# Nature-based solutions, sowing the seeds for sustainable cities ?

Making the argument for nature, specifically nature-based solutions as fundamental transition niches for sustainable cities and subsequently exploring the strategies which enable the diffusion of said niches.

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# Copholon

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# Preface and acknowledgements

The following thesis you are about to begin is to fulfill my Master's degree in Environment and Society Studies at Radboud University, Nijmegen, The Netherlands. The particular specialisation of the programme I chose was "Local Environmental Change and Sustainable Cities", a theme which I hope is reflected in the following thesis.

Admittedly, I for one **hate** cities, they are dense, hectic and claustrophobic. However, I am confronted with the dilemma that in order to exist to an extent - (particularly as a young graduate starting out) one has to spend considerable time in a city. On the other hand, I **love** nature - be it the sea, the rolling hills, beaches and biodiverse spaces. Accepting my fate of dwelling in a city for some time is somewhat alleviated by the concept of bringing (or returning) nature into the city. Throughout my years in academia, from Bachelor's to Master's, I have been rather absorbed by this concept of bringing nature back into the otherwise concrete jungle, this thesis aims to build on this interest and exhibit the potential of nature-based solutions.

I would like to thank in particular my thesis supervisor, Dr. Duncan Liefferink, for his in-depth and insightful feedback and guidance, especially when it came to navigating the complex and tangled ideas and concepts in my head. His reflections really helped me put pen to paper, in a coherent manner.

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I hope you enjoy,

Shibeal Mc Cann

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# Abstract

Fostering sustainability in the face of environmental adversity today has gained high priority on the agenda of cities globally. The profound ability of nature to contribute to the sustainability and resilience of cities is becoming increasingly apparent, as is the recognition and urgency for sustainability transitions in these urban environments. Cities are recognised as key sites for these transitions. The following research paper positions nature-based solutions as transition niches for sustainable cities. This research herein seeks to identify ways in which the implementation of nature-based solutions with specific regard to urban agriculture, can become conventional when it comes to urban planning. To advance the practice of implementing nature-based solutions in cities, it is important to examine the strategies and aids which accelerate their proliferation. Hypothesised strategies or aims for this thesis include efficient followership, entrepreneurial linkage, supporting policy environments and subsequently networking. For this study a detailed case study was conducted - a positioned frontrunner city with regard to nature-based solutions is investigated alongside a partner follower city. The research will elaborate on the different ways nature-based solutions, as transition niches in these cities get diffused; replicated, embedded and scaled in order to contribute to the wider transition to sustainability in that region.

Key words: sustainability transition, niche, nature-based solutions, sustainable cities.

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#### **Chapter 1: Introduction to the research**

#### Urbanisation

By 2050, it is estimated that urban dwellers will amount to 6 billion of the world's population, translating to 70% of the global population residing in cities (Staddon et al, 2018). The significance of cities today is stark in contrast to the state of affairs at the turn of the century, when approximately 13% of the global population called these urban areas - home. At present, there is ever-increasing recognition of the potential impacts of climate change in cities. The UN International Strategy for Disaster Reduction concluded that cities are progressively becoming more vulnerable to environmental change: flooding, extreme rainfall events and heat stress events occurring more frequently (Elmqvist et al, 2015). Catastrophic events particularly felt in Europe this summer, have begun to verify this vulnerability, following a series of unignorable anomalies with London flooded and Vancouver burnt. Despite homing most of the world's population, these cities are quickly becoming uncomfortably unsustainable, dense, and unappealing places to live. The impacts of these changes are likely to have harsh impacts on the development of these largely resource-dependent regions (Scott et al, 2001).

Urbanisation itself is intrusively eroding the resilience of cities, as critical socio-ecological systems at a time when enhancing the resilience of these environments should be of key priority (Staddon et al, 2018). Cities are recognised as locations wherein (un)sustainability issues emerge. Each of the three main pillars of sustainability - environmental, economic and social - have been enshrined in the 2030 UN Sustainable Development Agenda, which includes Sustainable Development Goal (11) - "Sustainable Cities and Communities", focusing explicitly on urban areas and ensuring their sustainability and resilience (UN, 2015) Yet how do we reach these goals ?

The literature advocates for transition as a pathway to a more resilient and sustainable state (Meerow et al, 2016). Such a transition will entail structural systemic realignments in urban systems like the food system, through which wicked or persistent problems are addressed and tackled such as attempts to relocalise food systems (Frantzeskaki et al, p.24, 2017). Cities form the nucleus of economic and political activity, hence, such settlements are thought to be capable of considerable adaptation, depending considerably on the competence and capacity of individuals, communities

and local governments along with access to adequate resources (Hunt and Watkiss, 2011). The challenge however, lies in unlocking and unleashing this capacity.

This discharge of potential is not infrequent. Globally, cities are continuously unlocking this potential, taking for example

Copenhagen, Denmark which has pledged to become carbon neutral by 2025, elsewhere cities like Barcelona, Spain are experimenting by integrating information computer technology to increase their cities efficiencies. Increasingly, innovations are actively being developed, addressing this need for urban sustainability transitions (Frantzeskaki et al, p.24, 2017).

#### A sustainable city ?

A prerequisite for the transition to a sustainable urban form is knowing what it is. The sustainability of a city gives rise to the ever contested nature of "sustainability", sustainability as a target contains different perceptions and meaning depending on the respective context, space or city. Given the complexity of cities, not one single solution exists, and scholars should acknowledge that multiple sustainable urban futures are likely to coexist within a single city. Overarching definitions of sustainable cities however, consider self-sufficient cities, those who do not depend heavily on external resources, a rather utopian ideology. Often it is easier to depict what is *un*sustainable. Some scholars refer to the term "sustainable urban development" in the transition to sustainable cities, as it refers to the process of achieving such a state (Nevens et al, 2013). In order to begin to achieve such a state a number of pathways can be followed, often, identifying these pathways can be the challenge (Burton et al, 2000, p.7).

Upon investigating sustainability transition initiatives in urban spaces Frantzeskaki et al (2017) noted that a great number of initiatives experiment with solutions which restore and work with nature, consequently nature-based solutions (NBS). Those committed to making our cities more sustainable are increasingly focused on the contribution of NBS. Not only their environmental attributes yet, their socio-economic attributes of sustainability; on citizens empowerment, and encouragement of adaptive behaviour among citizens (Staddon et al, 2018).

Today, the ways in which our societal systems are organized can be considered to be unsustainable from a long-term perspective: there are only limited resources and spaces, the possibilities for growth are limited, yet our hunger continues. These systems will need to go through structural changes in order to attain greater levels of performance and solve the unsustainability problems that we are confronted with (Loorbach, 2007, p.13). This transition can not only be considered a necessity for survival but it can also be seen as a desirable and ethical next step in human evolution: to organize our society in such a way that it is more in balance and in tune with the natural environment.

#### Urban sustainability transitions

Cities are among some of the most complex systems, subject to stubborn path dependencies and non-linear transitions (Wilson, 2010). Sustainability transitions imply that an unsustainable present ideally transforms into a more sustainable future - when societal systems, such as cities move from one relatively stable situation to another with the intention of benefitting the planet and people (Truffer and Coenen, 2012). These transitions will require changes at multiple social, economic and spatial scales. When concentrating on urban transitions, one must acknowledge and spearhead how multiple domain transitions intersect and are interrelated in these regions. The reconfiguration of an urban society's technologies, cultures, lifestyles, institutions and infrastructures can be referred to as urban sustainability transitions - fundamental changes in urban systems, addressing wicked problems (Frantzeskaki et al, 2017, p.2).

#### The contribution of NBS to urban sustainability

Nature-based solutions (NBS) have emerged as opportunities to assist urban communities in their transition to increased sustainability and adaptation to climate change (Frantzeskaki et al, 2019). The impact of ever-increasing urbanisation has concurrently meant a decimation of vegetated surfaces within these realms, and with this decline, a departure of their accompanying ecosystem services (Gill et al, 2007). Within cities, these ecosystem services are constantly overlooked and undervalued. Trees are felled for the perceived effect they have on much prioritised buildings, gardens are compacted, paved over to provide parking spaces, whilst biodiverse "wasteland" is earmarked for future development (Gill et al, 2007).

"Civilisation is snorting like a steer on growth hormones" (The Overstory, p.259).

However, what we often neglect to see is that in these drastically changing climates, the functionality or contribution of green space becomes increasingly important. The biophysical features of green space in urban settings through the reduction of water runoff, the provision

of cooler microclimates or the amelioration of air pollution offer a remarkable potential to aid cities as they hurriedly adapt to climate change (Gill et al, 2007).

In many existing urban areas where built form is already established, the potential of creating larger green spaces is usually non-viable. Urban planning must be creative and make use of available land for greening whether it be scaling the walls of skyscrapers or through the donning of rooftops (Gill et al, 2007). Nature-based solutions are a rather novel concept, introduced as an approach to further increase the resilience, viability and sustainability of a region where they are installed. The European Commission has defined these innovations as *"living solutions which are inspired by, supported by, or copied from nature, designed to address many societal challenges in a resource efficient manner while simultaneously providing social, economic and environmental benefits"* (EC, 2016).

The EU's research and innovation policy is actively seeking to address societal challenges with NBS, turning them into experimental innovation opportunities (Faivre et al, 2017).

#### Positioning nature-based solutions as transition niches for sustainable cities

The recognition of NBS as transformative solutions to address a myriad of contemporary urban challenges simultaneously - alleviation of climate risks, social cohesion, air pollution and biodiversity degradation to name but a few - has strongly encouraged the incorporation of these solutions into city planning (Frantzeskaki et al, 2016). Yet, greater efforts are required to make these innovations conventional.

Globally today, initiatives are emerging which design, implement and monitor transition experiments in real world environments in support of sustainability transitions (Van den Bosch, 2010). This new experimental transition niche which is emerging entails a collaborative effort between actors from both academia and society to foster the warranted transformative change together towards sustainability (Nevens et al, 2013). The sustainability practices experimented upon do not concern the mere modification of elements already present, rather, they offer a radical alternative to the status quo in both process and outcome.

Here, within this research project we seek to explore this transition to urban sustainability, where transitions are defined as processes of structural change in societal systems. Transitions entail a shift in dominant rules of the game, a transformation of established technologies, movement from one (usually unsustainable) dynamic equilibrium to another, preferable one (Meadowcroft, 2009). Loorbach (2010) postulates that urban transitions from present regimes to more sustainable ones

will have the objective of putting resilience into practice. To what extent can NBS by contributing to resilience, accelerate the transition ?

For the duration of this paper we will refer to the nche definition of Smith et al (2010), who define niches as "spaces where networks of actors experiment with and mutually adapt greener organisational forms and eco-friendly technologies", pockets of the future in the present. Afterall,

"Change within the regime tends to be incremental and path-dependent... *revolutionary* change originates in niches" (Smith et al, 2010).

Schot and Geel (2008) arrived at the assumption that if niches are constructed adequately, they can act as the building blocks for wider, societal change. Niches have the potential to diffuse into the mainstream, displacing or influencing incumbent socio-technical regimes if the latter are placed under concerted pressure (Smith et al, 2010). The following paper seeks to develop these ideas further, positioning NBS as transition niches, their applications have been developed somewhat in opposition to the incumbent regime, a built environment which relies heavily on external resources, gray infrastructure and intensive development approaches. The hope is that if these transition experiments or niches work well in real world settings and if upscaling and acceleration can occur, these niches can add to the momentum of the emerging sustainable socio-technical configuration and help to overthrow or influence the unsustainable regime (Sengers et al, 2014). The process through which niche experiments come to influence the regime is called diffusion - consisting of the activities which are aimed at embedding, upscaling and translating the experiment. Much of the NBS technology and infrastructure exists today from street trees and parks to allotments and green spaces, yet greater efforts are required to integrate them into functioning systems or regimes. Wide scale implementation would further improve the economic and social efficiencies of these technologies, but what factors and what actors can accelerate their diffusion ?

#### Narrowing down nature-based solutions: Urban agriculture

Urbanisation and the associated climatic and social challenges require holistic solutions. One such option exists as urban agriculture (UA), positioned as a nature-based solution (NBS). Many scholars argue that urban food supply by means of UA can be considered as a NBS (e.g. Kingsley et al, 2021). Urban agriculture can be broadly defined as the production of foodstuffs, flowers and fibre on land which is dispersed through urban and peri-urban areas (FAO, 2016). The contributions of

urban agriculture are bountiful; enhancement of climate change mitigation and adaptation, provision of ecosystem services while improving food security and social cohesion. Urban agriculture has major potential to improve the resilience and sustainability of cities. UA takes on various forms, from community gardens to allotment spaces and guerilla gardens, within back gardens on rooftops, or in vacant city spaces (Kingsley et al, 2021). It is crucial that urban planners begin to recognise the merit of urban farming among the rich mix of activities that characterise 21st century cities. As urbanisation prevails, greater local food self-sufficiency and reliance must be acknowledged as an important aspect of urban sustainability transitions alongside mobility and energy efficiency initiatives and the containment of urban sprawl (Deelstra and Girardet, 2000). The ensuing case studies within this research project hope to highlight the potential of urban agriculture, positioned as nature-based solutions have, at contributing to urban sustainability transitions.

#### **1.2 Research problem statement**

The above introduction can lead one to a more defined problem statement. Given the current upward trajectory of both population growth and urbanization, cities urgently need to transition to a more sustainable state. The potential of nature-based solutions as experimental niches for this transition is remarkable, yet their uptake and primacy remains to be seen across many European cities. Understanding the strategies by which these niches diffuse in investigated cities may lead to generalisable lessons for more prominent implementation in the future.

#### **1.3 Research aim and research question(s)**

The overarching aim of this research paper is to explore the strategies by which nature-based solutions, positioned as transition niches diffuse, influencing urban sustainability transitions. The research seeks to contribute to a rather nascent, emerging body of knowledge and literature on NBS for sustainable cities and their potential for influencing wider systemic change. Thus the following research will be primarily exploratory in nature, research which investigates a subject about which little knowledge is available (van Thiel, 2014, p.15).

The above framing introduction has influenced the development of the following research statement from which research questions will be subsequently isolated:

"Making the argument for nature, specifically nature-based solutions as fundamental transition niches for sustainable cities and subsequently exploring the strategies which influence their diffusion by means of embedding, upscaling and translation of these niches".

## **Overarching research question:**

Through which strategies do NBS, positioned as Urban Agriculture initiatives for this particular study seek to diffuse (become embedded,translate and scale), to influence the broader sustainability transition ?

## Sub question(s)

- What strategies contribute to the translation of UA initiatives from one location or institution to another ?
- What strategies enable UA initiatives to become embedded within their socio-spatial contexts ?
- How can UA initiatives effectively grow internally, regards to actors, resources and spatially and hence, scale up ?
- What are the landscape factors at play that have influenced the emergence of nature-based solutions, particularly UA initiatives ?
- Do UA initiatives have transformative potential, has a transition occurred ?

### 1.4 Scientific and societal relevance of the research to be carried out

#### Scientific relevance

This research seeks to fill or contribute to identified gaps in the extant academic literature and knowledge base. Markard et al (2012) in a surveying paper discovered a noticeable gap in the sustainability transitions literature when it emerged that only 6% of analysed studies had taken an urban perspective. Furthermore, Bilali et al (2018) recognised that sustainability transitions research has a tendency to overlook agro-food systems, and is weighted towards transitions in energy and mobility sectors. In this context the aforementioned research will contribute to filling these gaps as the focus is on food system transitions in the urban context.

The following research seeks to understand the transition not primarily from a systems perspective but also an agency perspective, providing a richer explanation of the roles of visions, narratives and interests in transformative change (Frantzeskaki et al, 2014, p.17).

One of the hypothesised strategies by which NBS diffuse to be investigated in this research is city scale followership. With respect to the topic of climate followership, today most literature on leadership and pioneership has paid little attention to climate followers and the associated leader-follower dynamics (Torney, 2019). This neglect of followership in the extant literature is

understandable due to challenges associated with capturing and identifying followers and followership in-situ. For example, how exactly do we know or apprehended that the actions of a proclaimed frontrunner city have triggered a change of approach on the part of a would-be follower? The study will seek to investigate this relationship and its contribution to diffusion.

# Societal relevance

Societal relevance takes into consideration the contribution of a research study to solving topical social or policy problems (van Thiel, 2014, p.14). As we have previously discussed, nature-based solutions are defined as solutions which address various societal challenges, providing environmental, economic and social benefits (EC, 2016). The study seeks to explore the strategies which can further scale and diffuse learnings on the implementation of these solutions, hence, is societally relevant. It is anticipated that the project can provide an example of how cities can and are scaling NBS in response to the unsustainability issues that they face. Together the societal relevance, identified research gaps and recognised research opportunities will contribute to the formulation of our research question(s), (fig 1.).



Fig 1. Combining research gaps, societal relevance and opportunities to guide the formulation of research questions (Authors own).

# **Chapter 2: Literature review and theoretical framework**

#### 2.1 Review of the extant literature - determining what we know

In order to begin to understand and attempt to answer our research question(s), a literature review must be carried out. Furthermore, a literature review can help to develop the context and appropriate theoretical frameworks (Saunders et al, 2015, p.71). I intend to carry out an in-depth literature review on urban sustainability transitions and the contribution of nature-based solutions positioned as transition niches. The following section presents some findings from said literature review and provides reflections on the utility of different theories and frameworks for the research.

#### 2.1.1 Transitions and nature-based solutions in the current global policy context

The notion of transition has been making waves in the past years among global policy arenas. Policy makers have become increasingly interested in transitions, acknowledging that incremental change will not lead to the crucial sustainability that is required. Transition is perceived as a policy objective, with potential to tackle a multitude of problems in various life domains (Elzen & Wieczorek, 2005).

Recent global climate negotiations including The Paris Agreement (2015) and The New Urban Agenda (2016) have both underlined the role of research and innovation for these negotiations to come to fruition (Faivre et al, 2017). Article 157 of The New Urban Agenda makes specific reference to nature-based innovation (New Urban Agenda, 2016). NBS have been further promoted by the UN Convention on Biological Diversity, in recognition of their contribution to restoration and maintenance of biodiversity. Given the rather nascent state of NBS however, standards and policies are at present, limited. It must be acknowledged that increasingly, there is a clear increase in interest on behalf of the European Union (Frantzeskaki, 2018), which may act as an influencing landscape factor for the transition.

#### 2.1.2 Transitions literature

Due to the broad nature of NBS, and systems which they can influence, a narrower focus is required. This study will focus on transitions in local food systems, looking at alternative, sustainable means of food production. This section of the paper attempts to review existing approaches to transition thinking, in order to distill insights for examining nature-based solutions as niche initiatives. Exploring the relationships between dominant prevailing regimes and emergence alternatives is the essence of transition approaches (Rut and Davies, 2018). Transitions as a

"gradual process of societal change in which society or an important sub-system of society structurally changes", implies that transitions concern themselves with systemic change, reconfiguration of technology, policy, cultural meanings and infrastructure over time (Geels, 2011). Such changes are required as incumbent systems are locked into unsustainable trajectories. It is fundamental to discuss which aspects of the socio-technological system require changing in order for a transition to occur for our research, and how are these transitions brought about. The following section will examine some commonly applied frameworks for transitions.

# 2.1.3 The multi-level perspective

The multi-level perspective (MLP) is an analytical tool which can be applied to study transitions of societal systems such as the food system. The framework can help to understand the factors which influence processes of change at varying levels. The MLP considers three analytical levels - landscape, regime and niches which are further elaborated in table 1. The interaction between these three levels is argued to drive socio-technical transitions (Geels, 2011).

Table 1. Defining the regime, landscape and niche adopted from Smith et al (2010).

| Landscape<br>(Macro-level) | The exogenous landscape which externally influences the interplay<br>between niche and regime. The landscape is associated with trends or<br>pressures such as environmental disasters or changing cultural trends. |
|----------------------------|---|
| Regime<br>(Meso-level)     | The dominant socio-technical structures, which harness an institutionalised set of rules, practices and technologies to create a societal system.   |
| Niche<br>(Micro-level)     | Niches are the loci for radical innovations. An isolated network of actors within a sociotechnical system which seeks to compete with and/or influence the incumbent regime.  |

According to the MLP, transitions entail a shift at the regime level. This can occur by the growing influence of innovative niches who act to destabilise the regime and/or by changes occurring at the landscape level (Rut and Davies, 2018). It is argued that the MLP is a useful framework for understanding the factors that influence change at different levels and how the different levels interact (Rut and Davies, 2018). The above argumentation provides reasoning for the potential of the MLP as a theory to aid answering our framed research question(s). As the research seeks to explore the strategies which enable and influence niche diffusion, the MLP can prove useful in understanding these strategies as "factors of change".



Fig 2. Niche innovations influencing the incumbent regime, Verbong and Geels (2010).

Following an introduction to the MLP and its respective analytical levels, we turn to understanding *how* the interactions between these levels could ultimately lead to a transition. Processes of transition seek to challenge the prevailing regime. Once a regime has become established it dominates practices of people and institutions and may lead to a 'lock-in' effect. A 'lock-in' effect implies that institutions are incapable of acting outside the boundaries of a set of rules set by the prevailing regime. In this case, cities have to an extent become locked-in to unsustainable food systems - due to sunk investments in infrastructure, vested interests and behavioural consumer patterns etc. Yet, urban agriculture positioned as a niche may have the potential to challenge or influence this trajectory (fig.2). If so, these alternative approaches to food production can be seeds of transition, however, they need significant support to flourish.

Niche innovations are unable to trigger this regime shift alone, they require the right circumstances. Developments occurring at the landscape level have the potential to trigger transitions. These exogenous factors can reveal deeper, routed unsustainable problems of certain systems (Grin, Rotmans and Schot, 2010). They act by applying pressure on the dominant regime, opening up windows of opportunity for niche innovations to grow and influence the regime.

The allure of the MLP is that it provides a relatively straightforward skeleton for simplifying the analysis of complex, large scale transformations. Its conceptual repertoire has the ability to link niches with structural transformations in the regime and pressures exerted by the landscape. However pitfalls do emerge. There is a recognised tension between appreciating the overarching picture whilst maintaining a focused analysis. The MLP may prove useful for simplifying the

process, but must not become counterproductively simplifying its abstraction. Some scholars question whether transitions are actually as tractable as the MLP implies (Rotmans et al, 2010). Transitions can take different pathways and are influenced by different agencies and interactions between actors (Farla et al, 2012) thus, others feel the framework underplays the role of agency in said transitions (Geels, 2010).

#### 2.1.4 Strategic niche management

One of the early theories regarding the governance of transitions exists as strategic niche management (SNM). This early theory posits that the greatest potential for sustainability change resides in the micro-level, niches (Beers et al, 2019). SNM can be further explored to provide a deeper understanding of the niche building processes in the context of identified cities. The niche is fundamental in transition literature, directly linked to innovation and experimentation for change (Smith et al, 2010). SNM began with the observation that many sustainability innovations never actually leave the showroom (Raven, 2012). The concept has been developed to support actors in fostering experiments which are geared towards sustainability transitions.

Early SNM scholars began to search for the processes which determine successful niche development, processes which could mold their future into a more sustainable direction (Schot and Geels, 2008). How and under what conditions is successful niche emergence possible ? Kemp, Schot and Hoogma (1998), distinguished three internal processes which are thought to be fundamental for niche diffusion;

- The articulation of visions and expectations. Expectations are crucial for niche development, providing direction for the process, attracting enthusiasm and attention while providing legitimacy. This seeks to reduce uncertainty and mobilise resources by emphasizing future benefits. Expectations are increasingly powerful when shared by a number of actors and are tangible, participatory processes enable this negotiation and alignment of expectations (Raven, 2012).
- The building of social networks to engage other stakeholders in niche development. Developed networks work to carry articulated expectations and enable learning and diffusion of lessons and experiences between actors and locations.
- Learning processes: the sharing of learning experiences from one project to another can enable niche diffusion as they generate both first-order and second-order learning (Kemp et al, 1998).

There are however, shortfalls to this framework. Often SNM is critiqued for concentrating too heavily on the internal niche building processes (Seyfang et al, 2014). Acknowledging this deficit, scholars have sought to broaden the scope of the framework linking it to external factors, niche-regime interactions and landscape shifts (Geels, 2011). As the name suggests, SNM focuses on nurturing and enabling the niche to diffuse, analysing aspects of the niche which influence its potential to scale up - this focus relates to our postulated research questions. Acknowledging that internal niche developments (the primary focus of SNM) are not the only important factor and that external factors play a considerable role in transitions - a conceptualisation which links niche internal and external processes is sought (Geels, 2011), by integrating an MLP perspective. The MLP corrects the notion of earlier SNM scholars who posit that regime shifts would come about solely through bottom-up processes of niche expansion. Rather, alignments of processes at the multiple levels are supported. More recent literature anticipates that when internal conditions mentioned above are aligned with favorable external conditions in regimes and landscapes, the niche should be able to diffuse. Niche experimentation and innovations are still heralded, yet, their diffusion requires recognition and interaction with other levels.

#### 2.1.5 Transition Management

A third framework to consider exists as transition management (<sup>TM</sup>). <sup>TM</sup> emerged in a similar vein to SNM, with the ambition of supporting and nurturing radical innovation and niche establishment. This model puts emphasis on the co-creation of visions for alternative futures, created in a so-called "transition arena", prior to any experimentation (Loorbach, 2007). These alternative visions seek to influence incumbents or regime actors. Actors involved attempt to foster a transition following the outlined procedure (Rotmans et al, 2001);

- 1. Envisioning: Collaborative future visions are set, to create a shared vision for a more sustainable future in a dedicated transition arena.
- 2. Agenda setting: The objectives for the transition are decided upon.
- 3. Experimenting: Niche alternatives who show the potential to contribute to the transitions are trialled and efforts made to diffuse these niches are made.
- 4. Monitoring: Learning objectives and agendas are continuously reflected upon along with the proposed niches, evaluated and adjusted if required.

In a snapshot, following on from the establishment of visions, agendas are set, experimentation follows and subsequent efforts for diffusion are made (Bilali et al, 2018). The emphasis of this particular framework however, is on the articulation of visions to empower and support the establishment of the niche project or initiative (Avelino and Kunze, 2009) which is not what this research intends to explore.

#### 2.1.6 Experimentation for transitions

Experimentation is fundamental for the field of sustainability transitions. Such groundwork can take place in niches. Experimentation concerned with sustainability transitions is stark in contrast to that experienced in the realm of natural sciences - implying a more engaged and social constructivist approach where society itself is the laboratory and real actors commit to the experimental process, trialling alternative practices and technologies. In the context of transitions, these experiments are acknowledged as seeds of change which may lead to a profound shift in the way a societal function is being met. The intention is that the lessons gathered from these experiments can add to the momentum of the emerging transition (Sengers et al, 2014). Transition experiments can be defined as a specific type of innovation project with the ambition to explore radically new alternatives to meeting societal needs (Van den Bosch & Rotmans, 2008) such as food provision among others. The analytical emphasis of transition niches and their experimental nature is on deepening, broadening and scaling up.

## 2.1.7 Local experiments and global niches

SNM literature puts emphasis on the role of individual niche projects and associated internal processes (Kemp et al, 1998). However it was later suggested that individual projects did not have as strong a diffusion potential. Acknowledging this, Geels and Raven (2006) introduced the idea that local individual projects can contribute to a broader global niche. It was later hypothesised that niches should be perceived as cosmopolitan spaces consisting of multiple on-the ground local projects linked together by dedicated networks (Seyfang et al, 2014). A stylised model of the niche development process was developed (fig 4), considering both local experimentation and the broader, global niche. Here, local refers to small scale experimentation in local contexts. On the other hand, global constitutes the emerging field supported by a network of actors concerned with knowledge exchange which transcends local contexts, interacting with the wider world. It is the formation of the latter which we are concerned with for our research - a global urban agriculture

niche. Locally learned lessons require translation into context independent rules and knowledge in the form of handbooks and generic models (Raven, 2012). It is posited that these interactions between regime and landscape dynamics, local niche experimentation and global niche building explain how these niches can either become powerful and proliferate or alternatively, quench and fail to become established.



Fig 3. Defining the 'global' niche, adapted from Geels and Raven (2006).

Sequences of local projects can gradually add up to an emerging field at the global level. Thus, developments begin as one or a few projects carried out on a local scale. The rules and practices which guide these smaller scale projects are initially unstable. However the local projects provide a fertile test bed for the elaboration of new lessons and ideas. If the learning processes and lessons in local projects are compared and aggregated, the rules at a more global niche level may become more articulated and stable (Geels and Raven 2006) (fig 4).



Fig 4. The five building blocks of global niche development adopted from Raven (2012).

# 2.1.8 Exploring the strategies which contribute to the pathways for niche diffusion

A standing assumption regarding niche experimentations is that it is possible to scale up from an individual local niche experiment to achieve wider system change. Focusing on individual niche experiments directs attention to the specific social and material context in which urban change is embedded and through which it literally takes place (Evans et al, 2016). The question becomes whether and how these place-specific experiments create an impact on a broader scale i.e. how solutions and experiences developed in one place will diffuse more widely. Von Wirth et al (2019) argue that there are three ideal-typical types of diffusion processes or pathways dominating transition literature; translating, scaling and embedding. They further elaborate on hypothetical strategies by which niches can contribute to these processes. This research will explore hypothetical strategies by which UA niche initiatives can contribute to translating, upscaling and becoming embedded.

#### Translation

Translation which can otherwise be referred to as replication refers to horizontal diffusion, addressing the process through which elements of an experiment are being replicated and reproduced elsewhere. Translation deals with changing the context of an experiment, for example a differing spatial context, like in our research the diverging cities, or different places within a city. Translation can also consider different organisational or institutional contexts e.g. when a niche practice is being replicated by a different suite of actors in the same city.

Translation often requires actor-networks to be established to facilitate knowledge transfer and collective learning across said networks. Translation functions to spread new, sustainable ideas, hence, is a diffusion pathway. Hypothetical translation strategies include followership - since for effective translation, niche experiments must become visible and act as an example to be followed (Van der Heiden, 2016), engaged followers can themselves act as agents of change (Kellerman, 2008). On the other hand, networked learning requires collective learning across networks. The extent to which the strategies of **education, followership** and **networking** enable the diffusion of UA will be explored in our case cities.

#### - Provision of education and training

Learning processes are recognised as a strategy which shapes niche development as they generate both first and second order learning (Kemp et al, 1998). UA initiatives provide training and education programmes; to disseminate and hence, translate their practices. (Kemp et al, 1998). Such physical initiatives have the potential to stimulate situated learning, which involves direct engagement in the initiative itself. Situated learning is social, rooted in experience and can produce tacit knowledge (Maye, 2016). This hypothetical strategy attempts to generate second-order learning impacting cognitive frames and values (Seyfang et al, 2014) upskilling and building the capacity of motivated actors' so that they can go forth and translate these initiatives into their own lifestyles and local contexts.

#### - Networking

Networking is required to establish a constituency around the initiative to provide resources and engage like minded actors involved in niche development (Schot and Geels, 2008). Networking has been identified as a fundamental niche-building strategy which enables this diffusion between actors and locations (Kemp et al, 1998). Networks contribute to effective niche development when their membership is broad, consisting of plural perspectives, and they have a reservoir of resources (Seyfang et al, 2014). Translation requires a medium by which learnings and resources can be shared and drawn from, a broad and resourceful dedicated network can achieve this.

#### - Followership

Leadership cannot occur without followership, despite this the vast majority of historic research has been leader-centric, conceiving leaders as the motivating entity along with subordinate followers. However this narrative is changing. The significance of following for leadership implies that our understanding of leadership is insubstantial without a mastery of followership (Uhl-Bien et al, 2013). Ira Chaleff (1995) posits that the key to effective leadership is effective followership, which occurs when followers strongly support leaders in pursuing the mission and visions of the project, in this case EU H2020 projects Connecting Nature, Ru:rban and the scaling of NBS. Kellerman (2008), argues that engaged followers can themselves act as agents of change.

Torney (2019) describes climate followership as the adoption of a policy, idea, institution, approach or technique for responding to climate change by one actor by subsequent reference to its previous adoption by another actor. This definition implies an intentionality on the part of the follower, intentionally following what the leader, or in this case frontrunner city has done (Torney, 2019). The author raises three rather neglected questions in respect to leader-followership relationships, which by means of this research we seek to answer. Firstly, who follows? Subsequently, through which pathways can this followership emerge? March and Olsen (1998) distinguish between two contrasting roots from which these pathways emerge - a logic of consequence or a logic of appropriateness. In the case of this research, it is observed that front-runners attract followers by providing models or exemplary performance, and additionally providing support, counsel and knowledge. Finally, Torney questions what conditions facilitate or hinder followership. The perceived legitimacy of the example or knowledge being disseminated by the leaders will affect the degree of followership. The characteristics of the would-be follower are likely to be of importance here too, for example, whether the fast-follower city of interest is committed and actively mobilising for stronger climate action (Torney, 2019). Theoretical constructs and a sampling of variables which could be included in the study of followership include;

- → Identification of 'who' follows.
- → Followership characteristics, features that impact how one enacts followership.
- → Followership behaviors; behaviours enacted in the act of following; obeying, emulating.
- → Pathways through which followership emerges (Torney, 2019), e.g. logic of consequence or logic of appropriateness.
- $\rightarrow$  The circumstances under which followers are likely to follow

Followership theory is adequate for this particular research because it focuses on identifying effective followership behaviours as a means for translating niche projects and thus provides direction for answering our research (sub)question.

Upscaling

Counter to horizontal diffusion, upscaling refers to the growth and internal development of niche experiments. Scaling seeks to explore the ways in which a localised project or experiment becomes bigger in terms of content and scope. Examples of scaling include spatial - considering geographical growth, content; extending across domains, actor scaling; increasing the number of actors involved and developing partnerships and resource scaling; expansion of funding for the niche. In a nutshell, upscaling considers the growth of membership, supporters or users of the initiatives in order to spread these new sustainable ways of thinking, organising and practicing. As a diffusion process, scaling can be deemed as a pathway whereby the novel, sustainable practice is applied beyond its infant core, to a broader receptive audience (Boyer, 2015, p.322). Hypothetical strategies for upscaling of UA include **visions, entrepreneurial linkage** and **sense of place.** 

#### - Visions

Visions are crucial for niche development, as they provide direction for the project and attract members and enthusiasm, if future benefits are emphasized. Visions and shared expectations can contribute to successful niche diffusion when they are robust, shared by many and of quality (Seyfang et al, 2014).

#### - Entrepreneurial linkage

A common barrier perceived by NBS actors is a shortfall of funding, particularly, sustained funding. In a study carried out by Seyfang and Longhurst (2015), they recognized that a significant contributor to scaling is the possession of sufficient resources. By creating entrepreneurial linkages to the UA endeavours, the potential for generation of funds can be increased and hence, resource scaling occurs. Actor scaling is further enhanced when job opportunities can be linked to these radical alternatives.

#### - Stimulating a sense of place and ownership

Taking a place-based approach to sustainability transitions acknowledges the people and communities involved and how their activities and perceptions contribute to the transition. A place is the result of history and the inscription of culture alongside geographic characteristics. This sense of place is relevant, one that is shared can act as a call for action and result in collective care of said place (Horlings et al, 2020). Thus, a strong sense of place is envisioned as a strategy for particularly, the actor scaling of UA niches.

# Embedding

Embedding entails the adoption and integration of the niche's design and approach into existing local structures (institutions, regulations, planning) and/or communities of practice (Von Wirth et al, 2019). This can be further considered as aligning the old and new ways of doing, organising and thinking to integrate them into governance structures. According to the conceptualisation of embedding of niche solutions, learning is a fundamental process, catalysing knowledge creation and adapting novel innovations to existing regulations and infrastructures. When successfully embedded, the niche becomes somewhat commonplace. Hypothetical strategies to be explored for the embedding of UA niches include the **presence of supportive local governments** and subsequently **the strategic alignment of UA with wider city goals**.

#### - Supportive local governments

Many transition niches report that limited resources including budget and political mandate constrain their activities and consequently their ability to diffuse (Frantzeskaki et al, 2017). There is a dependence of said niches on the support of local government. Thus the contribution of political support is expected to enable the embedding of such niches.

#### - Activating partnerships and synergies across sectors

For diffusion of NBS, a recognition of the potential to exploit or connect social, environmental and economic agendas and the synergies between them is required (Frantzeskaki et al, 2017). On the outset NBS, and UA may be typically perceived as environmental solutions, particularly by governmental departments despite delivering multiple benefits. NBS inherently require a collaborative approach; their design and operation relies on collaboration between diverse urban actors from governmental staff to citizens, scientists and organisations (Frantzeskaki, 2017). A commonly perceived hurdle when implementing NBS is the insufficient capacities of local governments to establish departmental synergies or domains like the environmental, educational or economic departments who naturally work compartmentalised, in silos (Frantzeskaki et al, 2017). In order to jump this hurdle initiatives should seek to highlight the ways in which UA can serve the agendas of multiple domains, in a bid to develop partnerships and contribute to the local-embedding. It is worthwhile to be aware that an agenda for NBS is inherently an integrated agenda for economic, social and environmental issues (Frantzeskaki et al, 2017).



Fig 5. Three processes of diffusion between the urban agriculture niche and its socio-spatial context, adapted from Von Wirth et al (2019).

The different diffusion pathways discussed above give some indication as to how our investigated NBS; urban agriculture initiatives may have an impact beyond their immediate settings. However, the current literature neglects the strategies and associated practices which help to navigate the pathways of translating, scaling and embedding (Von Wirth et al, 2019). Such unexamined assumptions of causality may impact the proliferation of NBS into the future. By means of this research we seek to explore the different strategies used by urban agriculture initiatives to scale, translate and become embedded, and hence, diffuse.

This argumentation supports the formulation of the research question;

"Through which strategies and practices do nature based solutions, specifically urban agriculture initiatives seek to diffuse their sustainable practices beyond their immediate boundaries, contributing to the urban sustainability transition ?"

This section has provided insight into sustainability transitions exploring alternative yet complementary frameworks which aid our understanding and the theoretical pathways by which niches can diffuse. To summarise; the pathway for transition has been described; whereby the emergence of innovative niches is encouraged by exogenous shocks which surface cracks in the prevailing regime. These landscape factors open up a window of opportunity for niche the niche to diffuse and challenge or influence the regime.

The following section will elaborate further, providing an operationalisation of the chosen frameworks; used to answer the research question(s).

#### 2.2. Development of conceptual framework

The research seeks to achieve insight into how these niches are actively seeking to diffuse more widely and the impact of discussed strategies. Acknowledging the limitations of both SNM and MLP, and that our broad research question(s) cannot fully be addressed by drawing upon a single theory, an attempt will be made to incorporate SNM, MLP and hypothetical strategies which contribute to niche diffusion pathways including followership theory among others. As previously discussed, the limitation of SNM is the lack of attention given to the exogenous landscape factors, such as cultural and environmental trends which can influence the niche building process, requiring us to adopt an integrated MLP and SNM framework approach alongside the pathways of diffusion presented by Von Wirth et al (2019). Integrating the frameworks requires replacing the niche level analysis of the MLP with the SNM framework, to understand the development of urban agriculture initiatives, reframed as transition niches. The SNM is applied to analyse internal niche building activities (networking, learning and expectations). In analysing the potential of these innovations to exert influence over the wider system, we need to assess the extent to which these internal processes are occurring in tandem with external landscape factors and the strategies enlisted to diffuse (section 2.1.4).

Both frameworks exhibit different understandings of transitions, SNM views transitions as a result of empowerment activities, where the niche gains influence over the regime. On the other hand, the MLP perceives transitions as the result of interaction between the three analytical levels: landscape pressures reveal cracks in the regime, opening up windows of opportunity for niche innovations to proliferate. The following integrated framework will adopt the MLP conceptualisation of a transition, initially investigating the landscape factors and regime dynamics at play, which in turn

inform niche experimentation. The internal niche developments (Kemp et al, 1998) will be explored (visioning, networking and learning) alongside the other aforementioned strategies (section 2.1.4) and *how* they contribute to the pathways of diffusion.

#### When has a transition succeeded ?

There are different perceptions as to when a transition has succeeded, or reached the end-phase. Some argue that when niches lead to the demise of the prevailing regime that this is a transition. Others assert that niche innovations need not always cause the complete breakdown of the incumbent regime but rather be co-opted and influence it. The latter implies that niches adopted by the regime can assert a sustainable influence on practices carried out, perceived as a transition (Roep & Wiskerke, 2012). In our case studies we will explore whether or not the development of urban agriculture has had an effect on the prevailing food regime, - whether a new one can emerge or the existing one be influenced.

Geels (2011) contends that the extent to which changes in cultural meanings, policy, technologies and user practices have occurred can determine whether or not a transition has or is actively taking place. Taking this contention into account we will later explore the extent to which changes have occurred in each of these categories.

#### The journey from niche experiment to regime shift

Destabilisation of the prevailing unsustainable regime is crucial for sustainability transitions (Loorbach, 2007). Regime dynamics can influence or condition selection environments for niche experiments (Smith, 2007, p.430). Key sources of these dynamics include tensions within the incumbent regime or pressures derived from the overarching landscape. Opportunities for niche proliferation reach a high point once the regime is unstable and the niche stabilises. Regime contexts can exert either positive or negative effects on the diffusing niche. Positive here implies proactively supporting the diffusion of the niche. Policy contexts can support by means of governmental support or constrain and confound the niche if hostile and ignorant towards it (Seyfang and Longhurst, 2016). Where ample policy support is in place, vibrant niches can emerge.

#### 2.3 Operationalisation of theoretical frameworks: conceptual or analytical framework



Fig 6. Hypothetical operationalisation of MLP/SNM integrated framework applied to research cases. Adapted fromVerbong and Geels (2010), integrating a roadmap for followership (Torney( 2019); Uhl-Bien (2013) and other hypothetical diffusion pathway strategies to be explored (Von Wirth et al, 2019).

A preliminary step is to define what these analytical levels (fig 6) will mean for this study. Beginning with the landscape level; the exogenous environment within which the regime and niche are nested within. The regime which encapsulates the niche alternatives is the food systems. And finally the niche level considers UA initiatives.

- The green box considers the MLP, exploring the landscape and regime dynamics which are at play informing experimentation at the niche level (section 4.1). This analysis seeks to answer the following sub-question: What are the landscape factors at play that have influenced the emergence of nature-based solutions, particularly UA initiatives ?
- 2. The blue box considers SNM in combination with the pathways for diffusion. Informed by exogenous landscape and regime dynamics, local UA projects begin to emerge and experiment with alternative socio-technical configurations. The embedded case study units of analysis exist as local niche UA projects which will be investigated under the lens of SNM (visions, networking, learning) alongside the extent to which they seek to embed, upscale and translate (section 4.5),to answer our overarching research question: Through which strategies do NBS, positioned as Urban Agriculture initiatives for this particular study seek to diffuse (become embedded, translate and scale), to influence the broader sustainability transition ?
- 3. Collectively, local niche projects contribute to the development of a global UA niche.
- 4. The extent to which the developed global UA niche has diffused, and has begun to challenge and/or influence the prevailing food system and hence a transition has occurred will be explored (section 4.7), in an attempt to answer the sub-question: Do UA initiatives have transformative potential, has a transition occurred ?

#### **Chapter 3: Methodology**

The underlying reasonings behind the form which a research takes must be clearly specified and explained (Van Thiel, p.59), thus, the following chapter will explore the considerations taken when developing this research. The research design must be carefully thought through, an understanding of the underlying research philosophy, associated methodological choices and complementing research strategies are fundamental for a sound study. These considerations help to ensure that the data collection techniques and subsequent analysis are appropriate and coherent for the study (Saunders and Tosey, 2012). These considerations can be maintained by following the logic of Saunders and Tosey's "research onion", beginning from the outside and working our way into the core (see appendix C). There is a gradation associated with this approach, with the researcher moving from a more global approach (the research strategy) towards the practical stages of applying methods and techniques to execute the research. These sections will consequently follow the logic of the onions' layers.

#### 3.1 Research philosophy

Perhaps unbeknownst, every research is guided and further defined and influenced by the underlying research philosophy, the perspective held by the author. Guba and Lincoln (1994) posit this as the paradigm of choice which informs and guides the inquiry. A paradigm presents a world view, which defines for she who obtains it, the nature of the world, the place of individuals in it and existing relationships (p. 108). The research philosophy will ultimately influence how the research is conducted and the subsequent results are interpreted. The main significance of a researcher's philosophy is their personal view of what constitutes knowledge and the processes by which this knowledge is developed (Saunders and Tosey, 2012). The research onion aids in the understanding of this rather philosophical, abstract concept, making it more tangible. Accordingly, it is the researcher's understanding and decisions regarding the outermost layer of the onion - research philosophy, which will provide the context and boundaries within which the methodologies, strategies and collection method choices to be made. Unlike the outer layers of an onion which are often peeled away and discarded, the outer layers of this metaphorical onion are crucial and must be kept in mind throughout the research process.

In order to detect one's research philosophy, Guba and Lincoln (1994) direct us towards our ontological, epistemological and methodological inclinations. The ontological question asks "what is the form and nature of reality ?", shaping the way we see and study research objects. The epistemological question asks "what is the relationship between the knower and what can be known ?". Finally, the methodological question examines the ways in which this knowledge is obtained. These questions are linked or constrained by one another and aid the development of four different research philosophies ranging from positivism at one end of the spectrum to constructivism (Guba and Lincoln, 1994).

For the purpose of this research, we are concerned with gathering richer, fruitful insights into a rather nascent phenomenon. Calling for subjective meanings and the study of said phenomena in their natural contexts, reflects the philosophy of *interpretivism*. This philosophical paradigm makes the argument that humans are different from the physical phenomena as they create meaning, and hence along with their social worlds cannot be studied in the same way (Saunders et al, 2015). Interpretavism is an umbrella term encompassing several different paradigms - commonly concerned with the meanings and perceptions of humans (Williamson, 2006), and *constructivism* is one of these included paradigms. Stark in contrast to a positivist approach, the constructivist approach accepts the view that "all knowledge and meaningful reality is contingent upon human practices being constructed in and out of interaction between humans and their world" (Crotty, 1998, p. 42). Here, meaning and knowledge is not simply discovered, it is rather, constructed. The researcher in this case can be described as a *bricoleur*, highlighting the need to be flexible and not straightjacketed by conventional meanings (Crotty, 1998, p.49).

This paradigm develops a new, rich understanding of social worlds and phenomena in their own contexts. Taking this position, the researcher focuses on conducting research among people, not just objects. With an acknowledgement of complexity and multiple interpretations, interpretivism is explicitly subjective. This implies that the values and beliefs upheld by the researcher in combination with their interpretations of the data will play a role in the research process (Saunders and Tosey, 2015, p.141). The task here is for the researcher to enter the world of the participants and understand and interpret their views on matters, adopting an empathetic stance (p.141). Sustainability is an inherently contested and ambiguous concept, with the potential for different interpretations and meanings for different individuals - taking such a constructivist perspective

recognises this. The "sustainability" of a city recognises this contested nature, the given place manifests different meanings of sustainability as people approach the concept from different perspectives. Sustainability transitions are loaded with debates regarding the relative importance of different environmental and social problems which entail diverse values and beliefs. Applying this to our focused area of study - food systems, and the transitions towards more sustainable food systems are characterised by multiple green niches, there is not one single green innovation around which opinions coalesce (Geels, 2010). Sustainability herein is a social construct, concurring with a constructivist epistemology. This requires adopting a stance to understand the ever-changing, dynamic social world and attempting to derive meaning from one's own point of view.

#### **3.2** Methodological choice and approach to theory development

This layer of the research onion is the broader approach taken and provides the researcher with the option to carry out either deductive or inductive research and subsequently qualitative or quantitative methods. As the research aims to build on existing transition theories and associated hypothesised strategies for niche diffusion, deductive research will be carried out, utilising existing theories aiming to build on them or test them via the research. Linked to these two approaches is the question of using qualitative or quantitative methods, or even a mixture of both - methodological choice. For this research a multimethod qualitative design will be used, whereby more than one qualitative data collection techniques are used with associated analysis procedures (Saunders and Tosey, 2012).

#### **3.3 Research strategy**

Peeling away the philosophical and methodological layers leads us to consider the research strategy. A central consideration for research is the choice of research strategy to be adhered to, this is the overall, logical procedure to be followed which delineates the accompanying methods and techniques to be applied (Van Thiel, 2014, p.57). The chosen strategy is greatly influenced by the research problem and aims. In order to explore the diffusion processes of nature-based solutions, specifically urban agriculture initiatives a qualitative case study design will be employed. Case study is a research strategy wherein one or multiple cases of the subject of study are examined in-situ (Van Thiel, 2014, p.86). Such strategy is particularly appropriate when answering the 'how' and 'why' questions which we may have (Yin, 2014). We aim to explore 'how' experimental NBS niches can contribute to the wider sustainability transition.

#### 3.3.1 Case selection

According to Yin (1994), selecting multiple cases can increase the methodological rigour of the study by increasing the validity and robustness of results. Furthermore, to identify leader-follower relationships analysis of more than one city is required. Case study research will be employed in two cities, one positioned frontrunner city who has ample experience with nature-based solutions and emerging urban agriculture projects - Glasgow and subsequently a positioned follower city who is being supported by the former to implement urban agriculture initiatives - A Coruña. The two cities show several contextual similarities, but also differences. A precondition for the selection of these cities is their awareness or alignment of the NBS with the wider city goals for sustainability and climate adaptation. A further, rather obvious precondition for city inclusion is the existence of sufficient nature-based solution(s) to provide a sound basis for attaining empirical data. The two cities were identified via the Connecting Nature project, a Horizon 2020 research and innovation project, which seeks to actively support the scaling and implementation of NBS in urban settings (Frantsezkaki et al, 2019). The selected cities have been identified through their participation in the H2020 project, however, embedded cases will extend beyond the scope of the project. Given the broad array of nature-based solutions, the specified unit of exploration will be narrowed down to urban agriculture initiatives, which both cities boast.

The research will attempt to provide an insight into the strategies and conditions which enable (or even hinder) the acceleration of sustainability transitions in these urban contexts. This is hoped to be achieved by means of in-depth empirical case studies. An embedded multiple case design will be used, whereby the cities are cases and their respective urban agriculture projects will act as embedded units of analysis (see fig 7 below). The respective projects have been identified by attendance at conferences.



Multiple-case design



To answer our multiple research questions, different strategies will be enlisted. For example, in order to investigate followership as a strategy for niche diffusion, one must not only identify the professed leader and an actor who has adopted their practices, one must prove that the two are causally linked (Wurzel et al, 2020). By pursuing a comparative analysis to an extent one can investigate whether similar approaches have been adopted by the follower, and hence count as followership.

Based on this design the process will entail the following steps:

- 1. Selection of cases
- 2. Identification of embedded units of analysis
- 3. In-depth study of the UA niche within its own context
- 4. Interaction between the two case studies and with their wider context

#### 3.4 Research methods and data collection

Employing triangulation of data results in greater validity and reliability of results (Van Thiel, 2014, p.52). In order to achieve said triangulation, the methods to be employed to obtain empirical data are as follows; semi structured interviews with relevant stakeholders, observational data from attendance at conferences, knowledge webinars and summits and subsequently by means of document analysis - analysis of official documents and reports of the cities.

3.4.1 Semi-structured interviews
Interviews are of particular importance here as they are an effective means to gain an understanding of matters which are difficult to observe (Partington, 2001) - for example our hypothesised diffusion strategies, complimenting our observational data methods. Interviews should help to verify prior data obtained. Semi-structured interviews are particularly suited for case study research, taking this approach the researcher poses pre-determined yet flexible questions. This flexibility allows the researcher to probe deeper into certain topics which arise during the interview (Hancock and Algozzine, 2006, p.40).

Key participants whose knowledge and opinions can provide insight regarding our research questions are initially identified and contacted. Participants were identified through their participation in the H2020 project, Connecting Nature which I have been working on. The initial aim was to consult with an equal number of interviewees from each city, however due to certain facets like language barrier and smaller scale projects, the availability of respondents was reduced in A Coruña.

To identify further interviewees the snowball sampling method was applied whereby initial interviewees were asked to recruit other suitable interview candidates. On the basis of this method a total of four interviews were carried out.

An interview guide is formed based on the literature review, consisting of open ended questions to be posed (Appendix A). Questions evoked details of each project's establishment, its interface with the local government, efforts to diffuse and challenges faced. Following the interviews, recordings are transcribed and coded for analysis. Due to the current climate, these interviews have been held via Zoom and/or Teams. The benefit to this however, is the ability to readily record these interviews, provided consent is given. Having a record of the interviews contributes to the reliability and rigour of the research.

| Case     | Position   | Referred to as       |  |  |
|----------|--|----------------------|--|--|
| Glasgow  | Member of board of directions of Glasgow Community<br>Food Network                         | GCFN Interviewee     |  |  |
| Glasgow  | Project Officer at Glasgow City Council  | GCC Interviewee #1   |  |  |
| Glasgow  | Manager for Growing Spaces with Glasgow City Council                                       | GCC Interviewee #2   |  |  |
| A Coruña | Project Officer for implementation of the CN and R:Urban projects in the city of A Coruña. | A Coruña Interviewee |  |  |

#### Table 2. Overview of interviews

#### 3.4.2 Observational data

This method requires that the researcher use their own observations and associated interpretations to arrive at conclusions and results (Van Thiel, 2014, p.70). For this particular study observations were "hidden" whereby the researcher remains aloof and "open", whereby the researcher is present in the situation, however, does not interact with the subjects merely observing.

A less structured approach can be applied to our observations. Notes and transcripts will be derived during the observation phase. These observational notes and transcripts are subject to detailed analysis following the same coding scheme applied to interview scripts. Observational data is sourced from online Summits, conferences and launches; taking place online during the ongoing COVID-19 pandemic (see table below), the merit of this is that all observations have been readily recorded allowing for repetitions and additional more careful observational data, it will be used in conjunction with further methods. Two main associated risks include selectivity and subjectivity (Van Thiel, 2014, p.72). There is a risk that the researcher while making their observations may consciously or subconsciously be selective in what they note. In situations where there is a lot of stimulation, it can be difficult to observe and record all ongoing events, thus a degree of selectivity is often expected. By using the recordings of observations to carry out a more in depth study I will try to minimise this selectivity. A further risk mentioned is observer bias wherein the researchers own expectation influences their observations made, to limit such effect it is important that the researcher remain open to their observations.

| Table 5. Overview of observations |  |                   |                                     |  |  |
|-----------------------------------|--|-------------------|-------------------------------------|--|--|
| Case                              | Name   | Date              | Referred to as                      |  |  |
| Glasgow and A<br>Coruña           | <ul> <li>Glasgow Innovation Summit: 3 day conference</li> <li>Building natural networks and delivering<br/>the deal with stakeholders</li> <li>Community growing, networks for nature</li> </ul> | March 2021        | Innovation Summit, 2021             |  |  |
| Glasgow and A<br>Coruña           | URBACT From Farm to City: Day long conference  | May 2021          | From Farm to City, 2021             |  |  |
| Glasgow                           | Glasgow City Food Plan Launch  | June 2021         | GCFP Launch, 2021                   |  |  |
| Glasgow                           | Bellahouston Steering Committee Meeting  | September<br>2021 | Bellahouston Committee member, 2021 |  |  |

# Table 3. Overview of observations

# 3.4.3 Document analysis

In addition to obtaining data from observations and interviews, existing documents will be reviewed to gather information relating to our research question(s), such approach is a commonly used method for case study research (Hancock and Algozzine, 2006, p.52). Documents to be examined will include material abstracted from online searches, publications, public records and reports of the cities - including urban and environmental strategies, policy documents etc. It must be acknowledged that internet sources vary in both reliability and quality and the research must be prudent when determining the legitimacy of search findings. It is hoped that information sourced by means of document analysis will

augment the other sources.

| Table 4. Overview of reports and documents analysed |   |                   |                   |  |  |
|---|---|-------------------|-------------------|--|--|
| Case  | Name  | Cited as in text  | Type of document  |  |  |
| Glasgow   | Glasgow Food Growing Strategy 2020-2025   | GFGS, 2020        | Strategy          |  |  |
| Glasgow   | Glasgow City Food Plan  | GCFP, 2020        | City Plan         |  |  |
| Both  | Glasgow Food and Climate Declaration  | N/A               | Declaration       |  |  |
| Both  | The New Urban Agenda  | NUA               | Report            |  |  |
| Both  | The Right to Food Report  | N/A               | Report            |  |  |
| Both  | Milano Pact   | N/A               | Policy paper      |  |  |
| A Coruña  | La Voz De Galicia - "Vecinos de Eirís relatan<br>sus progresos en el cultivo de frutas y<br>hortalizas" | Rodríguez, 2019   | Newspaper article |  |  |
| A Coruña  | La Opinion A Coruña - "Furor por la huerta<br>en el Agra do Orzán"                                      | Otero Mayán, 2021 | Newspaper article |  |  |

#### 3.4 Data analysis

Data analysis saw the transcription of recorded observations and interviews utilising ATLAS.ti software. Thematic analysis of the data will be carried out, as it is recognised as a way to explore patterns across qualitative data. Subsequently the coded data will be organised and categorised based on similarities, guided by the factors produced in our conceptual model (fig 6). The main groups and associated codes can be found in the appendices. These findings are compared and contrasted to the findings of our document analysis and literature review and finally described in relation to the research questions. Aligned with the above strategy, in-vivo coding is carried out to

extract from the data, salient quotes to elaborate upon the argumentation. Themes along with supporting excerpts derived from the data will be discussed in the final chapters.

# 3.5 Interpreting the information and reporting of findings

Inevitably case study research generates large amounts of information from multiple sources which requires synthesising: combining, integrating and summarising findings. To aid the synthesis of the information generated by this case study approach, Hancock and Algozzine (2006), present a set of questions to facilitate the process (annex, D) providing structure. Unlike certain forms of research, case study research requires a recursive approach to interpreting data in order to reach tentative conclusions and to refine the research questions if required (Hancock and Algozzine, 2006, p.56). When information which raises new questions emerges from the data, the researcher should be able to adjust and refine the research questions.

# 3.6 Quality of the research: reliability and validity

Reliability and validity of case study research requires special attention (van Thiel, 2014, p.86). Following a case study research strategy, means that it is difficult to generalise findings to other situations because the cases are under the influence of unique contextual factors, the small number of units of study in case studies present as a further difficulty. Thus, the external validity of case studies is limited; however, the focus of this study does not lie with statistical generalisation, rather analytical exploration.

The following study considers primarily Western European contexts. It must be acknowledged that while these European case studies exemplify transitions that can be inspirational to onlooking cities, one cannot forget that there are many cities who face barriers to transition (Frantzeskaki et al, 2017, p.17). The limitation of Western European cities and their respective contexts makes it difficult to determine whether the outcomes of this thesis can be applied more generally and globally, thus from the outset, external validity is limited.

# Reliability

The reliability of a study is a function of its accuracy and consistency by which variables are measured (van Thiel, 2014, p.48). To increase reliability here, interview scripts will be developed following on from the literature review, to ensure the accuracy and relevancy of questions. One way in which to increase the reliability of a study is to discuss and consult methodological choices with other researchers throughout the study to enhance inter-researcher- reliability (Van Thiel, 2014, p.49). I hope to achieve this by consulting with my colleagues. Consistency is harder to achieve,

revolving around the idea of repeatability of the study. As mentioned above transcripts and where possible audio-visual recordings of interviews will be retained, aiding the repeatability of the study.

#### **3.7 Ethical considerations**

As a researcher in this process there is a dependence on people in order to derive data. Given this, the consideration of ethics is inevitable, how can the participants of this study be protected in practice ? Ethics are consequently taken into account during data collection, analysis and subsequent interpretation.

Protection of research participants began from the outset by gaining informed voluntary consent from those involved in order to participate. This implies not putting pressure on anybody to participate, but rather seeking to obtain their voluntary consent (Creswell, 2016, p.60), and providing them with ample information to make the decision to take part, or not. An informative email was sent to potential participants, disclosing the purpose of the research, what would be required of their engagement and a set of sample questions. The candidates were extensively informed about the topic and overarching aims of the thesis, in a bid to uphold transparency. During the interview process itself, potential power imbalances between the researcher and participants were minimised by avoiding taxing questions and attempting to create a cordial atmosphere. They were also given the opportunity to pass or reject any questions which they did not feel comfortable answering.

With regard to the observational data collected, these can safely be regarded as public events with open access, thus notes could be recorded without further implications.

Following on from the data collection, there is the potential for research results to present a harmful or negative picture of the participants or case, and as a researcher one needs to be conscious of protecting participants' privacy (Creswell, 2016). This is maintained by disguising names of both observed subjects and interviewees, guaranteeing anonymity from the outset. With the above considerations in mind, efforts were made to uphold ethics during the research.

# **Chapter 4: Findings and Results**

# The development of Urban Agriculture - landscape and regime factors

# 4. The development of Urban Agriculture, landscape and regime factors

The following chapter will consist of a desk research study regarding the development of urban agriculture as a nature-based solution. The following sections will investigate the overarching landscape pressures which are currently exerting pressure on the regime, revealing cracks in the not-so-well-oiled system.

# 4.1 Landscape pressures

Landscape processes include environmental and demographic change, new social movements, shifts in political ideology, emerging scientific paradigms and cultural movements. The ways in which such pressures are articulated can produce and unveil regime tensions or faults. Niches can seek to make use of these tensions to their advantage despite these tensions occurring beyond niche control. The following section seeks to explore the overarching landscape factors at play exerting pressure on conventional food systems.

# Rapid urbanisation

Urbanisation is defined as an increasing share of the world's population living in urban areas, associated with a shift in settlement patterns from dispersed to condensed (Satterthwaite et al, 2010). A trend which resulted from people moving in search of better economic opportunities offered by these urban settlements. Urbanisation directly impacts on food demand and farming hence, acting as a landscape pressure. While the world's urban population continues to grow, the rural counterpart will stagnate. With this stagnation in rural areas, it is expected that the proportion of the population producing food will decline, parallel to inflating urban population and energy intensive diets (United Nations, 2008). Hand in hand with this development pattern comes serious problems including food insecurity and diet related health problems. Urbanisation is not a direct causality for these instances, rather, the inadequate governance and policy responses. In many nations, the speed of urbanisation has outpaced the needs of social freeform and adequate planning responses, leading to condensed, poorly planned, grey cities. One of the main development challenges of our era will be how to feed, *sustainably* this increasingly urbanised world.

"In A Coruna one of the main pressures facing us today is the dense population the city council struggles to find available land, one of the main issues we have right now."

(A Coruña Interviewee, 2021).

Urban agriculture can in response play a role in feeding this increasing population growth which has been generated by urbanization, by directly generating household food supply and offering urban food chain protection (Zhong et al, 2020), if occurring on a significant scale. The social role of UA should become more prominent in this increasingly urbanised world, offering agricultural product appreciation and a means of social cohesion (Petit-Boix and Apul, 2018).

#### The Global Food Crisis 2008

The Global Food Crisis which transpired in 2007, feeding right into 2008, saw an 83% increase in global food prices (Mittal, 2009), triggering a UN response for action. The prices of fundamental crops such as maize, wheat and rice grew exponentially. The crisis had a severe impact on developing countries, forcing many into hunger, yet tremors of the crisis were felt globally. The 'urban middle class' were adversely affected, resulting in widespread discontent and protests generating attention and concern (Mittal, 2009, p.3). The loss of traditional agricultural land in urban areas and the ability to provide for the growing demand in these areas elevated the concern of endangering food security. Food security considers both the availability of food in markets and accessibility of this food. Thus, in urban areas food is likely to be available however, not always accessible. During the crisis, urban dwellers across the globe were some of the most vulnerable, succumbing to the rising food prices. By nature, especially in the Western world, urban citizens take the role of food *consumers*, and hence, don't have access to localised agricultural production to fall back on in times of crises.

Many factors were to blame for the food crisis; adverse weather conditions as a result of climate change being quite blatant, meanwhile, increasing energy prices saw the cost of production surge. Forecasts from this period exhibited a doubling in cost of the energy intensive components of agricultural production including fertiliser and fuel costs. Such a rise in cost of production invariably increased the exportation cost of major, fundamental food commodities (Mittal, 2009, p.4). The crisis revealed the instability and vulnerability of the food system.

A further causal factor of the global food crisis was the increase in demand for coarse grains for biofuel production, primarily in the EU and United States. According to Mitchell (2008), biofuels and their resulting consequences, for example land use change and reduced land for food crops, could be held accountable for up to 70% of the increase in food prices during this period. In response to the crisis, a conference led by the FAO saw world leaders pledge more than \$12 billion to assist low-income food importing countries with the effects of soaring prices (Cohen and Garrett, 2009). Policy responses included a reduction in cereal import prices and subsidies in an attempt to keep domestic food prices below inflating world prices (FAO, 2008). The G8 proposed measures including improvement of food system infrastructure - from distribution mechanisms, to roads, to irrigation alongside the support for national strategies which would address climate change (Mittal, 2009, p.16). The credibility of the "Great" 8 and their commitments, should however be taken with a grain of salt. Concurrently, the International Assessment of Agricultural Knowledge Science and technology, an independent multi-stakeholder body produced an evidence based assessment of the state of agriculture. The report offered more promising and tangible alternatives to the crisis. Issues included the systemic redirection of investment of funding to meet the needs of less intensive, small farmers. The report drew attention to the urgent need to safeguard natural resources and utilise agro-ecological principles. The report diverged from the notion that market forces alone can deliver food security (IAASTD, 2009).

The pledges and declarations paid considerable attention to the vulnerability of urban dwellers who rely primarily on the market for their food, accounting for a huge proportion of their expenditure. Accordingly, the incidence of food insecurity is found to be greater in urban areas versus rural due to food inaccessibility (Cohen and Garrett, 2009).

"Urban gardens started in Spain after the crisis in 2008 in many cities, especially in Madrid and Barcelona, they started to create these new gardens."

(A Coruña Interviewee, 2021).

While global hunger is not a new narrative, the Food Price Crisis of 2008 served as a wake up call, showing that agriculture, the means by which food is produced, is fundamental for the well being of all people, and that the system is economically and socially unsustainable. Such food crises, more of which are to be expected, in synergy with climate effects, reveal the cracks in the vulnerable prevailing food regime across the globe, serving as a landscape factor in our analysis. The

consequences of the food crisis saw a resurgence of UA (Stewart et al, 2013), shining light on alternative means of food production geared towards safeguarding food self-sufficiency of nations and cities. UA has significant untapped potential to improve urban food security whilst contributing to the emergence of a new, resilient food system.

# The Climate Crisis

Many countries globally today have raised the climate alarm, albeit actions and responses remain rather muted. Growing climate concerns have been reflected by a strong electoral support for Green Parties in recent years (Birnbuam, 2019). Concurrently, the emergence of grassroot campaigns such as Extinction Rebellion and the Fridays for Future movement have been pivotal for the crisis to gain momentum on public and media agendas.

Temperatures experienced across Europe this summer ignited a global conversation about our climate-disrupted world, when a wave of violent, extreme weather smashed heat and rain records, killing hundreds and displacing thousands (Watts, 2021). Ironically, agriculture is a predominant force fuelling the climate crisis today, driving the environment dangerously beyond planetary boundaries (Foley et al, 2011).

However, urban agriculture can in response, help in this fight against climate change. Many city dwellers are unaware, ignorantly or unintentionally of their burdening consumption patterns. Responding to the growing demand for food in cities, conventional agriculture seeks to expand into sensitive ecosystems, which has detrimental effects on carbon storage and biodiversity, particularly when forests and valuable habitats are cleared for the practice. Ceasing this invasive expansion into special territories is a critical step to shifting the systeem towards a more sustainable path (Foley et al, 2011). Although halting this expansion could limit or impact global crop production, losses could be offset elsewhere in the system, for example - urban agriculture.

Climate change and the associated weather anomalies are impacting agricultural outputs, causing a decrease in production growth globally. Droughts, water scarcity, freezing temperatures and floods impede agricultural output in developing countries, who are ordinarily market suppliers (FAO, 2008). However, it is not just exporters in developing countries feeling this blow, major oilseed and grain producing regions in Europe have cited recent adverse weather conditions as factors for decreased and disrupted production. Increasing environmental awareness is a socio-cultural development, considered as a landscape pressure, elevated by denouncing civilians and global

social movements acting as catalysts for changing values and behaviours. This heightened awareness places doubt on the performance of the regime.

#### COVID-19

The COVID-19 pandemic has further emphasized the importance of resilience and sustainable food systems - heightening our awareness of the links between food, health, poverty and supply chains (GCFP, 2020). The Pandemic which ensued exposed the inequalities and inadequacies of prevailing market-driven economies over welfare, this exposure increasing tensions in the regime. COVID-19 has demonstrated how current food systems are ill-equipped to protect from hunger and diet-influenced disease and how the poor and marginalised are those most vulnerable (Nestle, 2020). However, the collective response to the pandemic has shown that a system shift is possible. Furthermore, the current crisis has stressed the importance of green spaces, particularly in urban areas. In a time when we are urged to social distance, green spaces provide a space for stress relief and connection with nature itself. This emphasis highlights the importance of green space as an essential component of sustainable cities (Kleinschroth and Kowarik, 2020), opening a window of opportunity for their proliferation.

It is hypothesised that during the stringent lockdowns, outdoor activities and being in nature rose in popularity versus pre-pandemic days. To support their hypothesis, Kleinschroth and Kowarik (2020) utilised Google to analyze search trends for outdoor activities. The researchers concluded that the pandemic had produced a new way of valuing green space. However, this increase in value and interest is often not matched by an equal supply of accessible green space, particularly in urban areas. Albeit a devastating period in time, the Coronavirus pandemic has to an extent reshaped people's perceptions of greenspace and nature, acting as a landscape factor for enhancing urban environments. Researchers such as Venter et al (2020) have similarly reflected upon the crisis as an impetus for more sustainable approaches to city planning, acknowledging the increased reliance on greenspace during the pandemic in Norway.

Many argue that the one thing we can take away from the crisis is a changed approach to the ways in which our urban environments play out, if we act accordingly, within this window of opportunity. History has shown that crises can create openings for transformation, effectively navigating these crises however, requires an understanding of what capabilities, strategies and capacities are required for the transition (Olsson et al, 2021). COVID has illustrated what change is really feasible - what can be expected of governments, citizens and businesses in terms of changing their behaviours and practices, should not be underestimated (Davies, 2020). This is not to undermine the grief caused by the pandemic, although the crisis caused global grief, the pause in system dynamics in response to it has provided a golden opportunity to reinvent the wheel. Post-covid urban planning and policies should take this opportunity into account, to take more transformative actions towards creating sustainable cities (Sharafi et al, 2020), such as the scaling of UA initiatives, hence acting as a landscape factor.

"The past year has given a renewed sense of focus as to why this work is so crucial to this city....One lesson we can take from the pandemic is how to act in an emergency situation "

(Cllr Anna Davies, GCFP launch 2021).

#### *COP26*

In November 2021, the UN Climate Change Conference, COP26 will be held in the city of Glasgow. Hosting the conference provides one of our case cities, Glasgow with both a force to act but also a window of opportunity - for the city to showcase their sustainability innovations towards reaching ambitious net zero emission goals by 2045 and carbon neutrality by 2030. COP26 is considered to some as "the most important climate conference since The Paris Agreement" (From Farm to City, 2021), and thus a pivotal moment to deliver effective food and climate policies, if food systems are brought to the table. Cities and farmers hold great potential for driving system transformations yet they don't have a seat at the table in food and climate policy making (From Farm to City, 2021).

"The aim for COP26 is to show national and international policy makers how cities are leading the way on food sustainability... food systems have a multitude of co-benefits, yet in international climate change debates we often fail to consider the interconnectedness of food systems and to involve the plurality of local actors that drive change from the ground "

(Nourish Scotland, From Farm to City, 2021)

The city has plans to use the Summit as a leverage point for action, piloting a city food waste reduction initiative in the lead up (GCFP, 2021). Thus COP26 is a potential landscape factor for the

proliferation of UA initiatives in Glasgow, does being in the global spotlight drive the diffusion of these niches ?

The previous section has discussed changes in the landscape of urban food systems including mounting climate concerns and exogenous shocks to the system, positioning them as enabling conditions conducive to the emergence of urban agriculture practices, but are they sufficient to enable the transition, alone ?

#### 4.2 Cracks in the regime, unveiled

To understand the need for a systematic transformation of the urban food system or regime, it is necessary to outline why the current one at play is unsustainable. A formidable case can be made for the environmental degradation caused by the system, however there are social and economic faults functioning too (Holden et al, 2018).

Regimes consist of the stable and dominant ways of realising a particular societal function (Grin et al, 2010). These stable ways of doing things have co-evolved from the alignment and accumulation of knowledge, investments, infrastructures, norms and values over a period of time. These heterogeneous configurations become the prevailing means for realising societal functions, in this case, food provision. For this research the domineering regime at play is represented by the urban food system, centred on intensification and large scale production. Actors in this regime include; conventional supermarkets, government bodies and indoctrinated consumers. It is these dynamic structures which sustainable niches seek to overcome or influence if they are to dismantle the regime and seed a transition (Grin et al, 2010). As discussed in chapter 2, regime shifts come about through interlinkages between developments on the multiple analytical levels; niche, regime and landscape. This shift entails the rise of both strong and favorable niche alternatives in addition to conducive windows of opportunity, produced by landscape pressures.

Relatively little is known about the processes and mechanisms for accelerating the unlocking of unsustainable socio-technical regimes (Grin et al, 2010). How do regimes crack, erode and decline ? What are the political conditions that allow for the dismantling and replacement of these structures while concurrently creating space for sustainable alternatives to develop ? How can entrenched regimes upon which we have become accustomed lose their economic and social legitimacy ? We have looked at landscape processes and their role in unlocking the regime.

The majority of food consumed today is inherently unsustainable, the fault lies with a system that causes detrimental environmental impacts while simultaneously depleting finite resources. The dominant regime of horticulture and agriculture is currently driven by global markets pushing for industrialised production systems based on intensified, large-scale production and specialisation in crops or livestock. This global emphasis minimises the scope for less intensive, more benign practices to compete. This high-input modern farming practice is a key driver of the wide-scale habitat destruction devastating our planet today (Drottberger et al, 2021).

#### Environmentally unsustainable

According to the FAO (2015), the agri-food system accounts for 30% of global energy consumption, with Europe alone claiming 17% of this statistic in 2013. Agriculture itself is the most energy-intensive phase of the food system due to the dominant methods of animal rearing and crop cultivation. The system is fossil-fuelled, and thus, from an energy perspective the system is deemed highly unsustainable and inefficient (Holden et al, 2018).

The dominating practices are reliant on irrigation. Aquifers replenish at a very slow rate, and hence, are in effect a non-renewable resource. This excessive depletion of aquifers in food producing areas threatens food production and hence, security (Dalin et al, 2017). It has been highlighted that the vast majority of the world's population sources crops from trading partners who dangerously deplete groundwater reserves in order to produce these crops (Dalin et al, 2017). From a water management perspective, the system is non-viable due to this reliance.

Taking into account the initial energy and water demands, let alone the other vast resource requirements, of this food production system from an environmental perspective, the system is unsustainable and an urgent transition is required, the reliance on finite resources cannot physically be sustained.

"We can live without oil, but cannot live without food" - (Vitiello, 2011) Industrialised agriculture came about by means of land clearance and habitat destruction consequences included biodiversity loss and the generation of greenhouse gas emissions. According to a cumulative study, it has been estimated that between fertiliser manufacturing, food processing and everything in between, one third of GHGs are emitted from this conventional way of agriculture (Gilbert, 2012). The impacts of such emissions are being felt by the system in a viscous feedback loop, as crop yield and health feel the burden of a warming world.

Taking the above repercussions into account, and acknowledging that there are many more, from an environmental perspective it is clear that the current system is not sustainable and in order to attain

a sustainable system, the situation needs to be rectified (Holden et al, 2018). The unsustainable food systems are in a "lock in", current incentives and behaviours promote monocultures and farm intensification presenting barriers to niche alternatives. We need to make a transition to food cultures which restore and enrich the biosphere, rather than degrade it (Olsson et al, 2021). Engaging in alternative ways of doing farming, like growing in cities, will ultimately entail struggling against the subordination of alternative practices to the industrial norms of intensive farming, despite the emergence of scientific evidence and knowledge (Drottberger et al, 2012). *Food waste* 

Despite the extreme resources and efforts required to produce food, a large volume of it is simply discarded and degraded. The FAO (2011) has cited that more than one third of the food grown is never actually consumed, be it by animals or humans. Most of this food loss occurs in developed countries, primarily and the consumption stage, despite its worthiness. The main cause of this ghastly loss comes down to consumer behaviour and lack of coordination in the food supply chin (FAO, 2011). The prevailing regime sets standards for shape and appearance of food, meaning that food items are easily rejected for not fitting these stringent standards, or for poorly calculated "best before dates". Food waste in such developed countries can be reduced once awareness is raised and behaviours are changed (FAO, 2011).

# 4.3 Using this window of opportunity: The Urban Agriculture niche

The following section frames urban agriculture as a niche - in opposition to the prevailing food system - whose practices are fundamentally unsustainable.

#### 4.3.1 The roots of urban agriculture

The key guiding principle for urban agriculture is informed by the unsustainable nature of the dominant ways of food production. Since the mid 1900's the prevailing food regime has been dominated by socio-technical practices which are reliant upon pesticides and chemical fertilizers, intensified industrialisation, destructive large scaled farms and mechanized practices. The current regime further promotes these practices in many regions by way of governmental policies which incentivise and subsidise farmers. Such subsidies can pressure farmers to conform to these norms if they wish to maximise their incomes. As farm output grew throughout the 1900s, an industrialised food regime developed to support this. Farming became a link in the supply chain between farm and fork, one which extended to include processing, packaging, distribution and retailing. Evidently the factors above suggest that a transformed system is required.

Food production for and within cities is not necessarily a novel innovation, it has a long history, and in this case history must repeat itself as a fundamental element of future urban sustainability. Integration of food production into urban life has a lengthy timeline across many Asian cities and is increasingly important for food security across Africa and Latin America. In the Western world, interest in urban food production is recognised to be triggered by times of economic, political and ecological instability or crises - landscape factors. For instance, in the US provisions for community gardens were first made during the economic depression of the late 19th century (Irvine et al, 1999). Both WWI and WWII forced attention to urban food production, when all available land was harnessed for food production to compensate for limited imports. Evidently in times of crises, urban food growing has been a safety net for many people. *Schrebergaerten* (allotment gardens) began cropping up in Germany in the wake of WWI when people had no alternative but to grow their own food. The "Dig for Victory " campaign was set up in Britain during WWII by the Ministry for Agriculture; here, people were encouraged to cultivate urban land to combat or supplement rationing (Deelstra and Giradet, 2000). Today we are facing a different set of crises, a climate crisis, a global pandemic, thus one can expect urban gardening to crop up once again.

#### 4.3.2 Regime versus niche

In the Western world, we as consumers have become accustomed to this socio-technical regime, and the convenience of purchasing groceries at one, single supermarket, rather ignorant to the background processes. Today, more than 95% of people do their food shopping at the supermarket. Practicing urban agriculture is stark in contrast to this conventional trend, here, a decentralised system of food production, distribution and consumption is the goal. A circular system embedded in its own urban environment, supplying local food for local consumption. Contrasting the spatially dislocated, demanding system of the conventional agricultural socio-technical regime (table).

**Table 5.** Contrasting socio-technical practices in niche and regime (adapted from Smith, 2007, p. 433).

| Socio-technical<br>dimension  | Conventional agriculture<br>- regime  | Gulf | Urban agriculture - niche  |
|-------------------------------|---|------|--|
| 1. Guiding<br>principles      | Maximise outputs using non-linear inputs  |      | Optimise land-use and circular inputs  |
| 2. Technologies               | Industrial farming,<br>chemical fertilisers   |      | Natural processes; healthy<br>environments, nutrient<br>recycling            |
| 3. Industrial structure       | Intensive production, large globalised operations   |      | Localised food production  |
| 4. User relations and markets | Consumption chains long -<br>supermarkets and<br>intermediary processors.<br>Processed and packaged<br>goods. |      | Consumption is close to the<br>source of production. Low<br>processing       |
| 5. Policy and regulations     | Favorable import policies and low tax on imports.   |      | Certification of organic<br>standards. Financial aid for<br>some production. |
| 6. Knowledge                  | Food technology, transport logistics  |      | Soil science and ecology, seasonality of food                                |
| 7. Culture                    | Maximise profit and convenience   |      | Sustainable food   |

Analysis of the two alternatives described above exhibits a gulf between the niche and regime. The niche has to some respect been initiated or re-emerged and informed in response to the incumbent regime. Problems encountered within the regime, particularly regard to it's sustainability, inform the guiding principles which create the niche.

#### 4.4 Case studies

The following section will turn to the case study cities of this research, beginning with a brief history of the cities and their contexts followed by a discussion of how the projects have been established and maintained. The objectives are as follows; exploring if a transition as described in the literature has or is taking place and if so, understanding the factors that enabled niche diffusion in Glasgow and A Coruña.

#### Glasgow

Glasgow is the most populous city in Scotland, boasting a population of approximately 621,020 (GCC, 2017), situated in the centre of the country, along the banks of the River Clyde. The name Glasgow translates to 'place of the green hollow', or 'dear green place' (Bellahouston Demonstration Gardens, Respondent). This meaning comes from the Brythonic words *glas* and *cau* meaning green and hollow respectively, this should be interpreted as "Dear Green Place" (MacKay, 2000).

The city experienced rapid urbanization due to unplanned industrialization occurring from the 18th century onwards, industries such as coal mining, ship building and iron founding settled in the city. At the time the city was one of Britain's major hubs for transatlantic trade. In the 1950's the population peaked at 1,089,000, at this time Glasgow was one of the most densely populated cities in the world. However, reforms and industrial decline in the later 20th century saw a redirection of people from inner city areas to new towns, leading to quite a rapid population decline and a shrinking city. The harsh effects of this accelerated post-industrialisation can be seen quite starkly across the city today. Despite a declining inner city population, urban development continued with high rise development schemes replacing urban slums, attempts were made to 'revitalise' the city (Britannica, 2020). Unlike the 1950's the population density is not as enormous today (3,396km2). In fact, vast areas of vacant and derelict land (over 1,300 hectares) lie across the city due to the exodus, representing 4% of the city's land area (Crossan et al, 2015). The bulk of this vacant land lies in the deprived, East of the city.

Glasgow is highly deprived and divided, with 47% percent of the population residing in impoverished areas, approximately 292,000 of Glaswegians reside in 20% of the most deprived areas in Scotland (Understanding Glasgow, 2019). On the 16th of May 2019, the city of Glasgow declared itself in a state of climate emergency acknowledging the vast challenge which climate change is posing to both people and the city itself (Glasgow Open Space Strategy, 2020). Aside

from social and economic concerns, the city faces many climate consequences as a result of its urban morphology - increased built cover, lack of vegetation, pollution and anthropogenic heat generation.

#### *The food system*

The conventional food system in Glasgow is complex, reaches well beyond its immediate boundaries and is failing to meet the needs of its dwellers. The UK food system as a whole has been depicted as one which is devoted to providing cheap food at the expense of health and environmental sustainability, lacking any sense of self-sufficiency (Nestle, 2020). Up to 30% of households are struggling to afford what the National Government recommends as a healthy diet, 66% of the adult population are overweight and a prevalence of dietary related illnesses is observed (GCFP, 2021). Zero Waste Scotland estimates that the system produces 113,706 tonnes of food waste per annum (ZWS, 2020). This indicates the cracks and tensions associated with the prevailing system. However, niche urban agriculture initiatives are emerging. A central theme of the Glasgow City Food Plan 2020 considers food waste and the environment, whereby sustainable urban agriculture is positioned as an integral part of building a sustainable food system for the city. This relocalisation of food chains as a means to achieve sustainable consumption has been put on the table as a strategy for the transformation of food systems and farming across the UK (Pretty et al, 2005). Locally- implying food consumed as closer to the point of origin as possible, cutting down on food miles and strengthening local economies against the forces of globalization. Consumer demand for organic produce across the UK has excelled in the last two decades - growing from what was once a niche activity to being co-opted into the mainstream (Smith, 2006), can UA in Glasgow similarly follow this trajectory?

#### Approaches taken

In recent years significant efforts are being made to develop the vast derelict and vacant lands in the cities with recognition of the social, economic and environmental pressures the city faces. A range of nature-based solution projects are emerging in Glasgow; a climate forest, a wealth of urban gardens, a dedicated open space strategy and sustainable food policies. The emerging coalition between these projects was evident at the Glasgow Innovation Summit (March 2021), representing a motivated set of actors who share a transformative vision for their city. Collectively and individually, these actors have piloted a set of radical alternatives to the dominant models of

city-scape planning and urban food production, with a keen focus on food production and social cohesion. Throughout the city you will find over eighty community growing spaces (Innovation Summit, 2021).

The NBS projects and approaches towards urban agriculture were not necessarily established as 'strategic niches' however, they do emerge as exemplars with the purpose of creating sustainable change from their 'protected' spaces. From a multilevel perspective, the diverse coalition of practitioners, urban farmers, planners and communities working on these radical alternatives are an example of an emerging systemic niche (Geels and Schot, 2007). The subsequent section will explore emerging approaches in Glasgow.

#### Strategic approaches:

#### Glasgow Food Growing Strategy

In 2015 the Community Empowerment Act was introduced, placing duty on local Scottish authorities to prepare food growing strategies for their district. The Act had the potential to promote food growing across the wider Scottish region (GFGS, 2020), however, many authorities have yet to comply. Glasgow however, was very compliant, producing their strategy in 2020. Consultations throughout the city revealed a high demand for growing spaces, these consultations in turn inform open space needs and the Open Space Strategy.

# **Open Space Strategy**

Community gardening is particularly high in aging industrial cities where the demise of the manufacturing city has left behind vast amounts of derelict space. As disclosed above, the city of Glasgow is a rather pertinent case, with over 1300 ha of vacant space, over 925 dilapidated sites. Most of this available land lies in the more deprived areas of the city, namely the east, north and southern regions (Scottish Vacant and Derelict Land Survey, 2013). The Glasgow Open Space strategy sets out a long-term vision for these spaces to ensure that they meet the challenges of the 21st century, providing a guiding framework for the development of otherwise derelict and neglected spaces (Glasgow Open Space Strategy, 2020). The OSS seeks to promote a Glasgow that is liveable, healthy and resilient. Moving from this widely held narrative that community growing spaces are merely for 'interim use', the council scopes out permanent provision of spaces. Production of the OSS is being facilitated through participation in the EU's Horizon 2020,

Connecting Nature project. An audit of the open spaces in Glasgow took place between 2007-2010, illustrating the extent, type and spatial distribution of vacant spaces throughout the city. The OSS works collaboratively with other strategies throughout the city. Consultations were held by the dedicated Food Growing Strategy (2020) to calculate the demand for growing spaces in the city. Identified land suitable for growing spaces is exhibited on the Open Space Map and receives further protection by the City Development Plan. Should a deficit of existing space be identified across the city, new residential developments will be expected to make a contribution to fulfill this demand, partnering with the Housing Association. Local governments can often be reticent when it comes to shifting the control of public land for community growing spaces (Ghose and Pettygrove, 2014), however, Glasgow is seemingly proactively supportive.

# Community Growing Spaces in Glasgow Bellahouston Demonstration Garden

The Bellahouston Demonstration Garden is a community growing space managed by Glasgow City Council situated within Bellahouston park. The space boasts plots for local charities, organisations, schools and community groups. The gardens were originally set up for educational purposes, however, given the misalignment of the harvest and and school calendar, the purpose of the gardens was later reconsidered (GCC Interviewee #2). Acknowledging the ability of community growing spaces to foster social cohesion and engagement the rationale was altered to provide spaces for particular user groups including those with long term illnesses, vulnerable people and extending to school children.

A formal steering group was established to support the implementation of the garden consisting of representatives from the Council, Glasgow allotment forum (the city's main advocacy group for allotment holders), alongside representatives from the respective organisations. The growing space is organised in the same format as a traditional allotment with individual plots for each group (Bellahouston Demonstration Gardens, Respondent). Although the Council have installed a site officer, the garden is managed quite autonomously, with user groups taking collective control for the day to day running of the gardens. As of Summer 2021, there are nine user groups using the plots ranging from Macmillan Cancer Support, SACRO garden project to Alzheimer's Scotland alongside a local school, a real melting pot of individuals. It is recognised that the gardens here go far beyond providing sustenance and produce, rather the gardens have played a significant role in improving the health and wellbeing of participants (GCC Interviewee #2, 2021).



Fig 8. Bellahouston Demonstration Garden (Glasgow City Council, 2020).

# Glasgow Community Food Network

In 2012, the agglomeration of UA initiatives in Glasgow came together to set up what was once known as "Glasgow Community Food Group", an informal group who sought to establish a collective voice for urban agriculture (GCFN Interviewee, 2021). From 2017 the group became formally known as a Food Network with the aim of collaboratively developing a flourishing food system for the city, under an umbrella organisation. The GCFN hosts events and workshops and engages with national organisations to encourage further growing throughout the city.

The Urban Agriculture strategies, projects and initiatives exhibited in Glasgow although perhaps not explicitly outlined in their visions or manifestos, these initiatives hold significant transformative ambition, potential and impact. Our findings from this exploratory research suggest that the proliferation of UA activity in the city is largely dependent on the abundance of motivated and determined individuals, alongside a proactive local government who has access to external funding. Many of the actors interviewed cited the divisive deprivation of the city as a fuel for these initiatives. A common social mission is recognised amongst the projects including community development and social cohesion. A respondent from the Glasgow Community Food Network echoed this shared mission, emphasising that the cooperation between UA activists in the city was fundamental for realising their goals (GCFN Interviewee, 2021). Challenges are prevalent, securing stable funding streams, identifying permanent places, and maintaining motivation.

# A Coruña

Situated in the Northwest of Spain, A Coruña is medium-sized city, housing more than 244,000 inhabitants within 37.8 km2. Due to this high population density, A Coruña has a reduced number of green areas (compared to similar sized European cities). However, here, the existing urban parks are perceived as the city's green lungs, which contribute to the improvement of air quality and the fight against climate change (Connecting Nature, 2018). A Coruña is an extremely compact and dense city. Scarcity of available land surface and an increasing population has forced the development of vertical construction in the city, with many buildings towering over 6 stories. Parallel to this vertical growth is the demise in biodiversity and green areas, these two factors in tandem lead to heat stress. There is also a growing pressure on better waste management in the city. In 2018, A Coruña saw the creation of three new public urban gardens in three different locations - 112 plots in Agora, 75 in Eiris and 30 in Novo Mesoiro (Urbact, 2021). In the city of A Coruña, besides their environmental attributes, urban gardens are observed as a strong social tool to connect people with nature and people with people.

# *Urban agriculture approaches taken in A Coruña Networking*

Besides involvement in the Horizon 2020 project, Connecting Nature, A Coruña is also involved in the URBACT Ru:rban project, a transfer network, which specifically focuses on the art of urban gardening, transferring knowledge and experiences from leading city to another follower. The cities involved in this particular network include Rome, A Coruña, Vilnius, Thessaloniki, Krakow, Caen and Lourdes, who utilise the platform to exchange knowledge. The network aims to enrich Rome's urban gardens with ideas, and in turn for Rome to transfer these ideas to following cities. Rome is recognized as the most agricultural municipality in Europe, with regard to the rise in the number of community gardens it has (Cavallo et al, 2016). The leading city has by trial and error produced a number of rules to be applied in other contexts to aid their implementation of UA, including regulatory frameworks, organisational models and financing mechanisms. The city is acknowledged to be an exemplary model. The initial objectives of A Coruña's involvement included the multiplication of urban gardens, to network with local stakeholders, and to better communicate

urban garden activities by learning from this frontrunner. Throughout their involvement further aims emerged; to involve further departments and to create the urban garden network. Involvement in the project was perceived as playing a key role in the proliferation of the gardens, As it has facilitated a resourceful knowledge exchange between cities which is essential for the implementation of novel innovations (Farm to City, 2021).

# Community Growing Spaces

# Eiris Park

Eiris Park covers almost 9 hectares of space. The park itself was created in 2003 as part of a restoration project which aimed to recover nature from the severe impacts caused by recent industrial development. The industrialisation of the region saw what was once a traditional rural, agricultural area transformed into a largely derelict, industrialised site with a pipeline running below it (Connecting Nature, 2018). However the restoration ran into many problems including environmental conservation issues, a scarce water supply and the presence of invasive species, hampering biodiversity. Taking initiative, A Coruña City Council developed a series of targeted interventions, emphasising the multifunctional use of green spaces to incentivise local citizens and stakeholders.



Fig 9. Urban gardens situated in Eiris Park, A Coruña (Connecting Nature, 2019). Aside from the improvement of public amenities in the park and the naturalisation of the pond, one

of the overarching interventions launched in the park by the City Council was the creation of urban gardens, to enable local residents to produce organic groceries. A large space was set aside for urban agriculture (fig.9). The beneficiaries of the gardens must follow organic agricultural practices - informed by a dedicated educational programme.

In the city it is acknowledged that the "creation of green urban areas, accessible to a wide range of citizens is key for the promotion of sustainable lifestyles" (Connecting Nature, 2019) These interventions saw the connection between urban residents of A Coruña and nature. The park has been included in the local environmental education programme to further this relationship and connection. Eiris itself is famous for the harvesting of strawberries, however, with the implementation of the gardens, residents have diversified their crops, growing peppers, chards, aubergines among others (Rodríguez, 2019). This diversification has enabled the provision of a more dynamic and sustaining diet. Although training is provided by the council, the opportunity to learn from fellow gardeners is recognised, "older people give us the best advice" one gardener cited. There is a certain element of healthy competition amongst the plot holders, but this encourages continuous learning.

#### - Agoras

At the foot of the Agora centre, lies the Agora Urban Gardens. The Urban Gardens of Agoras have proven very popular, so much so that beneficiaries are calling for the City Council to extend their three year plot leases. Users have formed the "De Leria na Leia" association to demand an increase in the number of available plots. A lengthy wait list of more than 300 people currently exists (Mayán, 2021).



Fig 10. Urban gardens situated in Agra del Orzán, A Coruna, (Connecting Nature, 2019).

The network of Urban Gardens, launched by the local government, facilitated by the Connecting Nature project was awarded a prize for good local practices for climate of the spanish federation in the NBS category (A Coruña Interviewee, 2021). Encouraged and enthused by this, the intention to expand the network of gardens to meet the demand was announced. The department is also attempting to investigate more areas in the densely built region to transform into bustling, vibrant gardens.

#### 4.5 Strategies which contribute to the pathways of diffusion

One of the key questions to ask during this research is whether and how these identified place-specific experiments create an impact on a broader scale; how these NBS niches developed in Glasgow and A Coruña can diffuse more widely, engaging more actors and disseminating lessons learned, increasing the potential for transformative impact. Throughout this study, we have explored in further depth the strategies and associated practices through which NBS, with particular attention paid to UA can diffuse and hence impact the wider urban sustainability transition through processes of *scaling, embedding* and *translating*. We began the analysis by testing SNM's central hypotheses - which posits that niches will be more effective at diffusion once they exhibit visioning, learning and networking (2.1). The following chapter will report the results of the empirical analysis. Internal niche building processes are explored and subsequently, the auxiliary specific strategies observed which enabled the scaling, embedding and translation of the niches will be described.

#### **Translation**

# *RQ:* Through which strategies can UA initiatives translate from one location or institution to another ?

Returning to our earlier literature review, translation refers to the process by which elements of an experiment or niche project are being replicated and reproduced elsewhere, either spatially or in a different institutional context (Von Wirth et al, 2019). The transformative potential of NBS will be realized when applying their learnings across sectors, actors and geographical boundaries (Von Wirth et al, 2019).

Examples from our case cities include the adoption of best practices by one city from another by means of followership, community garden approaches being incorporated into local educational institutions, and internal and external networks being developed leading us to formulate three

apparent strategies which enable niche translation: provision of education and training, effective followership and subsequently, networking.

#### Provision of training and education

Training, development of dedicated guidebooks and engagement at summits and conferences is recognised to enable or make the process of translation easier (Seyfang and Longhurst, 2015). By means of the provision of education and training, capacity for sustainable change can be built. The local organisations, supported by the municipality, have created the right conditions to support the urban agriculture niche. People should have a greater understanding and appreciation of the food growing processes when they are more locally attached to the cultivation process. Their knowledge and appreciation can be increased through agricultural and environmental training (Deelstra and Girardet, 2000). Such knowledge acts as a powerful force of influence over the ways in which food is produced in a locality. By educating local citizens of Glasgow, the GCFN is actively growing environmental awareness among its citizens, promoting urban food growing. Furthermore, community growing has been implemented into the school curriculum of certain schools in these cities.

"The reason why we are trying to impact early education levels and primary school education levels is because these lessons stay with children for life..... It's not just the idea of food growing, I think it helps to develop empowerment"

(GCC Interviewee #2, 2021).

By introducing urban agriculture and community growing practices literally into schools by implementing school gardens and implementing the associated learnings into school curricula, situated learning can be stimulated, which contributes to sustained impact.

The translation of UA practices in order to replicate them elsewhere either in the city, or elsewhere on the continent (in our case) is supported by the provision of education and training activities. This replication however is not linear, tensions arise when concepts of a niche are translated into a new context, we recognise such tensions with regard to the contextual differences between A Coruña and Glasgow. Glasgow implements an OSS to identify space for UA initiatives due to a surplus of

vacant and derelict land. Meanwhile, A Coruña struggles to identify unoccupied spaces to meet the growing demand for growing spaces, thus shared learnings often require adaptation.

"We have a very dense population - the city council struggles to find available land, this is one of the main issues we have right now"

(A Coruna interviewee, 2021)

One should acknowledge that replicable models or examples to be followed should maintain flexibility in order to contextualise and adapt to diverging needs and localities. For enhanced replication models should be accessible and straightforward. Urban Gardens as niches however, do have an increased potential for translation; they are by nature, low tech and designed to be accessible to community, and civil society groups wanting to experiment with alternatives, and thus in theory, easy to transfer to new locations.

#### Followership

Despite a literature bias towards leadership, we are naturally predisposed and more likely to act as *followers* rather than leaders. Climate followership has previously been defined as the adoption of in this case, an approach or technique for responding to climate change by one actor by subsequent reference to its previous adoption by another actor (Torney, 2019), hence a city emulating the approach of another. An intriguing question from an evolutionary lens is why a city would voluntarily assume the role of follower when this means sacrificing some autonomy to another city (Bastardoz and Van Vugt, 2019). However, with regard to the implementation of novel innovations such as urban gardens, the benefits of accepting this role are acknowledged. When implementing such experimental niche innovations, there is a risk of the unknown associated, performance can be low and costs high (Geels and Raven, 2006) however, by following the leader this experimental risk can be minimised.

"Cities like Glasgow have paved the way, hopefully it will be alot easier for other cities to follow their example, and see what does and doesn't work."

(GCFN Interviewee, 2021)

Alas, if no individuals are willing to follow, there is no followership and thus no leadership (DeRue and Ashford, 2010).

"The process of transferring good practice from Rome has been fundamental to developing our future urban garden policy, a regulatory framework for the management and allocation of municipal garden plots" (Farm to City, 2021).

A Coruña has engaged in two dedicated Horizon 2020 projects; R:Urban and Connecting Nature, allowing it to partner with two leading cities with respect to nature based solutions; Rome and Glasgow respectively. The two frontrunner cities are considered to be exemplars in the global urban agriculture movement. The two cities acting as leaders, actively seeking to gain traction among followers exhibiting an exemplary type of leadership (Liefferink and Wurzel, 2017). Yet what is it that allows for this effective followership to emerge ?

This followership has emerged through a pathway of learning stemming from a logic of appropriateness (March and Olsen, 1998) whereby the leading cities have provided both models and relevant knowledge for the implementation of UA and NBS in partner cities. In this case A Coruña, the following city is not coerced, rather, they believe that the models exhibited by the leader are worthy of followership and critical for development of UA in their own city. Followership is increasingly likely to emerge when the model exhibited by the leader is realistic and fits the circumstances of the follower (Torney, 2019). We recognise this match to an extent between the offerings of the frontrunner cities and what the follower has the capacity to accept. Involved cities have the kindred objective to upscale and implement nature-based solutions in their urban contexts with an objective of responding to climate change (Connecting Nature, 2019). However, when contextual differences do emerge, adaptations are made.

"We do not necessarily transfer the whole Roman regulation but we adapt it...The wealth of R:Urban is to be able to learn from individual experiences, to analyse the evolution of the regulatory framework and to analyse the many different possibilities existing"

(Farm to City, 2021).

When questioned how involvement in these followership projects enabled the development of UA in their city, A Coruña responded;

"It helps politicians and decision makers realise the potential that this project has and that it is not something that happens just here in the city just at the local level but there is interest from EU and abroad and other cities are doing similar things. Being part of these networks gives legitimacy to the project I would say"

(A Coruna Interviewee, 2021).

The relationship does not only provide a medium for the transfer of knowledge and lessons from the leader city to the follower and access to more resources, additionally it contributes legitimacy to the initiatives. This followership is enabled or facilitated by the perceived legitimacy of both the example and knowledge communicated. Both Rome and Glasgow have exhibited attractive characteristics for the follower, being perceived as legitimate examples to follow. Followership need not be a permanent role, following can prove profitable for anyone exploring what it takes to be a leader. Following enables learning and observing from leaders before claiming this role themselves at a later time (Bastardoz and Van Vugt, 2019), this is applicable for A Coruña who in the next phase of the URBACT project will themselves take on the role of leader and disseminate their learnings in a similar manner.

Followership can happen internally within a country as well. An example of this translation via followership is occurring in Scotland at a national level. As national government has brought in legislation which requires all Scottish cities to produce an Open Space Strategy, following the example of Glasgow (GCC, interviewee #1). The leader-follower relationships facilitate niche translation as lessons are shared and contextualised from one city to another.

#### Networking

A lack of coordination between niches seeking to transform the prevailing food system is often recognised as a barrier for diffusion. Often niches attempt to invent the wheel all over again, rather than synergising one another, recognising a mutual interdependence (Immink et al, 2013). Internal project-project networking is a niche strategy which appears to be strongly linked to diffusion success (Seyfang and Longhurst, 2015). This is a key aim of A Coruña's Connecting Nature exemplar

"The goal is to replicate the project all along the city with an infrastructure of green systems; the gardens have to go beyond their immediate boundaries and flood the whole city....At the local level the objective is to establish a network of gardens connecting the pre existing initiatives in the city"

(Innovation Summit, 2021)

Here, A Coruña explicitly disclose their ambitions with the gardens, recognising that in order to have a greater impact, there is a requirement to reproduce the model across the city. By identifying and creating synergies between existing local UA initiatives in the city of A Coruña, collectively they can build a stronger case in the fight against the "corporatist food agenda" (Moragues-Faus and Morgan, 2015). This collective action draws government attention to local food and how it is produced.

This strategic approach to networking is observed similarly in Glasgow. In 2012 representatives from existing UA projects across the city including groups such as Locavore, and Urban Roots came together to establish what was then known as the Glasgow Local Food Network, (later became the Glasgow Community Food Network) (GCFN interviewee, 2021). The original objectives of the network were as

"A very informal space for community gardens to meetup and discuss things, for example logistic problems so you can talk to people if you have issues growing, just kind of a nice space for people to talk shop"

(GCFN Interviewee, 2021)

They later decided to make a more formal organisation in 2017, having been approached by the Scottish government to do this, they were wanting to take community growing more seriously as something that provides social and environmental goods, they were wanting to create umbrella organisations who they could engage with and engage with the wider sort of community (GCFN interviewee, 2021).

Scholars make a diversification between individual niche projects; which are specific sites of innovation, i.e. our embedded cases and subsequently the overarching global niche, the network of said niches. It is envisaged that a niche has greater potential of emerging into the mainstream when the constituent niche projects exhibit a coherent and coordinated alternative to dominant regime practice (Boyer, 2015). Thus we see the creation of both local and international networks evolving, contributing to the diffusion of these niches. Participating in EU projects such as R:Urban, and

Connecting Nature has been critical for the flourishing of niches, particularly in A Coruña, the networks increase legitimacy of the alternative practices.

"It helps politicians and decision makers realise the potential that this project has and that it is not something that happens just here in the city just at the local level but there is interest from EU and abroad and other cities are doing similar things. Being part of these networks gives legitimacy to the project"

(A Coruña Interviewee, 2021)

Not only do these networks bring legitimacy or validity to these alternative practices, they donate a platform on which actors can share their key lessons through accessible media; notably online, knowledge transfer seminars and conferences. In order to nurture translation opportunities A Coruña and Glasgow are actively engaged in H2020 projects, including Connecting Nature and R:urban. The cities engage in conferences and workshops with fellow interested cities who are interested in internalising the practices of Urban Agriculture into their cities.

# Embedding

*RQ: What factors enable UA initiatives to become embedded within their socio-spatial contexts ?* Returning to the definition of embedding of niches; the adoption or integration of its design, approach or outcomes into existing local structures e.g. regulations, institutions, spatial planning arrangements (Von Wirth et al, 2019, p.232). We can explore to what extent (if) have urban gardens been embedded in our respective cities and the strategies by which this has been achieved. *Supportive local governments* 

UA projects are typically observed to be managed by community groups, operating on the margins of political realms, however, local governments can assume a role as a supporter, enabler and promoter of UA initiatives. Niche actors tend to devote a significant part of their resources to self-maintenance and can be ambivalent with regard to diffusing their alternative practices, due to limited resources (Boyer, 2015). Through our empirical case studies we have observed the many hurdles faced by community growing spaces in both cities, as they strive to gather legitimacy, permanence and ample resources. Ensuring this can be aided by a supportive policy environment (Irvine et al, 1999).

"The issue is that there is limited national support for local and subnational food policies. Sometimes national policies either create barriers or fail to incentivise local

#### innovations"

(From Farm to City, 2021)

When policy makers are on board they can play a pivotal role in the embedding of these practices, acting as a bridge between those working at the niche level and those within government. Collective action has significant potential to increase the transformative potential of UA. As the community gardens become embedded within the local contexts, the level of startup support needed should diminish.

Niche theories posit that overtime, niche activities will progress embedding as mainstream actors adopt the innovation (Seyfang and Longhurst, 2015). Although UA has existed in the city of Glasgow for many years now, ample policy developments have recently emerged, encouraging the institutionalisation of the practice.

"I still think we've got a way to go in the city for embedding it into policy to make sure that nature based solutions are commonplace" (GCC, Interviewee #1, 2021).

Urban agriculture has the potential to reduce the ecological footprint of cities, increasing their sustainability when environmental goals are aligned and co-opted into the overarching city policy agenda (Deelstra and Giradet, 2000). A series of pivotal policy pathways have emerged in Glasgow which strengthen the opportunity for niche diffusion both at the local and global level. At the national level, The Community Empowerment Act (2015) emerged to place duty on local Scottish authorities to prepare food growing strategies for their district. Alongside this duty, the legislation aims to enable community organisations in Scotland to take up ownership of vacant land in their localities, emphasizing local food growers as chief beneficiaries. In practice, the regulatory act seeks to empower citizens to acquire land for food growing activities without having to wait for it to be put on the market (Scottish Government, 2014, p.12). The Act is highly influential and promotes food growing across the region (Glasgow Food Growing Strategy, 2020). According to Deelstra and Girardet (2000), a fundamental step to creating fertile conditions for urban agriculture is to develop a supporting urban agriculture plan and accompanying policies. The Glasgow City Food Plan (2020), does just that. Acknowledging the interrelated nature of food, environment, health and wellbeing a municipal working group was formed. The working group incorporated individuals from essential departments including health, economic, environment, civil

society organisations, among others. The Glasgow Open Space Strategy provides a guiding framework for the development of otherwise derelict and neglected spaces in Glasgow. We found evidence that the context and regime in which the niche was set was significant in determining its success. Supporting policy contexts were linked to wider diffusion - confirming previous hypotheses. Partnerships between the garden projects and the local governmental departments are crucial, particularly in the initial years of the projects, however, the state or local government must play a supportive and enabling role as opposed to a controlling one (Crossan et al, 2016). Government interaction must be careful not to suffocate UA under the weight of complex legislation and administrative practices (White and Bunn, 2017). The policy environment should continue to facilitate the endeavours of these niche practices by prioritisation of funding, establishing supportive policies and aligning with these visions. Crossan et al (2016) argue that such orientation would render the benefits associated with urban gardening in these cities more sustainable, and thus could influence the envisioned sustainability transition. Some actors however, err on the side of caution with regard to political promises, taking them with a grain of salt.

"I am quite cynical, I'm always very cynical about politicians' promises but they are saying all the right things, both the Scottish gov and city council are giving it a lot of lip service"

(GCFN Interviewee, 2021)

#### Activating partnerships and synergies across sectors

Fertile ground provides support and resources for the diffusion of these niches. Niche theories posit that overtime, niche activities will evolve towards becoming embedded as mainstream actors adopt the innovation (Seyfang and Longhurst, 2015), this can be achieved by intently activating network partners or incumbents. Under this strategy, urban gardens seek to embed their work into a broader network of actors, this can be achieved by making explicit the ways in which UA can serve the different agendas of the city, and the wider region. Practices of activating a wider range of network actors were evident in both cities.

"As you can see we had different departments in the municipality connected to the initiative of urban gardens, it was not only the department of environment but employment and also the department of education with the school gardens. This is why it is so important to embed the project of the urban gardens network into the city's strategies, it's not just a project that belongs to one department, it's a project that is so multifunctional and can address many issues at the same time and concerns different departments. "

(A Coruña Interviewee, 2021).

For accelerating urban sustainability transitions a common challenge faced is the insufficient capacities of local governments to establish synergies across domains like food and education. The compartmentalisation of local governments is a huge barrier faced by multiple cities (Connecting Nature, 2019). Local public administration tends to have siloed departments, each administering a distinct specialisation. This hampers efforts in accelerating a sustainability transition in the city region (Frantzeskaki et al, 2017). In A Coruña, a proactive approach has been taken, recognising the problem, it sought innovative ways to overcome this compartmentalisation in order to achieve better coordination.

"At the national level we recognise that the responsibility for food systems is split into different ministries and sectors and policy areas such as labor, agriculture and environment and these sectors set their own goals, which can lead to policy incoherence and conflict and missed opportunities to unleash all the benefits of addressing food systems as an interconnected issue."

(From Farm to City, 2021)

For scaling nature based solutions to contribute to accelerating the sustainability transition, social and environmental agendas need to strategically exploit synergies (Frantzeskaki et al, 2017). Advocating for the multiple benefits provided by nature-based solutions, A Coruña achieves just this. The above cases have exhibited alongside environmental benefits but also social benefits - addressing social challenges such as social cohesion. An urban agenda for NBS is intrinsically an integrated agenda for social and environmental issues.

# Scaling

# **RQ**: How can UA initiatives effectively grow internally, regards to actors, resources and spatially and hence, scale up ?

Scaling of Urban Agriculture initiatives entails the expansion to involve more participants, resources or geographical extent, ideally beyond the activist core, towards a broader audience

(Seyfang and Haxeltine, 2012). Scaling requires a combination of both internal and external factors. Certain strategies enlisted influence the ability of the projects to grow and recruit. *Visions* 

Visions are pivotal for mobilising and inspiring collective action for transformative change (Frantzeskaki et al, 2018). This strategy seeks to aid niche diffusion by disseminating narratives about alternative and more sustainable urban futures which may be achieved. A vision of the future is critical for realising a transition, the government involved must assist in the formulation of said vision to inspire and mobilise other actors (Rotmans et al, 2001, p.25). By means of our empirical research we can analyse whether the visions held by regime actors are shared by those at the niche level. Has there been a vision set which can motivate, inspire and mobilise more actors ?

"The Glasgow City Food Plan has been developed by the city council and other partners across the city and that's setting out the vision of how they are going to change the city."

(GCFN Interviewee, 2021)

In the case where there is a failure to connect or create a vision for a future sustainable city, the warranted societal change may face constraints, the GCFP covers six broad themes and strives to engage every sector and person. To foreshadow a transitional pathway, visions must be appealing and supported by a broad range. What these visions often lack however, is a connection or tie to a particular place, visions which are connected to place can act as a catalyst for local urban transformations (Frantzeskaki et al, 2018).

"Talking about urban gardens is talking about the future, talking about sustainability and different models of production and consumption"

(From Farm to City, 2021)

# Stimulating a sense of place and ownership

The urban agriculture initiatives which we have explored take place in a geographical and social setting, and are thus anchored in a particular local context. This wider socio-cultural context in which the projects sit play a role as external factors for scaling (Seyfang and Longhurst, 2015). Observed particularly in Glasgow, success or increased demand for community growing spaces can be put down to socio-cultural factors of the East end location of most of these projects. Raven et al (2008) postulate that sensitivity to local context is a key component for determining the success of a

project. Thus, when a project provides local benefits and applies locally appropriate practices its potential for success and becoming scaled increases. Farming is not solely just about food production there are elements of culture and heritage associated. Local civic pride is a huge factor driving usage of the gardens in both cities due to their cultural ties. What became apparent from our studies was that context is key, place matter and fostering a sense of place among participants and those on the fence is pivotal for actor scaling of the project.

"Urban gardens help us to recover culture values and identity and the farming tradition of Galcicia (A Coruña) that is well known and we have always sustained our diet on locally grown produce and this is a way to relive this tradition"

(From Farm to City, 2021).

Frantzeskaki et al (2018) have conceptualized that sense of place can be an outcome of experimentation, in this case niche experimentation which influences urban sustainability transitions by fostering meaning and attachment. Sense of place is defined as "the collection of meanings, beliefs, symbols, values, and feelings that individuals and groups associate with a particular place" (Williams and Stewart, 1998). By stimulating a sense of place, urban resilience can be enhanced, strengthening the connection between people and their environment. Such connection has been coined *topophilia*, the affective bond with one's environment, a person's mental, emotional and cognitive ties to a place.

" I think a lot of it is due to the derelict spaces and people wanting to improve their community and make it a pleasant place to live. And I think there's an element of people want to do something that has a bit of dignity attached to it, particularly because there's a long history of industrialisation in the city, there's a tradition of people with quiet manual labor based jobs who never got reskilled and having something to do with their hands is something really important"

(GCFN Interviewee, 2021).

Urban gardens in a sense have the ability to construct this topophilia. Sense of place can be created through social relations and networks (Frantzeskaki et al, 2018). In both cities it was recognised that urban gardens foster new relations between people and people and people and place. Promoting collective relations to place and furthermore a collective sense of citizenship.
"We're all aware of how damaging isolation is, when you have a community growing platform and that connection with other plot holders, some of the plot holders when they're at their plots might be the only opportunity to speak to somebody else in maybe three or four days. How relieved I am to have such a resource where people can get away from that isolation."

(GCC Interviewee #2, 2021)

The above stated gives a sense of the diversity of users of these community gardens. One might expect conflict to emerge given the range of users, rather, this was not indicative of a challenge. The environments here are ones which promote social cohesion reducing fragmentation or isolation. Groups who would not meet otherwise are brought together to collectively produce these urban spaces. Our empirical study has observed that new relations have emerged and even associations and networks due to the UA projects. Here, individuals are empowered. The gardens in both case cities function as a symbol for the envisioned or desired change, participants involved are not only motivated to grow food, but to improve the quality of their neighbourhoods. A quest for community spirit or social cohesion is regularly depicted as a motivational driver for the scaling of these initiatives which can enable the scaling of these projects. Furthermore, having a successful garden project helps to create a strong narrative which attracts interest from other actors, increasing opportunities for funding and expansion which can lead to internal growth.

#### Entrepreneurial linkage

Sufficient resources are required for the upscaling of a niche (Seyfang and Longhurst, 2015). Many of the investigated projects cite the requirement for sufficient resources for the continual and long term maintenance of their gardens. Some go as far as to find or develop their own streams of income to secure the stewardship of the gardens. Most of the projects manage to secure initial funding from EU sources or national budgets however this does not satisfy or account for a stable stream of income required to maintain the projects. One of the key limiting factors for the diffusion of urban agriculture is cited as this high dependency on public funding.

"If you were to drive around Glasgow, you would see all sorts of derelict projects and that's the nature of the funding, you will find a lot of the times organisations and schools will get one off funding opportunities to build a community garden, and then they've ran out of steam or staff to deal with it and its kinds of left derelict, this is a very common thing to see its a nature of short term funding"

(GCFN Interviewee, 2021)

A review carried out by Santo et al (2016) noted that most UA projects are sustained through grants, donations and public funds, not food sales. However, some interviewees noted the potential for changing this trend.

"There is scope to organise something for nature-based entrepreneurship, some of the trainees already have their own enterprises, one in particular is working with primary schools, building urban gardens for them so it has been quite successful. This proves that there is scope for this kind of enterprise in the city."

(A Coruña Interviewee, 2021)

The market context of these innovative projects is beginning to change and the consideration of such growing spaces as avenues for economic development is rising. With rising energy prices and prospect of peak oil looming, UA could increasingly become a viable practice (Vitiello, 2011, p.274). By linking these projects to entrepreneurial endeavours they can become more self-sustaining and contribute to resource scaling.

#### Paradox of mainstreaming urban agriculture

Scaling-up may lead to a dilution of niche values - a contradiction between upscaling niche innovations and concerns for the loss of core values and principles exists. Thus not all niche actors have the objective of 'scaling up' for fear of losing their intrinsic values (Seyfang et al, 2014). Committed individuals and groups are central to the persistence of urban agriculture niches in the face of potentially squandering mainstream indifference.

#### 4.6 Landscape factors at play

# **RQ**: What are the landscape factors at play that have influenced the emergence of nature-based solutions, particularly UA initiatives ?

One of the hypotheses of this research was that global developments in the form of landscape pressures have been instrumental in triggering the proliferation of UA in recent years. A prior desk study (section 4.1) explored potential landscape factors influencing the development of urban

agriculture. Exogenous shocks included The Food Crisis of 2008, The Global Climate Crisis, and the ongoing COVID-19 pandemic.By means of observation and interview we analysed which narratives were dominant for the proliferation of UA activities in the city. The motivations for participation shed light on the contributing landscape factors. Contrasting the expectations of this research, one of the reasons for the development of UA in Glasgow had emerged in response to an unexpected or unforeseen pressure; deprivation in the divided city, echoed by members of the Bellahouston Gardens Steering Committee. When asked why they thought community growing projects had taken off in Glasgow, one responded quiet blunty;

"Overall I would put it down to deprivation, regards to food insecurity, a lack of services, deprivation across the board."

(Bellahouston Steering Committee member, 2021)

Another factor which arose was the industrial and historic ties of the city. These more localised landscape level pressures are considered to have provided momentum for alternative food practices in the city as opposed to global forces.

The prevalence of the narrative that UA enables the greening of cities, and thus reconnects citizens with nature was observed in both cities. This narrative has been accentuated by the COVID pandemic. The data collected supports this conclusion. Both urban sites really recognised the associated benefits of reconnecting urban citizens with nature, particularly during the pandemic; influencing the regime to make space in its spatial planning for more NBS.

"Our allotments have five year waiting lists in the city, which predates anything to do with COP, we will probably have more trees in the city, and that will be the result of COP. Food growing, there's a lot especially because of COVID, there has been an increase in food poverty, growing spaces are becoming more popular because of that more so, than COP"

(GCC Interviewee #1, 2021)

Many actors on the ground in Glasgow disregard the impact of COP as a potential force for the proliferation of urban growing. They make clear the fact that the city has been at the forefront of urban gardening, that this predates the summit by decades (GCFN Interviewee, 2021). Some even cite that if anything the onset of COP has caused a reckless or inconsiderate allocation of funds and resources to make the city seemingly greener.

"Some of our departments are doing stuff for COP, but not necessarily in a strategic way and thinking about it long term. One of our departments has this objective to plant 200 trees before COP and they're just finding random places to plant them. Not much thought behind it"

(GCC Interviewee #1, 2021).

For the city of A Coruña and the wider Spanish region, urban gardens began cropping up following the Food Crisis of 2008, one of our hypothesized factors. However the recent surge in interest can be attributed to the COVID pandemic. In an article with local growers in the city, Mayán, (2021) noted the respite donated by the gardens to the local growers during the pandemic, offering a space of relief from isolation. Data has shown that these landscape pressures have influenced the emergence of UA, however, can only lay claim as a partial player.

# 4.7 Has a transition occurred ?

#### RQ: Do UA initiatives have transformative potential, has a transition occurred ?

Has our exploratory study observed a sustainability transition towards a more sustainable food system, contributing to more sustainable cities ? Geels (2011) asserts that the extent to which changes have occurred in policy, cultural meanings, technologies and user practices can depict whether or not a transition has or is actively occurring. Taking this categorisation into consideration, we can explore the extent to which changes have occurred in each.

#### Policies

Changes in policy can be recognised by the development of supporting policy measures in both cities. Significant policy changes and developments have been emerging, particularly since 2015 in Glasgow following the Community Empowerment act. However, actors reckon that there is still a long way to go before these actions become commonplace.

A Coruña has made headwinds at making UA initiatives more commonplace in their political contexts, integrating the grassroots projects into the cities strategic goals by strategic alignment (Innovation Summit, 2021). One could argue that under where policy is concerned significant developments have been made in the case cities.

#### User practices

Changes in user practices considers a process of societal embedding. Both cities have revealed that changes in user practices geared towards the larger society have not occurred to the extent which

can facilitate a transition. On the community scale however, the gardens are perceived to have made significant contributions to individuals and households. In both cities facets of community gardening and gardening in general are beginning to infiltrate the school curriculum which should convey changes in user practices into the future if successful.

#### Technologies

Urban Agriculture does not necessarily require "new" technologies, rather a retreat to old, more traditional practices, but this will require a demand. Trainings are made available to teach and translate these practices thus there is potential for change regarding technologies.

"Technology today is scaled for the massive industrialised system but I think the more that small scale becomes the norm and an option, the more we are going to see technologies, funding and systems in place and routes to the market that make everything a lot easier"

(GCFN Interviewee, 2021)

Technologies and practices exist, and accommodating policies adopted by local and national governments; however, user practices and cultural meanings have yet to be changed on a significant scale.

#### Cultural meaning

Changes in cultural meaning can be detected by alternative narratives that actors hold about the system. Interviews have revealed a transformative vision of an alternative means of food production in cities.

"I think in peoples heads urban agriculture has created a change in people's understanding of what is possible, what is capable...I think the psychological change is huge like the people I work with in Blackhill, seeing that they can grow in their own community is a great thing, really changing people's mindsets, at the moment were not at the stage where its being upscaled to the point where its having a serious impact on the percentage of foods for example people are eating grown in glasgow is still very small, but it's changing the opinions of people that live here, its changing the opinions of the Glasgow council and hopefully this means that in 10, 20 years time we will be in a position where your going to see a really different food system

in the city"

(GCFN Interviewee, 2021)

However, this vision is not held by the major part of urban society. As of now, no coherent, city wide vision towards achieving a localised sustainable food system is visible in either city. Rotmans et al (2001), believe that a transition of a system is the result of long term developments they refer to as stocks and developments on shorter time scales referred to as flows. They assign "cultural changes" to this long term category of stocks, while for instance technological and institutional change can occur on a shorter time scale. The whole picture of a transition is therefore a composition of these fast and slow dynamics, ultimately constrained by the slowest process, which is often cultural change (Rotmans et al, 2001).

Taking Geels' (2011) understanding of a transition applied to our cases we conclude that a transition has not occurred. However, actors are still hopeful, afterall, a transition takes time.

"I just turned 30 and I'm moving onto a stage in my life worrying about a mortgage and kids, if I didn't think that there was a future in what I was doing then I would be trying to get another job, but I do think we're approaching the watershed moment, up until now everything has been very experimental, people reinventing the wheel they would say where you try and find out radical new solutions, and I think we're getting to the point where the benefits have been proven, the impact on the environment, the impact it has socially, the impact on people's health, I think what we're going to see is a huge surge in interest and investment in locally grown small scale production"

(GCFN Interviewee, 2021).

There are, however, alternative views on when a transition has occurred or reached its end phase. Roep and Wiskerke (2012) argue that when specific niche innovations get adopted into a dominant regime, suggesting that when the practices and techniques of a regime become more sustainable, a partial transition can be observed. Niche innovations are not always destined to lead to a radical change in the regime (Roep and Wiskerke, 2010). It could potentially be argued that what we are seeing here is a partial transition of these food systems, particularly in Glasgow; whereby elements of the regime are becoming subject to influence by niche developments (in tandem with landscape factors).

# **Chapter 5: Discussion and Conclusion**

The overarching research question was; through which strategies do NBS, positioned as Urban Agriculture initiatives for this particular study, seek to diffuse (become embedded, translate and scale), to influence the broader sustainability transition ?

The previous study set out to identify the strategies by which urban agriculture initiatives engaged in the identified processes for niche diffusion; embedding, upscaling and translation (Seyfang and Longhurst, 2015; Von Wirth et al, 2018). Based on the empirical analysis, a series of strategies have been proposed by which these UA initiatives seek to diffuse and thus create a greater transformative impact (section 4.5), summarised below.

| Pathway     | Strategy  |
|-------------|---|
| Translation | Provision of education and training                 |
|             | Followership  |
|             | Networking  |
| Embedding   | Political support                                   |
|             | Activating partnerships and synergies across actors |
| Upscaling   | Visions   |
|             | Sense of place                                      |
|             | Entrepreneurial linkage                             |

#### Table 6. Summary of strategies identified

#### No one single strategy

The identified strategies do not occur in isolation from one another, rather, often working in synergy with one another. Taking for example the strategies of networking and followership. The UA niches are considered as experimental spaces which provide platforms for learning, disseminated by networks (Raven et al, 2008). The identified leader-follower relationships which were observed in our study emerged from the participation in EU projects with dedicated learning networks; Connecting Nature and R:Urban. The emergence of a network of pioneering trialling actors who struggle, test, fail and embed their learnings and solutions in the wider global niche realm provides a platform for forthcoming followers. Thus in a sense, networking is a promising prerequisite for followership to ensue.

Subsequently we observed that internal networking projects enabled partnerships to evolve. This was the case in A Coruña, where initiatives that were originally working solely came together to form a network which eventually led to the development of partnerships with the city council. Thus the strategies of networking and activation of partnerships tend to occur in tandem.

#### One size does not fit all

However, the global niche reservoir of learnings and rules (e.g. organizational models, financing structures, best-practice publications) requires a context-independent structure (Raven et al, 2008). Thus, often this networking and followership posits that lessons be adapted to fit the particular context. What works for one city will not immediately work for another, actors must reinvent these rules and interpret them to their own contexts. Projects developed by the follower cannot be a literal reproduction, rather, a local variation of the generalised model. The two cities represent different contexts, yet the application of similar urban agriculture approaches; community growing spaces. Glasgow exhibits an abundance of vacant and derelict space, whilst in A Coruña this is few and far between - requiring localised project variations. These local contexts provide varying constraints and opportunities. Despite their stark contextual differences, the study of the cities has sought to provide some generic lessons which can be applied to other cities.

#### Niche-regime alliance

This research has highlighted that the success of diffusion of niche projects goes beyond the control of any single set of actors. UA has the potential to play a role in the sustainability transition, however, piloted by one group or one actor alone these initiatives are subject to dwindle. In order to achieve the intended impact or influence on a broader scale, support is required. The contribution from a wider body of actors is recognised in both cities. For example, in Glasgow, the integration of (unexpected) motivated regime actors, those holding influential positions in local government have proved instrumental for the embedding of UA initiatives in the city, whether that be by playing a supportive role or approving legislation. Chapter two of this research presented a theoretical framework for sustainability transitions, exhibiting the lenses of MLP and SNM. Admittedly, transitions are not as straightforward. The MLP characteristically holds a bottom-up perspective on transitions, implying that niche alternatives emerge from grassroots in response to ill-fitted regimes. However findings from both cities don't emphasise this, rather, contradict these assumptions. Urban agriculture initiatives are not primarily "bottom-up", concurrently "top-down" developments are occurring.

Evidently in Glasgow the proliferation of UA has been supported by a committed City Council, despite originally emerging through grassroots organisations like Urban Roots (GCFN Interviewee, 2021). The research has made clear that approaches towards more sustainable systems need not be steered primarily by grassroots innovators, but local governments can play a role too; a "bottom up activism meets top-down institutionalism" approach. Transition theories have often been criticised for disregarding the agency of those within the prevailing regime to alter them (Geels and Schot, 2007, p.400). Evidently, in both cities the local governments have aided the diffusion of UA niches particularly in terms of embedding and scaling. Smith and Raven (2012) deduce that the dynamics of a transition lie in the ability of innovative niches to engage with both other niches and the prevailing regime, emphasising this synergy between actors on different levels, allowing for a cross-fertilisation to enable a system reconfiguration (Bilali, 2019). In Glasgow increased cooperation between food campaigners and government officials is recognised. This linkage increases the outreach and legitimacy of UA.

Niche to regime alliance or translation may warrant that niche practices and associated visions be compromised in a bid to engage mainstream audiences. Smith (2007) recognises that a niche which is too radical will fail to engage incumbents if it's practices dictate too many structural changes. A shift is more likely to occur if the project is more intermediately situated, a meet in the middle between the niche-regime context.

#### No silver bullet to sustainability

The empirical study exhibits how urban agriculture initiatives, namingly community growing spaces, can contribute to sustainability challenges in cities. The observed strategies contribute to their diffusion, however, their transformative impact has yet to be seen. In my opinion, UA cannot be depicted as a panacea to the unsustainable nature of urban food systems. Community growing spaces operating at their current scales in European cities cannot produce yields significant enough to feed the entirety of the city's populations (Crossen et al, 2015). However if they work in collaboration with other niche alternatives e.g. roof growing, hydroponic growing, organic farming perhaps eventually a transformation could occur.

Yet, operating in parallel to triumphant transitions are complex systems dominated by hegemonic ideologies of neoliberal capitalism and commodity flows (Shove and Walker, 2007) is it really possible for an intervention ? Shove and Walker (2007) argue that the normalisation of consumer expectations in the Westernised world for example; purchasing of food stuffs from a conventional

supermarket or importing vegetables, sustain complexes of practices which are inherently unsustainable patterns of demand. Consumers, despite being distanced spatially from the systems of production are central to them. Transitions and dedicated practices do not have the conceptual resources to enter these areas of day-day life. Thus they utter caution if expecting such a smooth, linear transition.

#### **Recommendations for praxis**

Today humans are actively farming more of the planet than ever before, with increasing resource intensity and associated environmental impacts. Concurrently, billions of people in the world are going hungry. This trajectory cannot continue, the requirements of current and future generations request that we transform agriculture, transitioning the current food system to meet the parallel challenges of population growth and environmental sustainability (Foley et al, 2011). Analysis demonstrates that UA alone cannot strive to meet future food production needs, however in tandem with other strategies, food production needs and environmental challenges can be met if deployed simultaneously, no single strategy is sufficient, urban agriculture is not a panacea. As in many facets of urbanism, tackling the problems of unsustainable urban food systems requires a diversified set of strategies which can be applied appropriately in context (Vitiello, 2011). The challenges caused and faced by agriculture today require innovative, revolutionary approaches for solving the cracks in the food system, and many workable paths exist.

• Thus, we advocate for the deployment of multiple niche alternatives, simultaneously. At the national level within the EU, holistic food policies are few and far between. Food systems have a multitude of facets, all which overlap. Yet in international climate negotiations this interconnectedness fails to be considered. In recognising the interconnectedness of food systems, there is an opportunity to involve a plurality of actors. A participatory, whole systems approach is warranted in order to deliver effective food and climate policies. Policy integration is critical to achieve this approach. At the national levels the responsibility for food systems is split into different sectors and policy areas such as agriculture and environment and these sectors set their own agendas, which can lead to policy incoherence, conflict and often missed opportunities to unleash the benefits of addressing food systems effectively, as an interconnected issue (From Farm to City, 2021). Integrated sub-national policies are gaining traction, however, their infant state requires that further monitoring and evaluation is required to establish their impacts on a longer scale (Davies, 2020). Localised policies are acknowledged for provision of experimental opportunities for new approaches as they include a range of local agents across the food system (Davies, 2020).

• The recommendation here is that practitioners and policy makers recognise the interconnectedness of food systems and strive to establish integrated, holistic policies.

Effective policy measures are fundamental for any manoeuvre towards a sustainable food system, however, existing policies will also need a review to identify where and how they help and hinder progress. This is not a simple task, given the complexity of the system. At a global level, agriculture, fisheries and food are subject to a large number of binding agreements designed to maintain global trade - policies which support and perpetuate the system at play need to be addressed (Davies, 2020). Policymakers are often cautious or wary with regard to experimentation due to the high level of risk involved. Policy makers interested in ameliorating the unsustainable nature of cities and their associated issues benefit from engaging with niche projects and involved individuals who are proactively experimenting with risky alternative rules of the game. However, policy makers should not always rely on niche actors to activate or initiate these processes, an alliance should be established. Mechanisms which allow for networking between the two should be established. Such interaction may influence policy makers to support and create strategic niches to foster experimentation for sustainable development (Boyer, 2015).

• We recommend that niche and regime actors unite for this transition.

There is no silver bullet intervention that will achieve a sustainable food transition (Davies, 2020). Recent policy advances such as the Farm to Fork strategy, published in June 2020 has reflected some elements of sustainability, however, it can be argued that it does not go far enough in order to achieve a transformation. There are some effective messages around circularity and shorter food chains, however it does not go far enough to prevent perpetuation of the unsustainable practices in the current system. Davies (2020) argues that the challenge of connecting social science research findings with policymakers who are actively developing policy interventions is one to be met. This was echoed at the Farm to City conference (2021); "Cities and farmers hold great potential for driving sustainable food system transformations, locally yet they don't have a seat at the table in food and climate policy making".

• The recommendation here is that civil society actors, those on the ground, in direct contact with food production should be given a seat at the negotiation table.

#### Limitations to the research and recommendations for future research

Evidently there were many implications with regard to the methodological procedure carried out for this research study, some which should have been forecasted from the very beginning..

- An outstanding critique of this research is the bias shown to frontrunner city Glasgow, despite a "comparative-case study" approach being declared. Unfortunately the focus of this study is heavily based on Glasgow, primary reason being: accessibility of data. A Coruña is a smaller city in comparison with a Spanish speaking population which made access to interviews and policy documents rather difficult. Future research should provide a weighted analysis by deriving an equal amount of information from both cities. The rationale for carrying out this comparative approach however, was to observe the leader-follower relationship, which to some extent has been grasped.
- Future research would also benefit from larger samples incorporating more cities to provide a broader, more representative picture of the urban agriculture movement and allowing for more generalisable results.
- A further criticism of the research is the limited amount of interviews carried out. There was the potential to continue with interviews in the city of Glasgow. However one could argue that there has been a 'saturation' of data (with regard to Glasgow), whereby on the basis of data collected there is no further data collection required (Saunders et al, 2017).

#### Closing remarks

This paper has aimed to identify the strategies by which urban agriculture initiatives as transition niches can effectively diffuse, influencing a sustainability transition. The purpose is to better harness an understanding of the forces driving these innovative solutions for a more sustainable urban form. The research highlights that successful diffusion is dependent on a multitude of factors that can work in tandem or alone and are beyond the concerted control of any actors or group of actors to ensure the presence of these contributing factors.

The case studies explored suggest that different niche projects play different roles in the larger global niche movement. Glasgow plays a critical role as a leader in the movement, being explicitly positioned as a 'frontrunner', the city acts as a model to be followed whilst A Coruña plays a critical niche translation role, adopting attentively these shared best practices.

Can urban agriculture positively change the regime ?

Despite the observed benefits of urban agriculture, the proliferation across Europe, the political recognition and abundance of literature discussing the potential that the practice has to ignite a sustainability transition, a transition has not (yet) been achieved. The MLP possesses a bottom-up view of transitions, however, our case studies contradict this view. This research has provided evidence that top-down developments play a complimentary role in the development of urban agriculture. In the case of Glasgow the emergence of UA within the city can be attributed to a large extent to the commitment of the local government, and thus transitions to an extent can be steered or aided by governmental actors where an unsustainable regime dominates. Some of the key players behind the development of UA in both cities were employees of the local government, an institution perceived to belong to the regime. This reveals the ability of actors within a regime to act alternatively, a critique of transition theory which often fails to recognise the capacity of actors within the prevailing regime to act disparately (Geels and Schot, 2007).

It can be argued that due to the international developments of urban agriculture and establishment of networks, contributing to a global niche, the early pre-development and take-off phases of transitions were skipped in these cities. The niche practices of urban agriculture have been pre-developed in other contexts, the development of urban agriculture in both cities did not necessarily begin from the ground, in both cities it can be concluded that both bottom-up and top-down forces worked, collaboratively. Regime influence and its high resource dependence places barriers to long term sustainability concerning urban agriculture practices. Whether it be for finance, space - there is a resource dependence on the regime on behalf of the niche. The research has offered insights into the internal workings of a global urban agriculture niche, exploring how the projects can work together as a networked entity e.g. how replication activities in Glasgow have contributed to the successes of activities in A Coruña. This research has aimed to donate insights into the strategies enlisted by niches to help other activists and movement leaders strategize for broader, warranted socio-technical change.

#### References

Allen, Michael. The SAGE Encyclopedia of Communication Research Methods. SAGE Reference, 2017.

- Bastardoz, N., & Van Vugt, M. (2019). The nature of followership: Evolutionary analysis and review. *The Leadership Quarterly*, *30*(1), 81-95.
- Beers, P. J., Turner, J. A., Rijswijk, K., Williams, T., Barnard, T., & Beechener, S. (2019). Learning or evaluating? Towards a negotiation-of-meaning approach to learning in transition governance. *Technological Forecasting and Social Change*, 145, 229-239.

Bilali, H. (2019). The multi-level perspective in research on sustainability transitions in agriculture and food systems: A systematic review. *Agriculture*, *9*(4), 74.

- Birnbaum, M., 2019. European Greens surge as voters abandon old parties over climate. Washington Post,.
- Boyer, R. H. (2015). Grassroots innovation for urban sustainability: comparing the diffusion pathways of three ecovillage projects. *Environment and Planning A*, 47(2), 320-337.
- Burton, E., Jenks, M., & Williams, K. (Eds.). (2013). Achieving sustainable urban form. Routledge.
- Cavallo, A., Di Donato, B., & Marino, D. (2016). Mapping and assessing urban agriculture in Rome. *Agriculture and Agricultural Science Procedia*, *8*, 774-783.
- Chaleff, Ira. "The Courageous Follower: Standing Up to And for Our Leaders." *NASSP Bulletin*, vol. 81, no. 586, 1997, pp. 119–119., doi:10.1177/019263659708158616.
- Cohen, M. J., & Garrett, J. L. (2010). The food price crisis and urban food (in) security. *Environment and Urbanization*, *22*(2), 467-482.
- Connecting Nature, 2019. Urban Ecological Gardens: Educating and engaging citizenship in the improvement of urban biodiversity and responsible consumption practices. [Blog] Available at: <a href="https://connectingnature.eu/blog/urban-ecological-gardens-educating-and-engaging-citizenship-improvement-urban-biodiversity-and">https://connectingnature.eu/blog/urban-ecological-gardens-educating-and-engaging-citizenship-improvement-urban-biodiversity-and</a> [Accessed 14 August 2021].
- Connecting Nature, 2018. Transforming cities and enhancing wellbeing through nature-based solutions: the experience of A Coruña. [Blog] Available at:

<https://connectingnature.eu/blog/transforming-cities-and-enhancing-wellbeing-through-nature-based-solutions-experience-coru%C3%B1a> [Accessed 2 August 2021].

- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.
- Crossan, J., Cumbers, A., McMaster, R., & Shaw, D. (2016). Contesting neoliberal urbanism in Glasgow's community gardens: The practice of DIY citizenship. *Antipode*, 48(4), 937-955.
- Crotty, Michael,. (1998). The foundations of social research: meaning and perspective in the research process.
- Dalin, C., Wada, Y., Kastner, T., & Puma, M. J. (2017). Groundwater depletion embedded in international food trade. *Nature*, *543*(7647), 700-704.
- Davies, A. R. (2020). Toward a sustainable food system for the European Union: insights from the social sciences. *One Earth*, *3*(1), 27-31.
- Deelstra, T. and Girardet, H., 2000. Urban agriculture and sustainable cities. Bakker N., Dubbeling M., Gündel S., Sabel-Koschella U., de Zeeuw H. Growing cities, growing food. Urban agriculture on the policy agenda. Feldafing, Germany: Zentralstelle für Ernährung und Landwirtschaft (ZEL), pp.43-66.
- Derue, D. Scott, and Susan J. Ashford. "Who Will Lead And Who Will Follow? A Social Process Of Leadership Identity Construction In Organizations." *Academy of Management Review*, vol. 35, no. 4, 2010, pp. 627–647., doi:10.5465/amr.2010.53503267.
- Drottberger, A., Melin, M., & Lundgren, L. (2021). Alternative food networks in food system transition—values, motivation, and capacity building among young Swedish market gardeners.

Sustainability, 13(8), 4502.

- Ehnert, Franziska, et al. "The Acceleration of Urban Sustainability Transitions: A Comparison of Brighton, Budapest, Dresden, Genk, and Stockholm." *Sustainability*, vol. 10, no. 3, 2018, p. 612., doi:10.3390/su10030612.
- Elmqvist, T., Setälä, H., Handel, S. N., Van Der Ploeg, S., Aronson, J., Blignaut, J. N., ... & De Groot, R. (2015). Benefits of restoring ecosystem services in urban areas. *Current opinion in environmental sustainability*, 14, 101-108.
- Elzen, B., & Wieczorek, A. J. (2005). Transitions towards sustainability through system innovation. *Technological forecasting and social change*, *6*, 651-661.
- Encyclopedia Britannica. 2021. *Glasgow* | *History, Facts, & Points of Interest*. [online] Available at: <a href="https://www.britannica.com/place/Glasgow-Scotland">https://www.britannica.com/place/Glasgow-Scotland</a> [Accessed 23 August 2021].
- European Commission, 2016 European Commission Policy Topics: Nature-Based Solutions (2016) https://ec.europa.eu/research/environment/index.cfm?Pg=nbs
- Evans, J., Karvonen, A., & Raven, R. (2016). The experimental city: New modes and prospects of urban transformation. *The experimental city*, 1-12.
- Faivre, Nicolas, et al. "Nature-Based Solutions in the EU: Innovating with Nature to Address Social, Economic and Environmental Challenges." *Environmental Research*, vol. 159, 2017, pp. 509–518., doi:10.1016/j.envres.2017.08.032.
- Farla, Jacco, et al. "Sustainability Transitions in the Making: A Closer Look at Actors, Strategies and Resources." *Technological Forecasting and Social Change*, vol. 79, no. 6, 2012, pp. 991–998., doi:10.1016/j.techfore.2012.02.001.
- Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., ... & Zaks, D. P. (2011). Solutions for a cultivated planet. *Nature*, 478(7369), 337-342.
- Folke, Carl, et al. "Resilience Thinking: Integrating Resilience, Adaptability and Transformability." *Ecology and Society*, vol. 15, no. 4, 2010, doi:10.5751/es-03610-150420.
- Folke, Carl, et al. "Transformations in Ecosystem Stewardship." *Principles of Ecosystem Stewardship*, ." *Principles of Ecosystem Stewardship*, 2009, pp. 103–125., doi:10.1007/978-0-387-73033-2 5.
- Frantzeskaki, Niki, et al. (2019). "Examining the Policy Needs for Implementing Nature-Based Solutions in Cities: Findings from City-Wide Transdisciplinary Experiences in Glasgow (UK), Genk (Belgium) and Poznań (Poland)." *Land Use Policy*, vol. 96, 2020, p. 104688., doi:10.1016/j.landusepol.2020.104688.
- Frantzeskaki, N., Van Steenbergen, F., & Stedman, R. C. (2018). Sense of place and experimentation in urban sustainability transitions: the Resilience Lab in Carnisse, Rotterdam, The Netherlands. *Sustainability science*, 13(4), 1045-1059.
- Frantzeskaki, Niki, et al.(2017) "Nature-Based Solutions Accelerating Urban Sustainability Transitions in Cities: Lessons from Dresden, Genk and Stockholm Cities." *Theory and Practice of Urban Sustainability Transitions Nature-Based Solutions to Climate Change Adaptation in Urban Areas*, 2017, pp. 65–88., doi:10.1007/978-3-319-56091-5\_5
- Frantzeskaki. Urban Sustainability Transitions. Routledge, 2017.
- Geels, Frank W. "The Multi-Level Perspective on Sustainability Transitions: Responses to Seven Criticisms." *Environmental Innovation and Societal Transitions*, vol. 1, no. 1, 2011, pp. 24–40., doi:10.1016/j.eist.2011.02.002.
- Geels, F., & Raven, R. (2006). Non-linearity and expectations in niche-development trajectories: ups and downs in Dutch biogas development (1973–2003). *Technology Analysis & Strategic Management*, 18(3-4), 375-392.

- Ghose, R., & Pettygrove, M. (2014). Urban community gardens as spaces of citizenship. *Antipode*, *46*(4), 1092-1112.
- Gilbert, N. (2012). One-third of our greenhouse gas emissions come from agriculture. Nature News.
- Gill, S.e, et al. "Adapting Cities for Climate Change: The Role of the Green Infrastructure." *Built Environment*, vol. 33, no. 1, 2007, pp. 115–133., doi:10.2148/benv.33.1.115.
- Grin, J., Rotmans, J., & Schot, J. (2010). *Transitions to sustainable development: new directions in the study of long term transformative change*. Routledge.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*, *2*(163-194), 105.
- Gustafsson, J., Cederberg, C., Sonesson, U., & Emanuelsson, A. (2013). The methodology of the FAO study: Global Food Losses and Food Waste-extent, causes and prevention"-FAO, 2011.
- Hancock, D. R., & Algozzine, B. (2006). A practical guide for beginning researchers doing case study research.
- Holden, N. M., White, E. P., Lange, M. C., & Oldfield, T. L. (2018). Review of the sustainability of food systems and transition using the Internet of Food. *NPJ science of food*, *2*(1), 1-7.
- Hölscher, K., & Frantzeskaki, N. (2021). Perspectives on urban transformation research: transformations in, of, and by cities. *Urban Transformations*, *3*(1), 1-14.
- Hunt, A., & Watkiss, P. (2011). Climate change impacts and adaptation in cities: a review of the literature. *Climatic change*, *104*(1), 13-49.
- Immink, V. M., Reinders, M. J., Van Tulder, R. J. M., & Van Trijp, J. C. M. (2013). The livestock sector and its stakeholders in the search to meet the animal welfare requirements of society. *Journal on Chain and Network Science*, 13(2), 151-160.
- International Assessment of Agricultural Knowledge, Science and Technology for Development, 2009. *Agriculture at a Crossroads*. [online] UNEP. Available at: <a href="https://wedocs.unep.org/20.500.11822/8590"></a> [Accessed 20 July 2021].
- Irvine, S., Johnson, L., & Peters, K. (1999). Community gardens and sustainable land use planning: A case-study of the Alex Wilson community garden. *Local Environment*, *4*(1), 33-46.
- Kellerman, Barbara. "What Every Leader Needs to Know About Followers." *Discovering Leadership*, 2008, pp. 157–166., doi:10.1007/978-1-137-24203-7\_12.
- Kemp, R., Schot, J., & Hoogma, R. (1998). Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technology analysis & strategic management*, 10(2), 175-198.
- Kingsley, J., Egerer, M., Nuttman, S., Keniger, L., Pettitt, P., Frantzeskaki, N., ... & Marsh, P. (2021). Urban agriculture as a nature-based solution to address socio-ecological challenges in Australian cities. Urban Forestry & Urban Greening, 60, 127059.
- Kleinschroth, F., & Kowarik, I. (2020). COVID-19 crisis demonstrates the urgent need for urban greenspaces. *Frontiers in Ecology and the Environment*, 18(6), 318.
- Liefferink, D., & Wurzel, R. K. (2017). Environmental leaders and pioneers: agents of change?. *Journal of European Public Policy*, *24*(7), 951-968.
- Loorbach, Derk, et al. "Sustainability Transitions Research: Transforming Science and Practice for Societal Change." *Annual Review of Environment and Resources*, vol. 42, no. 1, 2017, pp. 599–626., doi:10.1146/annurev-environ-102014-021340.
- Loorbach, Derk. "Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework." *Governance*, vol. 23, no. 1, 2010, pp. 161–183., doi:10.1111/j.1468-0491.2009.01471.x.

Loorbach, Derk, and Jan Rotmans. "Managing Transitions for Sustainable Development." Environment

& *amp; Policy Understanding Industrial Transformation*, pp. 187–206., doi:10.1007/1-4020-4418-6 10.

- Loorbach, D. (2007). Transition management. *New mode of governance for sustainable development*. *Utrecht: International Books*.
- March, James G., and Johan P. Olsen. "The Institutional Dynamics of International Political Orders." *International Organization*, vol. 52, no. 4, 1998, pp. 943–969., doi:10.1162/002081898550699.
- Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research policy*, *41*(6), 955-967.
- Meadowcroft, James. "What about the Politics? Sustainable Development, Transition Management, and Long Term Energy Transitions." *Policy Sciences*, vol. 42, no. 4, 2009, pp. 323–340., doi:10.1007/s11077-009-9097-z.
- Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and urban planning*, *147*, 38-49.
- Mitchell Donald, O. (2008). A note on rising food prices: policy research working paper 4682. *Development Prospects Group, World Bank, Washington, DC.*
- Mittal, A. (2009). The 2008 food price crisis: rethinking food security policies (pp. 1-40). UN.
- Moragues-Faus, A., & Morgan, K. (2015). Reframing the foodscape: The emergent world of urban food policy. *Environment and Planning A: Economy and Space*, *47*(7), 1558-1573.
- Mulhall, A. (2003). In the field: notes on observation in qualitative research. *Journal of advanced nursing*, *41*(3), 306-313.
- Nestle, M. (2020). A call for a food system change. The Lancet, 395(10238), 1685-1686.
- Nevens, F., Frantzeskaki, N., Gorissen, L., & Loorbach, D. (2013). Urban Transition Labs: co-creating transformative action for sustainable cities. *Journal of Cleaner Production*, *50*, 111-122.
- New Urban Agenda, 2016. United Nations Conference on Housing and Sustainable Urban Development (Habitat III), Quito, 17–20 October 2016
- Partington, G. (2001). Qualitative research interviews: Identifying problems in technique.
- Petit-Boix, A., & Apul, D. (2018). From cascade to bottom-up ecosystem services model: How does social cohesion emerge from urban agriculture?. *Sustainability*, *10*(4), 998.
- Powers, Richard. The Overstory. Random House UK, 2018.
- Raven, Rob "Analyzing Emerging Sustainable Energy Niches in Europe: A Strategic Niche Management Perspective: Rob Raven." *Governing the Energy Transition*, 2012, pp. 136–162., doi:10.4324/9780203126523-13.
- Raven, R. P., Heiskanen, E., Lovio, R., Hodson, M., & Brohmann, B. (2008). The contribution of local experiments and negotiation processes to field-level learning in emerging (niche) technologies: meta-analysis of 27 new energy projects in Europe. *Bulletin of Science, Technology & Society, 28*(6), 464-477.
- Rockefeller Foundation Index, C. R. (2014). City resilience framework. The Rockefeller Foundation
- Roep, D., & Wiskerke, J. S. C. (2012). Chapter 9. *Reshaping the Foodscape. The Role of Alternative Food Networks* In: Spaargaren, G., Oosterveer, P, and Loeber, A.,(eds) Food Practices in Transition. Changing Food Consumption, Retail and Production in the Age of Reflexive Modernity, Routledge, New York, 207-228.
- Rotmans, J., Kemp, R., & Van Asselt, M. (2001). More evolution than revolution: transition management in public policy. foresight.
- Rut, Monika, and Anna R. Davies. "Transitioning without Confrontation? Shared Food Growing Niches and Sustainable Food Transitions in Singapore." *Geoforum*, vol. 96, 2018, pp. 278–288., doi:10.1016/j.geoforum.2018.07.016.

- Santo, R., et al., 2016. Vacant lots to vibrant plots: A review of the benefits and limitations of urban agriculture. *Johns Hopkins Center for a Livable Future*,,.
- Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., ... & Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality & quantity*, 52(4), 1893-1907.

Saunders, M., Lewis, P., & Thornhill, A. (2015). Research methods for business students. Pearson education.

Satterthwaite, D., McGranahan, G., & Tacoli, C. (2010). Urbanization and its implications for food and

farming. *Philosophical transactions of the royal society B: biological sciences*, *365*(1554), 2809-2820. Scottish Vacant and Derelict Land Survey (2013)

https://www.webarchive.org.uk/wayback/archive/20150219213445/http://www.gov.scot/Publications/ 2014/02/7170/0

- Scott, M., Gupta, S., Jáuregui, E., Nwafor, J., Satterthwaite, D., Wanasinghe, Y. A. D. S., ... & Yoshino, M. (2001). Human settlements, energy, and industry. *Climate change*, 381-416.
- Schot, Johan, and Frank W. Geels. "Strategic Niche Management and Sustainable Innovation Journeys: Theory, Findings, Research Agenda, and Policy." *Technology Analysis & Computer Strategic Management*, vol. 20, no. 5, 2008, pp. 537–554., doi:10.1080/09537320802292651.
- Sengers, F., Wieczorek, A. J., & Raven, R. P. J. M. (2014). The role of experiments in sustainability transitions: a systematic literature review. In *conference; IST; 2014-08-27; 2014-08-29*.
- Seyfang, G., & Longhurst, N. (2016). What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches. *Technology Analysis & Strategic Management*, 28(1), 1-23.
- Seyfang, Gill, et al. "A Grassroots Sustainable Energy Niche? Reflections on Community Energy in the UK." *Environmental Innovation and Societal Transitions*, vol. 13, 2014, pp. 21–44., doi:10.1016/j.eist.2014.04.004.
- Seyfang, G., & Haxeltine, A. (2012). Growing grassroots innovations: exploring the role of community-based initiatives in governing sustainable energy transitions.
- Shove, E., & Walker, G. (2007). CAUTION! Transitions ahead: politics, practice, and sustainable transition management. *Environment and planning A*, *39*(4), 763-770.
- Smith, A., & Raven, R. (2012). What is protective space? Reconsidering niches in transitions to sustainability. *Research policy*, *41*(6), 1025-1036.
- Smith, Adrian, et al. "Innovation Studies and Sustainability Transitions: The Allure of the Multi-Level Perspective and Its Challenges." *Research Policy*, vol. 39, no. 4, 2010, pp. 435–448., doi:10.1016/j.respol.2010.01.023.
- Staddon, Chad, et al. "Contributions of Green Infrastructure to Enhancing Urban Resilience." *Environment Systems and Decisions*, vol. 38, no. 3, 2018, pp. 330–338., doi:10.1007/s10669-018-9702-9.
- Stewart, R., Korth, M., Langer, L., Rafferty, S., Da Silva, N. R., & van Rooyen, C. (2013). What are the impacts of urban agriculture programs on food security in low and middle-income countries?. *Environmental Evidence*, 2(1), 1-13.
- Thiel, Sandra van. Research Methods in Public Administration and Public Management: an Introduction. Routledge, 2014
- Torney, D. (2019). Follow the leader? Conceptualising the relationship between leaders and followers in polycentric climate governance. *Environmental Politics*, *28*(1), 167-186.
- Truffer, B., & Coenen, L. (2012). Environmental innovation and sustainability transitions in regional studies. *Regional studies*, *46*(1), 1-21.
- Uhl-Bien, Mary, et al. "Followership Theory: A Review and Research Agenda." *The Leadership Quarterly*, vol. 25, no. 1, 2014, pp. 83–104., doi:10.1016/j.leaqua.2013.11.007.

- UN, United Nations, 2015. *The 2030 Agenda for Sustainable Development*. United Nations General Assembly.
- Understanding Glasgow, 2019. *Deprivation* | *The Glasgow Indicators Project*. [online] Available at: <a href="https://www.understandingglasgow.com/indicators/poverty/deprivation">https://www.understandingglasgow.com/indicators/poverty/deprivation</a> [Accessed 23 August 2021].
- Van den Bosch, S. (2010). Transition experiments: exploring societal changes towards sustainability.
- Van den Bosch, S., & Rotmans, J. (2008). Deepening, Broadening and Scaling up: a Framework for Steering Transition Experiments.
- Van der Heijden, J. (2016). Experimental governance for low-carbon buildings and cities: Value and limits of local action networks. *Cities*, *53*, 1-7.
- Venter, Z. S., Barton, D. N., Gundersen, V., Figari, H., & Nowell, M. (2020). Urban nature in a time of crisis: recreational use of green space increases during the COVID-19 outbreak in Oslo, Norway. *Environmental research letters*, 15(10), 104075.
- Verbong, G.p.j., and F.w. Geels. "Exploring Sustainability Transitions in the Electricity Sector with Socio-Technical Pathways." *Technological Forecasting and Social Change*, vol. 77, no. 8, 2010, pp. 1214–1221., doi:10.1016/j.techfore.2010.04.008.
- Von Wirth, T., Fuenfschilling, L., Frantzeskaki, N., & Coenen, L. (2019). Impacts of urban living labs on sustainability transitions: Mechanisms and strategies for systemic change through experimentation. *European Planning Studies*, 27(2), 229-257.
- Watts, J., 2021. Beware Summer! As climate crisis deepens, attitudes to season shift. The Guardian,.
- White, J. T., & Bunn, C. (2017). Growing in Glasgow: Innovative practices and emerging policy pathways for urban agriculture. *Land Use Policy*, *68*, 334-344.
- Williams, D. R., & Stewart, S. I. (1998). Sense of place: An elusive concept that is finding a home in ecosystem management. *Journal of forestry*, *96*(5), 18-23.
- Williamson, K. (2006). Research in constructivist frameworks using ethnographic techniques. *Library trends*, *55*(1), 83-101.
- Wilson, A. (2010). Cities as Complex Systems: Modelling Climate Change Dynamics. *Emergence: Complexity & Organization*, 12(2).
- Wurzel, Rüdiger K.w., et al. "Pioneers, Leaders and Followers in Multilevel and Polycentric Climate Governance." *Pioneers, Leaders and Followers in Multilevel and Polycentric Climate Governance*, 2020, pp. 1–21., doi:10.4324/9781003031086-1.
- Yin, R. K. (1994). Discovering the future of the case study. Method in evaluation research. *Evaluation practice*, *15*(3), 283-290.
- Zhong, C., Hu, R., Wang, M., Xue, W., & He, L. (2020). The impact of urbanization on urban agriculture: Evidence from China. *Journal of Cleaner Production*, *276*, 122686.

# Appendices

# Appendix A. Interview script

# Disclaimer: scripts were adapted to suit each city respectively.

#### 1. Introduction to interview

Cities worldwide face some of the most pressing sustainability challenges regarding energy consumption, air and water pollution, urbanization and livability and in general have started to design and deploy localized responses to address these (Mc Cormick, 2013) - von Wirth (2019).

- What are the pressures faced by your city ?
- Can you describe the major urban challenges faced by your city today ? e.g. environmental degradation, social integration, mobility, unemployment ...
- Are there any pressing landscape pressures food security, climate change, COVID ?
- In what ways does A Coruna intend to become more sustainable, resilient ?

# Exploring the gardens -

# Began in 2018

- Do you recognise NBS in your city ? (Can also be in the design, planning phase)
- What types of NBS can you identify ? e.g. green roofs, urban gardens,
- How many gardens are there currently ?
- What are the objectives of urban agriculture in your city ? e.g. targeting food security, social cohesion
- Are they supported, why ?
- Do these nature-based solutions object to the aforementioned pressures ?
- Have they been successful ?
- Have there been any unsuccessful projects ? Why ?

*Von Wirth et al (2019) argue that there are three ideal-typical types of diffusion processes currently discussed in the literature, these are as follows; embedding, translating and scaling.* 

# **Embedding of UA**

Niches are novel practices at the local level that are not yet institutionalized. An enabling environment is necessary for niche innovations to grow. Local governments can create this enabling

environment by protecting niche innovations in their 'experimental phase' through policy measures like subsidies (Amstel, van der Pijl & Spaargaren, p.182, 2012).

- Is this the case for your city ?
- Any policy developments ? If any, what policy developments
- How did the government react to the phenomenon of urban gardens and urban agriculture ?
- Challenges for implementing e.g. regulation/policy ?
- Have they been aligned with the wider cities goals / wider region development goals ?
- Has the City Agenda been updated ?
- Are UA initiatives incorporated into the city agenda ? How has it been integrated into the City's strategic goals ? The Spanish Urban Agenda ?
- Urban Garden network ?
- Who are the main actors/ stakeholders involved ?
- Have different departments and actors been activated/ involved ?
- Have new partnerships emerged ?

# Scaling

"A vision of the future is crucial in realizing a transition: an important task for the government is to assist in formulating that vision, and to inspire and mobilize other actors" (Rotmans, Kemp & van Asselt, 2001: 25).

- Are there collaborative visions for an alternative sustainable future amongst gardeners ?
- Is there a clear view or pathway behind the development of NBS (UA inclusive) for the future ?
- How (if) were the wider community involved in the process at any phase ?
- How is active participation encouraged ?
- Have behavioural changes been observed in recent years ?
- Stimulation of entrepreneurial growth
- Is there potential for market developments ?
- Do you think entrepreneurial growth is required for the sustainability of the projects ?

# Translation

# Followership/leadership dynamics

Climate followership can be described as the adoption of a technique, policy or idea in response to climate change from one to another (Torney, 2019). Engaged followers can themselves act as agents of change (Kellerman, 2008).

- Has international / EU policy/ FAO policies influenced these developments ?
- Has involvement in EU projects enabled the projects ?
- Have you adopted any lessons or techniques or approaches from other cities from these projects ?
- Would you owe any of the success in A Coruna to following the examples from other cities ?
- To your knowledge have any elements of the projects been or are currently being replicated or reproduced elsewhere ?
- Are you reproducing any lessons adopted from Connecting Nature or Ru:urbact ?
- What encourages this followership ? Exemplary models or ...
- How scalable are these projects and associated lessons and outcomes ? Can they be replicated across the city ? Or by other groups/ institutions ?

#### Provision of education and training

- Are you providing education and training ?
- Is there a recognition among gardeners of the impact they could have ?
- Has urban agriculture to any extent been incorporated into the school curriculum ?

# Transformative potential

- Is there a motivation for citizens to increase their self sufficiency?
- Do you think there is potential for UA to affect broader system change ?

| Ap | pendix | B. | Table. | overview | of | main | codes |
|----|--------|----|--------|----------|----|------|-------|
|----|--------|----|--------|----------|----|------|-------|

| Theme/ group                   | Code  |  |  |  |
|--------------------------------|---|--|--|--|
| Landscape factor               |   |  |  |  |
|                                | COVID   |  |  |  |
|                                | Food Crisis                                       |  |  |  |
|                                | COP26   |  |  |  |
|                                | Urbanisation                                      |  |  |  |
|                                | Social inequality                                 |  |  |  |
|                                | Environmental awareness                           |  |  |  |
| Diffusion process: Scaling     |   |  |  |  |
|                                | Strategy: Entrepreneurship                        |  |  |  |
|                                | Strategy: Sense of place                          |  |  |  |
|                                | Strategy: Visions                                 |  |  |  |
|                                | Strategy: Social cohesion                         |  |  |  |
|                                | Challenges associated with scaling                |  |  |  |
| Diffusion process: Replication |   |  |  |  |
|                                | Strategy: Education and training                  |  |  |  |
|                                | Strategy: Networking                              |  |  |  |
|                                | Strategy: Followership                            |  |  |  |
|                                | Challenges associated with replication            |  |  |  |
| Diffusion process: Embedding   |   |  |  |  |
|                                | Strategy: Activating partnerships/ breaking silos |  |  |  |
|                                | Strategy: Political support                       |  |  |  |
|                                | Challenges associated with embedding              |  |  |  |
| Has a transition occurred ?    |   |  |  |  |
|                                | Changes in cultural meaning                       |  |  |  |
|                                | Changes in technology                             |  |  |  |

|     | Changes in policy         |
|-----|---------------------------|
|     | Changes in user practices |
| N/A | Transformative potential  |

Appendix C. Saunder and Tosey's research onion (2012) used to guide Methodology.



# Appendix D.

Questions which facilitate the process of synthesizing information: adopted from Hancock and Algozzine (2006).

- 1. What information from different sources goes together ?
- 2. Within a source, what information can be grouped ?
- 3. What arguments contribute to the grouping of this information ?
- 4. How do various sources of information affect findings?
- 5. What information links findings together ?
- 6. What questions are being answered ?

7. What (if any) generalisations can be made ?