housing conditions.

Importantly, this transformation was achieved at very low public cost, aside from soil decontamination on a former industrial site. From the 2000s onwards, the municipality began to institutionalize and replicate these initiatives in 6 other districts through urban planning policies, including social housing neighborhoods. In addition, more than 1,700 plant species are recorded across just a few plots by the collective. This represents a process of scaling out and up, as resident-led greening practices spread beyond their original context. The mobilization of volunteer forces and self-sustaining greening processes subsequently supported local climate change adaptation policy.

More recently, as shown by our second field visit in 2023, after the first one in 2007, the civic initiative showed a vigorous process of scaling deep, characterized by the diversification, desectorization, and intensification of local initiatives. Ten working groups have been set up in Spijkerkwartier over the past decade. The cultural deepening process began in 2013, when residents decided to install photovoltaic panels on their roofs through a purchasing group. A 60-strong "Spijkerenergy" citizens' working group was then set up to create a social enterprise to advise residents on low-cost home insulation (thermal curtains, blinds, small-scale insulation measures, heating optimization, etc.). With the help of students from HAN University, this enterprise has taken action in 1450 households. A second social enterprise was then set up to carry out small-scale work, mobilizing the Arnhem region's "energy bank" to combat fuel poverty. One of the founders of the Spijkerenergy group then opened a local entrepreneurship support center (DAZO), with the support of the municipality and the Foundation for a "Neighbourhood Blue Economy" that he created in 2014. The foundation mobilizes public and private funds on projects and works to develop a very local circular economy, with the support of social enterprises, volunteers, and students from 4 universities. It represents a much more social prism than the "green" economy, whose products are inaccessible to the underprivileged classes.

The aim of the foundation is to build resilient and inclusive territories to cope with multiple crises (climate, Covid, soaring energy prices, geopolitical and political tensions) and assure a real socio-ecological transition. DAZO connects unemployed residents with local needs: fostering services in care, repair, and food production: such as a workshop for the refurbishment and resale of used bicycles, a clothing market, the recovery of coffee grounds to grow oyster mushrooms sold to Arnhem restaurateurs, or tourist accommodation in local homes.

The foundation, which has created some twenty jobs, has intentions that exceed their means, leading to much frustration. Supported in the name of the fight against poverty, "made in Spijker and in Arnhem" lacks the support of public structures needed to fully deploy this neighborhood-based citizen and social economy.

At the national level, these neighborhood initiatives are now being integrated into the campaign "We are here. Harnessing the power of our community," supported by numerous social organizations, which promote collective action under the principle "We Do It Together." The campaign aims to encourage the scaling up of a form of economy that responds to observed needs, close to where people live. It focuses on transferring economic activities to local entrepreneurship, to irrigate the capillary fabric of society and revitalize it.

4. Re-rededing scaling processes through case studies of civic initiatives

By examining these dynamics through the lens of scaling out, up, and deep in the territories investigated, and by incorporating contextual elements into the analysis, we identify four interdependent mechanisms through which territory operates as a scalar operator. These forms of scaling are not mutually exclusive. Rather, each case foregrounds a particular dimension of scaling in which territorial characteristics play a decisive role. Taken together, they reveal how material transformations are intertwined with social, cultural, and political transformations within and across territories.

Re-reading scaling out, up, and deep through the lens of territorial dynamics thus makes it possible to distinguish four interdependent mechanisms. The first is relational densification, whereby actors become connected through different forms of exchange and collaboration. In some cases, this process builds on established social-mapping practices, but it can also generate new networks and territorial solidarities by bringing previously disconnected actors into relation.

The second mechanism is ecological anchoring. Concrete ecological

transformations—such as the creation of a community garden, the planting of hedges, or the development of cycling infrastructure—produce material changes in space that can reshape how residents experience, use, and collectively appropriate their territory. These spatial artefacts therefore do more than embody ecological change: they help anchor transition processes in everyday territorial practices.

The third mechanism is cultural deepening, through which changes in practices contribute to transformations in values, meanings, and ways of understanding the territory. This occurs through the emergence of new practices, interpretive frameworks, and vocabularies for talking about territorial change, as well as through more subtle shifts in ways of living, producing, and consuming. Scaling deep is therefore not simply a matter of changing individual behaviours; it involves the gradual reconfiguration of the cultural meanings through which collective action becomes possible and legitimate.

Finally, the fourth mechanism is institutional territorialization. Although institutional change is often associated primarily with scaling up, our analysis shows that territorialization can take multiple forms and occur at different levels, depending on the scope of the initiatives and the intensity of collaboration with public actors. Institutional transformation may involve the consolidation of local arrangements, the incorporation of new practices into public policies, or the establishment of connections between territorial initiatives and higher-level institutions. Scaling up is therefore better understood not as a linear movement away from the territory, but as a process through which territorial experiences, arrangements, and knowledge can be translated into institutional forms and rearticulated at other scales.

These four processes—relational densification, ecological anchoring, cultural deepening, and institutional territorialization—are mutually reinforcing rather than sequential (Table 2). Together, they show how territorial dynamics can simultaneously reshape social relations, material spaces, cultural meanings, and institutional arrangements. Yet these processes have received limited attention in research on socio-environmental transition dynamics. Examining them therefore provides a privileged entry point for understanding how territories both shape and enable the scaling of transitions.

5. Discussion

5.1. Reframing scaling through territory

Our work reexamines explanatory models of scaling by demonstrating that scaling processes can originate within civil society and reflect a process of socio-ecological transition that is mindful of the leverage offered by territorial dynamics. These scaling initiatives address issues not prioritized by public authorities—such as the neighborhood economy or intermunicipal hedgerows—to establish their legitimacy, transforming urban ecology into a force for both material transformation and collective action. In dialogue with the work of Moore (2008), our approach captures the back-and-forth nature of territorial action, which simultaneously plays with scales to justify and expand its deployment, and draws on attachment to place to legitimize the construction and defense of a territory (Escobar, 2008; Featherstone et al., 2012). Citizen initiatives do not seek to conquer a higher scale, but rather to reconfigure the practices and norms that structure collective action across different scales simultaneously. Therefore, we challenge dominant scalar imaginaries that privilege normative verticality and institutional diffusion, and instead emphasize the situated, relational, and conflictual nature of scaling processes.

5.2. Scaling as more-than-human and contested ecological process

Building on the preceding analysis, scaling emerges as a more-than-human process, co-produced through the interplay between citizen practices and the agency of living systems.

Ecological dynamics—such as species circulation, soil regeneration, pollination, or the emergence of ecological continuities—actively participate in the expansion and transformation of initiatives beyond their initial sites. As we have seen, in the case of Arnhem, the proliferation of vegetation from the earliest gardens to the present day, along with the arrival of salamanders, herons, hedgehogs, martens, and bats—among the neighborhood's most iconic species mentioned by interviewees—contribute to scaling out and carry on the residents' efforts. The removal of impervious surfaces from roadways and building courtyards, the creation of multiple biotopes (ponds and pools, thickets, green facades), and the planting of edible species for both humans and non-humans species form the foundation of this urban ecological

Table 2
Summary of territorial scaling modalities based on case studies.

Scaling typologies* and territorial processes	Case studies	Relational densification	Ecological anchoring	Cultural deepening	Institutional territorialization
Scaling up	Eco-Plan (Paris 18th arrondissement)	Creating a network of existing initiatives	Mapping and linking citizen initiatives, new ways of communicating in public spaces (posters, signage)	Co-construction of citizen understanding of socio-ecological transition, recognition of citizens' action and knowledge by public actors, increased competence and politicization of citizens	Institutionalizing partnerships between public action and citizen action. Project to transfer the approach to other Parisian districts
Scaling out	Haie Magique (Massy)	Aggregating different groups of residents	Creation across several territories of new ecological networks, collective gardening sites.	Dissemination of ecological planting and management practices within municipal departments, raising awareness among residents and users of the ecological functions of urban hedgerows.	Expansion of partnership to new local authorities, formation of coalitions of environmental and social associations (social centers), support mechanisms provided by regional political authorities
Scaling deep	Greengroup (Arnhem, Netherlands)	New forms of sociability in public spaces, gardens, citizen working groups, and community premises	Transformation of the neighborhood vegetation, biodiversity and micro-climate. Pedestrianization, new community facilities (composters, rental cargo bikes, etc.).	New relationships with the urban environment, socio-ecological practices (soft mobility, energy savings, reuse of objects, local production), invention of a specific language and new vision of the economy: the neighborhood blue economy	Incorporation of citizen gardening into urban planning

* Per Moore et al., 2015.

expansion, which is spreading into adjacent areas. The case of the Haie Magique collective is similar: its actions have contributed to strengthening ecological connectivity at the regional level. This perspective displaces anthropocentric accounts of scaling and highlights the role of biophysical processes and urban ecological metabolism in shaping territorial trajectories (Buclet, 2021). Living systems co-produce both the territory and scaling: in Arnhem, as in Massy, the activation of biophysical processes leads to increased ecological connectivity that extends far beyond the initiative's original location. This human/non-human co-production constitutes a source of empowerment for citizen collectives (Blanc et al., 2022), thanks to the convergence of human and non-human capacities for action that shape the territory as a shared living environment. Ecological anchoring relies on the integration of local naturalists and their know-how into the production of territory and on the agency of living systems as a force that generates territories and scales of action, particularly through ecological connectivity and green and blue infrastructure. However, these dynamics are not frictionless. In Arnhem, the long-term maintenance of vegetated spaces raises questions about responsibility and labor in a context of progressive gentrification also due to housing improvements since the past decades (Smets & Weesep, 1995). In Massy, the expansion of hedgerows generates tensions with municipal land management practices. For instance, members of the collective report the persistent degradation of their plantings by municipal gardeners, who perceive the hedges as wasteland to be managed.

5.3. Scaling as a political struggle over legitimacy and institutionalization

Scaling processes are also fundamentally political, insofar as they unsettle established hierarchies of action and rework the boundaries between civil society and public authority. Institutional territorialization shows that scaling up does not follow a top-down logic but rather a continuous, often conflictual, negotiation between civil society and public authorities (Avelino et al., 2019; Perry et al., 2024). In our three case studies, mapping the initiatives was used to reveal and make public the existence of a citizen-led territory of socio-ecological transition. The launch of websites provides territorial coherence to a mosaic of initiatives, giving it a political dimension. In the case of Ecoplan, it created a forum for discussion among initiative leaders and with the borough council, revealing new focal points for citizen action. The online mapping approach thus serves as a key driver of scaling. Beyond its initial anchorage in the city of Massy, the website is also used to demonstrate the collective's impact on the territory since 2015, while serving as a showcase to engage new public actors following tensions between the collective and the municipal services.

In Arnhem, the redevelopment led by residents enabled the greening initiative to be rolled out starting in 1991, leading to its integration into the municipal Green Plan. In Massy, the discourse on transition introduced during the 2020 municipal campaign led several community leaders from the Haie Magique collective to join a citizen-led electoral list in the first round, before their arguments were adopted by the incumbent list, which was re-elected in the second round. The resulting disappointment led to the development of partnerships with other municipalities and a proliferation of hedge projects in neighboring towns. So, part of the scaling-out phenomenon is linked to the lack of trust and alliances between citizen collectives and the local government.

This scaling up, however, raises questions about implicit hierarchies between levels of action, marked by a constitutive tension between recognition and capture. On the one hand, the creation of new territories of citizen initiative disrupts established scales of public action. In Paris, the initiative mirrors the scale of the arrondissement due to existing partnerships, while politicizing its functioning and making it less administrative. In Arnhem, it fosters a neighborhood-based circular economy, while in Massy, citizen-led initiatives extend into adjacent intermunicipal territories through a chain reaction driven by the strengthening of ecological networks. Across the three case studies, biophysical processes involved in territorial transformation contribute to the scaling of collective action by creating new spatial and material interdependencies.

On the other hand, while institutional territorialization can open access to resources and increase visibility, it also exposes initiatives to processes of instrumentalization (Lawhon & Patel, 2013; Ernwein, 2021), standardization, and depoliticization (Haderer, 2020). Citizen-led environmental initiatives are therefore wary of the risks associated with scaling up. In Paris's 18th arrondissement, for example, the local democracy liaison officer from the arrondissement town hall participates in meetings of the Ecoplan 18 collective, provides material and organizational support, and facilitates connections with institutional networks. Although such involvement can strengthen citizen initiatives, it is embedded in broader power dynamics between the arrondissement and the central municipality. In this context, support for grassroots projects may simultaneously enhance the arrondissement's political positioning and relative autonomy, raising questions about the instrumental use of citizen-led initiatives.

Public authorities may selectively appropriate grassroots innovations, integrating them into existing policy frameworks while neutralizing their transformative potential. Scaling must therefore be understood as a site of political contestation, where competing socio-ecological transition projects confront one another, and where power asymmetries shape the trajectories, visibility, and durability of initiatives. In this perspective, Ecoplan members and the project coordinator expressed a desire to retain control at the local level: "Those who expand the map must be neighborhood residents who know the area well" (Interview with Ecoplan Volunteer 1, December 2020). This reluctance toward scaling reflects underlying power struggles, as well as concerns about depoliticization and the potential disempowerment of the citizens involved.

5.4. Scaling as uneven social transformation

At the social level, scaling operates through the reconfiguration of everyday practices, the densification of social relations, and the gradual emergence of shared cultural repertoires. Relational densification highlights the importance of localized networks of actors (Nicholls, 2007; Leitner et al., 2008). Scaling can thus occur through the addition of new actors, but also by shifting the vocabulary used to describe the citizen initiative—as demonstrated by Ecoplan's social maps of the 18th arrondissement or the weekly blogs from Arnhem, which constructed counter-narratives to the dominant urban governance. Cultural deepening refers to the gradual establishment of a way of living that engages with the materiality of the territory and is capable of transforming the perceptions and practices of the actors involved over the long term. Processes of cultural deepening and relational densification enable citizen initiatives to embed themselves in local contexts, transforming not only material environments but also modes of inhabiting and relating to place. However, these dynamics are unevenly distributed. Participation in socio-ecological initiatives is conditioned by differentiated access to time, resources, and forms of capital, resulting in selective engagement and recognition. As such, scaling entails an uneven redistribution of capacities to act, raising critical questions regarding inclusion, exclusion, and the reproduction of social inequalities. The social justice brought by citizen-led transitions depend on the socio-spatial configurations within which they unfold.

5.5. The territorial dimension: a key element

Territory is not merely the backdrop of scaling, but its very condition of possibility: it is through territorial anchoring that initiatives acquire materiality, legitimacy, and traction over time. The case of Arnhem underscores the importance of the long term and highlights the mechanisms involved: from ecological anchoring to relational densification, combined with institutional territorialization, leading to cultural

deepening. First, successive waves of citizen-led greening of public spaces created a mirror effect: the revitalization of the biophysical environment also revitalizes the residents capable of such work (Blanc et al., 2022). Recognition of their power to act on the space encourages them to take initiatives. Second, after forty years of citizen engagement, the neighborhood now features a myriad of gardening spaces and an active community center (DAZO). This neighborhood provides venues for social interaction and discussion, within which new ideas and aspirations emerge—renewable energy, low-cost insulation, clothing swaps, object repair, and more.

The DAZO leader explains: "*we didn't start full-time, it grew and it was it. It's organic. Growing is the key word here. We don't have a plan. It's more like: okay what do we like? And as soon as somebody walks through the door and says: hey, I think this is a good idea, can we do that? Then, what we got? We can help you, but you've got to do it. It's your idea, it's your dream*" (Interview, November 2023). We see that the de-sectorization of citizen initiatives and the transformation of the sociocultural norms and values at play in scaling deep (Moore et al., 2015) need a growing medium: the proliferation of places and opportunities for residents to come together. "*Ten years ago, we started a repair cafe. The bar was a central element, a centrifuge. A network where it's easy to move from one circle to another*" (Interview Greengroup member, November 2023).

The territory undergoing systemic material transformations is a common space for discussing differing topics: the conversation shifts from the role of greenery on the streets to that of cars, from summer cooling to soaring energy costs, from thermal insulation to local job creation, and so on. These issues arise from everyday life and they address needs rooted in the local community. Over the 16-year span between the two phases of the study, citizen initiatives have largely moved beyond the narrow focus of simply greening the neighborhood. Thus, the narrative constructed by the Foundation for a Neighborhood Blue Economy aims to rebuild society and highlight the resilience of local communities. The issue at stake is not just the supply of goods and services, as the modern state was able to do (energy, food, mobility, care, etc.), but to shift the nature of these goods and services, an area in which citizen cooperatives have been particularly active over the past fifteen years, according to Tine de Moor (2023): "renewable" energy, "organic" or "short-circuit" food, "soft" mobility, "home" care, and so on.

The territorial dimension of scaling reaches well beyond the boundaries of the lived environment. It encompasses not only ecological processes, but also the social projects that emerge within these contexts and the forms of governance that support them. In Arnhem, for instance, the Foundation for a Neighborhood Blue Economy articulates a broad political vision centered on citizen empowerment and the relocalization of economic activities at the neighborhood level. Its connection to the Dutch campaign "We are here. Harnessing the power of our community" signals an ambition to scale up these local initiatives and contribute to wider societal transformation.

In Paris's 18th arrondissement, a different yet complementary approach is evident. Here, efforts focus on identifying, documenting, and making visible the collective value generated by grassroots initiatives, particularly within working-class neighborhoods. Through mapping practices, these initiatives are not only recognized but also positioned as part of a broader territorial dynamic, capable of informing public debate and policy.

However, the cases we studied are partly "success stories" that cannot be considered representative: many civic transition initiatives remain invisible or fail to materialize due to a lack of sufficient resources (Feola & Nunes, 2014; Hölscher et al., 2019; MacGregor, 2019). So our analysis allows the highlighting and comprehension of certain mechanisms at work. However, there remains a need to examine, in a much more systematic manner, the obstacles that—depending on the territories—prevent their implementation (fragmentation of civic action, co-optation or opposition by public authorities) and thus hinder scaling. These initial findings open up a new research agenda with three components: expanding the analysis of the socio-political reconfigurations generated by these territorial dynamics beyond the case studies presented—which focus on middle- and working-class neighbourhoods, conducting a detailed analysis of the contributions (or lack thereof) of these forms of transition to social and environmental justice, and finally, gaining a better understanding of the obstacles and hindrances to scaling in this political shift.

6. Conclusion

This article shows that taking territory into account when scaling up citizen-led transition initiatives brings their emancipatory dimension into view. While these dynamics do not, in themselves, overturn existing political and economic systems, they open up pathways for redirecting dominant logics by strengthening social ties, engaging with ecological processes, and supporting forms of locally grounded collective self-organisation. Citizen action should therefore not be understood merely as a palliative response to the erosion of public finances and the growing neoliberalisation of society. It also seeks to redirect modes of production and consumption through an explicitly political project, in response to a range of perceived injustices (De Moor, 2023). In doing so, it can mobilise a substantial pool of voluntary labour and, in some cases, citizens' savings and investments, thereby contributing to the emergence of an economy more directly shaped by citizens themselves.

Understanding the role of these initiatives in processes of territorial transformation is all the more important because equating territory with the state and administrative power prevents us from fully accounting for its relational dimension and emancipatory potential (Sultana, 2022). This perspective also helps to decentre analyses of planetary boundaries, which are still largely approached at the global scale, through states and intergovernmental governance arrangements. Such an approach tends to obscure the role of citizen initiatives and, with it, the multiple geographies of responsibility and action in the face of the socio-ecological crisis

Taking citizen initiatives and their different forms of scaling into account, particularly from comparative Global North–Global South perspectives, could thus contribute to developing a typology of emancipation that brings together its territorial, political, cultural and environmental dimensions, while highlighting their mutual articulation and reinforcement.

This perspective also raises a question that goes beyond the analysis of the initiatives themselves: to what extent can their territorial embeddedness contribute to a territorialist project of habitability? The question then becomes how such initiatives contribute to making territories habitable, understood as a way of rethinking how individuals and social groups live, consume and adapt to ecological constraints by grounding these processes in ecological materialities and situated social relations. A habitable territory thus depends on socio-ecological transformations that bring together lived interpretations of local policies, global biophysical assessments—including those relating to climate, biodiversity and biogeochemical cycles—and situated experiences of the socio-ecological crisis specific to each territory and to the social groups that inhabit it. These conditions are continually renegotiated through crises, innovations and conflicts. From this perspective, the challenge is ultimately to understand how territory can become not only a site for socio-ecological transformation, but also a space in which imaginaries and practices of ecological liberation can be articulated.

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CRediT authorship contribution statement

Nathalie Blanc: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Hugo Rochard:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Cyria Emelianoff:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization, Investigation. The authors extend their warmest thanks to the reviewers for their advice and discussion, as well as to William Sutherland for his assistance with the translation.

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