Navigating the Path to Sustainable Cities:
Exploring Institutionalization in Urban Sustainability Transformations

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ABSTRACT

People in cities are sowing ‘Seeds of Good Anthropocenes’ by experimenting with innovations that foster social and ecological sustainability and present hopeful solutions to persistent urban challenges. Such seed initiatives are often portrayed in theories of bottom-up, systemic change as the building blocks of urban sustainability transformations. This is because transformations towards sustainability in the world’s cities rely on our ability to innovate fundamentally new ways of thinking, living, and connecting with people and nature. Research exploring transformative change has led to much learning on the earlier phases of transformations and the actors involved in seeding change. Less is known about the later phases of transformations and the actors and interactions involved in institutionalizing change. Institutionalization, a process of embedding innovations into systems and structures, accelerates transformations and ensures that changes persist. In this thesis, I synthesized existing knowledge and advanced understanding about institutionalization as a transformational process. I conducted a case study exploring seed initiatives’ interactions with a local government policy to institutionalize urban agriculture in a borough of Montréal, Canada. I integrated semi-structured interviews (n=46) with governmental and non-governmental actors to participant observation and document analysis of institutional reports and policies. I thematically analyzed this data using an iterative approach that combined deductive and inductive coding to explore predetermined themes, while allowing emergent ideas to inform my process. The findings showed that, contrary to prevailing assumptions, local governments can catalyze transformative change in cities by intervening early to institutionalize promising innovations for sustainability. Interventions designed to mobilize collective action, reduce barriers to experimentation, and dedicate resources to support change in local communities can bolster the emergence of seed initiatives, while legitimizing and consolidating efforts to transform. This study revealed that bottom-up (informal) and top-down (formal) approaches combined contribute to achieving desired outcomes of institutionalization. This challenges the commonly held notion of inherent opposition between dominant institutions and seed initiatives and underscores the potential for synergistic partnerships between governments and seed initiatives to foment urban sustainability transformations. By shedding light on these dynamics, my research contributes to a deeper understanding of the interactions involved in the process of institutionalization, and the role they play in shaping transformational pathways.

RÉSUMÉ

Partout dans le monde, des citadins expérimentent et créent des innovations qui favorisent la durabilité sociale et écologique (ce qu'on appelle « les graines d'un bon anthropocène ») et proposent des solutions prometteuses à des défis urbains persistants. Ces initiatives innovantes sont souvent présentées comme les éléments constitutifs de transformations urbaines durables dans les théories du changement systémique dit « bottom-up » (c'est-à-dire que ces innovations émanent de la base et impliquent des approches collaboratives et participatives). En effet, les transformations vers la durabilité dans les villes du monde entier reposent sur notre capacité à innover de manière fondamentalement nouvelle en matière de pensée, de vie et de connexion avec les gens et la nature. La recherche sur les changements transformatifs a permis d'en apprendre davantage sur les premières phases dans le processus de transformation et sur les acteurs impliqués dans l'amorcement du changement. Cependant, les phases ultérieures des dynamiques de transformation ainsi que les acteurs et interactions impliqués dans l'institutionnalisation de ce changement sont moins comprises. L'institutionnalisation, un processus d'intégration d'innovations dans les systèmes et les structures sociaux, pourrait être la clé pour accélérer ces transformations et garantir que ces changements persistent. Dans cette thèse, j'ai synthétisé les connaissances existantes et approfondi notre compréhension empirique de l'institutionnalisation en tant que processus transformationnel. J'ai mené une étude de cas explorant l'interaction d'initiatives innovantes d'agriculture urbaine dans le contexte d'une politique gouvernementale visant à institutionnaliser l'agriculture urbaine dans un arrondissement de Montréal, au Canada. Mon analyse se base sur des entretiens semi-structurés approfondis (n=46) avec des acteurs gouvernementaux et non gouvernementaux que j'ai intégrés à de l'observation participante et de l'analyse documentaire de rapports et de politiques. J'ai analysé thématiquement ces données en utilisant une approche itérative combinant un codage déductif et inductif pour explorer des thèmes prédéterminés, tout en permettant à de nouvelles idées ancrées dans mes données d'informer mon processus. Les résultats de cette étude ont démontré que contrairement aux hypothèses prédominantes, les gouvernements locaux peuvent catalyser des changements transformateurs en intervenant tôt pour institutionnaliser des innovations prometteuses pour la transition écologique des villes. Les interventions conçues pour mobiliser l'action collective, réduire les obstacles à l'expérimentation et pour offrir plus de ressources pour

soutenir le changement dans les communautés locales peuvent favoriser l'émergence d'initiatives innovantes tout en légitimant et consolidant les efforts de transformation. Cette étude a également révélé que les approches participatives et collaboratives – souvent informelles – ainsi que les approches verticales – plus formelles ou « top-down » - contribuent, si combinées, à réaliser les objectifs désirés des efforts d'institutionnalisation. Cela remet en question la notion communément acceptée d'une opposition inhérente entre les institutions dominantes et les initiatives innovantes, et souligne le potentiel des partenariats synergiques entre les gouvernements et les initiatives innovantes pour favoriser les transformations urbaines. En mettant en lumière ces dynamiques, ma recherche contribue à une compréhension plus approfondie des interactions impliquées dans le processus d'institutionnalisation et l'influence de ces interactions sur les transformations vers la durabilité.

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I dedicate this thesis to Rivière-des-Prairies-Pointe-aux-Trembles' flourishing urban agriculture community. You have generously shared with me your learnings and your harvests and have shown me that plants and community grow together.

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This work took place in Montréal, known as Tiohtiá:ke in the Kanien'kéha language, on the traditional and unceded lands of the Kanien'kehá (Mohawk) Nation. Tiohtiá:ke (Montréal) has long served as a gathering site and a place of connection for diverse Indigenous Nations. I would like to honor all Indigenous Peoples and Nations who have historically been and continue to be stewards of these lands and waters. This acknowledgement is offered in respect and recognition, crucial for fostering healthy and reciprocal relationships with Indigenous communities and contributing to the reconciliation process.

PREFACE

Thesis format

The following thesis is manuscript-based and presented as five chapters, organized in accordance with McGill University guidelines. The thesis includes a stand-alone chapter that has been submitted to a Special Issue in the peer-reviewed journal Ecology and Society (Chapter 3); in addition to an introduction (Chapter 1); a literature review (Chapter 2) that has been prepared in a style typical of a review article, but is not targeted at a specific journal at this time; a discussion (Chapter 4); and a conclusion (Chapter 5).

In Chapter 1, I introduce the importance of understanding institutionalization and its implications for sustainability transformations. In Chapter 2, I review the literature and integrate perspectives on institutionalization as a transformational process and explore its implications for achieving transformative change in cities. In Chapter 3, I explore institutionalization empirically, through a case study examining urban agriculture's institutionalization via the enactment of local government policy in a borough of the city of Montréal, Québec, Canada. In Chapter 4, I weave theoretical and empirical insights derived from earlier chapters and discuss the implications of my research and my contributions to knowledge. In Chapter 5, I summarize how the objectives of the thesis were met and synthesize the key takeaways of my research.

Contribution of Authors

Drs. Elena Bennett and Karina Benessaiah are co-supervisors of this thesis. Dr. Bennett and Dr. Benessaiah provided significant input, advice and guidance at every stage of the preparation of this thesis.

Dr. Bennett contributed to conceptualizing the research questions and design, selecting appropriate data collection methods, and interpreting and presenting results in writing and in figures. Finally, Dr. Bennett reviewed and edited each Chapter of this thesis.

Dr. Benessaiah contributed to selecting a case study and conceptualizing the research questions and design. Dr. Benessaiah provided guidance on conducting qualitative research, including preparing an interview guide, obtaining approval from the Research Ethics Board, and analyzing and interpreting qualitative data. Finally, Dr. Benessaiah reviewed and edited each Chapter of this thesis.

I, Olivia St-Laurent, was responsible for leading the conceptualization of research design and development of research questions. I led all data collection, field work, and qualitative data analysis, and the writing of the five chapters that make up this thesis.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Transforming the ways that humans act, think, organize, and engage in the world has become crucial for solving the grand societal challenges of our time and ensuring the future prosperity of people and nature (Bennett et al. 2016, Loorbach et al. 2017). Researchers have recognized the need to investigate how human societies might be transformed. Transformation entails fundamentally changing how we organize as societies (Lam et al. 2020), adopting different values and practices, creating new institutions (Sharma 2007, O'Brien and Sygna 2013, Loorbach et al. 2017), and instigating deep and structural change in currently unsustainable systems (Geels 2011, Pereira et al. 2020). Various theories have been put forth to understand transformation to sustainability, weaving together insights from several disciplines.

One approach to understanding transformations, which is rapidly gaining popularity, is called 'Seeds of Good Anthropocenes' (SoGA). SoGA integrates insights from two key but distinct sub-disciplines exploring systemic, bottom-up change: sustainability *transitions* and sustainability *transformations.* The SoGA approach focuses on those changes originating from the bottom-up, starting in the fringes of society, where 'seed initiatives' (so named for their role in seeding change) experiment with ideas and innovations that promote social and ecological sustainability. These seed initiatives emerge from the unique creativity and knowledge of local actors working together to create tailored strategies and solutions specific to their context (Krueger et al. 2022). The SoGA approach posits that seed initiatives have the potential to catalyze transformations towards more equitable and sustainable futures, provided they are nurtured and supported by favorable conditions for growth (e.g. Bennett et al. 2016, McPhearson et al. 2021, Olsson et al. 2017, Tuckey et al. 2023, Rutting et al. 2023, Vogel and O'Brien 2022).

Achieving transformative and lasting change requires seed initiatives' diverse and radical ideas and innovations be institutionalized (Pasquini and Shearing 2014, Loorbach et al. 2020,

Loorbach 2022, Son 2023), meaning they must be widely diffused, adopted and supported by diverse actors, and formally and informally embedded into societal systems and structures (Clegg 1989). This process of institutionalization has been described as “starting from various fuzzy, unstable, and only loosely coupled elements (i.e. innovative initiatives) into a more clearly aligned and interrelated configuration with well-defined actors, purpose, values, practices, routines and so on" (Fuenfschilling 2019). Given that institutionalization involves interactions between diverse actors and their strategies for enacting change, it is difficult to predict the outcomes of institutionalization for different stakeholders, and to precisely know the broader implications of institutionalization for realizing transformative change (Pel and Bauler 2014).

While institutionalization is represented in bottom-up theories of change as being a key transformational process, it has been under-explored compared to earlier-stage processes and is therefore less well understood (e.g. Pereira et al. 2018). Given its important role in accelerating change and generating longer-lasting impacts (Barnes et al. 2018, Nguyen and Davidson 2023, Turnheim et al. 2018), numerous scholars have emphasized that developing a better theoretical and empirical understanding of institutionalization would facilitate future implementation of sustainability transformations (e.g. Fuenfschilling and Truffer 2014, 2016, Raven et al. 2016, Barnes et al. 2018). While there have been recent efforts by transition scholars to address this gap in knowledge, the new insights gained have not yet found their way into the literature on transformations, and mainly apply to larger (national and regional) scales (e.g. Fuenfschilling and Truffer 2016, Raven et al. 2016), where conditions vary greatly to those found at local scales (Krueger et al. 2022).

In the case of urban sustainability transformations, empirical studies have shown that cities are promising sites of place-based experimentation, characterized by ideas, social practices, ways of living and ways of relating to place and space that drive innovation (Longhurst 2015). Cities promote cross-sector, multi-actor interactions (Amin and Thrift 1995) that may help and hinder efforts to create local-scale transformative change. Little is known about how these complex interactions influence the process of institutionalization, during which novel ideas and innovations for improved sustainability gain widespread acceptance and become supported by a broader range of actors pursuing their own visions of ‘green’ and resilient cities (Loorbach and

Shiroyama 2016, Rotmans et al. 2001, Zhou et al. 2021). Exploring the interactions involved in the process of institutionalization, and observing how this key transformational process shapes pathways to transformations is likely to deliver new insights that may guide us to achieving desirable and lasting outcomes of transformation.

1.2 THESIS OBJECTIVES AND OUTLINE

My objective in this thesis is to advance theoretical and empirical understanding of institutionalization in the context of sustainability transformations, a process that is considered critical to navigating and consolidating transformative change (Moore et al. 2014, Olsson et al. 2010, 2017). I begin with a literature review to identify what is known and remains to be learned about how transformative change occurs, especially in relation to the process of institutionalization. My review offers an in-depth exploration of the concept of institutionalization. I follow with a case study that traces the interactions of seed initiatives with other actors and their interventions to transform a borough of Montréal, Canada, where the enactment of a new policy triggered the institutionalization of urban agriculture and accelerated local changes.

In this thesis, I address the following two questions:

1. How has institutionalization been conceptualized in the context of transformations? (Chapter 2)
2. How do seed initiatives' interactions with other actors and their interventions to institutionalize urban agriculture shape pathways to transformation in a borough of Montréal, Canada? (Chapter 3)

In Chapter 2, I conduct a literature review to integrate insights from different (sub-)disciplines that deal with bottom-up transformative change, with the goal of developing a more complete understanding of how institutionalization occurs and the ways that it can bolster and constrain transformations. I unpack the term institutionalization by comparing how it is conceptualized in relation to other transformational processes and across different theories of transformative change and propose a definition of the concept to guide future research and application.

In Chapter 3, I use a qualitative case study approach to explore institutionalization. I conduct interviews with a diversity of stakeholders to develop a more nuanced understanding about the interactions that underpin the process of institutionalization, including how these interactions contribute to shaping the trajectory of a local transformation. The case study is based in Rivière-des-Prairies-Pointe-aux-Trembles, a borough located in the city of Montréal, and the first to enact an urban agriculture policy in 2019. I consider how the roles, strategies, and resources of different actors involved in the institutionalization of urban agriculture (triggered by the creation of a new policy) interact to help, hinder, and shape the process of transformation.

This thesis addresses gaps in knowledge about how seed initiatives progress beyond the experimental stage of transformations, towards the institutionalization of their diverse ideas and innovations, possibly resulting in the transformation of currently unsustainable cities and societies. By bridging divides across current analytical contributions to the study of transformations and acquiring new empirical knowledge on the process of institutionalization in the context of sustainability transformations, this thesis contributes to the scientific understanding of how institutionalization occurs in reality and how it contributes to shaping pathways to transformations.

CHAPTER 2

Towards an Understanding of Institutionalization in Urban Sustainability Transformations

2.1 INTRODUCTION

Cities are increasingly challenged with wicked, interconnected social and ecological problems such as biodiversity loss, climate change, and inequality (Herrero et al. 2021, Krueger et al. 2022). Tackling these problems in an effort to prevent societal and ecological collapse and create brighter futures (Folke et al. 2010) requires catalyzing what scholars have termed *sustainability transformations*, which entail fundamentally changing how we organize as societies (Lam et al. 2020), adopting different values and practices, creating new institutions (Sharma 2007, O'Brien and Sygna 2013, Loorbach et al. 2017), and deeply and structurally altering current, unsustainable and thus untenable systems and structures (Geels 2011, Pereira et al. 2020). While transformations threaten existing configurations, they offer opportunities for radical, system-wide, rapid change towards a more sustainable future (Loorbach et al. 2017).

Sustainability transformations rely on humanity's ability to innovate new ways of thinking, living, and connecting with people and nature (Chapin et al. 2011). People in cities around the world are taking action to address persistent and complex challenges by innovating, and experimenting with, alternative ways of being in the world that are not yet prominent in society (Wittmayer et al. 2019). These diverse, innovative initiatives may constitute the building blocks of transformations, by pointing us towards more equitable and sustainable pathways that promote better futures for people and nature (Bennett et al. 2016). Hope in the transformative potential of such initiatives has led to the development of multiple theories of change and approaches to understanding how broad, systemic change might grow out of bottom-up, innovative initiatives.

To date, the literature on sustainability transitions and transformations offers a greater understanding of the earlier phases of change - and the actors involved in seeding change - than the later phases of change - and the actors involved in navigating, accelerating and stabilizing change (Pereira et al. 2018, Ehnert et al. 2018, Gorissen et al. 2018). As a result, there remains a lot to learn, in theory and in practice, about how to shift from early-stage experimentation with

innovations for creating more sustainable cities and communities, towards later-stage institutionalization, a process that involves widely diffusing and embedding these innovations in the wider context (Clegg 1989, Sengers et al. 2021). Institutionalization is an important mechanism for accelerating transformations and ensuring that changes persist over long periods of time, making it crucial to understand how we can truly transform cities to better serve people and nature (Burch 2010, Pasquini and Shearing 2014, Gorissen et al. 2018, Loorbach et al. 2020).

In this first chapter, I summarize existing knowledge on transformations/transitions towards sustainability in human-dominated societies (2.2). I focus on the 'Seeds of Good Anthropocenes' (SoGA) theory of transformations, because it emphasizes bottom-up dynamics of change, a key theme of the research work involved in producing this thesis and because it contributes to bridging disciplinary divides by combining ideas from two bodies of literature which are likely to benefit from further integration: sustainability *transformations* and *transitions*. To develop a more complete understanding of, and integrate existing knowledge about, institutionalization in the context of transformations, I unpack *institutionalization* as a theoretical concept, compare its different understandings across different research strands and fields of study, and finally propose a definition of institutionalization that combines various theoretical and empirical perspectives on this key transformational process (2.3). Lastly, I discuss why the city-context serves as a seedbed for transformations and why more attention should be paid to multi-actor interactions in processes of transformation (2.4), setting the stage for the case study presented in the third chapter of this thesis.

2.2 THEORIES OF BOTTOM-UP TRANSFORMATIVE CHANGE

2.2.1 *Introducing 'transitions' and 'transformations'*

In response to widespread recognition of an urgent need to bring about local to global sustainability transformations, researchers across many disciplines (e.g. social innovation studies (Westley et al. 2009), transitions studies (Grin et al. 2010), resilience studies (Gunderson and Holling 2002), social-ecological systems studies (Berkes et al. 2008)) have developed numerous theories and methods for studying and better understanding how transformative change unfolds.

Prominent analytical frameworks that have been widely adopted and accepted for their usefulness in understanding bottom-up transformative processes and dynamics include the multi-level perspective (Geels 2002) on multi-phase socio-technical transitions (Rotmans et al. 2001), around which a literature on sustainability transitions has evolved; and the social-ecological transformations theory of change (Olsson et al. 2004, 2006, Moore et al. 2014), from which a rich body of literature on sustainability transformations has emerged (Box 2.1). These two bodies of literature, which also represent distinct research communities, are becoming increasingly integrated in emerging research on transformative change towards sustainability (e.g. Loorbach et al. 2017, Hölscher et al. 2018, Herrfahrdt-Pähle et al. 2020, Lam et al. 2020).

Box 2.1 Key analytical frameworks describing bottom-up transformative change

(A) Socio-technical transitions and the multi-level perspective

Rotmans et al. (2001)'s four-phase theory of socio-technical transitions was adapted by Geels (2002) to include the multi-level perspective (MLP), by which transitions are outcomes of alignments of changes occurring at the levels of niches (micro-level), regimes (meso-level), and landscapes (macro-level). In the first phase, termed pre-development, a dynamic equilibrium exists and there is no visible change to the status quo (Rotmans et al. 2001). At the micro level, small networks of (fringe) actors develop and experiment with path-breaking 'niche' innovations that tend to compete with the regime in order to change it (Smith and Raven 2012, Bui et al. 2016). Changing regimes requires innovating and creating change at the meso-level, where shared, stable, and well-articulated cognitive routines and rules coordinate action and contribute to reinforcing existing pathways (Geels and Schot 2007, Barnes et al. 2018). In the second phase, called take-off, some niche innovations may succeed in 'breaking through', creating structural (e.g. socio-cultural, economic, ecological and institutional) changes that react to each other (Rotmans et al. 2001). Such breakthroughs are possible when (very slow) changes at the macro-level, in what is called the landscape, create new or intensify existing problems for the regime (e.g. climate change). The landscape is an exogenous environment independent of the influences of niches and regimes, where changes destabilize or create 'cracks in the regime' (Geels and Schot 2007, Westley et al. 2017), forcing the uptake of innovations which represent viable solutions to problems, at the meso-level. In the

third phase, termed acceleration, the pace and scale of change increases through learning, and through the diffusion of niche innovations, and their social and structural embedding, either as add-ons to the incumbent regime or as new regimes (Rotmans et al. 2001, Gorissen et al. 2018). In the fourth phase, called stabilization, the pace of change slows to become more controlled and consolidated, as previous niche innovations represent new and stable regimes, and a new dynamic equilibrium is attained (Rotmans et al. 2001, Geels and Schot 2007).

(B) Social-ecological transformations

The theory of change that underpins much of the literature on transformations is a four-phase process of social-ecological system transformation, based on the original work of Olsson et al. (2004, 2006) and later extended by Moore et al. (2014). The four phases - pre-transformation, preparing for change, navigating the transition, and institutionalizing the new trajectory - are described in Moore et al. (2014) as follows: In pre-transformation, major social or ecological disturbances (also called 'triggers') create windows of opportunity for change. In preparing for change, sustainability problems are identified and analyzed, new visions and 'seed initiatives' for more sustainable futures are created, and experimentation with alternative pathways and innovations for sustainability, along with the mobilization of organized networks, build momentum for change. The phase of navigating the transition is characterized by investments of capital to support certain 'chosen' pathways or innovations. It also involves learning from experiments, and the adoption of innovations by actors in the wider context. Institutionalizing the new trajectory depends on what were previously considered radical innovations or alternative pathways (i.e. more sustainable ways of doing, thinking, or organizing) become routine or the 'new normal'. It also involves 'scaling' innovations to create broader and more significant impacts (Moore et al. 2012). An outcome of this last phase of transformations is greater stability for the innovation or the new pathway, which has now become widely institutionalized.

A key distinction between the two approaches—socio-technical transitions and social-ecological transformations—when studying change in complex adaptive systems, lies not only in their use

of different theories and frameworks but also in their focus on distinct coupled systems. Sustainability *transitions* research primarily examines changes in socio-technical systems driven by technological innovations, such as shifts towards low-carbon energy, transport, and agro-food systems (Loorbach et al. 2017). In contrast, sustainability *transformations* research tends to explore broader human-environment systems and interactions, for instance, by investigating sustainable ecosystem stewardship as a means of addressing planetary degradation (Folke et al. 2010; Olsson et al. 2010; Chapin et al. 2011).

A common thread that links the transitions and transformations communities is their joint interest in advancing knowledge on bottom-up change processes and dynamics. Across various theories and conceptual frameworks for understanding multi-actor, non-linear, emergent, disruptive and long-term changes in different systems of interest (Loorbach et al. 2017, Lam et al. 2020), change is understood to originate from the bottom-up: innovative initiatives, which often emerge as small-scale experiments led by networks of local actors that promote hopeful solutions to challenges (Lam et al. 2020), grow and organize, creating increasingly destabilizing pressure for change to possibly, eventually, catalyze societal and regime shifts towards more sustainable pathways (Pereira et al. 2018).

Many different terms have been used to describe such innovative initiatives (Table 2.1), which I refer to hereafter as 'seed initiatives' for their role in seeding transformative change and starting growth towards desirable futures (Bennett et al. 2016). Thus, in the context of this thesis, I define seed initiatives as locally defined experiments that innovate alternative ways of thinking, doing, organizing, and engaging with the world (Gernert et al. 2018, Lam et al. 2020), and which represent hopeful solutions to persistent problems in an effort to create more equitable and sustainable societies (Bennett et al. 2016).

Table 2.1 Commonly used terms to describe bottom-up innovative initiatives.

Term	Definition	Theoretical background	Key references
Seeds, Seeds of Good Anthropocenes	"Initiatives (social, technological, economic, or social-ecological ways of thinking or doing) that exist, at least in prototype form, and that represent a diversity of worldviews, values, and regions, but are not currently dominant or prominent in the world," (Bennett et al. 2016:442)	Social-ecological transformations	Bennett et al. 2016
Niche innovations	"Small networks of actors [that] support novelties on the basis of expectations and visions," (Loorbach et al. 2017).	Socio-technical transitions	Loorbach et al. 2017
Transformative social innovations	While the concept of social innovation is in-development and lacks a clear definition (Bekkers et al. 2013, Moulaert et al. 2013), "transformative social innovation challenges, alters, replaces, or supplements dominant institutions in a specific societal context…resulting in varying degrees of institutionalization as the transformative social innovation unfolds across time and space," (Haxeltine et al. 2017:15).	Social innovation	Haxeltine et al. 2017
Grassroots innovations, Grassroots experiments	"A network of activists and organizations generating novel bottom-up solutions for sustainable development and sustainable consumption; solutions that respond to the local situation and the interests and values of the communities involved…The grassroots approach is fundamentally different from the top-down policies expressed through government action," (Seyfang and Smith 2007:585).	Social-ecological transformations, Socio-technical transitions	Seyfang and Smith 2007
Grassroots initiatives	"Grassroots initiatives are groups of people trying to create solutions to challenges as they see them, adhering to criteria that diverge from mainstream institutions and practically expressing core social values…they challenge the status quo and promote new forms of organizing social and economic life as well as alternative systems of provision," (Gernert et al. 2018:3). "In contrast to the market activities developed and implemented by business organizations, grassroots initiatives operate in civil society arenas and involve committed activists experimenting with social innovations," (Seyfang and Smith 2007:585).	Social-ecological transformations, Socio-technical transitions	Seyfang and Smith 2007 Gernert et al. 2018

Table 2.1 Commonly used terms to describe bottom-up innovative initiatives.

Transition experiments, Transition initiatives	A transition experiment "is an innovation project with a societal challenge as a starting point for learning aimed at contributing to a transition," (Van den Bosch and Rotmans 2008). Transition initiatives more specifically refer to "locally based initiatives which drive transformative change towards environmental sustainability…actor-networks that start-up, adopt and/or engage with new practices, technologies and experiments that seek to profoundly change established unsustainable routines and perceptions towards more sustainable ones," (Gorissen et al. 2018:172)	Socio-technical transitions	Van den Bosch and Rotmans 2008 Gorissen et al. 2018
Sustainability initiatives	"Sustainability initiatives are potential local solutions to sustainability problems with global relevance...These are often designed, carried out, and led by local actors. Sustainability initiatives provide new ways of thinking, doing, and organizing (e.g., social, technological, economic, socio-technical, or social-ecological)," (Lam et al. 2020:3). Sustainability initiatives "often respond to opportunities or persistent problems in [a] specific environment," (Loorbach et al. 2020:252)	Sustainability transformations, Sustainability transitions	Lam et al. 2020 Loorbach et al. 2020

Seed initiatives can vary significantly in terms of their degree of radicality (Geels 2019), their age, their level of stability and establishment within a regime or system of interest, their resource needs and assets (Wolfram 2016), and the narratives and ethical orientations that underpin their motives, actions, and interactions (Feola 2014). Seed initiatives also differ according to the context in which they emerge; some encounter enabling contexts - favorable environments or critical junctures in time - that bolster their ability to incrementally or abruptly alter established paths and catalyze transformative change (Nyborg et al. 2016, Collier and Munck 2017), while others are likely to remain place-based experiments with local-scale impacts. Seed initiatives do not always intend to scale their impacts broadly, or to bring about systemic change (Westley et al. 2014). They may instead focus their efforts locally by fostering community, fulfilling the needs and aspirations of their members, or ensuring a sense of identity, self-expression, recognition, and belonging (Moore et al. 2012, Smith and Seyfang 2013). Such goals are more closely aligned with notions of inner transformation (Ives et al. 2020, Pisters et al. 2020, Woiwode et al. 2021), scaling deep (Moore et al. 2015), and changing the personal sphere (O'Brien and Sygna 2013).

2.2.2 *An integrative approach to studying bottom-up change*

The 'Seeds of Good Anthropocenes' (SoGA) approach to studying bottom-up transformative change is rapidly gaining popularity, in part because it weaves together insights from both transitions and transformations research. It applies a social-ecological systems lens to the multi-level perspective on transitions (Geels 2002) and draws upon earlier contributions by Olsson et al. (2004, 2006) and Moore et al. (2014) on social-ecological systems transformations (Bennett et al. 2016, Pereira et al. 2018, Raudsepp-Hearne et al. 2020, Biggs et al. 2022).

The SoGA theory of change occurs over three phases: preparation, navigating the transition, and consolidation. In the preparation phase of transformations, seed initiatives emerge and experiment with alternative and potentially transformative ideas and innovations. This is inspired by - and inspires - an emerging awareness, and the articulation of narratives, about Anthropocene challenges and the need for systemic change (Pereira et al. 2018). Seed initiatives then begin to coalesce; they mobilize networks and develop shared discourses and collectively defined identities for their innovations (Loorbach et al. 2020). Seed initiatives, which are often locally embedded and contextualized, see their innovations diffuse, meaning they are adopted and reproduced by other actors or adapted to other contexts (Loorbach et al. 2020). Other key actors, such as transformation intermediaries, may intervene at this point and play a linking role by connecting networks of seed actors and their activities, skills and resources, to others and to existing regimes (Smith et al. 2016, Kivimaa et al. 2019a).

Between the first and second phases, a crisis or anticipated crisis may open a 'window of opportunity' for institutional change, leading to an increased uptake and championing of certain ideas and innovations by diverse actors. Such actors include grassroot actors (Triollet et Bernier 2016, Brundiers and Eakin 2018, Benessaiah and Eakin 2021), political decision-makers (Geels 2014, Mendizabal et al. 2018), and newly formed coalitions and networks (Höslcher et al. 2018, Audet et al. 2022) performing different, and sometimes evolving, roles in transformation (Wittmayer et al. 2017), and pursuing complementary, or possibly conflicting, transformation goals (Kivimaa et al. 2019a). New ideas and innovations are often adopted in response to crises because they present viable solutions to new or worsened challenges. This shift, from experimenting with ideas and innovations for sustainability towards increasingly anchoring these

innovations in society (Geels 2019), embedding them in societal configurations (Fuenfschilling and Truffer 2014, Heinrichs and Laws 2014), and integrating them into policy and politics (Bibri and Krogstie 2017), characterizes the process of institutionalization, beginning in the second phase of transformations (navigating the transition) and progressing into the third phase (consolidation). This process of change is theorized to lead to three possible outcomes: 1) transformation, whereby innovations have been widely institutionalized into new regimes or a new status quo, 2) disruption, whereby innovations have a disruptive effect, but continue to exist in isolated pockets within existing regimes, or 3) capture, whereby innovations are 'gobbled up' by the dominant regime and vanish.

Studies on sustainability transformations have emphasized the role of seed initiatives as key actors of change, framing them as the building blocks of transformation, and leading to much learning about how seed initiatives prepare and build momentum for change, early in transformation (Schot and Geels 2013, Köhler et al. 2019; Raven et al. 2016). Less is known about how ideas and innovations progress from being partly institutionalized in the second phase of navigating the transition, to widely institutionalized in the third phase of consolidating change (this 'gap' in knowledge is clearly depicted in Figure 1, which offers little insight into how change progresses in the second and third phases of transformations) (Gelcich et al. 2010, Elzen et al. 2012, Wamsler et al. 2014, Durrant et al. 2018). Additionally, there remains a lot to learn about how institutionalization shapes pathways to transformations, and thus influences the possible outcomes of change in the third and last phase of the transformational process (Herrfahrdt-Pähle et al. 2020).

2.3 INTEGRATING PERSPECTIVES ON INSTITUTIONALIZATION

2.3.1 *Institutionalization as a multi-stage process*

As a first step towards building an understanding of institutionalization in the context of transformative change, I looked to institutional theory where institutionalization is viewed not as a static state (i.e. to be 'institutionalized'), but rather as a process that can occur slowly or rapidly (Zucker 1977, Tolbert and Zucker 1999), and which involves progressing from ideas or innovations being partly or weakly institutionalized, to widely or strongly institutionalized

(Barley and Tolbert 1997). The traditional institutionalization curve (see Fig 2.2) developed by Lawrence et al. (2001, p.626) shows that an innovation's perpetuation over time, and its spread across a population of appropriate adopters, lead to its stability and eventual sedimentation within a regime or system of interest (Tolbert and Zucker 1999). Ideas and innovations that are not yet prominent in society, and which have only existed for a short time are usually only weakly institutionalized; they can be easily challenged and have less capacity to influence action (Barley and Tolbert 1997). Similarly, seed initiatives experimenting with these newly developed innovations tend to rely on only a small number of committed individuals (Borgström 2019, Krueger et al. 2022), making them vulnerable to the loss of champions or the disruption of social networks (Pasquini and Shearing 2014), which can result in motivational damage and even failure (Heiskanen et al. 2015).

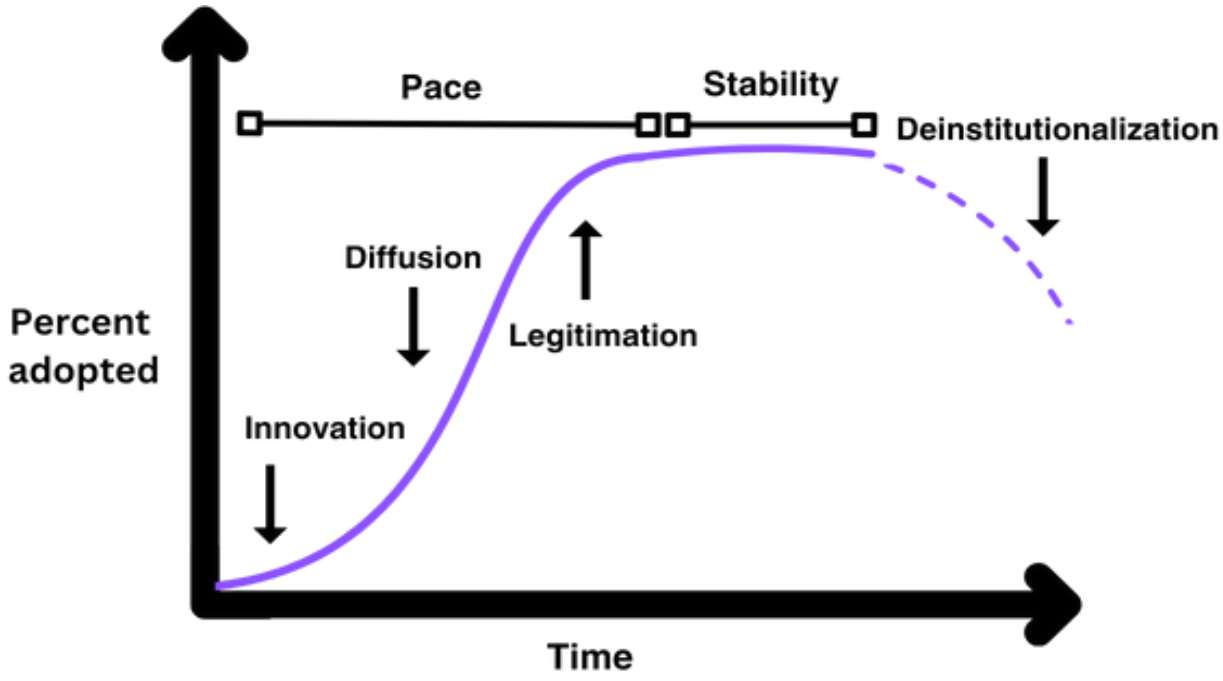

Figure 2.2 Traditional institutionalization curve, adapted from Lawrence et al. (2001, p.626). Over time and at varying paces, innovations are diffused across populations of potential adopters, stabilizing their presence in the system of interest.

In this conceptualization of institutionalization, previously marginal innovations become more strongly institutionalized as they diffuse (i.e. spread) across a larger and more heterogeneous

population of adopters, leading to the eventual stabilization of their presence in the system. Among these diverse adopters, those with decision-making power are likely to play an important role in enhancing an innovation's legitimacy as it appears, increasingly, in dominant discourses (Tolbert and Zucker 1983, Leblebici et al. 1991, Clegg 2012). Achieving stability is desirable because it renders more difficult the reversal of changes, and the deinstitutionalization of an innovation, thus enhancing its likelihood of cultural persistence (Zucker 1977, Dacin et al. 2008, Burch 2010). Recent interest in the concept of deinstitutionalization (e.g. Fuenfschilling and Truffer 2014, Newig et al. 2019, Novalia et al. 2022) hints at the dynamic nature of institutionalization that should be viewed as a process, rather than an outcome, involving feedback between the fading away of existing ways of doing, thinking, and organizing and the progressive anchoring of new ideas and innovations in societal systems and structures.

Coherence is a third dimension of institutionalization. Tolbert and Zucker (1999) identify 3 stages of institutionalization - habitualization, objectification, and sedimentation (Table 2.2) - that show us how innovations gain the legitimacy and stability we find in the traditional institutionalization curve, while introducing the notion of coherence. In each of the three stages of institutionalization, diverse actors carry out extensive work to build coherent alternatives to existing regimes by discussing, theorizing and challenging ideas and innovations (Fuenfschilling 2019). Different kinds of people contribute to collectively rationalizing an innovation by communicating and structuring their personal norms (i.e. the right way to behave), expectations, goals and values. They eventually form collective patterns of thought, achieving a greater degree of social consensus on the innovation's identity and value (Tolbert and Zucker 1999, Burch 2010), and determining the logic by which future actions will be decided (Pasquini and Shearing 2014). This process overrides diversity (DiMaggio 1999, Dimaggio and Powell 2004), causing certain actors' perspectives to be favored over others', and risking the exclusion of certain people and ideas from the transformation (Bach and McClintock 2021); contributing to the creation of winners and losers of transformation (Blythe et al. 2018). However, coherent innovations are more likely to be taken up as viable solutions to current challenges as they become interwoven with the structuring elements of systems such as laws, regulations, practices, technologies, policy and politics (Hajer 1995, Anguelovski and Carmin 2011, Pel and Bauler 2014, Bibri and

Krogstie 2017). In this way, coherence facilitates processes that contribute to legitimizing and stabilizing innovations.

Table 2.2 Three stages of institutionalization based on the original work of Tolbert and Zucker (1999) and a synthesis by Fuenfschilling and Truffer (2014).

Stage of institutionalization		**Legitimacy**	**Coherence**	**Stability**
1	HABITUALIZATION	Adopters are a small number of actors and there are no legitimate users.	Activities are uncoordinated, no consensus exists for the usefulness of the innovation.	The innovation is unstable and impermanent, there is a likelihood of disappearance if the actors that created the innovation disappear.
2	OBJECTIFICATION	Adopters are organizational decision-makers, and increasingly heterogeneous, actors' institutional work legitimizes the innovation, alliances are made.	The innovation is collectively rationalized, there is significant discourse on the innovation, and there exists some degree of social consensus concerning the value of the innovation.	Variance of the innovation decreases, resources are mobilized to support the innovation.
3	SEDIMENTATION	Adopters are multiple generations of organizational members, actors have vested interests in the innovation, there is low resistance by opposing actors.	The innovation has become normative, change in design is rare and failures are low, the innovation's functionality is not questioned.	Virtually complete spread of the innovation across appropriate adopters, perpetuation over time (historical continuity), the innovation is stable and hard to deinstitutionalize.

2.3.2 *Late-stage transformational processes*

There are disciplinary differences in how the later phases of transformations are conceptualized in theories of transformative change, without alignment under one broader approach. Several processes characterize transformations after and beyond the scope of experiments, where radical novelties shift from being merely talked about by a few to being supported in practice by many (Barnes et al. 2018, Sengers et al. 2021). These processes represent unique aspects or mechanisms of how institutionalization occurs. There are inconsistencies in how institutionalization is understood in relation to these other transformational processes across different frameworks and theories of transformative change (Figure 2.3). Building on the efforts of Pereira et al. (2018) to integrate transitions and transformations research in the 'Seeds of Good Anthropocenes' approach to studying transformative change, I compared framings and understandings of institutionalization and related late-stage transformational processes across studies on socio-technical (sustainability) transitions and social-ecological (sustainability) transformations (see Box 2.1).

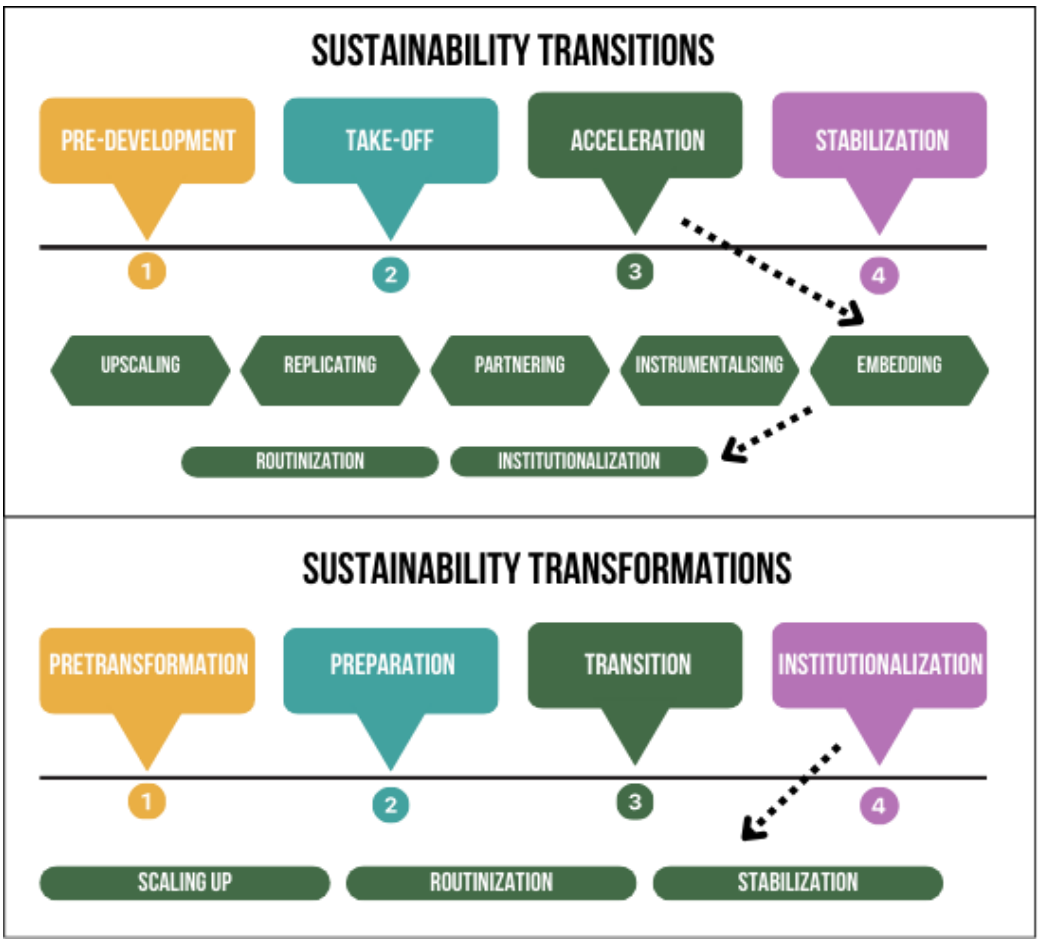

Figure 2.3 Comparing late-stage transformational processes across different theories of change: (a) A simplified model of sustainability transitions, based on the four phases of socio-technical transitions by Rotmans et al. (2001) and five mechanisms for acceleration of urban sustainability transitions by Gorissen et al. (2018) (b) A simplified model of sustainability transformations, based on the four phases of social-ecological transformations by Olsson et al. (2004, 2006), complemented with the insights of Moore et al. (2014).

Routinization and Institutionalization

Routinization and institutionalization rely on innovations' diffusion and contribute to the mechanism of embedding innovations in dominant culture, practices, and structures (Van den Bosch and Rotmans 2008, Gorissen et al. 2018) (see Fig 2.3). Empirical studies by Gorissen et al. (2018) and Ehnert et al. (2018) investigate the acceleration phase of transitions in urban (city) contexts and focus on the interactions of seed initiatives (which they refer to as 'transition initiatives') and local government. These studies frame routinization as an *informal* process of integrating innovations for sustainability into the daily routines of people, such that they are

'normalized' as the new standard (Ehnert et al. 2018). They frame institutionalization as a *formal* process that reserves a key role for government. Some scholars hold that the routinization of innovations is not sufficient for achieving transformative change, arguing that existing ideas and conventional practices need to be ruptured (i.e. deinstitutionalized) (Luederitz et al. 2017) and novel ideas and innovations must be formally consolidated via the establishment of new rules (i.e. institutionalized).

In the four phases of social-ecological transformations, there is no distinction between routinization and institutionalization as informal and formal processes. Instead, routinization is a sub-process of institutionalization (i.e. it contributes to institutionalization) (see Fig 2.3). This broader perspective on institutionalization encompasses the formal *and* informal actions of diverse actors which build on, and are likely to outlast, the pre-existing informal efforts and networks of seed initiatives, generated in the earlier phases of transformations (Moore et al. 2014). Formal actions, or mechanisms, that drive the institutionalization of innovations include the allocation of funds and the creation of jobs to implement and maintain newly standardized innovations (Yin 1981), as well as legal reforms and changes in organizational structures (Moore et al. 2012). For the purpose of this thesis, I refer to these as institutionalizing mechanisms (Table 2.3).

Table 2.3 Six institutionalizing mechanisms.

Institutionalizing mechanism	**Description**	**Key References**
Partnerships	The involvement of new actors able to leverage resources and political, cultural and economic opportunities, and to support consensus-building between stakeholders.	Westley et al. 2013 Ehnert et al. 2018
Reconfiguration and Professionalization	Introducing changes to institutions and/or organizational structures (e.g. in governments, this might entail the creation of committees or bureaus to support innovations). This includes the creation of jobs and new positions, and the provision of training and knowledge, to implement and maintain innovations.	Yin 1981 Moore et al. 2012 Pasquini and Shearing 2014 Barnes et al. 2018 Gernert et al. 2018
Policies	The development and enactment of policies and associated goals, action plans, or strategies.	Anguelovski and Carmin 2011 Pasquini and Shearing 2014
Support programs	The development of programs to transfer resources to seed initiatives experimenting with innovations.	Anguelovski and Carmin 2011
Regulatory reform	The creation of new (or the reforming of existing) laws, regulations, and/or codes.	Anguelovski and Carmin 2011 Moore et al. 2012 Westley et al. 2013 Pasquini and Shearing 2014
Monitoring and Evaluation	Monitoring the changes introduced, evaluating outcomes, and ensuring that the process of developing and implementing alternative pathways is working well.	Rotmans et al. 2001 Howells 2006 Intarakumnerd and Chaoroenporn 2013

Scaling and Institutionalization

The social innovation literature offers rich conceptualizations of the concept of scaling innovations to create greater impact and generate transformative change, including three strategies for scaling developed by Moore et al. (2015), based on the earlier work of Van den Bosch and Rotmans (2008). The three strategies differentiate between scaling deep, scaling out, and scaling up. 'Scaling deep' refers to changing people's (individual and collective) hearts and minds, their cultural values, relationships and beliefs (Moore et al. 2015). The idea of scaling deep closely resembles O'Brien and Sygna's (2013) notion of transforming the personal sphere, which determines how people 'see' systems and structures, and is considered to have powerful consequences for determining the potential for transformation and the trajectory of change. However, this dimension of scaling is less discussed in current understandings of institutionalization, compared to scaling out and scaling up.

'Scaling out' relates to geographical expansion and the notion of innovation *diffusion* across a population of potential adopters. Scaling out/diffusion serves to broaden the innovation's reach by attracting adopters in greater numbers and replicating the innovation in more places (Van den Bosch and Rotmans 2008, Moore et al. 2015). Scaling out/diffusion is sometimes conflated with scaling up/upscaling, for example in Gorissen et al. (2018), where upscaling represents one of five acceleration mechanisms that actually describes a process of scaling out/diffusion (see Fig 2.3a).

'Scaling up' relates to institutional expansion and requires efforts to create changes at the policy level (Moore et al. 2015). Relationships matter for scaling up, because this process requires that seed initiatives' radical ideas and innovations become 'backed' by a diversity of actors, including those with greater decision-making power, who are capable of building enabling environments for them (Douthwaite et al. 2003), for example by changing (or creating new) policies, rules and laws to support these innovations (Moore et al. 2015). Scaling up legitimizes innovations, a key dimension of institutionalization (see Fig 2.2), by enhancing public recognition of the innovation's value, along with its credibility in the given context (Ehnert et al. 2018). What is depicted as institutionalization in Figure 3a and the (transitions) study by Gorissen et al. (2018)

closely resembles Moore et al.'s (2015) notion of scaling up, or rather, changing institutions and integrating transformative innovations at higher institutional levels (Boyer 2015, Gorissen et al. 2018). In contrast, Figure 2.3b and the (transformations) study by Moore et al. (2014) frame scaling up as merely one aspect of institutionalization. Here again, the transformations literature adopts a broader, more encompassing view of institutionalization.

Scaling up has received most attention as a mechanism for changing the rules of the game (Moore et al. 2015). It requires that seed initiatives and other actors in transformation identify opportunities and barriers for embedding innovations in dominant cultures (how we think), practices (what we do) and structures (how we organize) (Van den Bosch and Rotmans 2008) in order to transform the system that created the problem in the first place (Westley et al. 2014). To do so entails innovating at multiple scales or 'levels' (Geels 2002, Van den Bosch and Rotmans 2008): while seed initiatives innovate at the micro-scale, these initiatives and their innovations are scaled up when they are incorporated at the meso-scale (the regime, or 'problem domain', where unsustainable systems emerge and are reinforced), and finally at the macro-scale (the landscape, where structures and institutions are ultimately transformed) (Westley et al. 2011). The idea of scaling up closely resembles O'Brien and Sygna's (2013) notion of transforming the political sphere (which requires enacting changes at the meso-level) where systems and structures exist that define the constraints and possibilities for changing what they call the practical sphere, where the outcomes of change can be viewed and measured. Changes in all three spheres of transformation (the personal, practical, and political spheres) and scaling mechanisms in all three directions (scaling deep, scaling out, and scaling up) are deeply intertwined on the pathway to creating large scale or systemic impact (Moore et al. 2015, O'Brien 2018).

Despite nuanced differences in how late-stage transformational processes are conceptualized across theories of change, there is a common understanding that routinization (changing social norms as previously radical ideas and innovations become widely accepted) and scaling up (changing rules and addressing the broader institutional and systemic roots of problems) both rely on diffusion processes. This is because diffusion leads to an influx of new and different types of actors, which in turn, diversifies the resources and skills that can be leveraged to achieve

transformative outcomes (Westley et al. 2013). However, this influx of new actors in transitions/transformations also complicates the process of change, emphasizing a need to strengthen relationships in order to achieve desirable outcomes of institutionalization (Moore et al. 2012, 2014). I propose a definition of institutionalization as a transformational process (Box 2.2) derived from, and integrating, the various insights presented thus far.

Box 2.2 A definition of institutionalization

Adopting a broad and integrated notion of the concept, I describe institutionalization as beginning with the diffusion (or scaling out) of innovations, leading to their routinization (becoming the new normal) as they are adopted by a greater number and diversity of people. These adopters collectively build more coherent innovations that can more easily be formally embedded (or scaled up) into new (or existing) regimes, which 'changes the rules of the game' and legitimizes innovations. As innovations become entrenched in society as new regimes, they are less likely to vanish and more likely to perpetuate over time.

Proposed definition: Institutionalization is a transformational process that (slowly or rapidly) embeds an innovation in new (or existing) regimes, via its diffusion across an increasingly diverse population of adopters who employ formal and informal strategies that interact to enhance an innovation's legitimacy, coherence, and stability within a system of interest.

2.3.3 *The importance of relationships in institutionalization*

When their ideas and innovations become institutionalized, seed initiatives may gain increased visibility, additional resources, and learning opportunities, while simultaneously becoming more susceptible to the actions and decisions of external stakeholders (e.g. Gorissen et al. 2018). Hence, during institutionalization, the relationships between seed initiatives and other actors become crucial. These relationships may bolster or hinder transformative change.

The institutionalization of transformative innovations is bolstered by, and can benefit, many different types of actors that are linked together by their support for a certain innovation or a

shared goal of transformation if they are able to collaborate constructively (Ehnert et al. 2018). These different actors may decide to work together, coordinating their isolated actions (Anguelovski and Carmin 2011) and forming synergistic (or 'complementary') relationships, whereby each improves or emphasizes the others' qualities by filling resource gaps or simply being stronger together (Krueger et al. 2022). For example, non-governmental actors and groups (i.e. civil society) are commonly seen as a source of creativity and innovation, where seed initiatives often originate (Moore and Milkoreit 2020). Governments can commit to supporting the bottom-up, innovative initiatives (i.e. seed initiatives) of civil society actors and groups, as a political instrument to generate public support (Pel and Bauler 2014).

Seed initiatives that promote innovative ways of tackling pressing problems, without challenging the interests of incumbent actors, are more likely to engage in a collaborative, and less competitive, process of institutionalization (Frantzeskaki et al. 2014, Ehnert et al. 2018). This idea was earlier articulated by Geels and Schot (2007), who differentiated between innovations that compete with the dominant regime by aiming to replace it, and those that can develop a symbiotic relationship with the regime by solving problems and improving performance. Even in a collaborative process of institutionalization, seed initiatives with transformative goals must adjust their innovations to some extent to align with the interests and agendas of other influential actors. While this can bring seed initiatives closer to political and organizational structures of government that can include them in decision-making processes, maximize their access to resources, and ultimately offer them greater power to kick-start and embed a broader, more influential process of change (Heinrichs and Laws 2014), it risks stifling the potential for more radical transformational change.

2.3.4 *The risks of institutionalization*

Institutionalization, while critical for accelerating and stabilizing systemic changes, is a polarizing concept because it has a potential downside, which social innovation research has paid much attention to (e.g. Pel and Bauler 2014, 2017, Herrfahrdt-Pähle et al. 2020, Pel et al. 2023). As an innovation undergoes a process of institutionalization, seed initiatives that created diverse versions of, and experimented with, that innovation in an isolated space protected from external forces (a niche), become inextricably linked to the actors, discourses, and institutions of wider

society (Augenstein et al. 2020) and to the regimes they seek to transform. These new interactions leave seed initiatives more vulnerable to domestication, meaning they become forced to 'fit-and-conform' to existing and possibly restrictive frameworks and institutions (Smith and Raven 2012). This entanglement of seed initiatives with larger-scale systems and structures, and their remolding to match the demands and interests of the dominant regime, can wither away creativity, hinder more radical elements, and cause the disappearance of original intents along with a loss of motivations of seed actors leading these initiatives (Pel and Bauler 2017, Bauler et al. 2017, Wolfram 2018). Institutionalization may ultimately blunt seed initiatives' innovative edge and stifle their potential for disruption and transformation (Ehnert et al. 2018, Gernert et al. 2018). Empirical findings support the idea that institutionalization creates both positive and negative outcomes: Gorissen et al. (2018) demonstrate that, while 'formally embedding' innovations (a key element of institutionalization) creates legitimacy and multiplies the resources mobilized to support innovations, it also leads to a stricter, more controlled, process of transformation (in this example, increasing control is exerted by a city government).

Institutionalization can even hinder the transformative outcomes that some individuals had envisioned, because the process emphasizes the visions and interests of certain people and groups over others. For example, institutionalization, when it favors those who are resistant to innovation and their attempts to redefine or revert radical change, can lead to system reproduction (i.e. 'disruption' and 'capture' outcomes in the SoGA theory of change, see Fig 1) (Avelino and Rotmans 2009, Moore and Tjornbo 2012, Moore et al. 2012, Pel and Bauler 2014). For many this outcome is undesirable because it maintains current systems that are untenable, given that humanity has already transgressed its safe operating space (Richardson et al. 2023) and because unintended outcomes are likely to appear out of a contested or confrontational process of institutionalization (Westley et al. 2009). However, the outcome of system reproduction is more likely than system transformation, because structures that are already institutionalized (i.e. the state, regulations) and their selection environments (i.e. people's preferences and practices, physical infrastructure) reinforce incumbent regimes and maintain the status quo, making it extremely difficult to introduce any change that is not incremental, in the form of alternative rules, practices, values, or worldviews (Barnes et al. 2018).

System transformation can be conceived as the (very broad) desired outcome of institutionalization by people committed to system change, resulting from the 'stretching-and-transforming' of existing structures and institutions (Smith and Raven 2012). Institutionalization fosters system transformation by anchoring a new trajectory. Doing so requires that actors with greater capacity to grow and entrench innovations intervene strategically and carefully to support seed initiatives (for example, by connecting them with resources) but not overly manage and control them. Thus, the relationships of seed initiatives with other actors during transformations (e.g. other seed initiatives, NGOs, businesses, governments) become increasingly important as the process of institutionalization plays out. Luckily, collaborative approaches to institutionalizing more equitable, sustainable, and radically innovative pathways already exist in many of the world's cities, which are hotspots of transformations.

2.4 CITIES AS HOTSPOTS OF TRANSFORMATIONS

Cities are hubs of innovation - places where diverse ideas, social practices, ways of living and ways of relating to place and space co-exist (Longhurst 2015). People and organizations in cities participate in shaping and changing their environment to better meet their needs, especially when current unsustainable systems fall short. They may do so by experimenting with innovations that address the failures of systems of provision that coalesce in cities, such as food, transportation, and waste management (McCormick et al. 2013). Cities are dense with institutions, social networks and intermediaries playing influential roles in transformation (Amin and Thrift 1995).

This social density promotes interactions between actors representing different parts of society like citizens, businesses, government and non-governmental organizations. Cross-sector, multi-actor interactions promote the sharing of knowledge, ideas and resources, and cultivates opportunities for learning and development (Schot and Geels 2007). We might say that cities, by their very nature, favor conditions that foster the emergence of radical novelties and promote interactions that drive the adoption and institutionalization of innovations, possibly leading to transformations at small and large scales (Geels 2011, Wolfram 2016).

Transforming the world's cities towards sustainability necessarily involves a role for governments, which are key to institutionalizing new ideas and innovations. Governments can

drive structural changes by drawing on institutionalizing mechanisms (see Table 3), which include creating policies and plans, changing rules (Anguelovski and Carmin 2011, Pasquini and Shearing 2014), forging strategic partnerships (Westley et al. 2013, Ehnert et al. 2018), professionalizing innovations by creating new jobs, establishing committees or bureaus to support innovations (Barnes et al. 2018, Gernert et al. 2018), and dedicating resources to supporting transformational efforts (Yin 1981, Roberts 2008, Westley et al. 2013). These formal, top-down approaches to bringing about structural changes remain useful, especially when they draw on resources that are exclusively accessible to people in power (e.g. legislative resources). However, top-down approaches alone may be insufficiently nuanced for tackling the complex and wicked urban challenges that cities face today (Fudge and Peters 2009). A number of studies have shown that the role of governments in transformations can be innovative, collaborative, and supportive of existing and emergent bottom-up seed initiatives for improved urban sustainability and resilience (e.g. Abels 2014, Amundsen et al. 2018, Macedo et al. 2020, Bradley et al. 2022), and that taking a blended (top-down and bottom-up) approach to advancing transformative change may be most effective (Elzen et al. 2012, Fudge et al. 2016).

Local governments are uniquely positioned to support existing bottom-up efforts and build on the work of seed initiatives because they operate within local social, cultural and economic contexts, which shape local challenges and their potential solutions. Local governments also represent the closest link to place-based communities and are therefore better able to affect the behavior of individuals (Burch 2010) and to empower individuals to actively engage in efforts towards, and discussions about, sustainable living and sustainability transformations (Fudge and Peters 2009, Elzen et al. 2012). Given that studies about institutionalization have focused on national and regional governance contexts (e.g. Fuenfschilling and Truffer 2016, Raven et al. 2016), there is a need to further explore the unique role of local governments in supporting bottom-up seed initiatives and institutionalizing transformative change, with sensitivity to local context and on-the-ground realities (Bulkeley et al. 2011, Bolton and Foxon 2013, Fudge et al. 2016). In doing so, close attention must be paid to how seed initiatives, local governments and other actors involved in transformations interact and influence transformational processes and dynamics.

2.5 CONCLUSION

In this chapter, I synthesized existing knowledge about sustainability transformations, with a focus on integrating across different theories and frameworks of transformative change. I presented theoretically and empirically derived perspectives on how institutionalization occurs, and how it can influence the dynamics and outcomes of transformations. I framed institutionalization as being a result of actions and interactions between diverse actors and introduced the potential downsides of institutionalization for realizing truly transformational change. I highlighted the potential of cities for triggering transformative changes in societies and place-based communities, as hotspots of transformations. The review process I undertook in this chapter helped me to develop a more complete and coherent understanding of institutionalization, and led me to propose a new, integrated definition of the concept, which is likely to facilitate future research on, and implementation of, transformation.

CONNECTING STATEMENT

Existing literature on sustainability transitions/transformations offers an insufficiently developed and unified understanding of institutionalization, and lacks a clear definition of institutionalization, which represents a key dimension of navigating and consolidating transformative change in theories of transformations (Wamsler et al. 2014, Xie et al. 2022). As a result, there is a lack of applicable knowledge about how to navigate the shift from early-stage experimentation towards later-stage institutionalization to produce and maintain desirable and transformative outcomes (Clegg 1989, Sengers et al. 2021). My literature review in Chapter 2 addressed the need for a conceptualization of institutionalization that combines theoretical and empirical insights across various (sub-)disciplines studying transformative change. I offered an integrative explanation and an integrated definition of institutionalization, as a first attempt at clarifying what remains a rather "fuzzy" concept in the literature on sustainability transitions/transformations.

Still, we need to develop an 'inside view' of transformations by acquiring a more grounded understanding of transformational processes, including institutionalization, with an approach that is sensitive to the complexity of particular contexts and settings (Patterson et al. 2021). Empirical studies that have explored institutionalization have mainly observed the process at national and regional scales (eg. Fuenfschilling and Truffer 2016, Raven et al. 2016), creating a gap in knowledge about how institutionalization occurs at local scales, such as in cities or boroughs, where it is likely to involve interactions between different (types of) actors, strategies, and resources (Adams et al. 2023, Barnes et al. 2018, Pasquini and Shearing 2014). In Chapter 3, I contribute to building empirical knowledge of institutionalization at a local scale, by conducting a case study that investigates the interactions of diverse actors and their interventions to institutionalize urban agriculture in a borough of the city of Montréal, in Canada.

CHAPTER 3

Pathways to Transformation: Institutionalizing Urban Agriculture in a Montreal Borough

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3.1 ABSTRACT

Around the world, cities and their residents are sowing the seeds of a good Anthropocene by experimenting with innovations for greater social and ecological sustainability. While such 'seed initiatives' tend to emerge and experiment in the margins of society, some may succeed in widely diffusing their innovations, and embedding them into new or changing systems and structures. This transformational process, called institutionalization, is thought to be crucial for accelerating transformations in cities and ensuring the persistence of change. Our study sought to deepen empirical understanding of the process and dynamics of institutionalization by investigating how seed initiatives interact with other actors and their interventions to institutionalize innovations in the pursuit of transformative goals and visions. We conducted a qualitative case study based in Rivière-des-Prairies-Pointe-aux-Trembles, a borough in the city of Montreal, Canada where urban agriculture became more strongly institutionalized in response to the local government's enactment of an urban agriculture policy in 2019. Semi-structured interviews with governmental and non-governmental actors (n = 46) led us to uncover the importance of sharing a vision of transformation, of champions who mobilize for change and intermediaries who help to navigate change, and of interventions that create actor and resource synergies. We observed that certain aspects of transformations, including actors' roles and the boundaries of experimentation, are dynamic and evolve as the transformation unfolds. Finally,

we discovered that institutionalization may begin early in the process of change and unfold across all phases of transformation in a pathway that is more circular and iterative than current theories suggest. We present an alternative theory of change that better reflects the case studied, while contributing to expanding understanding about institutionalization at a local scale, in a city-context.

Keywords: amplification; ecological transition; institutionalization; institutionalisation; local government; mainstreaming; seeds of good anthropocenes; social innovation; sustainability transformation; sustainability transition; urban agriculture

3.2 INTRODUCTION

Improving urban sustainability requires tackling intertwined social and ecological challenges such as biodiversity loss, climate change, and inequality (Herrero et al. 2021, Krueger et al. 2022). Addressing such wicked problems will, in turn, require radical, systemic, and accelerated change (Olsson et al. 2014, Blythe et al. 2018). Such transformations towards sustainability involve fundamental changes in how we live in and understand the world (Westley et al., 2011), qualitative changes in societies' values, practices, and institutions (Sharma 2007, O'Brien and Sygna 2013, Loorbach et al. 2017), and deep and structural alterations of current and unsustainable systems (Geels 2011, Pereira et al. 2020).

In cities around the world, people are putting their visions of a sustainable society into practice (Wittmayer et al. 2019) by starting small-scale, locally rooted initiatives that experiment with alternative and innovative ways of thinking, doing, organizing, and engaging with the world (Gernert et al. 2018, Lam et al. 2020). These 'Seeds of Good Anthropocenes' (hereafter 'seed initiatives') present hopeful solutions to persistent problems in an effort to create more equitable and sustainable cities (Bennett et al. 2016). Many researchers believe that such seeds are likely to play a role in catalyzing sustainability transformations towards brighter futures in the world's cities (e.g. Sellberg et al. 2020, McPhearson et al. 2021, Hebinck 2021).

Research on sustainability transformations has advanced understanding about how seed initiatives emerge, experiment with alternative pathways and innovations, and self-organize into networks, thus creating momentum for transformation (Pereira et al. 2018). Less is known about how the shift from experimentation to the institutionalization of innovations occurs in reality,

and about how seed initiatives interact with other actors and their interventions to support or hinder transformative change during this shift (Elzen et al. 2012). The institutionalization of innovations, which broadly refers to their widespread diffusion and embedding into new regimes, is critical for attaining longer-lasting impacts and realizing broader systemic change (Wamsler et al. 2014, Gorissen et al. 2018, Pereira et al. 2018).

The overarching objective of this study was to deepen empirical understanding about institutionalization at a local scale and in the context of urban sustainability transformations. Specifically, we sought to better understand how seed initiatives interact with other actors and interventions that engage with and shape the process of institutionalization, while responding to calls for paying greater attention to the influence of local governments in guiding transformative change in cities (Bulkeley et al. 2011, Bolton and Foxon 2013, Fudge et al. 2016). We conducted a case study examining the institutionalization of urban agriculture linked to a local government-enacted policy in a borough of Montréal, Québec, Canada.

In the following section, we offer a literature review on institutionalization, framing it in the context of transitions and transformations towards sustainability, considering the role of governments, and identifying other actors and key strategies for institutionalization. We then outline our methodology for data collection and analysis. Subsequently, we introduce our case study and research findings and follow with a discussion of the results. In the final section, we present our conclusions.

3.3 CONCEPTUAL BACKGROUND

3.3.1 *Institutionalization in the context of sustainability transformations*

Research in the field of sustainability transformations is primarily centered on theories of bottom-up change (i.e. catalyzed by seed initiatives) over multiple phases of transformation. For example, Pereira et al. (2018)'s 'Seeds of Good Anthropocenes' theory of transformations builds on the sociotechnical transitions (Geels 2002) and the social-ecological transformations frameworks (Olsson et al. 2006, Moore et al. 2014) to describe different phases of transformations from preparation to navigating change to consolidating change (Fig. 3.1). This

popular theory of change posits that transformations begin with a preparation phase, during which seed initiatives emerge, and experiment with alternative pathways and innovations to solve persistent problems or challenge the dominant regime. As seed initiatives self-organize to create and mobilize networks, they gather momentum for transformation. An opportunity for institutional change, typically in the form of crisis or anticipated crisis, opens a window to the second phase of navigating change, where new regime innovations become partly institutionalized, as worldviews start to change. The third phase, consolidation, leads to one of three possible outcomes: transformation (innovations become widely institutionalized into new regimes), disruption (innovations become incorporated into the dominant regime), or capture (innovations are "squeezed out" by the dominant regime).

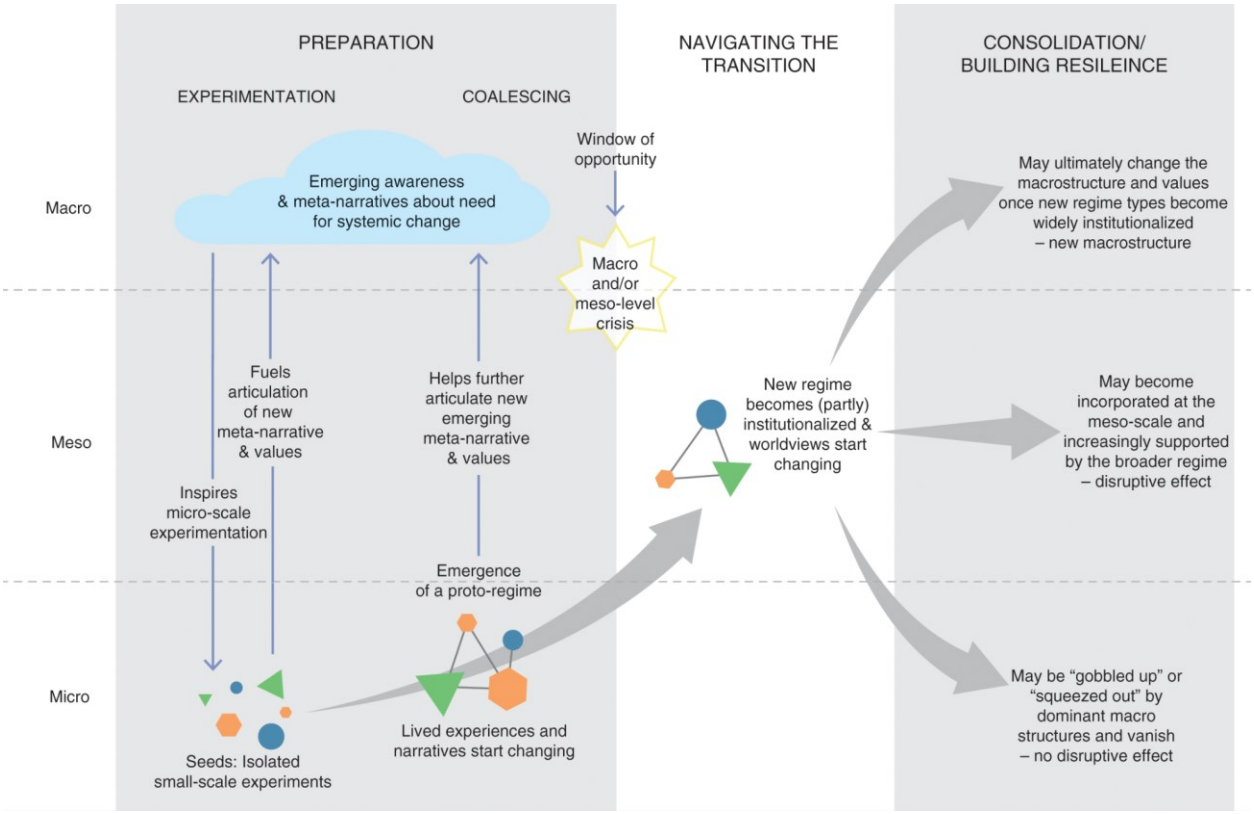

Figure 3.1 The 'Seeds of Good Anthropocenes' multi-phase bottom-up theory of transformations. From Pereira et al. 2018, used under Creative Commons CC-BY-NC-ND license.

While a great deal of attention has been paid to identifying seed initiatives and learning about the early preparation phase of transformation, understanding about how innovations become

institutionalized in the turbulent phase of navigating the transition remains limited (Elzen et al. 2012, Wamsler et al. 2014, Gorissen et al. 2018, Pereira et al. 2018). Furthermore, the term 'institutionalization' is rarely clearly defined in the literature on sustainability transformations and is sometimes conflated with other similar concepts (e.g. 'acceleration', 'anchoring', 'mainstreaming'). Here, we have integrated ideas from social innovation, socio-technical transitions, and institutional theory to define institutionalization as a transformational process that diffuses innovations across a greater diversity of adopters, and embeds them in new or evolving regimes by building their legitimacy, coherence, and stability via the interactions of diverse actors and their formal and informal actions (Tolbert and Zucker 1983, 1999, DiMaggio 1999, Anguelovski and Carmin 2011, Clegg 2012, Fuenfschilling and Truffer 2014, Pel and Bauler 2014).

The more legitimized, coherent, and stable an innovation is within a system of interest, the more it is institutionalized (Zucker 1977, Burch 2010, Fuenfschilling and Truffer 2014). An innovation gains legitimacy as it becomes increasingly adopted by more diverse and more powerful actors working to change laws, regulations, norms, values, practices, technologies, and policy to support the innovation's embedding, as well as forming alliances and discouraging resistance by opposing actors (Hajer 1995, Anguelovski and Carmin 2011, Pel and Bauler 2014, Bibri and Krogstie 2017). Coherence is enhanced when people develop shared understandings of what an innovation entails and build consensus on its value and functionality (Tolbert and Zucker 1999, Fuenfschilling and Truffer 2014), leading to a convergence of visions and activities (Burch 2010, Burch et al. 2014). Finally, the diffusion of an innovation across a population of potential adopters, and the mobilization of resources by actors with vested interests in the innovation, enhances its stability.

Understanding institutionalization - including identifying who institutionalizes innovations and how they do so - is key for achieving desired outcomes and managing transformation, because systemic transformation is more easily achieved when innovations have been widely institutionalized (Fuenfschilling and Truffer 2014, Pel and Bauler 2014).

3.3.2 *The role of governments in institutionalization*

Governments tend to be associated with an overly simplified 'homogeneous regime' (Seyfang et al. 2014, Fudge et al. 2016) that is assumed to compete against innovation in order to maintain the status quo (Fischer and Newig 2016), and yet researchers across a number of disciplines have shown that governments can respond to, and interact with, bottom-up seed initiatives by taking an innovative and collaborative approach to institutionalizing transformative changes (e.g. Abels 2014, Amundsen et al. 2018, Macedo et al. 2020, Bradley et al. 2022). Policy makers are recognizing that conventional top-down measures are insufficiently nuanced for tackling wicked urban sustainability challenges (Fudge and Peters 2009). Instead, change efforts that blend top-down approaches focusing on structural change with bottom-up innovative actions (called 'dual track' governance) may prove more effective (Elzen et al. 2012, Fudge et al. 2016).

Governments are well-positioned to drive structural change by drawing on mechanisms that contribute to institutionalization, such as the development and enactment of policies, strategies and action plans and the creation or reforming of regulations (Anguelovski and Carmin 2011, Pasquini and Shearing 2014), the formation of strategic partnerships (Westley et al. 2013, Ehnert et al. 2018), the creation of jobs and the establishment of new committees or bureaus to support the innovation (Barnes et al. 2018, Gernert et al. 2018), and the allocation of resources to seed initiatives (Yin 1981, Roberts 2008, Westley et al. 2013). Some of these mechanisms for institutionalization draw on resources that are exclusive to governments (e.g. legislative resources), such that government involvement may be required for introducing additional or different, and previously unavailable, resources to the process of transformation.

Local governments are uniquely positioned to intervene in transformations by building on the bottom-up efforts of seed initiatives, having greater sensitivity to local social, cultural and economic contexts, which shape local challenges and their potential solutions. In certain cities, including Montréal, the most local level of government operates at the scale of boroughs. Boroughs are governed by elected mayors and councilors, allocated budgets, and made responsible for various aspects of city life, including local urban planning, roadways, cultural and social development, and parks and recreation. Such (hyper-)local governments, being closest to where the impacts of environmental change are felt (Pasquini and Shearing 2014) and at

which responses are put into action (Betsill and Bulkeley 2005), are more likely to empower individuals to actively engage in efforts towards, and discussions about, sustainable living and sustainability transformations (Fudge and Peters 2009, Elzen et al. 2012). This notion, coupled with the fact that studies about institutionalization has thus far focussed on the national and regional levels (e.g. Fuenfschilling and Truffer 2016, Raven et al. 2016), create a pressing need for research on the potential role and influence of (hyper-)local governments in institutionalization, and more broadly in urban transformations towards sustainability (Bulkeley et al. 2011, Bolton and Foxon 2013, Fudge et al. 2016).

3.3.3 *Actors' roles and strategies during institutionalization*

During institutionalization, the actors engaged in the process of change become increasingly diverse (Tolbert and Zucker 1999, Fuenfschilling and Truffer 2014), employing different strategies and mobilizing different resources in the pursuit of possibly different goals (Avelino 2011, Farla et al. 2012). Understanding institutionalization therefore requires examining the relationships, interactions, and dynamics among these various actors (Ehnert 2023a, 2023b). Navigating institutionalization requires mediating and linking across actors (Loorbach et al. 2017).

Some scholars have highlighted the important role of intermediaries for navigating these multi-actor interactions by translating visions and linking activities, skills, resources, and storylines across different actors (Hermans et al. 2016, Kivimaa et al. 2019a, 2019b). Others have noted the key influence of hybrid actors during institutionalization, who are insiders to more than one group, and thereby assume various roles that allow them to deploy diverse strategies and leverage different types of resources, transferring them across sectors such as government and the civic sector (Garud et al. 2007, Kivisaari et al. 2013, Elzen et al. 2012, Smink et al. 2015). Both intermediary and hybrid actors require good interpersonal, networking, and trust building competencies (Williams 2002).

We synthesized the insights of Kivimaa et al. (2019b) and Westley et al. (2013) on the key strategies that actors - intermediary, hybrid, seed, governmental, non-governmental organizations

and community actors, can employ to accumulate resources and accelerate change during the process of institutionalization (see Table D2 in Appendix D). These are: 1) mobilizing for change, 2) managing relationships and 3) capacity building.

Mobilizing for change involves raising awareness about an innovation, creating common visions and setting shared goals, building legitimacy for the new pathway or innovation, lobbying for visibility and resources, establishing intermediary roles and organizations to help navigate the transition, and strengthening political and institutional space to support experimentation and innovation. *Managing relationships* involves translating between actors and 'spaces' or sectors, creating community cohesion across shared aspirations, aligning different perspectives, and integrating diverse ideas. *Capacity building* involves developing multi-actor coalitions, creating and protecting safe spaces for interaction and collaboration, spreading knowledge, and expanding expertise to fit the needs of the transformation.

To date, institutionalization has been under-conceptualized in the literature on sustainability transformations (Wamsler et al. 2014, Xie et al. 2022). We looked to related disciplines, including the field of socio-technical transitions, to understand how this fundamental process occurs, but found that studies have mainly investigated institutionalization at national and regional scales (eg. Fuenfschilling and Truffer 2016, Raven et al. 2016). Empirical understanding about institutionalization at the local level, and about the interplay of different actors, strategies, and resources in this process, thus remains limited (Adams et al. 2023, Barnes et al. 2018, Pasquini and Shearing 2014).

To address this knowledge gap, we explored a real example of institutionalization in Montréal, Canada, where urban agriculture is playing an increasingly important role in the city's ecological transition ('transition écologique') objectives (Ville de Montréal 2021), which include achieving carbon neutrality by 2050 and tackling environmental and social issues by adopting new ways of consuming, producing, working, and living together (Montréal 2021). We focused on the interactions of seed initiatives with the actors and interventions tied to a local government policy to institutionalize urban agriculture in the borough of Rivière-des-Prairies-Pointe-aux-Trembles (RDP-PAT). The overarching research question is: *How do seed initiatives' interactions with*

other actors and their interventions to institutionalize urban agriculture shape pathways to transformation?

3.4 CASE STUDY

3.4.1 *Urban agriculture in Montréal, Canada*

Urban agriculture, the production of food in cities, shapes, and is shaped by, a city's economic, social, and ecological systems: its activities often use city resources (e.g., land, urban organic wastes, water) and are influenced by urban conditions (e.g., policies, competition for land) as well as climate and environmental conditions. In turn, urban agriculture produces food for residents and affects multiple dimensions of city life, from food security to urban biodiversity (Mougeot 2000, Langemeyer 2021, Horst et al. 2024). Urban agriculture is increasingly being formalized via local government interventions seeking to make cities more liveable, sustainable and resilient (Mansfield and Mendes 2013, Hammelman 2019).

In Montréal, urban agriculture is flourishing. From 2010 to 2021, the number of urban agriculture initiatives in Montréal tripled (Ville de Montréal 2021: 12). Many of these are collective grassroots initiatives that eventually gained the support of the municipality, which has a history of active civic engagement (Bach 2016, Bhatt and Farah 2016). Urban agriculture was integrated into the city's plans for the first time in its 2010-2015 Community Sustainable Development Plan (Ville de Montréal 2010), following demands by residents and NGOs for increased municipal leadership in supporting emerging and existing urban agriculture initiatives. In 2011, over 25,000 signatures were acquired through a petition calling for a public hearing on the state of urban agriculture in Montréal (OCPM 2012). In response to this rising momentum for urban agriculture in Montréal, a permanent urban agriculture committee was created in 2013 (Sloan 2014).

The Montréal 2030 Citywide Strategic Plan and the Montréal Climate Plan 2020-2030 have given borough governments the impetus to align their actions with the city's objectives (Baril et al. 2021). Since 2021, these plans have included a multi-year urban agriculture strategy designed to contribute to Montréal's ecological transition (Ville de Montréal 2021). A recent comparative

study of ten cities showed that Montréal's global and borough-level urban agriculture strategies and policies are unmatched, emphasizing the importance that urban agriculture occupies in the city's politics (Druine and Duchemin 2023).

3.4.2 *The borough of Rivière-des-Prairies-Pointe-aux-Trembles, Montréal*

We based our study in Rivière-des-Prairies-Pointe-aux-Trembles (RDP-PAT) because it was the first borough in Montréal to enact an urban agriculture policy, as well as being a lower-income borough (Pampalon et al. 2012) that has received less research attention. As the city's second largest borough, RDP-PAT spans 43.2 km^2 and is located on the northeastern outskirts of the island of Montréal (Ville de Montréal 2019:5) (Fig. 3.2). The borough's administrative boundaries encompass two demographically, culturally, and economically distinct neighborhoods: Rivière-des-Prairies (RDP) is materially deprived (inadequate access to necessities) (Direction de la santé publique 2011:5) and culturally diverse, with a high immigrant population, particularly of Haitian and Italian descent (Montréal en statistiques 2017a:2). Pointe-aux-Trembles (PAT) is socially deprived (exclusion from social opportunities and networks) (Direction de la santé publique 2011:6) and home to few immigrants (Montréal en statistiques 2017b:2). Once a dynamic agricultural region, RDP-PAT underwent rapid industrial and residential development in the first half of the 20th century (RDP-PAT 2019). Today, there are 90 hectares of un(der)used land in the borough's industrial zones, representing a unique potential for development (RDP-PAT 2019). Importantly, RDP-PAT is a food desert. Much of the population lives more than 500 meters away from the nearest supermarket and has limited access to fresh fruits and vegetables, possibly contributing to the borough's lower life expectancy relative to the Montréal average (Florent 2017). The development of urban agriculture in this borough is an opportunity to tackle issues of food insecurity, cultural division, and social isolation, while providing a vocation for vacant lands.

Rivière-des-Prairies-Pointe-aux-Trembles' urban agriculture policy sets the objective of converting 30 hectares of the borough's territory to urban agriculture by the year 2030, and outlines orientations to guide the actors involved in the borough's urban agriculture transformation and determine the actions to be implemented. The policy's existence demonstrates

the borough government's willingness to support what it calls a 'plural and innovative' urban agriculture.

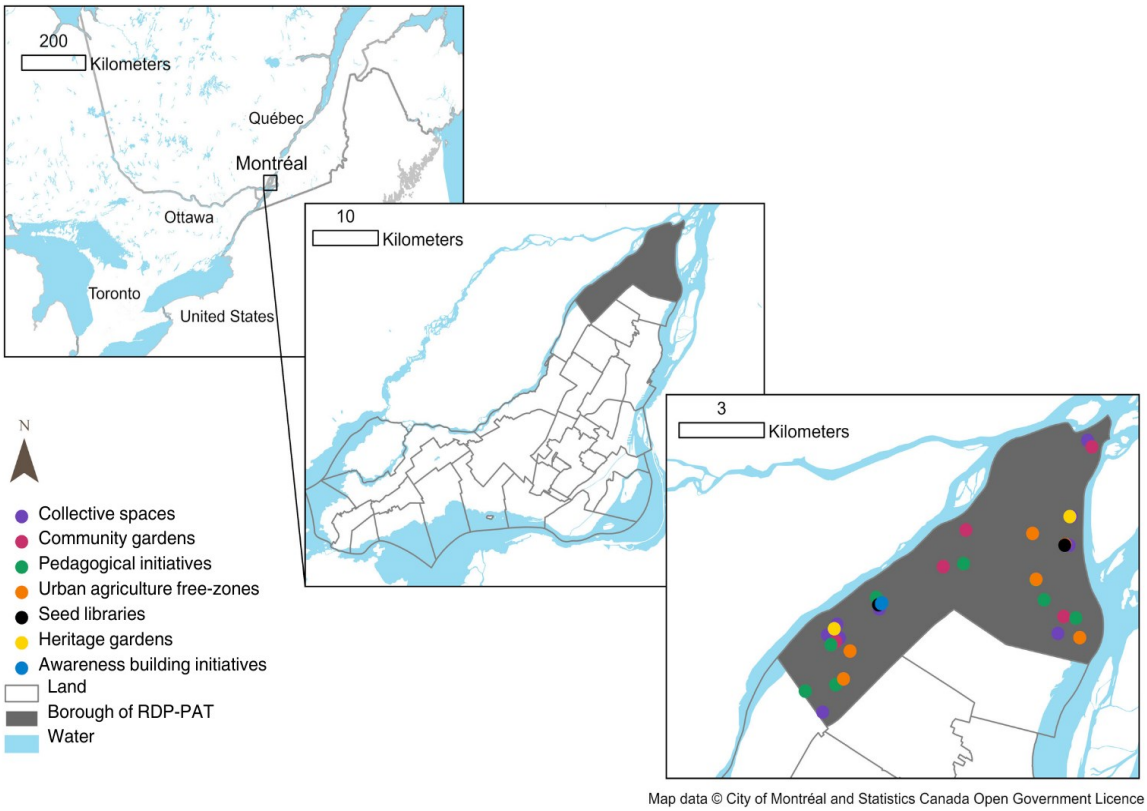

Figure 3.2 Case study area: the borough of Rivière-des-Prairies-Pointe-aux-Trembles (RDP-PAT) in the city of Montréal, Québec, a province located in eastern Canada. Colored circles are the urban agriculture seed initiatives that were identified for this study (last updated in June 2024). Collective spaces include collective gardens, eco-grazing areas and feeder forests in public parks, an art exhibition, and beehives. Awareness building refers to, for example, the integration of urban agriculture activities in summer camp curriculum, and the distribution of compost and edibles plants to residents. The figure excludes initiatives that are not location-based (i.e. activities and events). Appendix A lists and describes seed initiatives for which interviews were conducted and defines the different activity types. An interactive map of these seed initiatives is available at: https://www.google.com/maps/d/u/0/edit?mid=1pM-FdmiAYXsrcyFgOeHTDdCj6bW49HY&ll=45.64344365561274%2C-73.59686161481933&z=11

3.5 METHODS AND ANALYSIS

We adopted a qualitative case study approach, allowing for an in-depth and contextually rich description and interpretation of the institutionalization of urban agriculture in RDP-PAT (Eisenhardt 1989), integrating in-depth semi-structured interviews (n=46) (as a primary data source) with participant observation and document analysis (Given 2008) to describe and interpret the multi-actor dynamics and implications of institutionalizing urban agriculture in RDP-PAT via a government-enacted policy.

The lead author led the data collection and analysis with an insider perspective as a native French speaker born and raised in Montreal. Despite this familiarity, they were an outsider to the specific experience of living or working in the borough of RDP-PAT. Participant observation and an internship at a local organization allowed the lead author to gain a deeper understanding of the local context in which the events and dynamics under study occurred.

Participant observation

Participant observation enabled us to contextualize the study by observing first-hand the conditions in the borough, learn about urban agriculture projects, and build rapport with the community of urban agriculture practitioners (Saldana 2011), while also enabling identification and recruitment of study participants. From June to November 2023, the lead author completed a 200-hour internship with an organization in the borough that led activities and managed urban agriculture projects including advising citizens, local organizations, and the borough government. This internship created opportunities to participate in urban agriculture events in the borough, exchange with the local community of urban agriculture practitioners, visit project sites, meet project leaders, and sit-in on private meetings, all of which deepened contextual understanding for the study, and generated insights about seed actors' motivations, challenges, and overall experiences with starting projects in the borough.

Interviews

Semi-structured interviews were the primary data source for this study. Individuals were selected based on two criteria: whether they had started or led seed initiatives in the borough, and whether they had contributed to developing and implementing the borough's urban agriculture policy and

actions in the first plan associated with the policy. We then categorized participants based on whether their involvement with urban agriculture in the borough was primarily 1) through a role in government, 2) through their employment in a non-governmental or community organization, or 3) as independent actors.

We started by contacting all 16 members of the RDP-PAT urban agriculture policy's coordination committee (RDP-PAT 2019). This committee was intersectoral, involving governmental actors from several departments and divisions, non-governmental organizational actors, and one resident of the borough. We successfully recruited and interviewed nine members of this committee.

Next, we identified seed initiatives in the borough using a map of urban agriculture projects in RDP-PAT published by the borough administration (RDP-PAT 2022). If contact details were not available online, we relied on our participation in borough agricultural activities to make connections. We recruited project leaders and initiators for interviews (a maximum of two representatives per project), to obtain their perspectives on and experiences with sowing the 'seeds' of urban agriculture in the borough. Additional participants and seed initiatives were identified through participant observation and during interviews using a snowball method, until saturation was reached, and no new names were offered (Bernard 2006a, Parker et al. 2019). This approach guarded against excluding from the study any individuals and organizations playing key roles in the borough's urban agriculture transformation.

We stratified between different types of actors (Bernard 2006b) to capture diverse perspectives on RDP-PAT's urban agriculture transformation. Our final participant population included local governmental actors (20%), non-governmental organizational actors (57%) and independent actors (28%) (see Appendix B in Supplementary Material for detailed information about interviews and participants). Two participants belonged to two of these actor-categories, fulfilling dual roles simultaneously or at different moments in the borough's transformation.

Between July 2023 and January 2024, the lead author conducted semi-structured interviews with 46 participants. We recruited interview participants in person, via email, or by phone call, and

explained the study's objectives, the reason they had been identified for participation in the study, their rights, and the measures in place to ensure confidentiality. We provided each participant with a written consent form before the interview, in addition to asking for oral consent at the start of the interview. The study was approved by McGill and Guelph Universities' research ethics boards (REB # 23-04-099 and 23-07-028). The interviews followed a guide consisting of open-ended questions but remained flexible to allow interviewees to freely express themselves (Hay and Cope, 2005: 81). We collected information on interviewees' perceptions of the borough and its evolution since the policy's enactment, their involvement with the 2019 urban agriculture policy, its implications for their activities, the goals and conditions that motivated their actions, and the limitations they faced to realizing these goals (see Appendix C in Supplementary Material for interview guide). Interviews were conducted at project sites or at participants' homes or workplaces and ranged between 30 minutes and 1.5 hours. Most interviews were conducted in-person (31 interviews), but when this wasn't possible, they were conducted online using the platform Zoom (14) or by telephone (1). Participants had the choice of being interviewed in French or English by the bilingual lead author (only one interview was conducted in English). Interviews were recorded, then transcribed using the software program Sonix.ai. Transcripts were cleaned and cross-checked for accuracy using the audio recordings of the interviews.

Document Analysis

We ensured a triangulation of data sources by complementing participant observation and semi-structured interviews with an evaluation of relevant documents (Denzin 2017). These documents included RDP-PAT's 2019 urban agriculture policy and its first associated action plan, news articles, municipal reports and web pages, the annual reports of a local organization in the borough, and an account of community gardens in RDP-PAT produced by a local artist. To enhance the credibility of our analysis, we corroborated findings across data sets (Bowen 2009). For example, to enumerate the seed initiatives in the borough over time and determine the establishment date of all known seeds, we compared the data derived from interviews against that of documents.

Data Analysis

We conducted a thematic analysis that iteratively combined deductive coding (based on the pre-established themes that informed our interview questions) with inductive coding (based on themes that emerged from the data) (Guest et al. 2012, Saldana 2021, p. 65). Applying codes to raw data facilitates later analysis by organizing text according to the concepts and themes that characterize a study (Guest et al. 2012). Our initial collection of codes consisted of descriptive and thematic codes (and sub-codes) based on interview questions (e.g. 'borough conditions', 'personal motivations', 'influential actors') (see Table D1 in Appendix D). We performed a first round of deductive coding using this initial collection of codes, while allowing new hypotheses to emerge and inform our coding process (i.e. inductive codes) (Miles et al. 2014). We quickly realized that pre-established as well as emergent ideas and themes broadly related to the theoretical discussion around the interplay between 'actors', 'strategies', 'resources', and their 'willingness to act' in support of transformation (Avelino 2011, Farla et al. 2012, Borras et al. 2023), so we allowed these parent-codes to form the basis of this study's analytical framework. We associated existing codes to these new parent codes, then derived additional, theoretically informed, sub-codes using literature exploring key actors, strategies, and resources for institutionalization (see Table D2 in Appendix D). We then performed a second and final round of deductive coding using the updated collection of codes (those included in Table y, in addition to descriptive codes). Segments were coded more than once to identify relationships between the different concepts investigated (i.e. a single segment coded as one or multiple actors, strategies, and resources). Resources were further coded as 'have' (access to resource-type) and 'don't have' (lack of, or insufficient, access to resource-type). The quotes presented in the results were translated from French to English using the translation software DeepL, then verified by the lead author. Pseudonyms were used to maintain the anonymity of the people and organizations.

3.6 RESULTS

3.6.1 *Dissatisfaction and opportunity create willingness to act*

RDP-PAT is an industrial neighborhood with a negative reputation among Montrealers; an interviewee (I2) who grew up in the borough summarized that reputation by stating *"we are the*

city's garbage". Other interviewees described RDP-PAT using words such as 'contaminated' and 'neglected', 'asleep', and 'not trendy, nor progressive'. Many commented on the borough's lack of community life, pointing to causal factors such as poor walkability reducing the likelihood of chance encounters, marginalized cultural communities, gang violence, disparity between rich and poor, and division between the RDP and PAT neighborhoods.

"When many oil refineries recently closed, there was a need to find a new vocation" for the borough, explained the leader of a collective garden (I10). A community garden president (I6) said: *"as the only borough with so much vacant land still available…we had enormous potential."* The director of a local organization (I1) explained that *"recognizing this potential sowed a seed in people's minds"*. As stated by a city councilor (I2), the development of a plural and collective urban agriculture on un(der)used territory would help the borough address its issues of food insecurity and social isolation by enhancing access to fresh foods, promoting intergenerational exchange, educating youth and bridging the divide between cultural communities. It would provide an opportunity to change people's perceptions of the borough because, as stated by an urban agriculture professional (I18), *"if we can grow vegetables, it means that the territory is not so contaminated anymore."*

Widespread dissatisfaction with current conditions in RDP-PAT, along with the desire to change negative perceptions of the borough, were palpable among interviewees across actor categories. These shared sentiments, coupled with the enormous potential for urban agriculture development on RDP-PAT's territory due to the presence of vacant space, acted as fuel for the borough's transformation by motivating people to act towards realizing the common "vision of making RDP-PAT a good place to live" (RDP-PAT 2019).

3.6.2 *Isolated seed initiatives draw the attention of decision-makers*

Interviewees indicated that before the 2019 policy, individualized forms of urban agriculture, such as backyard gardening, prevailed over community-based activities, and only a small number of collective urban agriculture seeds existed in the borough (Fig 3.3). Interviewees' accounts of seed initiatives established in the borough before the urban agriculture policy's enactment were verified via internet research, and by reviewing a local environmental organization's annual

reports and a local artist's published account of the borough's community gardens. Before 2019, the borough had six community gardens, co-managed by dedicated gardeners and the borough government, a greenhouse providing horticulture education and a safe space to vulnerable youth, a collective garden promoting food security and urban biodiversity, and shared planter boxes called 'free-zones' in public spaces, managed by ÉcoUrbain. Alongside these community-based initiatives, governmental actors with a background in horticulture, or a keen interest in sustainability, reported incorporating urban agriculture into their work. A cultural agent involved in the policy's development (I38) said: *"there were a number of small actions carried out by every [government] division, but it wasn't consolidated."* They described urban agriculture activities in the borough at this time as *"one-off, piecemeal projects"*, adding that *"there wasn't necessarily any money attached to these actions."* Thus, seed initiatives in the borough before the policy were mostly isolated, unconsolidated, and undercapitalized.

Still, the passionate dedication of seed actors attracted the interest of local governmental actors and may have played a role in inspiring the creation of a policy, by showcasing urban agriculture's potential for improving life in RDP-PAT. In an interview with a local media outlet, a city councilor whom we also interviewed for this study (I2) said: *"it was the presence of these passionate gardeners that initially motivated us to get involved in urban agriculture politics and took us further, because we can see the positive impact,"* (Largier 2023). The leader of the borough's first and largest collective garden (I10) expressed disappointment when the garden's role in inspiring the policy was *"a bit overlooked. When they announced the policy, they never named the garden as an integral part of that project. On the other hand, when they needed to shoot a video on urban agriculture, they asked to come and shoot it here, because it was the only place there was."* Since the garden's establishment in 2012, this seed actor actively sought the attention of local decision-makers to obtain additional funding but also to showcase their positive impact in the community. They (I10) said: *"every year we had a festive event for the gardens and we always invited the elected representatives. There was at least one city councilor who turned up regularly."* When asked whether they believed there was a link between their seed initiative and the borough government's interest in adopting an urban agriculture policy, they said: *"I certainly think [we] played a role, I would hope. The gardens are beautiful, they were very productive, even if we didn't manage to make a profit, it's impressive."*

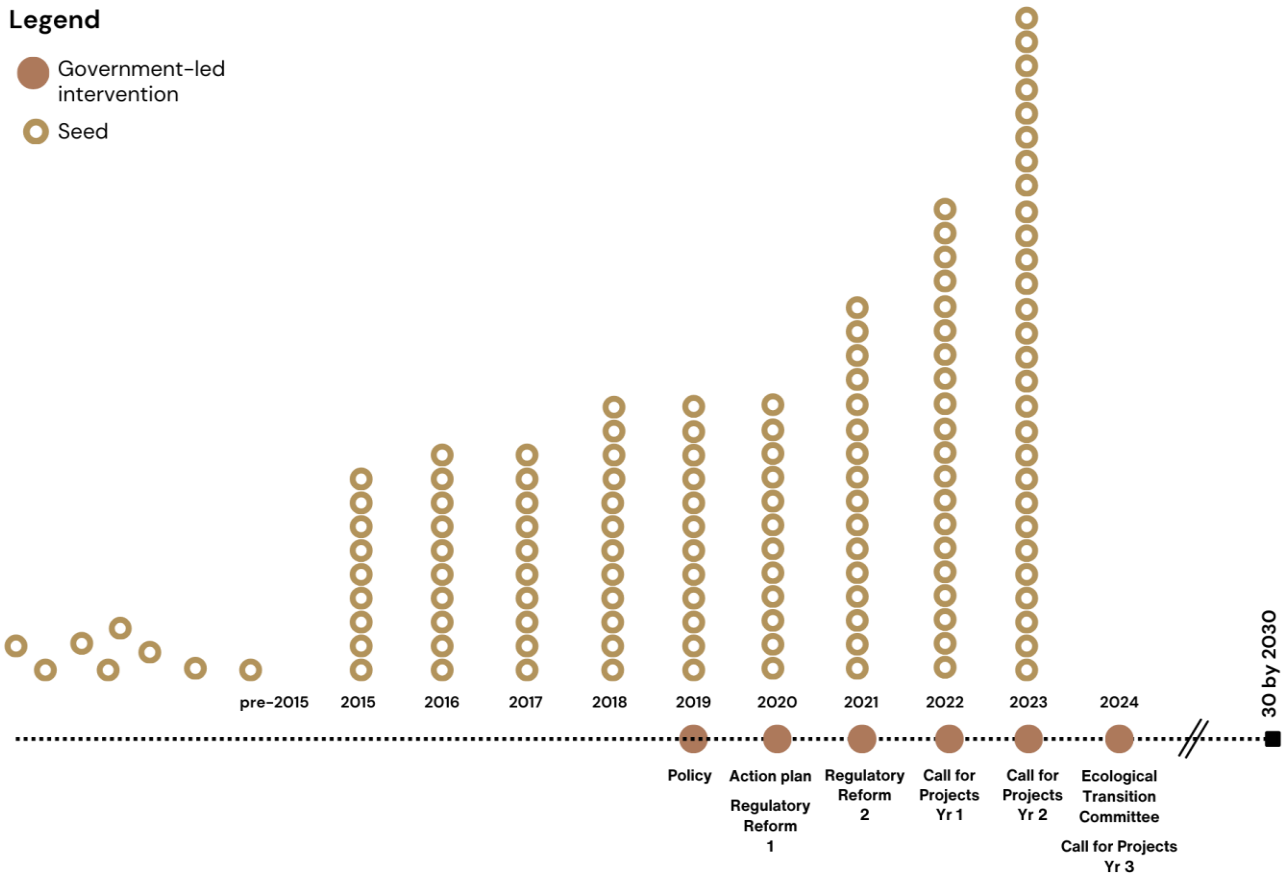

Figure 3.3 Timeline of seed initiative emergence (open circles) and government interventions in the borough's urban agriculture (closed circles). Regulatory reform 1 enabled residents to grow edible plants in their front yards. Regulatory reform 2 authorized residents to keep egg-laying hens on private property.

3.6.3 *Decision-makers seek to build a relationship with seed initiatives*

Later, in the process of developing the urban agriculture policy, the local government sought out the input of seed actors. For example, local officials solicited the advice of a devoted teacher (I8a) who co-founded a high school greenhouse in 2004 and has since developed expertise in working closely with the community, and for the benefit of the community. The greenhouse operates at the intersection of the government's efforts to alleviate social problems, including gang violence, and its co-founder's mission to create a safe educational space for vulnerable youth. The co-founder (I8a) explained this by saying: "our young people are afraid to leave their homes, so we have to offer them places where they feel safe. The greenhouse has been there for 20 years and there's never been any damage or vandalism. Why is that? Because the word has

always gotten out this place is ours and is for doing positive things. I find that really fascinating because there have been a lot of broken windows on the school, graffiti on the school, but never on the greenhouse...Here, [students] found a place where they could relax and listen, a place where they feel comfortable." However, the greenhouse's co-founder (I8a) added that their feeling of inclusion in the borough's efforts to amplify urban agriculture had stopped there: "there's no link with all that anymore…we still work too much in silos. It would be great to continue sharing in these wonderful initiatives." Sharing this sentiment, the director of a community organization (I5) stressed the importance of sustained, continuous collaboration with local actors: "intensity has to be maintained over time and we have to persevere to achieve interesting results…it's a fault of city policies; they mobilize at the start…but afterwards, it falls into oblivion…To keep residents, community organizations and partners involved, you need to update them on a regular basis."

3.6.4 *A key hybrid actor mobilizes for change*

One individual, referred to hereafter by the pseudonym Mélanie, played an outsized role in accelerating the borough's urban agriculture transformation. Mélanie was identified, more often than any other actor, as being especially influential for the borough's transformation. When describing her role, interviewees including Mélanie herself explain her progression from working closely with the community to working in government. In 2016, she took up the position of urban agriculture coordinator for a local environmental organization in partnership with the borough, referred to hereafter by the pseudonym ÉcoUrbain. She worked to enhance and diversify the offering of urban agriculture activities in RDP-PAT. Through community outreach efforts, she drew new and harder-to-reach individuals to discover and engage with urban agriculture, creating momentum beyond the existing core of practitioners. During her interview, Mélanie provided a playful example: she organized a father-and-child workshop for building bat nesting boxes and raising awareness about the role of bats as insectivores in urban agriculture. According to one interviewee (I9), Mélanie was *"the driving force behind the mobilization of local residents."*

In this position, Mélanie (I2) explained that she had a direct link to influential governmental actors: *"there were people who were mobilized, but maybe they didn't have such a strong link with the borough [government]."* This enabled her to be a voice for the borough's urban

agriculture community and positioned her favorably for convincing the government of getting involved in the politics of urban agriculture. The president of a community garden (I28) supported this idea, saying: *"I signed a petition about the chicken project. Of course, I went to the immediate person I knew, which was [Mélanie], because they were the bridge between the city and our citizens."* Hearing about the borough's plan to create an urban agriculture policy, Mélanie said she *"jumped on it"*, and said *"give me the mandate"* because she was a *"well-known figure in the sphere of urban agriculture"* with proven expertise. She therefore spearheaded the policy's development by disseminating surveys among the local population, organizing two public consultations, and forming a policy coordination committee.

Mélanie later transitioned to a role in government as city councilor for Pointe-aux-Trembles (PAT). This new role allowed her to further support the development of urban agriculture in the borough. An urban agriculture professional working across Montreal (I9) observed that *"since Mélanie moved into municipal politics, [urban agriculture] has become much more institutionalized."* For example, under Mélanie's leadership, resources were mobilized to create an 'ecological transition' committee. According to the director of the ÉcoUrbain (I1), the committee is a first of its kind in Montreal, notably for its inclusion of citizens. As the borough's transformation progressed, Mélanie's role shifted, enabling her to leverage new and different types of resources, and to remain influential at every stage in the process of change.

3.6.5 *A unifying vision of transformation is unearthed*

From public consultations to meetings of the policy coordination committee, *"these were encounters that enabled us to open a discussion on the different visions of urban agriculture,"* said a cultural agent (I38). During one such exchange, the vision of transforming RDP-PAT *"from chimneys to gardens"* was unearthed, explained Mélanie (I2). According to the director of a community development center in the borough (I5), unifying the local community around a shared vision of transformation, making residents dream, and giving them cause for action, was one of the policy's goals. While the policy document's vision to convert 30 hectares of RDP-PAT's territory to urban agriculture by 2030 failed to generate a mobilizing effect—most interviewees were either unaware of or unenthusiastic about this vision—the aspiration to improve the borough's living conditions and reputation succeeded in rallying the community. A resident and active member of the gardening community (I6) felt that *"it would be great, for*

changing perceptions, to come along and say, now our borough is going to be the champion of urban agriculture after having been the champion of petrochemical pollution".

3.6.6 *New space is created for multi-actor collaborations*

From development to implementation, RDP-PAT's 2019 urban agriculture policy invited diverse actors operating in separate societal spheres to find one another, to share ideas, and to work together. According to Mélanie (I2), co-creating a policy with the help of the community is less about producing a formal document, about which she says: *"It's there, but I don't think people are going to consult it"*, and more about bringing people together, which builds momentum: *"it's the fact that you talk about it, even before [the policy] is finalized. You have a survey, you have consultations, which lead people to get together and realize that they're not the only ones who are passionate about gardening. There's this whole effect"* The surveys and public consultations reached a total of 644 residents (RDP-PAT 2019), inviting them to share ideas and articulate visions for the borough's transformation. Mélanie (I2) said: *"You can never make policy without asking the people it's going to affect. And often, civil servants have their own vision and good ideas, but that doesn't mean they're gardening…one doesn't know the other's reality…it allows us to exchange ideas [and] to think about all the aspects we hadn't considered before".*
The policy document was co-produced by an intentionally intersectoral policy coordination committee, which pooled the expertise of community organizations, numerous divisions and departments of the government, urban agriculture professionals, and one resident. One committee member (I40) felt that taking a collaborative approach enhanced the policy's credibility and said: *"If there are sixteen people around the table with as many organizations represented, it carries a lot more weight than if there were three or four. Each organization has a strength and brings an extra voice of reflection."*

While a collaborative approach to policy making promoted inclusivity, it complicated the process of change by involving additional people and perspectives to the borough's transformation. ÉcoUrbain was already positioned to take on the role of intermediary, by translating between governmental and non-governmental actors to realize shared objectives. An employee of the organization (I27) said: *"We try to listen, to be attentive to the issues, challenges, worries, questions, concerns and ideas of residents…and then to share them with the*

borough when they ask for our opinion. We try to help [residents] realize their vision and bring it into line with the borough's vision. That's our implicit mission."

Thus, the interviews showed that RDP-PAT's urban agriculture policy created new opportunities for multi-actor collaborations, which contributed to determining the trajectory of change by crafting new relationships and informing the policy's orientations and goals. The need for intermediary actors arose, who could help navigate this collaborative process by translating between actors and manage delicate budding relationships.

3.6.7 *Some seed actors' efforts are consolidated and legitimized*

Some motivated seed actors, including progressive governmental actors, saw their actions become consolidated and legitimized under the awning of the 2019 urban agriculture policy. An employee of the borough government (I38) felt compelled to align their efforts with the urban agriculture policy's goals and vision, explaining that *"consolidating everything into a policy…created a certain sensitivity to including urban agriculture…in design, rehabilitation, and development projects…it gets everyone involved, makes everyone feel concerned, so that it doesn't look like an add-on, but is instead integrated into [future] development…so it's more meaningful and unifying".*

The responsibility to contribute to the policy's objective of converting 30 hectares of the borough's territory to urban agriculture by 2030 was diffused across different administrative divisions. The research agent responsible for overseeing the action plan's implementation (I35) worked across many divisions, including social development, parks, urbanism and economic development, culture, sports and recreation, and communications. The policy encouraged each division to prioritize urban agriculture; *"it allows everyone to feel concerned" (I2).* In one park, *"the entire planting was done with nut trees and fruit trees" (I2).* In the case of economic development, *"they can decide internally whether 'yes, we give importance to urban agriculture'...it's a matter of making choices in the face of opportunities" (I2).* Working in the division of culture, sports, and recreation, an agent said of urban agriculture: *"It was clear to us that this was what we wanted to do"* (I12).

The policy had the effect of legitimizing urban agriculture in the borough. An urban agriculture professional (I9) explained: *"a municipality or a borough will have access to many more means of action. When they speak, people listen."* For example, a public works supervisor (I15a) used the policy as fodder to justify their decision to prioritize the maintenance of urban agriculture initiatives like shared growing zones over tending to other tasks. The policy's mere existence helped them coerce resistant colleagues to incorporate urban agriculture into their work and responsibilities, for example, by letting sheep replace lawn mowers in certain sections of public parks (a practice called eco-grazing). They said: *"I'm always telling my boss and my colleagues that…we can't go against the policy and say we don't have time to do it. No, the borough has made this one of its priorities, so we must lend a hand and get involved in these projects."* The policy thus legitimized efforts to amplify urban agriculture and imposed it, as a practice and a set of values, on resistant actors by requiring that activities and organizations be reconfigured to integrate urban agriculture.

3.6.8 *New actors and resources bolster experimentation*

The adoption of the urban agriculture policy was followed by a proliferation of seed initiatives in the borough, which became "much more diverse" according to the leader of a collective garden (I10). Interviewees pointed to supportive and innovative government interventions as a trigger for a new phase of experimentation. These interventions were represented in the policy's first action plan, of which the opening message reads: "We're ambitious about this action plan, which will help transform our borough" (RDP-PAT 2020).

The action plan was itself an experiment, as well as a driver of institutionalization (see Appendix E for institutionalizing mechanisms employed in implementing the action plan). While serving as city councilor, Mélanie (I2) described the plan's implementation as a process of trial and error: *"That's what it's for; you make a plan, you see what's good. You get better at it over the years, but it's what we will achieve in the long term that's important."* Mélanie's interview showed that reflexivity and a willingness to learn were also inscribed in the borough's approach to transformation. The borough's focus on urban agriculture for advancing its ecological transition favors gardening (and terrestrial systems) over other forms of nature-related activities, such as urban fishing, an activity that was overlooked during policy making. Mélanie said: *"Maybe I*

should have gone into the field, but I didn't think about it at the time…So I didn't get their opinion. Of course, they would have asked for more facilities, a dock, maybe a stainless-steel area to cut and rinse your fish. There were people [fishing] every Saturday, and there was a diversity of people and languages…it was like a little blind spot. There are a lot of things to work on, and then you learn" (I2). Several interviewees noted that *"since the policy, the borough has shown a lot of openness"* (I1) and that *"they're really pro-ecology, I feel they're open"* (I33). These perspectives specifically referred to two interventions by the government: regulatory reforms and the call for projects.

Lowering barriers to experimentation

In 2020, an existing regulation requiring that front yards be mostly covered with well-maintained grass was modified, enabling residents to plant edible gardens (regulatory reform 1 in Fig 3). In 2021, in response to a petition by residents, the government launched a pilot project authorizing 12 residents to keep egg-laying hens on their property (regulatory reform 2 in Fig 3). This second reform was a collaborative endeavor involving the urban planning divisions of other boroughs and the city's legal affairs department. With this new regulation, guidelines were introduced to ensure the safety of people and hens. Hen-keeping required a permit, the completion of a mandatory training course, and the occasional monitoring of installations in one's backyard. The hen-keepers interviewed supported these measures, and one of them (I33) said: *"I think it's important to provide a framework. We're in a city here, so not just anyone can do anything…it's good to give people guidance to avoid things getting out of hand or being done in the wrong way. I don't feel the tone is controlling, it's more supportive."* In support of this view, the director of an organization that builds pollinator gardens and beehives (I9) said: "*When you take a perspective like the RDP-PAT action plan, which is more resident-oriented, if you provide the means, if you say "yes, you can do it", people will often do. If you use the tools, you have and say "we've just changed the regulations so that we can authorize you to plant tomatoes, zucchinis in your front yard," in my opinion, you benefit both sides, and recreate the link [with residents] that's sometimes harder to make."* Thus, the government mobilized legislative resources to lower, rather than create barriers to the practice of a novel form of self-subsistence in residents' private spaces.

Connecting ideas to resources: enablers and barriers

In 2022, the borough government issued a call for projects designed to stimulate experimentation by incentivizing - through financial and knowledge support - the creation of urban agriculture projects for the benefit of the wider community. Insufficient human resources were seen to limit the borough's ability to start its own projects; a former government employee (I37) said *"it's very demanding in terms of energy for the borough, for the benefit of citizens…. we don't necessarily have the time to support them as much as we'd like."* Instead, the borough government leveraged its more readily available resources - money and access to knowledgeable experts - to catalyze the emergence of seed initiatives that would be designed and managed by the local community. A selection committee was formed for governmental and non-governmental actors, including a few residents, to make decisions about which projects would become supported.

The program helped seed actors transform ideas into concrete projects. It was "*a pretext for an urban agriculture project, a catalyst"* (I41) and *"a model that enabled us to say, "we're going to go for it, we're going to do it"* (I29). The initiator of a seed dedicated to benefitting vulnerable youth (I34) said: *"my idea was there, but there was nothing concrete, so the call for projects really made it all happen…the grant helped us achieve our objectives and have a positive impact*." It did so in large part through capacity-building, involving the transfer of technical knowledge (i.e. horticulture) and experiential knowledge (i.e. how to navigate bureaucracy when starting projects in collaboration with the borough). A former sustainable development research officer and selection committee member (I37) explained that *"coaching is necessary to support people who are inspired to start projects, but don't have the knowledge….Otherwise, if they have a bad experience, they're not going to do it again the following year, even if they've made certain investments...If you're well supported in the process, it will help to keep the experience positive and give you the desire to start again."* Over two years, the call for projects supported the creation of 12 seed initiatives in the borough. A member of the selection committee and employee at ÉcoUrbain, the organization mandated to coach new seed initiatives (I27) observed that "*it's having a knock-on effect. The more people develop projects, the more others think "Cool. This school did this, I can do that too."* Interviews also showed that a key success factor for many of these projects was the mobilization of human resources in the community, taking the form of ideas, time, and voluntary participation. The call for projects thus enabled diverse actors

to combine their resources in complementary ways, contributing to advancing the policy objective of dedicating new space to urban agriculture while involving new and non-traditional seed actors, and more beneficiaries, in the borough's transformation.

According to our interviews, the program's eligibility criteria had two major shortcomings, which excluded some seed actors and initiatives from receiving support. Firstly, because the borough wasn't legally authorized to finance citizen-led projects, eligibility was restricted to seed initiatives associated with, or led by, an organization. Secondly, because the borough struggled with securing access to land for establishing new projects, institutional projects were favored over those led by citizens. One seed initiative led by a group of citizens was awarded *"funds conditional on obtaining land"* (I41), but their garden project never saw the light of day. The project's leader (I41) said: *"it just becomes effort in a vacuum, so I think from then on it becomes a bit demotivating"*, explaining that *"we've never been able to do [our project] because we've never had access to land…the call for projects is not able to support citizen groups with initiatives that go a little beyond the general framework."* By incentivizing experimentation, the program attracted non-traditional seed actors to start projects and created new beneficiaries of urban agriculture but supported exclusively organizational actors with access to land.

3.7 DISCUSSION

3.7.1 *Interactions for a collaborative institutionalization*

When investigating how seed initiatives interacted with other actors and their interventions to institutionalize urban agriculture in RDP-PAT, it became clear that seed initiatives and the borough government's policy and policy-related interventions benefited one another, driving an institutionalization (of urban agriculture) that was more collaborative than confrontational (Ehnert et al. 2018), and which created resource, governance, and social synergies (Frantzeskaki et al. 2014).

Such a 'friendly' and co-beneficial institutionalization is more likely when the interests and goals of the different actors involved are in alignment. In RDP-PAT, seed initiatives generated myriad benefits, including strengthening social cohesion, tackling food insecurity, and engaging harder-

to-reach and vulnerable individuals in the borough's urban agriculture. The activities of seed initiatives reflected the interests and goals of the borough government, which strived to promote and enhance viable solutions to local challenges and improve living conditions in RDP-PAT. Urban agriculture initiatives in the borough therefore had a symbiotic relation with the government (Geels and Schot 2007). This symbiosis led the government to intervene in support of urban agriculture at an early stage in the transformation, even in the absence of a strongly mobilized and coordinated network of seed actors building pressure for change (Irvine and Bai 2019, Borras et al. 2023). In fact, one way in which the policy supported transformation was by linking and coordinating actors and their resources (Peng et al. 2019), and mobilizing stronger collective action (Qiu et al. 2024, Zhou 2024). These outcomes of the policy bolstered the process of institutionalization.

The 2019 urban agriculture policy is tightly linked to the institutionalization of urban agriculture in RDP-PAT, a complex and co-produced process that contributes to increasing innovations' legitimacy, coherence, and stability within a new or changing regime. This policy contributed to institutionalizing the innovation by building legitimacy for efforts to integrate urban agriculture into all areas of the borough's community life and development. The government's dedication of resources to expanding urban agriculture activities further supported this integration. The policy also built coherence by fostering interactions that led to the unearthing of a common vision, of transforming the borough from chimneys to gardens. These multi-actor interactions led to the collective rationalization, or imagination, of RDP-PAT's urban agriculture. Finally, the policy built some stability for urban agriculture's presence in the borough, by asking governmental departments to reconfigure their activities to further incorporate urban agriculture and via the creation of new committees (e.g. policy coordination committee, ecological transition committee, and decision-making committee for the call for projects). However, urban agriculture's persistence as a priority for the borough beyond 2030 is uncertain, given the rather short-term policy objective of converting 30 hectares of the RDP-PAT's territory to urban agriculture by 2030. Institutionalization, and increased stability, implies the spread of an innovation among potential adopters. The lead-up to, and development of, RDP-PAT's urban agriculture policy drew hundreds of new actors to engage in and shape the pathway to transformation, including early seed actors who raised awareness about urban agriculture's potential for tackling local problems and captured the interest of decision-makers, a hybrid actor and champion of change,

and diverse governmental and non-governmental actors and residents who co-created the policy and continue their work to implement the policy's action plan and realize the common vision of making RDP-PAT a good place to live.

3.7.2 *A less linear pathway to transformation*

By examining how the dynamics that institutionalized urban agriculture in RDP-PAT shaped the borough's pathway to transformation, we discovered that transformation does not always follow a linear trajectory of experimentation followed by institutionalization (Pereira et al. 2018). Instead, it may adopt a more circular pathway with no distinctive starting point, whereby iterative cycles of co-produced, emergent, and potentially transformative changes drive forward the process of transformation (Fig. 3.4). This less linear, and more iterative, framing of transformational pathways accounts for the feedback we observed between transformational processes (e.g., experimentation and institutionalization), which results from the interactions of multiple actors, entering the process of change at different moments in time or at different stages of the transformation, and employing different strategies to mobilize different resources.

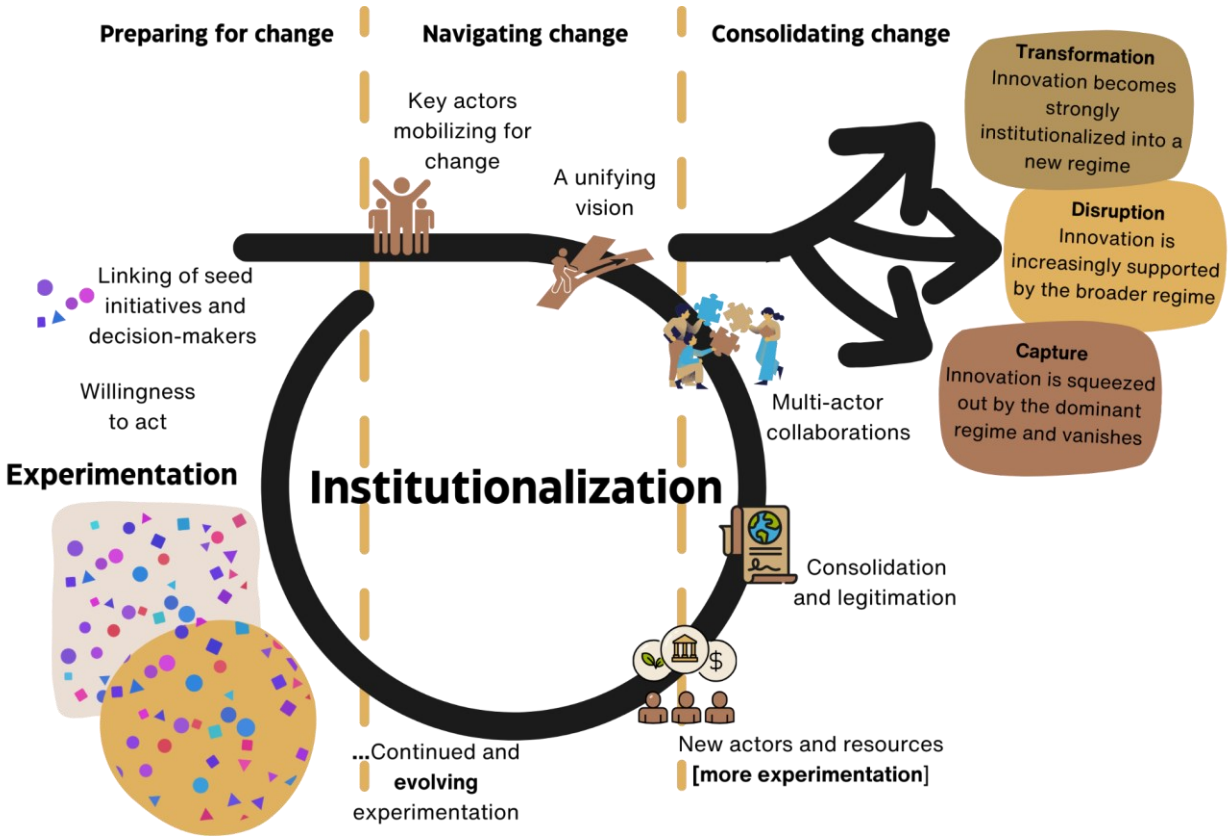

Figure 3.4 A circular and iterative multi-phase pathway to transformation building on Pereira et al. (2018). In RDP-PAT, the institutionalization of urban agriculture was linked to the enactment of a policy. Conditions in the borough created willingness to act (3.6.1), drawing seed actors to experimentation, which attracted the interest of decision-makers (3.6.2) who relied on the experiences of seed initiatives to design interventions (3.6.3). A key hybrid actor mobilized for the amplification of urban agriculture (3.6.4). A unifying vision of transformation was unearthed (3.6.5) in the policy making process, creating new space for multi-actor collaborations (3.6.6). Efforts to transform the borough became more consolidated and legitimized by the policy (3.6.7). New actors and resources were added to the transformation, which bolstered and also set the boundaries of experimentation (3.6.8).

Prevailing theories on transformations suggest that institutionalization begins later, responding to destabilizing bottom-up pressure for change created by seed initiatives in the preparation phase (e.g. Rotmans et al. 2000, Olsson et al. 2004, Moore et al. 2014, Pereira et al. 2018). However, our case study contradicts these theories, instead suggesting that change and innovation can sometimes originate, at least in part, from actors operating at the level of the regime, including governments (Rotmans et al. 2001, Kivimaa et al. 2019). We demonstrated that the development

and enactment of a policy, a mechanism for institutionalizing innovations (Anguelovski and Carmin 2011), gathered momentum for change and built on bottom-up transformative impulses that, alone, were insufficient to catalyze transformation.

In RDP-PAT, the institutionalization of urban agriculture spanned all phases of transformation. This empirical finding supports the perspectives of Ehnert et al. (2018) and Voss et al. (2006), emphasizing that transformation and transition processes are less linear, more complex, and messier than depicted in existing multi-phase models of change (eg. Pereira et al. 2018). The urban agriculture policy helped *prepare for change* by gathering momentum within a diverse community of local actors and led to a discourse on the different visions of transformations. During the *navigating* phase, the policy's development and implementation created space for new collaborations and enhanced the need for intermediaries, who would play a key role in facilitating these exchanges and translating between actors (Smith 2007). The policy *consolidated* seed actors' efforts to transform the borough by orienting fuzzy and only loosely coupled actions towards a common vision, leading to more alignment and interrelation between actors and their actions (Fuenfschilling and Truffer 2016). The shared vision of transforming the borough from chimneys to gardens served as a tool for mobilization (Gernert et al. 2018) and empowered people to act (Feola and Nunes 2014) by creating social ties and generating a sense of community (Grabs 2018), which interviewees felt was lacking in RDP-PAT. Actions led by the borough government to realize the policy vision and implement the first action plan increased the legitimacy of urban agriculture by incorporating the innovation into local ways of doing, thinking, and organizing (Anguelovski and Carmin 2011, Pasquini and Shearing 2014, Moore et al. 2015), making it a new priority for the borough.

Contrary to the commonly held theory that experimentation must precede institutionalization, our case showed that institutionalization can be triggered by, but can also bolster, experimentation. In RDP-PAT, government interventions further institutionalized urban agriculture while harnessing the innovative potential and resourcefulness of the local community (Westley et al. 2011), paving the way for more experimentation. Experimentation evolved to become more heterogeneous by involving new actors and new resources, which reinforced seeds' chances of persisting (Krueger 2022). Opportunistic individuals responded to the call for projects and started seeds in their community that would benefit harder-to-reach individuals and create new

beneficiaries of transformation. This had a trickle-down effect, inspiring new seed actors to learn from others' experiences and partake in the transformation, causing the number and diversity of seeds to multiply and further diffusing the practice of urban agriculture across the borough's population of potential adopters. Thus, in this story of change, experimentation and institutionalization were iterative and positively reinforcing processes. Institutionalizing urban agriculture via mechanisms such as policies and associated goals and action plans (Pasquini and Shearing 2014) supported experimentation by lowering regulatory barriers, incentivizing seed actors, creating new beneficiaries, and supporting new forms of urban agriculture. In return, this heightened experimentation drove further institutionalization, leading to a more strongly capitalized, more consolidated and coherent process of transformation.

Government-led interventions to institutionalize urban agriculture set new boundaries for experimentation (see Fig. 3.4) and determined the conditions within which the transformation process could operate (Smith 2007, Rotmans et al. 2011). Firstly, as resources are committed and tied up in ongoing work to institutionalize innovation, the scope for new ideas rapidly begins to narrow (Westley et al. 2013). Developing the policy required that a handful of individuals collectively rationalize urban agriculture by determining what it is (and isn't), what forms it can (and can't) take, and how it should (and shouldn't) be practiced in the borough. The visions that emerged were of an ecological transition focused on terrestrial systems - through a particular vision of urban agriculture - that ignored aquatic systems and activities. Nature-based activities existing outside of this rationalization (e.g. urban fishing) were an after-thought, receiving fewer resources and less support. Gardening initiatives, specifically, began to dominate 'spaces' of experimentation. Meanwhile, those led by organizations with available plots of land had a significant advantage over informal citizen-led initiatives. Thirdly, the policy set the normative bounds of appropriate behavior in terms of practicing urban agriculture in the borough (McClintock 2021), for example by introducing a new framework for keeping egg-laying hens, an activity that wasn't previously regulated or legally authorized. While experimentation and institutionalization can be positively reinforcing, each iteration of experimentation will be slightly different than the last, partly because institutionalization changes the rules of the game (see Fig. 3.4).

3.7.3 *Shifting actors' roles in transformation*

The strategies required in the different phases of preparing, navigating, and consolidating change are not static; they evolve and shift in relative importance as the transformation progresses (Loorbach et al. 2007; Kivimaa et al. 2019, Wang et al. 2024). Mélanie, the example discussed, was a key actor for steering the institutionalization of urban agriculture in RDP-PAT (Kemp and Loorbach 2003). She shifted roles over time operating in multiple spaces (firstly within the local community and later within government) and employing different strategies to mobilize (mainly human) resources for the borough's transformation. Mélanie started as a promoter of urban agriculture within the local community, aggregating place-based knowledge and building trust which would later help her to spearhead a collaborative policy development process (Wang et al. 2024). She bridged across stakeholders of transformation, for example by integrating the ideas of residents into policy and regulations (Son 2023) while working at ÉcoUrbain, and later, as city councilor, inviting residents and other local community actors to sit on an advisory committee for the borough's ecological transition. While we identified other hybrid actors during our interviews, we focused on Mélanie's example due to its significant contribution to challenging the notion of governments as monolithic or passive agents of change (Avelino 2011; Farla et al. 2012). This example illustrates that the actions and motivations of actors within government (we interviewed Mélanie while occupying the position of city councilor) are unique to the individual and may have been influenced and informed by previous roles and past encounters. Mélanie blurs the distinction between seed and governmental actors, emphasizing the value of analyzing agency in transformation (Smith et al. 2005) and adopting a more fluid, less static view of actors' roles in transformation (Holtz et al. 2008; Werbeloff et al. 2017).

3.8 RESEARCH LIMITATIONS

The findings of this study are based on the qualitative analysis of a single empirical case, which limits the generalizability of the conclusions. Local context partly determines the success of seed initiatives and shapes the enabling conditions and the capacities of local governments, which vary even under a single municipal regime (Krueger 2022). Such variance limits the ability to predict whether the outcomes observed in one borough or city will be replicated elsewhere.

Interviewees were identified for participation in the study for playing an active role in the development of urban agriculture in RDP-PAT, either as supporters or practitioners of urban agriculture, and are therefore likely to be in favor of the policy and to believe that amplifying urban agriculture represents a desirable transformation pathway for the borough. Thus, the data collected does not speak for how the broader population of RDP-PAT experiences the institutionalization of urban agriculture in the borough.

This study examined an event that occurred in the past - the development and adoption of RDP-PAT's urban agriculture policy in 2019 - introducing the possibility of recall bias as interviewees were asked to describe events of the past to the best of their capacity. To minimize this risk, the interviewer cued recall by providing interviewees with information (ie. about the policy) to jog their memories (Bernard 2006c).

For those people interviewed who worked in government, it is possible that the social desirability effect influenced their responses regarding the policy's development and its impact on the borough (for example, by exaggerating the policy's positive outcomes) (Bernard 2006c). Data source triangulation ensured that diverse views were represented in the study.

Data collection and analysis for this study was of relatively short duration. A longitudinal approach, extending over several years, would have provided a more comprehensive understanding of the long-term impacts and evolution of the institutionalization processes examined. This extended timeframe would allow for the observation of changes and developments that occur gradually, offering deeper insights into the sustainability and resilience of the transformations initiated.

Nonetheless, our research provides novel insights into, and an alternative framing of, the process and dynamics of institutionalization at a local scale, which we identified as a gap in knowledge about sustainability transformations. Additionally, our case underscores the pivotal role of local governments in leading and supporting efforts to achieve transformative change at the scale of a place-based community, where the behavior of individuals can be most directly influenced (Burch 2010). We highlight the idea that interventions led by local governments, including the enactment of policies, can be effectively designed in collaboration with a broad and diverse

community of change-makers to generate impacts for stakeholders across a multitude of life domains (Barnes et al. 2018).

3.9 CONCLUSION

Our case study contributes to the scholarship on sustainability transformations via a deeply contextualized exploration and analysis of local-scale institutionalization focusing on the interactions of seed initiatives with other actors and their interventions to institutionalize innovation.

Our results highlight three key ideas. First, the institutionalization of a sustainable innovation, triggered by local government intervention in the absence of sufficiently coordinated and mobilized action in the local community, can mark the early beginnings of transformation and create momentum for change as well as mobilize collective action towards a shared objective, or vision of transformation.

Second, the actors and interventions that contribute to institutionalizing an innovation by building its legitimacy, coherence and stability, may also create favorable conditions for more experimentation, occurring within shifting boundaries. This suggests that experimentation and institutionalization are not entirely distinct processes of transformation, but may instead reinforce one another, and highlights the possibility of institutionalization stifling some, while bolstering other, innovative impulses.

Third, existing notions of actors' roles in transformation are static and simplistic and fail to consider how roles might evolve throughout the process of change in line with the changing needs of transformation. Actors' ability and willingness to act in the present may be influenced by previous experiences and the positions they have held or alliances they have formed in the past or in other contexts.

Our study invites us to conceive of institutionalization as a series of interactions between diverse actors who detain unique capacities for initiating and facilitating transformative change, in the pursuit of goals that, if in good alignment, support a collaborative process leading to emergent

and co-produced changes. Local community and governmental actors in RDP-PAT playing different but key roles have shown that aligning strategies and combining resources to seed and navigate change can bolster experimentation, institutionalization, and the overall transformation process.

Whether the changes taking place in the borough of RDP-PAT are truly transformative remains to be seen. Still, in the six years since the enactment of the 2019 urban agriculture policy, the increasingly large and diverse community of urban agriculture supporters and practitioners serve as a hopeful indicator that the borough of RDP-PAT is well on its way towards transformation.

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3.11 SUPPLEMENTARY MATERIAL

Appendix A
Seed initiatives (descriptions)

Pedagogical garden (initiative) (‘jardin pédagogique’)

Educational gardens are created with the aim of experimentation and learning rather than productivity maximization. They are often situated at places of learning, such as schools and daycare centers, and allow educators to familiarize children with agriculture and food. (Translated from French)

● Source: Agriculture, environnement et ressources naturelles. (2023, Feb 23). *Jardiner dans les espaces publics.* Gouvernement du Québec. https://www.quebec.ca/agriculture-environnement-et-ressources-naturelles/agriculture/agriculture -urbaine/choisir-espaces-jardiner/jardiner-espaces-publics#c32411

Collective garden (‘jardin collectif’)

In a collective garden, everyone cultivates a common space and shares the upkeep and harvests. Surpluses are donated to local community organizations. (Translated from French)

● Source: Éco de la Pointe-aux-Prairies. (n.d.). *Jardins collectifs*. https://www.ecopap.ca/agriculture-urbaine-2/

Community garden (‘jardin communautaire’)

A community garden consists of an area of municipal land divided into individual plots called “jardinets”. Each gardener is responsible for the upkeep and harvesting of his or her plot. (Translated from French)

● Source: Agriculture, environnement et ressources naturelles. (2023, Feb 23). *Jardiner dans les espaces publics.* Gouvernement du Québec. https://www.quebec.ca/agriculture-environnement-et-ressources-naturelles/agriculture/agriculture -urbaine/choisir-espaces-jardiner/jardiner-espaces-publics#c32411

Feeder forest (‘zones nourricière’)

Feeder Forests are compact spaces for the cultivation of trees and edible and nectariferous plants, according to a permaculture approach favoring native plants. (Translated from French)

● Source: Ville de Montréal. (2024, May 3). *Zones nourricières écologiques.* https://montreal.ca/articles/zones-nourricieres-ecologiques-30279

Urban Agriculture Free-Zones (‘Zones Libres d’Agriculture Urbaine [ZLAU]’)

Urban agriculture free-zones, made up of garden bins, were created by ecoPAP to encourage collective gardening in shared spaces. The community shares the maintenance tasks and harvests at the end. (Translated from French)

● Source: Éco de la Pointe-aux-Prairies. (2016). *Rapport annuel*. Éco de la Pointe-aux-Prairies. https://drive.google.com/file/d/1AxYTg3XIbJbYmGX-IA67iypls3SAkbSs/view

Table A1: Seed initiatives selected for the case study in Rivière-des-Prairies-Pointe-aux-Trembles (Montréal, Canada)

Nr	French name	English Translation	Description	Year	Initiative type	Seed location	RDP	PAT	Actors involved
1	Jardin Mavi	Mavi garden	Spanning 450 square meters, MAVI was created by and for the community. This vibrant urban garden promotes biodiversity and serves as an inclusive area for relaxation and learning to garden.	2012	Collective garden	School grounds	1	0	Initiated as a collaboration between citizens, community organizations and a school.
2	Jardin du Citoyen	Citizen's garden	This collective garden offers residents a space for growing and sharing vegetables and herbs. It consists of geotextile pots placed on raised wooden structures, where edible plants are cultivated.	2018	Collective garden	Public park	1	0	Initiated and managed by a community organization.
3	Jardin Rodolphe-Forget	Rodolphe-Forget garden	A group of residents wanted to build a garden for collective use by the nearby community, and envisioned a place of cultural and knowledge exchange for young and elderly persons alike. With guidance from a local organization, a plot of land was secured. The garden's official name will be decided by a committee of volunteers.	2023	Collective garden	Municipal land	0	1	Initiated by a citizens group (inhabitants of a housing coop) and implemented with support from community organization.

4	Projet pilote des camps de jour	Day camp pilot project	As part of its commitment to raising awareness about environmental issues and in line with the urban agriculture policy, the borough government has initiated a pilot project that incorporates learning activities centered around the topic of urban agriculture into the regular summer day camp curriculum.	2023	Educational day camps	NA	1	1	Pilot project initiated by borough government and developed and tested by partner organization.
5	Serre Rivard-Paquette	Rivard-Paquette greenhouse	Our mission is to enable students with behavioral and learning difficulties to learn authentically, and to succeed differently, through experimentation, and without having the impression of being in the process of learning.	2004	Pedagogical greenhouse	School grounds	1	0	Initiated by teachers, managed with the help of volunteers.
6	Ruches et jardin de fleurs mellifères	Beehives and melliferous flower garden	Polliflora creates landscapes and living environments for pollinators. We plant flowers to save bees and butterflies.	2020	Beehives	Various public areas	0	1	Polliflora exists outside the borough and the borough government invited/funded their establishment in the borough.
7	Jardin patrimonial de la Maison Pierre-Chartrand	Heritage garden at Pierre-Chartrand heritage home	In the heritage garden, vegetables grown by Indigenous and European ancestors are cultivated.	2018	Heritage garden	Cultural center	1	0	Initiated by a cultural agent and managed by a community organization.
8	Les Prairies de Biquette	Biquette's prairies	Biquette is a project that showcases the advantages of eco grazing with sheep. The organization's mission is to educate people about sheep and to honor ancestral techniques of wool cutting.	2021	Eco-grazing	Public parks	1	0	Biquette exists outside the borough and the government invited/funded their establishment in the borough's parks.

			A seed library enables the sharing of herb, flower, and vegetable seeds. The aim is for people to take seeds, sow, grow, and harvest. Then, they save seeds and return them to the library. It's a circular economy initiative, and for some, an			Public			Initiated and managed by library employees.
10	Jardinothèques	Seed libraries	introduction to gardening.	2021	Seed sharing	library	1	1	
			Through various urban agriculture projects and by using technology to spark student interest, AgriLab hopes to train tomorrow's eco-citizens. Our ultimate goal is to teach students about their ecological		Pedagogical urban agr.	School			Call for projects beneficiary; initiated by school teachers.
11	AgriLab	AgriLab	footprint and how to reduce it.	2021	installations	grounds	1	0	
		Azure planter	This project reclaimed and revitalized an unused space with planter boxes to teach young people		Pedagogical	Early childhood			Call for projects beneficiary; initiated by a parent.
12	Bacs à l'Azur	boxes	where vegetables come from.	2023	planter boxes	center	1	0	
	Les Récoltes de		These urban fruit-growing zones on school premises are managed by students and a parent committee. Our goal is to produce harvests that local residents may enjoy while creating a buzz! We want to infect school students with a love for growing their own food, set an example for other schools, and inspire this kind of dynamic at larger		Pedagogical gardening	School			Call for projects beneficiary; initiated as a collaboration between parent/city workers, school teacher and school principal.
13	Félix	Félix's harvest	scales.	2023	installations	grounds	0	1	
	Les Jeunes		We want to educate the children of RDP-PAT through agriculture and all that the practice implies. We do this by organizing workshops with		Pedagogical	Early childhood			Call for projects beneficiary; initiated by the associate director of the center.
14	Pousses	Young shoots	the help of partners and our	2022	planter boxes	center	1	0	

			educators, enabling children to sew seeds, maintain our vegetable gardens, harvest, and consume healthy foods.						
15	Les Jardins Logis 12+	Logis 12 + gardens	This project was created for adults with mental health challenges living in low-income housing. Its goals are breaking social isolation, educating about growing, harvesting and preparing free and healthy plant foods, and raising awareness about food waste.	2022	Shared garden	Housing coop	1	0	Call for projects beneficiary; initiated by the psychosocial councilor employed at the housing coop.
16	Le Jardin 4 saisons	4 seasons garden	As a specialized school for vulnerable youth, we promote positive mental health through gardening. We use gardening to teach math and science, the values of mutual aid, autonomy and self-esteem. Our garden teaches us the cycle of life and allows us to craft sustainable lifestyles.	2022	Pedagogical gardening installations	School grounds	0	1	Call for projects beneficiary; initiated by school teachers.
17	Les Légumes Rappeurs	Vegetable rappers	The vegetable rappers garden project was created by a social intervention organization offering safe and creative spaces for people to talk, connect, express their emotions, set up projects and be themselves.	2023		Housing coop	1	0	Call for projects beneficiary; initiated by organization following demands of the community.
18	Mon Jardin	My garden	We use gardening as a medium to break down isolation, to help our youth create links with the community and increase their sense of belonging, and to explore their interests by trying different things.	2023	Shared planter boxes	Group home	0	1	Call for projects beneficiary; initiated by a group home for teenagers.

19	La Robe Jardin	The garden dress	This art piece uses plants and the activity of gardening as a medium for sharing stories and 'giving back'. Here, nourishing and caring for a plant becomes synonymous with caring for someone's story.	2023	Artwork	Cultural center	1	0	An artist and the borough's cultural center.
20	Jardin communautaire Des Belles-Roses	Des Belles-Roses community garden	The Belles Roses community garden is a space for gardening that encourages learning and sharing between citizens.	unknown (decades old)	Community garden	Municipal land	1	0	Jointly managed by borough government (development officer), partner organization (horticulturist), and committee of citizens-gardeners.
21	Jardin communautaire Les Arpents Verts	Les Arpents Verts community garden	Les Arpents verts community garden brings together gardeners who cultivate with passion, harvest with pride, enjoy the produce they grow with pleasure and share with generosity.	unknown (decades old)	Community garden	Municipal land	1	0	Jointly managed by borough government (development officer), partner organization (horticulturist), and committee of citizens-gardeners.
22	Jardin communautaire Pierre-Lacroix	Pierre-Lacroix community garden	Pierre-Lacroix is a community garden whose members garden, mingle, and share. Beyond their own plots, garden members collectively care for fruit trees, vines and a garden of flowers for pollinators.	unknown (decades old)		Municipal land	0	1	Jointly managed by borough government (development officer), partner organization (horticulturist), and committee of citizens-gardeners.
23	Serre communautaire Pierre-Lacroix	Pierre-Lacroix community greenhouse	The idea for this greenhouse was born in the minds of passionate gardeners and realized with the support of the borough. In its first year of operation, more than 1,600 plants of various vegetables and fruits were cultivated.	2021	Community garden & Greenhouse	Municipal land	0	1	Jointly managed by borough government (development officer), partner organization (horticulturist), and committee of citizens-gardeners.

24	Jardin communautaire Sainte-Marthe	Sainte-Marthe community garden	Sainte-Marthe community garden is a space of sharing, from seeds and vegetables to knowledge and ideas. It encourages healthy food habits and promotes mental wellbeing.	unknown (decades old)	Community garden	Municipal land	1	0	Jointly managed by borough government (development officer), partner organization (horticulturist), and committee of citizens-gardeners.
25	Jardin communautaire Sainte-Maria-Goretti	Sainte-Maria-Goretti community garden	The Sainte Maria Goretti community garden stands out because it's more intimate, it has fewer plots, making it easier to help each other. We're a small group of gardeners who love each other and love to garden.	unknown (decades old)	Community garden	Municipal land	0	1	Jointly managed by borough government (development officer), partner organization (horticulturist), and committee of citizens-gardeners.
26	Zones libres d'agriculture urbaine	Free zones for urban agriculture	Urban agriculture free-zones allow citizens to take advantage of shared spaces around the borough and learn about gardening.	2015	Collective planter boxes	Varied public areas	4	2	Initiated by community organization.
27	Zones nourricières écologiques au Parc Clémentine-De La Rousselière	Ecological nurseries at Clémentine-De La Rousselière park	Trees and shrubs in public parks create a unique new 'pick-your-own' area.	2023	Public feeder forest and ecological nursery	Public park	0	1	Borough government intervention.
28	Zone d'agriculture urbaine au parc Médéric-Archambault	Food forest at Médéric-Archambault park	Trees and shrubs in public parks create a unique new 'pick-your-own' area. This ecological nursery zone project is also one of the winning projects of Montreal's 2022 participatory budget. Citizens participated in a survey to weigh in on which species would be planted (up to 40 species).	2022	Public feeder forest	Public park	1	1	Borough government intervention.

30	Distribution de végétaux et de compost	Plant & compost distribution	Every year, many boroughs give away free plants, vegetable seedlings, shrubs, mulch and compost (which is offered by the City of Montreal).	2020	Plant & compost distribution	Private backyards	1	1	Borough government intervention managed by a partner organization.
31	Réseau alimentaire de l'Est de Montréal	East Montreal Food Network	The RAEM is a network of actors collaborating to tackle the problem of food deserts in the east of Montreal. By building synergies across actors and organizations, the network aims to improve access to fruits and vegetables and improve the lifestyle habits of citizens to promote health.	2017	Network	NA	1	1	Non-profit organization which serves all of East Montreal.
33	Jardin Sahaka	Sahaka garden	Jardin Sahaka aims to reappropriate history, reconnect cultures and communities, encourage just representation and promote the interests of immigrants and refugees. The garden project targets these goals by reconnecting youth with their culture and community as well as teaching them how to grow south-east asian vegetables.	NA	Cultural garden	No land secured to date	0	0	Call for projects beneficiary; initiated by citizens group. (Funds never spent due to inability to secure land to start a garden).
34	Le Repas partagé	The Shared Meal	The Shared Meal was a performance art piece that accompanied a written report showcasing RDP-PAT's community gardens and gardeners.	2013	Performance art and written report	NA	1	1	An artist and the borough's cultural center.

APPENDIX B

Information about interviews and study participants

Table B.1 Case study interview and participant information

Reference	Involvement in RDP-PAT's UA	Seed actor	Policy actor	Date	Interview participant	Actor type	Interview format	Seed	Policy
Interview 1	Policy development & implementation	X	X	13.07.2023	Director general at a local community organization	intermediary actor; NGO	in-person	X	X
Interview 2	Policy development & implementation / Committee for the ecological transition	X	X	10.08.2023	Elected city councilor; committee president; former urban agriculture coordinator at a local community organization	hybrid actor; NGO + (later) governmental	in-person		X
Interview 3	Policy implementation / MAVI + Rodolphe Forget collective gardens	X		multiple dates	Urban agriculture coordinator at a local community organization	intermediary actor; NGO	in-person	X	
Interview 4	Policy development		X	04.08.2023	Representative of the community sector	intermediary actor; NGO	in-person		X
Interview 5	Policy development / Call for projects committee		X	07.09.2023	Director general at a local community organization	intermediary actor; NGO	in-person		X
Interview 6	Policy development / Call for projects commitee / Des Belles-Roses community garden	X	X	29.08.2023	President of a community garden	hybrid actor; independent	in-person	X	X
Interview 7	Policy implementation / Day camp pilot project	X		22.08.2023	Urban agriculture project manager at a local community organization	intermediary actor; NGO	in-person	X	

Interview 8a	Policy development / Rivard-Paquette greenhouse / Les Arpents Verts community garden	X	X	16.10.2023	Seed leader; former president of a community garden; specialized teacher	hybrid actor; NGO	in-person	X	X
Interview 8b	Rivard-Paquette greenhouse	X		16.10.2023	Horticulturist	NGO	in-person	X	
Interview 9	Beehives and melliferous flower garden / Cultivate Montreal	X		02.08.2023	Seed representative; Director of operations and administrator at a not-for-profit organization in Montreal	NGO	zoom	X	
Interview 10	MAVI collective garden	X		19.09.2023	Seed initiator and leader; teacher	NGO	in-person	X	
Interview 11	Seed libraries	X		09.08.2023	Seed leader; librarian	NGO	zoom	X	
Interview 12	Heritage gardens	X		29.08.2023	Seed leader; government employee - cultural agent	governmental	in-person	X	
Interview 13	AgriLab / Call for project beneficiary	X		22.08.2023	Seed leader; specialized teacher	NGO	in-person	X	
Interview 14	Azure planter boxes / Call for project beneficiary	X		09.08.2023	Seed initiator; parent volunteer	independent	zoom	X	
Interview 15a	Policy implementation / Call for projects commitee / Félix's harvest	X	X	08.08.2023	Seed initiator, forewoman for city public works; parent volunteer	hybrid actor; governmental + independent	in-person	X	X
Interview 15b	Policy implementation		X	08.08.2023	Forewoman for city public works	governmental	in-person		X
Interview 16	Pierre-Lacroix community garden	X		17.08.2023	President of a community garden	independent	in-person	X	
Interview 17	Sainte-Maria-Goretti community garden	X		14.09.2023	President of a community garden	independent	in-person	X	

Interview 18	Policy development		X	01.08.2023	Director of a not-for-profit organization	NGO	zoom		X
Interview 19	The garden dress (art installation)	X		17.08.2023	Seed initiator and leader; artist	independent	in-person	X	
Interview 20	Call for projects committee / Les Arpents Verts community garden	X		21.08.2023	Vice president of a community garden	independent	zoom	X	
Interview 21	Sainte-Marthe community garden	X		07.09.2023	President of a community garden	independent	in-person	X	
Interview 22	Rodolphe-Forget collective garden	X		22.08.2023	Seed initiator	independent	in-person	X	
Interview 23	Logis 12+ gardens / Call for projects beneficiary	X		07.09.2023	Seed leader; psychosocial worker at local community organization	NGO	in-person	X	
Interview 24	Biquette's Prairies	X		29.08.2023	Project manager at a not-for-profit organization	NGO	in-person	X	
Interview 25	Skawanoti gardens	X		28.08.2023	Former director general at a local community organization	intermediary actor; NGO	zoom	X	
Interview 26	MAVI collective garden	X		23.08.2023	Participant gardener	independent	in-person	X	
Interview 27	Policy implementation / Call for projects committee	X	X	14.09.2023	Assistant director at a local community organization	intermediary actor; NGO	in-person	X	X
Interview 28	Regulatory reform for keeping chickens / Les Arpents Verts community garden	X		05.09.2023	Resident keeping chickens; member of community garden administrative council	independent	in-person	X	
Interview 29	Félix's harvest / Call for projects beneficiary	X		14.09.2023	Seed initiator; school principal	NGO	in-person	X	

Interview 30	Young shoots / Call for projects beneficiary	X		03.10.2023	Seed initiator; associate director at a local childcare center	NGO	zoom	X	
Interview 31a	Policy development & implementation / Call for projects committee	X	X	08.09.2023	Government employee - department manager (recreation and community)	governmental	in-person	X	X
Interview 31b	Policy development & implementation / Call for projects committee	X	X	08.09.2023	Government employee - development officer (recreation and community)	governmental	in-person	X	X
Interview 32a	Four seasons garden / Call for projects beneficiary	X		14.09.2023	Seed initiator and leader; specialized teacher	NGO	in-person	X	
Interview 32b	Four seasons garden / Call for projects beneficiary	X		14.09.2023	Seed initiator and leader; specialized teacher	NGO	in-person	X	
Interview 33	Regulatory reform for keeping chickens	X		09.09.2023	Resident keeping chickens	independent	in-person	X	
Interview 34	My garden / Call for projects beneficiary	X		20.09.2023	Seed leader; specialized educator	NGO	zoom	X	
Interview 35	Policy implementation (responsible) / Call for projects committee		X	11.09.2023	Former government employee - research officer (sustainable development)	governmental	zoom		X
Interview 36	Call for projects committee / Rodolphe-Forget collective garden	X	X	04.10.2023	Former urban agriculture coordinator at a local community organization	intermediary actor; NGO	in-person	X	X
Interview 37	Policy development & implementation (responsible) / Call		X	20.09.2023	Government employee - research officer (sustainable development)	governmental	zoom		X

	for projects committee								
Interview 38	Policy development		X	20.09.2023	Government employee - cultural agent	governmental	zoom		X
Interview 39	Vegetable rappers / Call for projects beneficiary	X		16.11.2023	Seed leader; coordinator at a local community organization	NGO	zoom	X	
Interview 40	Policy development / East Montreal Food Network	X	X	20.11.2023	Seed initiator; director / project coordinator at a community organization	NGO	zoom	X	X
Interview 41	Jardin Sahaka / Call for projects beneficiary	X		08.12.2023	Seed initiator and leader	NGO (for call for projects eligibility)	zoom	X	
Interview 42	The Shared Meal	X		05.01.2024	Seed initiator and leader; artist	independent	telephone	X	

Legend

NGO = non-governmental organizational (actor type)

UA = urban agriculture

Interview statistics			
Table B2. Initial sample for data collection via semi-structured interviews			
Individuals, organizations, and seeds	**potential participants**	**participants interviewed**	
	nb	**nb**	**%**
Members of the policy development committee	16	9	56
Representatives of organizations mandated to develop RDP-PAT's policy on urban a	2	2	100
Beneficiaries of calls for projects support program (2022, 2023)	10	9	90
Presidents of the borough's community gardens	6	5	83
Representatives of the borough's collective gardens	2	2	100
Representatives of the borough's heritage gardens	1	1	100
Initiators of other pre-identified urban agriculture seeds (hives, ecograzing, free-zone	3	3	100
Total	40	31	78

Table B3. Interview participants by category

Participant category	nb participants	sample representation (%)
Local governmental actors*1	9	20
Non-governmental organizational actors*2	26	57
Independent actors*3	13	28
Total	46	104

Note: Two participants belonged to two categories.

Table B4. Involvement with policy and 2020-2022 action plan

Scores	nb participants	sample representation (%)
No (0)	32	73
Yes (1)	12	27

Appendix C

Semi-structured interview guide

Project objective:

The research project's main objective is to understand how urban agriculture became institutionalized and its implications for shaping pathways to place-based sustainability transformations, focusing on the roles played by (and the interactions between) local initiatives and government. Overarching research questions: *How do seed initiatives' interactions with other actors and their interventions to institutionalize urban agriculture shape pathways to transformation? How does institutionalization bolster and constrain transformations?*

Interview objective: To answer the following specific questions:

1- How did the institutionalization of urban agriculture in RDP-PAT, starting with the policy on urban agriculture in 2019, come about, and what were the roles of local initiatives (independent and organizational) and the borough government in this process?

2- How did the institutionalization of urban agriculture in RDP-PAT bolster and constrain potentially transformative initiatives and what are its implications for the borough's transformation?

***Note: (optional)** questions will be posed solely if time permits

SECTION 1: INTRODUCTORY QUESTIONS

Version A for non-governmental actors:

1. [I have your project recorded as [name of project].

Can you tell me a little bit about this project/organization?

Probe:

- What are the project/organization's goals?

1.1 [In 2018, citizen surveys and consultations were organized to identify the main barriers to practicing urban agriculture. The results showed that lack of knowledge, lack of experience, and lack of space were important limiting factors. (source: RDP-PAT's 2019 UA policy)]

Is this also true for your project/organization?

Sub-question:

- What other factors limit your project/organization's ability to achieve its goals?

Version B for government actors:

1. Can you tell me about how you are involved with urban agriculture through your work in government?

Sub-question:

- Who are the main actors or groups you work alongside to develop urban agriculture in the borough and why do you collaborate with them?

1.1 Can you walk me through some of the complications or limitations involved with supporting the development of urban agriculture initiatives in this borough?

SECTION 2: A CHANGING PRACTICE

2. Can you describe how urban agriculture in this borough has changed over the last five years, (from approximately 2019 to the present day)?

Sub-questions:

- What do you think drove these changes?
- Who were the most influential actors or groups (including government actors) involved in bringing about these changes and why were their roles important?
- What changes that you know of, occurring at the Montreal-city level, have influenced urban agriculture in this borough? **(optional)**

SECTION 3: MAKING THE POLICY

[**Explanation:** I'd like to invite you to think back to the year 2019, when RDP-PAT enacted a policy on urban agriculture stating the vision that '*In 2030, 30 hectares of land in RDP-PAT will vibrate to the rhythm of a plural and innovative urban agriculture'*. The policy states that this vision fits within the borough's broader goal of sustainably developing RDP-PAT to make it a good place to live. It also claims that the vision was intended to guide the borough's future interventions. Finally, the policy aims to promote the implementation of citizen, community, institutional, and commercial urban agriculture projects on RDP-PAT's territory (source: RDP-PAT's 2019 UA policy).

3. If you were involved in making this policy in any way, big or small, can you describe your role and tell me what you remember of the process?

YES (involved) - continue to sub-question

NO (not involved) - continue to 3.5

Sub-question:

- In what ways do you think you/your project/your organization enriched the process of developing the policy? **(optional)**

3.1 According to the policy document, the policy was developed as a collaborative effort.
What did a collaborative process accomplish that couldn't have been accomplished otherwise?
3.2 Are there any persons or groups that were not invited to contribute to the policymaking process but which you think should have been involved or consulted?
Sub-question:

- Did you notice that some populations (age groups, ethnic backgrounds, people with disabilities) were missing from the conversation? Why do you think these populations did not explicitly engage with the process or were not explicitly considered in the process and what are the risks of excluding them? **(optional)**

3.3 What are some of the challenges that you encountered in the process of making this policy?
3.4 Did anything surprise you over the course of this experience?
3.5 Why do you think RDP-PAT was the first borough in Montreal to enact a policy on urban agriculture?
3.6 [I am interested in how the borough's 2030 vision to convert 30 hectares of land to urban agriculture projects was decided.]

Can you tell me what you know about where and from whom the idea of converting 30 hectares of land to urban agriculture came from?

Sub-question:

- Is it a realistic target in your view? **(optional)**

SECTION 4: Implications of the policy (and other interventions)

4. Is the goal of converting 30 hectares of land to urban agriculture aligned with your project/organization's/administration's goals for urban agriculture in the borough? Why or why not?
Sub-question:

- What do **you** envision as the ideal future for UA in this borough? **(optional)**

Version A for non-governmental actors:
4.1 Since the policy was enacted, what types of support have you received from the borough-level government (if any) and what impact does this have for your project/organization?

[**Explanation** - It is written in the policy that it should serve as a guide for future urban agriculture interventions in the borough in the years leading up to 2030. Since the policy was enacted in 2019, it is publicly stated that the government has intervened in different ways, for example, by changing regulations to allow chickens on private property, by funding certain projects, by establishing new urban agriculture free-zones and even establishing a committee for the ecological transition of the borough.]

4.2 Were any of these interventions meaningful for your project/organization, either by helping or hindering your activities?

Clarifying probes:

- How have they benefited your project/organization?
- How have they disadvantaged your project/organization?

Version B for government actors:

4.1 Since the policy was enacted, how have different stakeholders (including residents, community organizations, institutions…) helped you to advance toward your goal of amplifying urban agriculture in the borough? (In other words, how do non-governmental actors and initiatives contribute to achieving this goal?)

4.2 Since the policy was enacted, has the municipal government contributed to supporting urban agriculture initiatives in RDP-PAT? If so, how? **(optional)**

Sub-question:

- How do interventions at the city-level positively and negatively impact your work in the borough?

4.3 I would like to better understand how interventions are designed. Were they anticipated as part of the policymaking process or are they designed in response to specific needs as they arise?

4.4 How are decisions made about what projects/initiatives to support and prioritize through government interventions and what are the trade-offs of making these decisions?

Probe:

- For example, in the *Appels à projets* (2022 and 2023) how did you decide which projects would receive funding and which would be rejected?

Sub-question:

- To date, have any unintended consequences resulted from interventions to support urban agriculture initiatives? **(optional)**

SECTION 5: Transformative potential and limitations of institutionalizing UA

5. Do you think the policy and the various interventions that trickled-down from it have been influential in small, medium, or large ways and have led to meaningful changes in the borough? Why or why not?

5.1 What potential risks or undesirable outcomes do you associate with increasing local government involvement in urban agriculture initiatives in the borough?

Sub-question:

- Who is more likely to face these risks or be affected by these undesirable outcomes?

5.2 How do you see the roles of local/seed initiatives and government evolving in the future to further support and advance the institutionalization of urban agriculture in RDP-PAT?

(Note: The following questions are points of discussion to break ice and for informal conversations during participant observation)

5.3 Do you believe that urban agriculture in this borough has inspired other boroughs in any way? Why or why not, and if so, can you justify this with any examples? **(optional)**

5.4 How has urban agriculture changed the borough? **(optional)** (i.e. beautification, attraction of birds and insects, social gatherings, safety, green spaces?)

5.5 Has engaging with urban agriculture changed you, personally? Why or why not and if so, in what ways? **(optional)**

5.6 Do you believe that amplifying urban agriculture contributes to realizing a more just and sustainable future for this borough and its citizens? Why or why not? **(optional)**

6. In the study, we would like to use a description that you provide for your project/initiative. Can you describe your project/initiative in one or two sentences, please?

Appendix D

Table D1. Interview questions and coding process (codes used to organize data in the first and second rounds of mixed deductive and inductive coding).

Interview questions	Coding Round 1	Coding round 2
	Initial set of codes and (<) sub-codes	Expansion into parent codes
Background information about seeds		
Tell me about your project/organization...	seed description	(descriptive)
...and the role you play in it.	actor role	actor
What are the objectives of the project/organization?	seed objectives	willingness to act
In your opinion, what are the benefits of urban agriculture?	urban agriculture benefits	willingness to act
What motivates you to engage in urban agriculture?	personal motivations	willingness to act
Limitations + Changing conditions		
What factors limit your ability to reach your goals? / What are the limitations of supporting the development of urban agriculture initiatives in the borough?	limitations	institutionalization trade-offs/risks; resource (have/don't have); strategy (capacity/incapacity)
How has urban agriculture in this borough changed over the last five years?	borough conditions < observed changes	willingness to act
What do you think drove these changes?	borough conditions < change drivers	willingness to act
Who were the most influential actors or groups involved in bringing about these changes and why were they important?	actor role	actor; strategy; resource
Policy making process		
If you were involved in making this policy in any way, big or small, can you describe your role...	actor role	actor; strategy

...and tell me what you remember of the process?	policy making	(descriptive); actor; strategy; resource
What did a collaborative process accomplish that couldn't have been accomplished otherwise?	policy making < collaboration	(descriptive); actor; strategy; resource
Are there any persons or groups that were not invited to contribute to the policymaking process but which you think should have been involved or consulted?	institutionalization trade-off/risks < exclusion	institutionalization trade-off/risks
From whom or from where came the idea for the vision?	policy making < vision	(descriptive)
Is the goal of converting 30 hectares of land to urban agriculture aligned with your project/organization's/administration's goals for urban agriculture in the borough? Why or why not?	perspective on vision; institutionalization trade-offs/risks < co-existing visions	(descriptive); institutionalization trade-offs/risks
Policy outcomes + institutionalization		
What types of support or resources have you received from borough-level government?	institutionalizing mechanism; resource	institutionalizing mechanism; resource
Were government interventions in UA meaningful for your project/organization by helping your activities?	institutionalization benefits	institutionalization benefits
Were government interventions in UA meaningful for your project/organization by hindering your activities?	institutionalization trade-off/risks < (multiple)	institutionalization trade-off/risks
What potential risks or undesirable outcomes do you associate with increasing local government involvement in urban agriculture initiatives in the borough?	institutionalization trade-off/risks < (multiple)	institutionalization trade-off/risks

Table D2. Final collection of parent and sub-codes, code descriptions, origin of the codes, and references used to identify theoretically informed codes.

Parent codes	Sub-codes	Description	Origin of code	References
Willingness to act	Seed objectives	Overarching mission and goals.	Interview question	
	Urban agriculture benefits	Pursued benefits of UA for self and community.		
	Personal motivations	Personal motivators to action.		
	Borough conditions	Contextual drivers of action.		
Actor	Seed leader	Individuals leading seeds in the borough, either independently, or within a position in a non-governmental (profit/not-for-profit/local/community) organization.	Interviewee categorization	
	Government actor	Individuals acting within their position in the borough government.		
	Intermediary actor	Individuals or organizations linking seed activities to one another, and to regime-level institutions.	Inductive/Deductive	Hargreaves et al., 2013; Kivimaa et al., 2019; McCauley and Stephens, 2012
	Hybrid actor	Individuals able to cross the border between niche and regime levels (i.e. move across 'boundaries') and/or between different professions.		Kivisaari et al., 2013; Bunger and Schiller, 2022
Strategy	Mobilizing for change	Create legitimacy for the new pathway; Raise public awareness; Lobby for visibility and resources; Develop visions and set transition goals.	Inductive/Deductive	Kivimaa et al., 2019; Westley et al., 2013

	Managing relationships	Translate interests; Communicate and engage with key individuals in different sectors; Align and integrate different perspectives, ideas, viewpoints, and solutions; Create community cohesion.		
	Capacity Building	Network and develop social networks; Build multi actor coalitions; Create and protect safe spaces for interaction.		
	Fostering experimentation	Cultivating ideas; Guiding local experiments and facilitating their embedding to particular contexts of applications.		
Resource	Human	Man-power, time, culture and traditions, personnel.		Borrás et al. 2023, Gernert et al. 2018, Isaksson and Hagbert 2020
	Financial	Economic, budgetary, funding.		
	Physical	Land, water, tools, energy, infrastructure.		
	Knowledge	Information, learning, (lived) experience and local understanding, skills.		
	Relational	Social, network, personal contacts, access, trust.		
	Legitimacy	Authority, influence, power.		
	Legislative	Regulatory, legal.		
Institutionalizing mechanism	Resource allocation	The commitment (and 'tying up') of resources.	Deductive	Robert, 2008; Westley et al., 2013; Yin, 1981
	Regulatory reform	The creation of new (or reformed) laws, regulations, plans and/or codes.		Anguelovski and Carmin 2011, Moore et al. 2012, Westley et al. 2013
	Policy	Development and enactment of policy.		Anguelovski and Carmin 2011

	Support programs	Development of support programs.		Anguelovski and Carmin 2011
	Monitoring & Evaluating	Ensuring that the process of developing and implementing alternative pathways is working well. Evaluating outcomes.		Rotmans et al. 2001, Howells 2006, Intarakumnerd and Chaoroenporn 2013
	Partnership	The involvement of new actors able to leverage resources and political, cultural and economic opportunities, and to support consensus-building between stakeholders.		Westley et al. 2013, Ehnert et al. 2018
Institutionalization benefits		Benefits to seeds resulting from government interventions.	Interview question	
Institutionalization trade-offs/risks	Exclusion	Individuals or groups more likely to face the risks or undesirable outcomes of institutionalization or be excluded from transformational processes.	Interview question	
	Co-existing visions	Different visions of transformations, harmonious or competing.		
	Translation	Original transformative values and visions are lost as they are reconfigured.	Inductive	*Not discussed in this article
	Appropriation	Taking possession of, taking credit for, or not sufficiently acknowledging a seed, innovation, idea (etc...).		*Not discussed in this article
	Bureaucracy	Complicated or lengthy administrative procedures.		*Not discussed in this article
	Loss of autonomy	Seeds may come to depend on external support and resources to persist, losing autonomy in terms of what they do and how they do it.		*Not discussed in this article
	Loss of motivation	The stifling of motivation/willingness to act.		*Not discussed in this article

Projectification	Funding is often short-term, and project-based partly due to widespread risk aversion among policymakers.	*Not discussed in this article

Note:

- Strategies include those that actors are capable and incapable of employing. Resources include those that actors have and don't have (sufficient) access to.
- Fostering experimentation is typically associated with earlier phases of transformations (i.e. occurring before institutionalization).

Appendix E

Table E.1 Policy orientations, goals, and actions as institutionalizing mechanisms.

Policy orientations	Goals	Actions	Institutionalizing mechanisms
Promote and facilitate a diversity of citizen projects	Recognize residents' significant involvement in the practice of urban agriculture by revising the current regulatory framework to enable citizen-led urban agriculture activities to flourish. Inform the community about the benefits and potential drawbacks of urban agriculture activities.	Set up a pilot project authorizing hen-keeping in urban areas. Disseminate the new regulatory framework to promote citizen-based urban agriculture.	**Regulatory reform:** The creation of new (or the reforming of existing) laws, regulations, and/or codes (Anguelovski and Carmin 2011, Moore et al. 2012, Westley et al. 2013, Pasquini and Shearing 2014)
Support and endorse collective and community-based projects on the territory	Provide long-term (10 year) support to community projects in urban agriculture, which are essential to the social development of the borough because they address challenges such as food insecurity and social isolation.	Launch a call for community projects for the development of sites identified as wasteland or underutilized. Provide financial support for urban agriculture projects. Analyze and propose a renewed model for community gardens and continue to upgrade community gardens.	**Support programs:** The development of support programs for seeds (Anguelovski and Carmin 2011). **Resource allocation:** The commitment (and 'tying up') of resources (e.g. financial, material and human resources) (Yin 1981, Roberts 2008, Westley et al. 2013). **Partnerships:** The involvement of new actors able to leverage resources and political, cultural and economic opportunities, and to support consensus-building between stakeholders (Westley et al. 2013, Ehnert et al. 2018).

		Mobilize private and public partners to finance projects.	
Mobilize all stakeholders around the 30 by 2030 vision	To achieve this ambitious vision by supporting and mobilizing various stakeholders, including citizens, community organizations, the economic and institutional sectors, as well as different levels of government.	Create a committee of partners for the action plan's implementation and a follow-up committee to reach targets.	**Reconfiguration:** A reconfiguration of local institutions and/or organizational structures (Moore et al. 2012, Barnes et al. 2018). This includes the establishment of new committees or bureaus.

The table presents some policy orientations and related goals, as outlined in RDP-PAT's urban agriculture policy (RDP-PAT 2019). The actions associated with the policy orientations and goals are contained in the policy's first action plan (RDP-PAT 2020). We have identified institutionalizing mechanisms linked to these actions, which we derived from the literature on transformational processes, to showcase how the actions contribute to institutionalizing urban agriculture in the borough.

CHAPTER 4
Discussion

4.1 WEAVING THEORY AND PRACTICAL APPLICATION

In reviewing the literature on institutionalization in the context of transformations (Chapter 2) and drawing on perspectives across different fields of research including institutional theory, social innovation, sustainability (socio-technical) transitions, and sustainability (social-ecological) transformations, I found that institutionalization is commonly regarded as a complex and co-produced process occurring through the interactions of various actors and actions aimed at supporting or resisting innovation, which contribute to bolstering or constraining transformative change. As multi-actor interactions appear to be a necessary condition for institutionalizing innovations, I chose to approach my study of institutionalization with a focus on interactions between actors, the strategies they willingly employed in the pursuit of goals, and the resources they mobilized to institutionalize potentially transformative innovations.

A methodological difficulty I experienced in designing an empirical study of institutionalization is the lack of a clear and agreed-upon definition and understanding of institutionalization in the context of transformations/transitions, which can be linked to the interdisciplinary nature of research exploring transformative change towards sustainability. Popular theories of transformative change in coupled systems offer different perspectives on how institutionalization relates to other traditionally late-stage transformational processes (e.g. routinization, scaling, diffusion), which also drive forward and accelerate transformations. In Chapter 2, I contributed to knowledge about institutionalization by combining the insights of different research areas exploring transformative change to arrive at an integrative explanation and an integrated definition of the concept.

Pinpointing exactly when the institutionalization of urban agriculture began in RDP-PAT was difficult to do, given what we currently know and still don't know about how institutionalization occurs in reality. However, the more complete understanding of institutionalization I gained in Chapter 2 provided tools for assessing the value of RDP-PAT's 2019 urban agriculture policy in

strengthening the degree to which urban agriculture is institutionalized in the borough. The policy was an institutionalizing mechanism and a strategy (Anguelovski and Carmin 2011, Pasquini and Shearing 2014) that enabled other concrete actions to be taken that would further institutionalize urban agriculture in the borough (Table 4.1).

Table 4.1 Some policy orientations and goals (outlined in RDP-PAT's urban agriculture policy) with their associated actions (contained in the policy's first action plan), linked to institutionalizing mechanisms.

Policy orientations	**Goals**	**Actions**	**Institutionalizing mechanisms**
Promote and facilitate a diversity of citizen projects	Recognize residents' significant involvement in the practice of urban agriculture by revising the current regulatory framework to enable citizen-led urban agriculture activities to flourish. Inform the community about the benefits and potential drawbacks of urban agriculture activities.	Set up a pilot project authorizing hen-keeping in urban areas. Disseminate the new regulatory framework to promote citizen-based urban agriculture.	**Regulatory reform:** The creation of new (or the reforming of existing) laws, regulations, and/or codes (Anguelovski and Carmin 2011, Moore et al. 2012, Westley et al. 2013, Pasquini and Shearing 2014)
Support and endorse collective and community-based projects on the territory	Provide long-term (10 year) support to community projects in urban agriculture, which are essential to the social development of the borough because they address challenges such as food insecurity and social isolation.	Launch a call for community projects for the development of sites identified as wasteland or underutilized. Provide financial support for urban agriculture projects.	**Support programs:** The development of support programs for seeds (Anguelovski and Carmin 2011). **Resource allocation:** The commitment (and 'tying up') of resources (e.g. financial, material and human resources) (Yin 1981, Roberts 2008, Westley et al. 2013).

		Analyze and propose a renewed model for community gardens and continue to upgrade community gardens. Mobilize private and public partners to finance projects.	**Partnerships:** The involvement of new actors able to leverage resources and political, cultural and economic opportunities, and to support consensus-building between stakeholders (Westley et al. 2013, Ehnert et al. 2018).
Mobilize all stakeholders around the 30 by 2030 vision	To achieve this ambitious vision by supporting and mobilizing various stakeholders, including citizens, community organizations, the economic and institutional sectors, as well as different levels of government.	Create a committee of partners for the action plan's implementation and a follow-up committee to reach targets.	**Reconfiguration:** A reconfiguration of local institutions and/or organizational structures (Moore et al. 2012, Barnes et al. 2018). This includes the establishment of new committees or bureaus.

The three stages of institutionalization, which are habitualization, objectification, and sedimentation (Tolbert and Zucker 1999, Fuenfschilling and Truffer 2014), offer an understanding of how institutionalization contributes to increasing innovations' legitimacy, coherence, and stability. The framework can serve as a tool to assess the policy's influence on advancing the process of institutionalization, by legitimizing and stabilizing the presence of urban agriculture in the borough of RDP-PAT and building coherence in the way that it is envisioned and practiced. The policy marked a jump from the first stage of institutionalization, called habitualization, to the second stage of objectification (see Table 2.2). This is because the act of adopting an urban agriculture policy that was centered on supporting seed initiatives in the borough showcased decision-makers' willingness to invest resources in the development of urban agriculture. This action was thus legitimizing. Additionally, institutional work carried out as part of the policy making process (for example, framing problems and solutions, creating alliances, and mobilizing resources) further legitimized urban agriculture (Fuenfschilling and

Truffer 2014). The making of an urban agriculture policy, backed by multiple influential actors in the borough, also stabilized urban agriculture's presence in the borough as part of the borough's new identity. However, urban agriculture's 'variance' did not diminish at this point in the process of institutionalization, as is suggested to occur in response to increased stability (Tolbert and Zucker 1999). This is largely because one of the policy's goals was to encourage and facilitate a diversity and plurality of citizen and community-led projects in the borough (RDP-PAT 2019). Achieving this goal required creating 'spaces' to engage diverse actors and exchange diverse ideas and visions. Public consultations and the creation of an intersectoral policy coordination committee facilitated such exchanges. These exchanges led to increased coherence; by gathering hundreds of governmental and non-governmental actors across different settings (including public consultations and meetings of the policy coordination committee), the discourse on urban agriculture was intensified. Diverse actors co-envisioned RDP-PAT's urban agriculture transformation and collectively rationalized what urban agriculture meant and looked like, in the unique context of RDP-PAT. The policy document (RDP-PAT 2019) reads: "through various means of communication, [we] aim to inform, accompany and support the practice of an urban agriculture that is full of vitality and adapted to its territory."

The traditional institutionalization curve (see Fig 2.2) depicts diffusion and legitimation as key sub-processes of institutionalization. RDP-PAT's 2019 urban agriculture policy strengthened the degree to which urban agriculture was institutionalized in the borough by triggering its accelerated diffusion across a greater number and diversity of supporters, practitioners, and beneficiaries. In fact, it is stated in the policy document that the borough's ambitious vision of converting 30 hectares of territory to urban agriculture can only be achieved with the support and mobilization of the various stakeholders involved in the policy, including citizens, community organizations, the economic and institutional sectors, and the various levels of government. The policy legitimized, and increased consensus on the value of, urban agriculture through its integration in the borough's social and economic development plans and by framing it as an integral part of the borough's transformation and renewed identity. Five years following the policy's enactment, stability (represented as the leveling off of the traditional institutionalization curve in Lawrence et al. (2001, p.626)) and sedimentation (the last stage of institutionalization in the three stages framework by Tolbert and Zucker (1999)) have not yet been achieved in RDP-

PAT's urban agriculture. One reason for this is because urban agriculture has not yet been taken up by the majority of people living and working in RDP-PAT. In fact, the mobilization of harder-to-reach individuals to participate in the borough's urban agriculture remains a challenge for the borough government, according to governmental actors interviewed.

This observation - that much of RDP-PAT's population is not yet involved in, nor mobilized around, the borough's transformation - presents an opportunity for further research, by begging the question: to whose benefit is RDP-PAT's transformation unfolding, and which individuals, groups, or visions of change have been left out along the way? As well as: What are the trade-offs of institutionalizing urban agriculture in RDP-PAT, that is, does it come at the expense of, or in conflict with, other needs of the population or priorities for the borough? In addition, a comparative perspective on institutionalization at local scales would further enrich empirical understanding by providing different contextual underpinnings for transformative change. Future studies might also explore whether institutionalization via local government policy creates lasting and meaningful outcomes, for whom, and at whose expense, and assess the potential of local-scale institutionalization for inducing transformative change at broader scales.

4.2 AN ALTERNATIVE VIEW OF INSTITUTIONALIZATION

While the case study I conducted was informed by, and contributed to testing, prevailing notions about institutionalization, some of the findings that emerged from the research painted an alternative picture of institutionalization.

4.2.1 *Institutionalization as a collaborative multi-actor process*

Many studies have in transformations research have framed institutionalization as a contested and confrontational process that involves a greater role for actors associated with the regime, who may have divergent visions, goals, and interests compared to seed initiatives (Pel and Bauler 2017, Augenstein et. al 2020). The case study I conducted in RDP-PAT showed that institutionalization can also be collaborative, leading to desirable changes for (some) stakeholders of the transformation. It is likely that in this case, institutionalization bolstered (rather than constrained) transformative change in the borough, because the actors involved had

common goals and a shared vision of transformation, and because creative impulses and innovation were incentivized and supported with additional resources. These were likely key factors in fostering positive interactions and effective partnerships between the different actors involved in RDP-PAT's urban agriculture transformation.

People are more likely to collaborate if they share goals, and if the innovation that is being institutionalized reflects their interests (Geels and Schot 2007, Sayles and Baggio 2017). Across the categories of actors interviewed in the case study (these are: people acting independently, acting on behalf of non-governmental organizations, and acting on behalf of the government), people shared the dream of transforming the borough from chimneys to gardens, and the desire to reverse RDP-PAT's reputation as a polluted and contaminated borough. Seed initiatives operated with similar goals in mind to those of the local government, including addressing local problems (such as food insecurity), creating improved living conditions (by fostering community life and social cohesion) and educating and engaging youth. Studies have shown that local governments are more likely to develop policies if they perceive it as a tool for tackling local problems and improving communities' quality of life through the generation of (social, economic and ecological) benefits (Ryan 2015, Aylett 2014).

Most interviewees in this study had a favorable view of the borough government's strengthened role in urban agriculture through the new policy and the other interventions that trickled down from it. These people perceived their local government as playing an enabling role in the borough's transformation, primarily through their openness to innovation and their mobilization of resources. The borough government's openness to the creative ideas and initiatives of people living and working in RDP-PAT was regarded by multiple interviewees as critical to the success of this new policy.

The changes that took place in the borough in response to government-led interventions to amplify urban agriculture came about because the borough government incentivized individual and community action and involvement (Olsson et al. 2004). Rather than using top-down approaches to transform the borough, the government of RDP-PAT derived inspiration from existing and successful seed initiatives (e.g. six community gardens already existed in the

borough and showcased the viability of co-managing urban agriculture initiatives between residents and the government). The government learned from seed initiatives (e.g. by consulting the leaders of seed initiatives to learn how they mobilized the community). Building on the bottom-up efforts and acquired knowledge of seed actors in the borough, RDP-PAT's government leveraged its own (financial, legislative, legitimacy, and relational) resources to support further change. A caveat to interventions by the borough that were designed on the basis of a resource exchange between the local community and its government is the difference that exists between perceived and actual resources. During interviews, many of the seed actors that voluntarily offered time, knowledge, skills and ideas to start and manage urban agriculture initiatives in the borough alluded to being stretched thin, and many felt that their time was undervalued, and sometimes taken for granted, by governmental actors. If carefully navigated, collaboration between diverse actors for the purpose of co-creating positive, transformative change can allow these actors to combine their complementary capacities and achieve social and resource synergies (Frantzeskaki et al. 2014). These can improve conditions for, and thus bolster, further bottom-up and innovative experimentation.

4.2.2 *Institutionalization as a catalyst for transformative action and change*

A key finding of my research is the idea that institutionalization can occur early in a transformation and serve to catalyze transformative action and change in a community. Current and prevailing theories of transformative change frame institutionalization as a late-stage process that occurs in response to a crisis that destabilizes, and forces a shift in, the regime. The results of the case study do not reflect this order of events and are instead better aligned with Lawrence et al. (2001)'s conceptualization of institutionalization as a process which begins with the emergence of innovation. In RDP-PAT, the 'innovation' of urban agriculture emerged in the form of seed initiatives, but they were few, mostly isolated, and under-resourced. These seed initiatives showcased urban agriculture as a potential viable solution to local problems, capturing the interest of decision-makers who intervened by creating a policy to support the further scaling of urban agriculture in the borough, triggering an accelerated pace of institutionalization, while enabling further innovative experimentation. This continued, and better supported, experimentation took the form of new seed initiatives led by actors in the community and in government, as well as government-led interventions that experimented with changing

regulations to authorize new urban agriculture activities, designing resource-support programs to attract new seed actors and their resources, establishing committees, adapting actions that were successful elsewhere (e.g. eco-grazing, raising hens for eggs, planting public and share edible gardens). Institutionalization is often decoupled from experimentation and described as a shift 'beyond experiments' to generate more permanent impacts of experiments (Barnes et al. 2018, Turnheim et al. 2018). Meanwhile, experimentation proved an integral part of urban agriculture's institutionalization in RDP-PAT.

Taken together, the research findings presented in this thesis offer a different perspective on how institutionalization shapes the dynamics and the pathways of transformations. In the case study, institutionalization did not only contribute to diffusing and legitimizing the impacts of existing urban agriculture seed initiatives in response to the threat of a real or anticipated crisis. Institutionalizing urban agriculture via the co-creation and co-implementation of a policy represented an early effort to transform the borough of RDP-PAT that created favorable conditions for the blossoming of diverse and innovative new seed initiatives and government-led interventions. It also generated momentum for coordinated and collective action within the local community, by incentivizing and welcoming new stakeholders to partake in the process of transformation, leading to synergistic actor, resource, and strategic interactions. Additionally, my study of RDP-PAT adds to the growing body of literature that calls on the adoption of a less static view of actors' roles in transformations (e.g. Loorbach et al. 2007, Kivimaa et al. 2019b, Wang et al. 2024), because the same actors may be present throughout a transformation and shift their roles, adapt their strategies and leverage different types of resources to remain relevant in the process of change and effective at advancing transformative change.

My empirical study of institutionalization contributes to knowledge on transformative change by showing that transformations may follow a more circular and iterative trajectory than is predominantly thought, oscillating between experimentation and institutionalization, two key transformational processes which influence one another and can even be positively reinforcing (see fig. 3.4). More broadly, this work can inspire local governments and decision-makers in cities to take action sooner rather than later in such a way that supports and builds on existing

bottom-up impulses to seed change by experimenting with radical, hopeful, and potentially transformative innovations for a more just and sustainable future.

CHAPTER 5

Conclusion

My objectives in this thesis were to 1) identify gaps in knowledge about how transformative change unfolds, and address these by integrating knowledge across research strands exploring bottom-up and innovation-induced transformative change (Chapter 2), and 2) contribute to the body of empirical research on institutionalization as a key transformational process, with a focus on the local scale and the interactions that underpin the process (Chapter 3). Through a case study based in a borough of the city of Montréal, Canada, we investigated the institutionalization of urban agriculture via the co-creation and adoption of a new government policy aimed at furthering the development of urban agriculture locally and supporting diverse seed initiatives (i.e. urban agriculture projects) in the community. The study offered a deeply contextualized exploration and analysis of local-scale institutionalization focusing on the interactions of seed initiatives with other actors and their interventions to institutionalize innovation.

Our findings highlight three key ideas. First, the institutionalization of an innovation for sustainability, triggered by local government intervention in the absence of sufficiently coordinated and mobilized action in the local community, can mark the early beginnings of transformation and create momentum for change as well as mobilize collective action towards a shared objective, or vision of transformation. Second, the actors and interventions that contribute to institutionalizing an innovation by building its legitimacy, coherence and stability, may also create favorable conditions for more experimentation, occurring within shifting boundaries. This suggests that experimentation and institutionalization are not entirely distinct processes of transformation, but may instead reinforce one another, and highlights the possibility of institutionalization stifling some, while bolstering other, innovative impulses. Third, existing notions of actors' roles in transformation are static and simplistic and fail to consider how roles might evolve throughout the process of change in line with the changing needs of transformation. Actors' ability and willingness to act in the present may be influenced by previous experiences and the positions they have held or alliances they have formed in the past or in other contexts.

The research presented in this thesis expands the current understanding of institutionalization in the context of sustainability transitions/transformations, and challenges prevailing notions about how the process occurs and how it shapes pathways to transformation. It serves as an invitation to scholars, researchers, and policymakers alike to think of institutionalization as a series of interactions between diverse actors that have unique capacities for initiating (seeding) and facilitating (navigating) transformation. These actors pursue goals that, if in good alignment, can support a collaborative process leading to emergent and co-produced changes.

My hope is that the research presented here serves as a call to action for governments in cities to meaningfully intervene to support and amplify transformative impulses towards sustainability in the communities they govern, and for seed initiatives to have open minds about collaborating with local government to enact positive change.

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