

Article

# Scaling-Up Sustainable Development Initiatives: A Comparative Case Study of Agri-Food System Innovations in Brazil, New York, and Senegal

Rositsa T. Ilieva<sup>1,2,\*</sup>  and Andreas Hernandez<sup>3</sup>

<sup>1</sup> CUNY Urban Food Policy Institute, CUNY Graduate School of Public Health and Health Policy, City University of New York, New York, NY 10027, USA

<sup>2</sup> Parsons School of Design, The New School, New York, NY 10011, USA

<sup>3</sup> Department of International Studies, Marymount Manhattan College, New York, NY 10021, USA; ahernandez2@mmm.edu

\* Correspondence: Rositsa.Ilieva@sph.cuny.edu

Received: 2 October 2018; Accepted: 29 October 2018; Published: 6 November 2018



**Abstract:** To effectively address the sustainability crises our planet faces, decision-makers at different levels of government worldwide will have to get a handle on three key challenges: learning from Global North and South initiatives in tandem, taking stock of social innovations alongside technological fixes, and nurturing grassroots sustainable development initiatives next to, or in place of, top-down corporate and government interventions. Current scientific literature and grant-making institutions have often reinforced the compartmentalized fashion in which we learn and draw policy lessons from North/South, social/technical, and bottom-up/top-down sustainability initiatives, including local food system innovations. The strategic levers for global sustainable development lying in-between are thus left out. This paper uses exploratory, multiple case study analysis to address this omission. By concurrently drawing lessons from grassroots innovations in Brazil, New York, and Senegal—three profoundly different socioeconomic and geographic contexts—we identify common pressure points that have enabled local communities to drive system-wide transformations toward climate adaptation, resilience, and sustainability in the agri-food system. The findings of this paper would be of value to scholars, government officials, and community groups engaged in agri-food systems sustainability and interested in the processes of change that have allowed budding innovations to stabilize and scale up.

**Keywords:** sustainable development; alternative agri-food networks; transition theories; grassroots innovations; socio-technical systems; agroecology; ecovillages; social movements

## 1. Introduction

Why can some grassroots sustainable development projects scale-up and others cannot? Sustainability transitions are difficult as socio-technical systems like energy, transport, housing, and agri-food are stabilized by lock-in mechanisms that relate to sunk investments, behavioral patterns, vested interests, infrastructure, subsidies, and regulations. Sustainability transitions imply the transformation of these wider technical, social, and economic systems and occur through the emergence, alignment, and scaling up of radical socio-technical innovations.

This research seeks to shed light on the multi-level factors that contribute to the effective scaling up of grassroots sustainable development projects. Our goal is to identify possible transition “pressure points” at multiple levels of community food systems and in multiple sociotechnical domains that may be used to support and guide the effective scaling up of sustainable development initiatives within complex, nonlinear social and technical systems. The aim of this paper is thus

to provide theoretically-informed practical recommendations for policymakers seeking to steer community-based sustainability transitions and reform food system governance through, rather than despite of, grassroots innovations. To effectively navigate the sustainability crises our planet faces, decision-makers at different levels of government worldwide will have to get a handle on three key challenges: learning from Global North and South initiatives in tandem, taking stock of social innovations alongside technological fixes, and nurturing grassroots sustainable development initiatives next to, or in place of, top-down corporate and government projects and interventions.

Socio-technical transition studies focusing on community-driven transitions are still limited. There is, however, a growing body of work focusing on “grassroots innovations” and their contribution to different facets of sustainable development [1–6]. To transition the dominant agri-food regime—and dismantle the unjust [7–9], unhealthy [10–12], and inefficient [13,14] systems producing hunger, chronic diet-related diseases, environmental degradation, inhumane treatment of animals, and unfair labor practices—top-down approaches would hardly suffice or even be appropriate. Who should be in charge of sustainable development transitions is, thus, a question in need of urgent investigation. Unsolved dilemmas regarding the role of different societal domains—government, market, civil society, and all intermediary organizations in between—as well as the relationships between efforts to scale up sustainability innovations in Global North and South countries warrant new approaches to the study of grassroots innovations.

To fill this gap in current sustainability research, we undertake a comparative case study, exploring grassroots sustainable development efforts from the Global North and Global South that are transforming wider technical, social, and economic systems. The first case we examine is the Brazilian Landless Movement’s (MST) transition to agroecology (ecologically informed sustainable agriculture) focused in the south of Brazil. A group of MST cooperatives have developed one of the most extensive systems of agroecological production globally. The second case we present is the New York City’s food movement—a vast and heterogeneous movement of movements which, over the past two decades has advocated for food justice, health equity, environmental sustainability, and fairer labor practices throughout the urban food environment and the food chain more broadly. Lastly, in our third case, we focus on the Ecovillage Movement of Senegal, which is constructing alternative forms of grassroots sustainable development by drawing from West African village life and new green technologies, along with the recuperation of soils.

There has been significant work examining grassroots agri-food movements, global networking and organization, and resistance (see, for example, References [15–18]). There is a necessity for research that seeks to understand the successes and challenges in grassroots agri-food movements in scaling up. This comparative analysis of grassroots sustainable development initiatives calls attention to the coevolution of the different niche, regime, and landscape pressures, and the shared transition levels in each case. We identify crosscutting themes that point to important dimensions of sustainability transitions in each case. We conclude with a systematic summary of the main lessons learnt and outline a set of key recommendations for government officials and policymakers who wish to synergize and scale the innovations emerging from grassroots social movements.

## 2. Research Methods

### 2.1. Theoretical Framework

Radical transformations of systems of provision—such as food, water, and transportation—are best understood as the outcome of both social and technological innovations. Neither engineers alone nor policymakers or non-expert citizens can singlehandedly shift complex matrixes of infrastructures to a more equitable or sustainable regime of operation. Rather, it is the concurrent interplay, and alignment, of changes in multiple societal domains that can, under certain circumstances, bring about radical system transformation. Technological innovation examples, such as cellular phones and personal computers, are well known, as are social innovations such as microcredit loans,

sharing economies, community-owned renewables, and food cooperatives. We argue that both social and technological innovations are fundamentally socio-technical, and that this view is essential if we are to guide, rather than simply react to, socio-technical transitions in the near future.

However, what helps innovations endure, scale up, and transform mainstream institutions, infrastructures, and social norms? Transition theories such as the multi-level perspective (MLP) [19–21] provide some cues into that. The strength of this perspective lies, in fact, in the integration of social and technical understandings of sustainability transitions and the emphasis on multiple levels of stability, or path-dependency, of a socio-technical system. In brief, according to the MLP, socio-technical *regimes*, which are locked in and stabilized through mainstream infrastructures and institutions, can change when there is an alignment between a disruption (e.g., climate change, peak oil, obesity, economic recession) in the *landscape*, the highest level of system stability, and the level of *niches* of grassroots innovations which offer solutions to such disruptions and a promise for a reinstated stability.

The MLP has its roots in science, technology, and society studies [22] and evolutionary economics [23], and has been widely adopted to theorize historical transitions and the upsurge of nineteenth and twentieth-century innovations, such as steam ships [19], sewer systems [24], digital computers [25], and rock 'n' roll music [26], to mention a few, but also more recent cases of innovative municipal waste management [27], renewable energy [28], alternative food networks [29], and low-carbon transportation [30]. Drawing from the rich literature of historical case studies, contemporary theorists of sociotechnical transitions have also used the MLP to devise intervention-oriented theoretical frameworks, such as transition management [31–33], focusing on the governance of transition processes, and strategic niche management [34,35], offering insights into the distinct internal characteristics that successful niche innovations exhibit.

Yet the MLP, and its companion management frameworks, has also been faced with criticisms [36]. Close observers of grassroots innovations and social movements argue that current transition theories are limited in their ability to comprehend the full range of action of grassroots sustainability initiatives. Scholars caution that the focus of strategic niche management on novelty limits the ability to capture the scope of civil society action [37], that niche theory is not able to adequately explain the transformational power of social movements, and that this framework must take on a more critical capacity [1]. In fact, application of the growth-oriented approach of strategic niche management to grassroots innovations may not be able to encompass the complexity of diverse and conflicted realities on the ground [38]. Additionally, analyses of community currencies [39] reveal that grassroots innovations diffuse differently from conventional innovations, and that the MLP and niche theories require adaptation for this context.

To counter some of these limitations, we extend the MLP framework by embedding it in a spatially informed understanding of political economy, while simultaneously focusing on the agency of the collectivities constructing sustainable development initiatives.

## 2.2. Data Collection and Analysis

We utilize qualitative data collection and analysis research methods to gain an in-depth understanding of each case and conduct a comparative analysis. We conceived each of the cases as exploratory case study [40]. The MST and Senegalese Ecovillage Movement cases rely on ethnographic research including visual ethnography, photo-elicitation techniques, filming, and participant observation. The New York City food movement case relies primarily on secondary data sources and the analysis of peer-reviewed articles, government reports, and policy evaluations by nongovernmental organizations. Unstructured interviews with academic experts, government officials, and practitioners provided further insights into the key issues and turning points in each transition process. The extended MLP framework guided the transition analyses and thematic coding and analysis methods were used to identify shared themes across the cases. The final set of themes, or transition levers, were identified through discussion between the two authors and comparison of intermediate findings on each of the three cases.

### 3. Cases Overview

#### 3.1. MST Agroecological Cooperatives

From its modest roots in Southern Brazil, the *Movimento dos Trabalhadores Rurais Sem Terra* (Landless Rural Workers Movement, or MST) gradually grew into the largest nationally-based social movement in Brazilian history and is widely recognized as the most organized, dynamic, and influential mass movement in Latin America today [15,41–43]. Through organizing landless families to occupy unproductive agricultural land, the MST has pressured Brazilian governments into enacting the Constitution and redistributing more than seven million hectares of unproductive agricultural land on which one and a half million members are now growing food [15].

The MST has developed some of the largest scale agroecological systems on the planet. MST cooperatives have used agroecological techniques to delink from agribusiness and banks, produce more food at a higher quality and lower cost, and recuperate their soils. Perhaps most notably is the *Grupo Gestor de Arroz* (Rice Management Group) in the south of Brazil, which has created several intertwined cooperatives bringing together 501 families, across 16 municipalities, who are cultivating rice using diverse agroecological methods. The democratically owned and managed *Grupo Gestor* stores, processes, packages, and markets an estimated 500,000 sacks of rice per year, over 5513 hectares in several regions of the state of Rio Grande do Sul. In addition to internal organization (including building large scale food processing plants), at the core of the scaling up of the *Grupo Gestor* has been the construction on institutional markets, which the Movement has worked to create at every scale through agreements and through policy. The *Grupo Gestor* provides 1000's of livelihoods and provides food for families, the region, government institutions around the country, and for global export. They have built a large scale, horizontal, and democratic food system, demonstrating that agroecological methods are an effective option for peasant farmers to stay on the land and feed their regions. While there are numerous agroecological settlements and cooperatives in the MST, here we focus on the *Grupo Gestor* in the context of the wider Movement.

#### 3.2. New York City Food Movement

The New York City food movement is a vast and heterogeneous movement of movements which, over the past two decades has advocated for food justice, health equity, environmental sustainability, and fairer labor practices throughout the urban food environment and the food chain more broadly. While the city's food system is far from having radically transitioned to sustainability, it has effectively been reconfigured, both in institutional and physical infrastructure terms. Today, New York City has a dedicated Office of the Director of Food Policy, has released over twenty different reports on food policy-related matters [44], issues yearly food metrics reports, and has made the right to free lunch accessible to all public-school students in the city. The city has also witnessed the scaling up of many innovations in its local food system: it has more than 900 food producing gardens, over a dozen rooftop farms, more than 140 farmers markets of which more than half are located in high-poverty neighborhoods, a pilot curbside food scraps collection program already reaching over one million people, a network of more than one thousand upstate farmers engaged in sustainable watershed management practices, and a regional food hub supporting local food producers.

#### 3.3. Senegalese Ecovillage Movement

The Senegalese Ecovillage Movement brings together hundreds of villages in a heterogenous network that seeks community-led development by taking the best of West African village life and combining this with green technologies and recuperation of soils and forests. Movement leaders assert they have flipped the Northern ecovillage model on its head, saying that West African villages already have strong community, cooperation, and spiritual systems that link them to nature, but that they need green technologies. The Movement began in the traditional fishing village of Yoff in coalition with the Ithaca Ecovillage and the third international EcoCity Conference which was held there in 1995.

Through the internal successes of what became EcoYoff, the ecovillage framework began to spread organically to villages in ecologically diverse regions of Senegal. Government officials, including a President, took note in the early 2000's and launched the Ministry of Ecovillages, which later became the National Agency for Ecovillages (ANEV) with the project of transitioning half of the country's 28,000 villages into ecovillages. With this institutionalization, funds from the UNDP and other international donors became available, creating a split in the Movement. The complex network now has a wing linked to the government and a wing focused on grassroots community-led development (although also linked with international donors). Although the goal of 14,000 villages remains distant, hundreds of villages are adopting aspects of the African ecovillage model, often in coalition with ANEV or NGOs, creating one of the most successful grassroots development efforts on the continent. The model is spreading to neighboring countries such as Mali and Democratic Republic of Congo.

Villages have developed projects as diverse as: solar power grids, extensive permaculture gardens, biogas and solar cookers not reliant on scarce wood fuel, reforestation, reintroduction of dry crops such as millet, and water pumps and tanks that extend growing seasons. According to the UNDP [45], in at least one ecovillage, years of outmigration have reversed as young people return to new opportunities in villages.

#### 4. Results

The cross-case thematic analysis of the three case studies led to the identification of eleven main crosscutting themes, which we argue offer insights into possible levers for socio-technical transitions to sustainability.

##### 4.1. Environmental Pressure and Drive

Each of these cases is responding to very real environmental pressures that disrupt established forms of production, distribution and consumption in the agri-food system. It is in relationship to these environmental pressures, that the movements began to, in part, redefine their understandings and practices in the food system.

**MST (Landless Rural Workers Movement):** Most farmers and settlements transitioned to agroecology in great part as they were not able to produce on highly-degraded land, which was redistributed through the state and federal government. This was coupled with health complications from pesticide use (especially among children and those in the fields), the high costs of purchasing chemical inputs, as well as the high cost of interest through public and private banks. These dynamics conditioned settlements to look for alternatives to improve soil health and intensify soil capacity. Through trial and error, they began practicing a constellation of soil intensification techniques using materials available on their settlement, such as animal and crop rotation, organic inputs, and ground covers, to build their soil's capacities. These agroecological techniques recuperated degraded soils while delinking with expensive chemical inputs, and farmers report improved health conditions.

**NYCFM (New York City Food Movement):** Social justice and environmental concerns, rather than economic development motifs, have been at the heart of most threads of the food movement in New York City as well. Derelict and dilapidated urban spaces in the late 1970s triggered community groups organizing to convert them in quality green spaces. Most recently, the deepening health inequalities between New Yorkers of different socioeconomic statuses have also been a central driver for food justice activism and community food system innovations such as affordable community supported agriculture (CSAs) (e.g., Corbin Hill Food Project) and youth-run farmers markets. Additionally, the urban agriculture movement has gained further support in the aftermath of extreme weather events, such as Hurricane Sandy in 2011, and risks of flooding and environmental degradation.

**SEM (Senegalese Ecovillage Movement):** Villages face dire environmental conditions, which are intertwined with difficult social conditions. In the north of the country, the Sahara is arriving where forests existed 60 years ago. Deforestation by colonial powers, villages, and companies have left impoverished landscapes. Organizations such as USAID and the Chinese Government have

advocated and subsidized chemical and water intensive rice production to sell nationally and for export, poisoning rivers and mining soils. This constellation of factors has impoverished villages and contributed to hunger, outmigration, and social breakdown. A key dynamic of successful ecovillages has been recuperating the local environments on which they rely, particularly through improving and intensifying soils and through reforestation.

#### 4.2. Reframing Innovations as Political Tools

A key tenet in the MLP on transitions is that regime actors perceive the radical niches of innovation as advantageous and consequently take action to transform current institutions and practices. This need for compatibility between mainstream and innovative practices poses a paradox, but is also a key pressure point for transforming entrenched sociotechnical systems such as energy, food, and housing. Successful transition initiatives in each of the three cases examined have been able to take advantage of this by effectively reframing the social benefits (or the challenge) their innovation is a means to addressing.

**MST:** The MST has challenged the assumption that large-scale, chemically-intensive industrial agriculture is the only, or the most efficient, way to feed the world, and that the peasant farmer is outmoded. Through their practice, they posit that the peasant farmer is the best steward of the land for intergenerational use, and that agroecological cooperatives, such as the *Grupo Gestor*, can provide high quality, low cost food for their regions, provide livelihoods, and recuperate the earth. Agroecological methods are referred to as technologies that intensify soil, social, and political capacities. The MST has reframed agroecology as a *political tool* for peasants to stay in the countryside. Hannah Wittman [46] has theorized the MST project as agrarian citizenship, in which “political participation, local food production, and environmental stewardship redefine the ongoing constitution of the relationship between land, state, and rural society”.

**NYCFM:** Many of the successes of the New York City food movement are attributable to the timely and effective reframing of the key issue at stake and how it links to the highest priorities on the mayoral agenda. Examples include the reframing of urban agriculture as a tool for social justice [47], environmental and nutrition education, and green infrastructure for climate resiliency; the re-envisioning of farmers markets as a tool for community development and public health; and sustainable regional farming as a tool for safeguarding the city’s drinking water. The reconceptualization of food as an urban system and of food justice goals as part of the responsibilities of local government are arguably two of the most consequential shifts in local political discourse over the past decade and a half.

**SEM:** This Movement has reframed the notion of ecovillages coming from the Global North, and in the process also reframed ideas of West African rural development. The Movement seeks community-led development by taking the best of West African village life and combining this with green technologies and the recuperation of soils and forests. Movement leaders assert that Northern ecovillages are often focused on creating community and ecologically viable worldviews and spiritual systems. African villages, they argue, already possess these social and cultural resources, and seek to bring in “clean modern technologies to uplift living conditions” (interview with Ousmane Pame, July 2016) while recuperating the environments upon which villages depend. Leaders report that the holistic framework of ecovillages is highly resonant with West African traditional worldviews and provides an effective tool for development that respects traditional village culture while opening to the world and introducing technology.

#### 4.3. Openness to Experimentation

Transitions are complex, coevolutionary processes defying any attempt to plan and implement them in a linear fashion. Successful grassroots innovations and movements, as those discussed in this paper, have been able to circumvent this challenge by remaining open to new ideas and

experimentation and timely making adjustments in response to changing socioeconomic and political conditions, or internal struggles.

**MST:** Early in the Movement's history, MST leadership implemented cooperatives based on the Cuban model of agricultural modernization, cultivating monocultures with investment into machinery and chemical inputs. Many early settlements failed, due to high costs and increasing debt on equipment and chemical packages, difficulties in accessing markets and credit, and soil deterioration. A grassroots rebellion in the Movement forced the leadership to adopt more open-ended approaches, with settlements taking initiative and following multiple pathways towards effective production and livelihoods [15]. Through successful experiments at the settlement level, and later regional level with the *Grupo Gestor*, agroecology emerged as one of the most effective new pathways and was adopted as a pillar of the Movement in 2000. The open-endedness of agroecology itself, which proposes the holistic engagement of constellations of social and ecological relationships, has provided a fluid and agile tool for innovation and scaling up.

**NYCFM:** In New York, examples of the openness of food system entrepreneurs and policymakers to experimentation include pilot initiatives to test different models of curbside composting, demonstration urban farms at a public housing sites, forging new links between local farmers and preschool centers, call centers for food and nutrition assistance benefits, and online school food programs enrollment. Examples in the nongovernmental domain include developing alternative, healthy school food meal deliveries (e.g., Red Rabbit), pop-up drop-off sites for food scraps (e.g., Lower East Side Ecology Center), green jobs for youth through green roof construction, culinary education, and urban agriculture (e.g., Green Bronx Machine [48]), youth-managed farmers markets (e.g., GrowNYC Youthmarkets), and the conversion of industrial buildings' rooftops into food-producing farms (e.g., Eagle Street Rooftop Farm, Brooklyn Grange, Gotham Greens).

**SEM:** The ecovillage framework was initially adopted by a village being surrounded and subsumed by Dakar, which had been sprawling since at least the 1970s, to defend livelihood and culture. This framework set the foundations for innovative responses, outside of both traditional village modalities as well as mainline development pathways. Village leaders express how the ecovillage model provides a framework to engage the interrelations of culture, economy, technology, and environment, to promote materially and culturally better ways of living over the long term. The ecovillage framework they say is not prescriptive but orients innovative approaches to protracted problems. For example, the ongoing issue of food insecurity is being addressed the village of Mbackombel through installing solar powered microgrids. Among numerous other benefits, this grid powers pumps to store water, and thus expands the growing season, and creates new permaculture gardens, reforestation, and fish ponds. It also frees up young girls charged with getting water to go to school.

#### 4.4. Partnerships and Coalition Building

Coalition building is essential for the alignment and scaling up of niches of innovation. Links between participants with different powers and roles across government and market institutions are also key for the translation of niches' value in terms that can be seen as advantageous by mainstream actors in the socio-technical system.

**MST:** MST settlements, and the Movement as a whole, realized early on that they needed partnerships to survive politically and physically; as a movement they needed to challenge existing patterns of private property with direct links to the colonial era. The development of the agroecological systems of the *Grupo Gestor* has been accomplished through partnerships with universities, agronomists, religious organizations, and other organic farmers, among others. Beyond this, creating new markets required partnerships with city and state governments, other social movements, and technical support. The MST was a founding member of the global network Via Campesina, the world's largest social movement. Via Campesina has transformed global debate on food and agriculture, introducing democratic principles. Their idea of food sovereignty asserts the rights of peoples to define and

control ecologically sound food systems, rather than the demands of international commodity markets and corporations.

**NYCFM:** While the food movement in New York City is effectively a movement of movements and largely diverse and fragmented, partnerships have played an important role in both stabilizing grassroots innovations and influencing mainstream businesses and policies. Examples of coalitions include the NYC Community Gardens Coalition, which was key in preserving community gardens threatened from development, the now defunct Brooklyn Food Coalition, the New York City Coalition Against Hunger, City Harvest and its Community Action Networks, the NYC Agriculture Technology Collective, and the New York City Food Assistance Collaborative, among others. Cross-sectoral coalitions, such as the New York City Food and Fitness Partnership—a collaborative effort between City Harvest, Brooklyn Rescue Mission, and Transportation Alternatives—have also been essential in scaling up school food and food access initiatives throughout the city. New York City is also part of the cross-city Urban School Food Alliance (established in 2012) together with Orlando, Dallas, Miami, Los Angeles, Chicago, and Fort Lauderdale, and since 2017, Las Vegas, Philadelphia, Baltimore and Boston as well. The Alliance has been successful in mandating antibiotic-free chicken and compostable trays across school districts, collectively influencing more than 3 million meals and thousands of school cafeterias.

**SEM:** The ecovillage movement was born out of partnership with Northern ecovillages in the U.S. and Europe, as well as the Global Ecovillage Network. These exchanges continue, bringing the strengths of the African and Northern experiences to bear upon each other. The Ecovillage framework was at the center of the development of several coalition organizations, including the Senegal Ecovillage Network, GEN Africa, and village led NGOs, such as REDES, which coordinates the development of five regional villages. Ecovillages work with international organizations, such as the UNDP, Gaia Education, and IFAD, as well as the National Ecovillage Agency (ANEV), which is discussed below, making a new more engaged and effective relationship with the Senegalese state.

#### *4.5. Building and Maintaining Autonomy*

Historically, social movements have often been weakened through a mixture of cooptation and coercion, sapping the movements of independent and creative action. Each of these three cases has consciously fought to remain relatively autonomous, while in interaction with state, civil society, and NGO stakeholders. Autonomy has made it possible for the movements to continue to innovate, have policy impact, and scale up their projects.

**MST:** MST agroecological farmers and cooperatives, challenge the idea of growing food for money (and export), and then using money to buy food. High costs and poor soil quality catalyzed the development of farming methods that intensify soil with what is available on settlements, and to delink from the high costs of chemical inputs from agribusiness (and the high cost of bank credit in Brazil). The MST cooperatives have sought to first build their own self-sufficiency and autonomy (soil inputs, seeds, food, etc.), before extending to build wider exchanges. They argue that this provides independence and stability from varying macroeconomic conditions, as well as a core space of strength in which to act within wider social and political systems. The Movement has been successful at building capacity on the settlements, often in partnership with sympathetic organizations, to train settlement members in areas such as accounting, machine operation, and repair, and perhaps critically, political analysis.

**NYC:** As innovations scale up, one key dilemma is how to maintain their independence from the government agencies and private companies they are trying to resist and provide an alternative to. The recent rise of a commercial strand of the urban agriculture movement can potentially be coopted by mainstream food businesses and community-based composting initiatives are now gradually being “phased out” via the new city-led pilot programs. Yet, changes in mainstream practices are occurring because the pioneer initiatives were able to be sustainable on their own first. Spaces like Farm School

NYC, kitchen incubators, and the new urban agriculture business incubator continue to provide movement entrepreneurs with the skills and tools to build and maintain their autonomy.

**SEM:** The Senegal Ecovillage Network (GENSEN) was born out of the first ecovillages in the late 1990's. This network fell apart and the movement split into two heterogeneous wings as the federal government became involved with first the Ministry of Ecovillages, and then ANEV. One part of the Movement asserts that the community-led dimensions of ecovillage development are essential, and direct government intervention weakens community agency, creating a situation that looks like other government-led development efforts. The other part of the Movement insists that Government and international aid provides access to crucial and expensive technologies (such as solar power) and infrastructures (such as irrigation), and that villages remain agents in this relationship, participating in decisions of what interventions or resources will be provided. The Global Ecovillage Network (GEN) created GEN Africa, which has become the overarching and unifying organization to which most ecovillages may relate.

#### 4.6. Creating New Markets

The three movements found substantial barriers in the market systems in which they were situated. Each movement worked to create new market relationships, and often value-added enterprises, which became key infrastructures to their economic viability. Importantly, many of the new markets were developed by cooperatives, and in some cases between cooperatives.

**MST:** Foundational for the scaling up for MST agroecological systems has been the creation of institutional markets at every scale through direct agreement and through policy. Perhaps the most notable policy has been the Food Acquisition Program (PAA), which requires municipal governments to procure up to 30% of their food from family farms for city operations. Other institutional markets include the military, universities, and prisons, and importantly the National Program for School Meals (PNAE). Some cooperatives and organizations, such as the *Grupo Gestor*, also process and package their own brands (rice, milk, sauces, etc.) which are available in MST stores, grocery stores, and are exported. Farmers markets, organized in partnership with city governments and other institutions, and with other organic farmers, have emerged as critical spaces for MST farmers to gain dignified livelihoods by selling their production directly to consumers.

**NYCFM:** While far from replacing mainstream food production, procurement, retail, and disposal, the multiple streams of food justice activism in New York City have effectively reconfigured the marketplace. Currently, there are over 140 farmers markets, multiple links between the city's over 900 urban gardens and farmers markets, dozens of CSAs (including Community Supported Fisheries [CSFs]), food co-ops, farm to preschool programs, and new regional food hubs (e.g., Greenmarket Co., Lucky Dog Food Hub) now in operation. The pilot city compost collection and recycling program has also effectively been scaled up to now reach over one million New Yorkers. Other new businesses related to food waste, such as the recycling of used cooking oil into biodiesel, have also changed the local food and energy market and established themselves as viable local businesses (e.g., TriState Biodiesel, Grease Lightning).

**SEM:** In many villages, recuperating soils, creating permaculture gardens, and increasing growing seasons remains the focus, within the context of food insecurity. However, women's groups particularly, as they find success with permaculture methods, are able to gain increasing income. Villager farmers are building on existing institutional markets, such as selling produce to local and regional schools. As value added enterprises are launched (discussed below), these are also creating new market opportunities.

#### 4.7. Mobilization of Women's Groups

Women's groups played decisive roles in the three grassroots social movements. Often, it was women or women's groups that created key new practices and infrastructures, which supported the movements and helped scale up movement projects.

**MST:** Although the Movement continues to be led at the highest levels disproportionately by men, women have organized effectively within the Movement to create greater gender balance. For example, all elected coordinator positions from the settlement to the national level must be composed of one man and one woman. This gender balance within the movement organization has been foundational on the settlement level for experimenting with agroecological practices, which were often proposed and first implemented by women who sought to protect their families from sickness and economic hardship. One example was with the transition of a dairy operation to agroecology in the settlement COOPAVA. The first change proposed was to treat the cows with kindness, instead of with the historic rough treatment using dogs, horses, and whips. Women on the settlement embraced this proposal and led the initiative. University technicians report that changing the treatment of the cows increased milk production by 25% within one month.

**NYCFM:** Women and women's groups have been a powerful driving force behind the NYC food movement. The city's first community garden was initiated by Liz Christy in 1973, Christine Datz spearheaded the first community composting program and founded the Lower East Side Ecology Center in the 1980s, Annie Novak (together with Ben Flanner) co-founded the city's (and U.S.'s) first commercial food producing rooftop farm in 2009; Onika Abraham directs the first urban farming training program in the city Farm School NYC (co-founded by Ursula Chanse, Lorrie Clevenger and others); Karen Washington founded Black Urban Growers (BUGS) and directed the NYC Community Garden Coalition; and Linda Goode Bryant founded Project EATS—Active Citizen Project, to mention a few. Other noteworthy women-led initiatives, which have ignited the NYCFM, include Hot Bread Kitchen, an ethnic breads company allowing immigrant women an opportunity to start their own businesses; La Finca del Sur, a women-led community farm in the South Bronx; the Harvest Home farmers markets network, led by Maritza Owens; and Community Food Advocates, co-founded by Kathy Goldman (previously founder of the Community Food Resource Center 1980–2003) and Agnes Molnar who, together with Liz Accles, Jan Poppendieck (co-founder of the New York City Food Policy Center and the CUNY Urban Food Policy Center and author of *Free For All: Fixing School Food in America* [49]), and others, led a successful campaign for universal free school lunch in New York City.

**SEM:** Women and women's groups have often led the way in transforming food production in the ecovillages. For example, in the village of Djara, women's groups have created extensive permaculture gardens, providing the majority of village food, while building soil health. Each garden is a mixture of collective and family plots. The men of the village continue with chemical and water-intensive rice cultivation, which has had at best mixed success financially while adding to significant health problems in the village due to significant pesticides in their only water sources. Many villagers report symptoms of pesticide toxicity, such as joint pain and stomach problems. Women have also used the ecovillage framework to assert women's agency in formal village life, and in making direct relationship with Northern ecovillages and NGO's.

#### 4.8. Mobilizing Public Institutions (While Maintaining Autonomy)

Each of these movements has not only affected policy but has been able to mobilize public institutions at critical intersections. The movements, while all founded as agri-food movements, expanded their understandings of what is required for alternative agri-food systems. In these very diverse cases, these understandings are articulated differently, but each calls for the support of public and private institutions to build what might be loosely termed as citizenship rights.

**MST:** Through occupations, advocacy, and politics, the movement has been able to mobilize the redistribution of land for almost a million members. This is less than the land reform initially envisioned when the movement began. They have been more successful for the *struggle on the land*, mobilizing city, state, and federal institutions to provide citizenship rights for settlements including schools, healthcare, roads, electricity, and other infrastructure. Many have argued the focus on the *struggle on the land* is part of what has made the MST more successful than many other landless movements around the world. The Movement has sought (and sometimes struggled) to remain

autonomous while actively participating in formal politics. The MST was a founding force of the Workers Party (PT), which has held power at all levels and the majority of members continue to support. There have been numerous MST members elected to political office at local, state, and national levels. In some regions, where settlements are concentrated, the MST has taken electoral control of rural towns. The Movement has struggled internally with how much to push sympathetic governments (for instance, through land occupations) and how much to work with them (building infrastructure, new markets, etc.).

**NYCFM:** In December 2017, New York City passed a bill (Intro 1661-A) to create the city's first centralized digital hub for urban agriculture. This is just one example of how the alignment of bottom-up innovations, in this case commercial urban agriculture companies, can mobilize institutions to change the rules. Other examples include the expansion of the universal free lunch program, achieved through joint efforts by nonprofit advocacy organizations, like Community Food Advocates, and government officials like the City's Public Advocate. Under pressure of environmental groups in the food movement, the city also recently carried out a comprehensive food system resiliency study (2016), which assessed its degree of disaster preparedness.

**SEM:** As discussed above, GENSEN was able to help create the world's first Ministry for Ecovillages. This achievement was recognized with the GEN meeting held in Dakar in 2014. Although government involvement remains divisive, many villages report that they are able to mobilize financial and technical resources from ANEV and other international organizations, while continuing to be community determined.

#### *4.9. Affecting and Participating in Policy*

These successful movements were all able to, in different ways, begin to affect policy in ways that then fed back into their practices to support scaling their work. These policies also served to support transformation in consciousness of wider communities interlinked with the movements. Critically, beyond social and political pressure, each movement was able to utilize or create ongoing processes to propose policy and actively participate in policymaking.

**MST:** A key explanatory factor for the success of MST cooperatives in transitioning to, and scaling up agroecological systems, has been their ability to affect, participate in, and create policy at municipal, state, and federal levels. The Movement's success is in part due to its ability to participate in building policy that sets the stage for expanding its political and agricultural projects. The MST helped pressure social dimensions of the 1989 Constitution, which legitimized their struggle. Perhaps most crucial in the scaling of agroecology to regional levels has been the creation of policy for institutional markets, guaranteeing large purchases of food from family farms, such as the Food Acquisition Program (PAA) and the National School Food Program (PNAE). These programs that provide high quality food to schools, hospitals, and other public institutions through government purchases were designed as guaranteed and stable markets for agroecological cooperatives.

The Movement has worked with state governments to transform the industrial bias of agricultural support. For example, in the State of Rio Grande do Sul, subsidies were put in place for the support of organic and agroecological farming, including organic fertilizer, technical support, and infrastructure, such as irrigation, and support for building local markets. The Movement also has participated in the design of state and federal educational policy, building government-funded technical schools with specialties in areas such as agroecology and cooperative management. The MST voice is present in global forums through the Via Campesina and the food sovereignty perspective (see above).

**NYCFM:** Over the past two decades, the different strands of the New York City food movement have been able to reconfigure part of the local food system regime through concerted and sustained activism and coalition-building. Community groups have effectively prevented community gardens to be sold out for development in the 1990s and, more recently, the NYC Community Gardens Coalition saved nearly 70% of the community gardens that were threatened by affordable housing development. Other policy changes include the Zone Green amendment incentivizing rooftop

greenhouses, the introduction of universal free lunch for all public-school students, the increase of the minimum wage for fast food workers, the introduction of food procurement standards for city agencies, the ban on trans fats, and the requirement for calorie and sodium labeling for chain restaurants.

Many of the successes and the expansion and scaling up of local food initiatives are attributable to a blend of tactics that have enabled community food advocates to participate decision-making processes. Among these are community board meetings, participatory budgeting, demonstrations, legislative hearings chaired by City Council and the state, and electoral forums as the precedent-setting 2013 Mayoral Forum on Food Policy. Recently, food justice and food access advocates testified before City Council on how to revise the city's Food Retail Expansion to Support Health (FRESH) program offering tax and zoning incentives to developers to integrate fresh and healthy food retail in designated high-need neighborhoods.

**SEM:** The expansion of the Ecovillage Model has been driven both through the grassroots, as well as through government initiatives which villages both inspired and participated in building. Perhaps most important was the development of the Ministry of Ecovillages, following a visit of by the Country's President to a series of ecovillages in the late 2000s. This Ministry was set up with the task to transition half the country's 28,000 villages into ecovillages. A few years later, this project was moved to a new National Ecovillage Agency (ANEV) under the environment Ministry. ANEV seeks to involve and support the villages with development assistance that villages request. This includes interventions such as implementing solar power, providing seeds, infrastructure for irrigation, and technical support. The formal power structures of villages vary between elected mayors and hereditary chiefs. In both cases, villages have taken on the ecovillage framework usually with the leadership, or at least with the strong support of, these formal village positions. Thus, government resources are leveraged directly towards ecovillage development at the village level, as villages make this a political focus. Village leadership is also then able to formally interact with federal organs, particularly with ANEV.

#### 4.10. Access to Land and Land Tenure

The three movements had different relations to land and land access. The thread weaving through the three movement histories is that questions of land tenure were political from the beginning. Whether through occupations, or in defense of traditional lands, the movements encountered powerful resistance, often by some of the most powerful segments of their societies, to establishing their agricultural practices.

**MST:** The MST was born through the desire of farmers displaced by the Green Revolution and Military Government to gain land tenure. The Movement continues to pressure governments through advocacy, occupations, and politics to fulfill the constitutional mandate to redistribute unproductive land, as well as to provide citizenship rights on the settlements, such as education, roads, electricity, and healthcare. The main tool has been to occupy unproductive land as a kind of rural strike to force the federal government to fulfill the constitutional mandate.

**NYCFM:** Community gardens are often under pressure from more lucrative commercial and residential land uses. While the market overwhelmingly favors built-up spaces, the NYC food movement has been successful in institutionalizing a formal Garden Review Process (since 2010) that requires developers and the city to seek alternative sites for the relocation of existing community gardens (The Rules of the City of New York, Title 56, Chapter 6-05). Most importantly, several community-led land trust groups like the Brooklyn Queens Land Trust (which helped prevent over 120 gardens from being auctioned in the 1990s), the Bronx Land Trust, and the Manhattan Land Trust have been essential in helping urban gardeners stay on the land. The City's Green Thumb program and the nonprofit 596 Acres (which ceased operations in Summer 2018, after seven years of sustained advocacy) have also been playing a central role in facilitating access to public land and scaling up community food system initiatives.

**SEM:** The Movement began in part as resistance to land grabbing by public and private entities as Dakar expanded to encircle and subsume traditional villages. Farther away from urban centers,

most villages have access to lands, but are often historically degraded by deforestation, poor farming practices, and overgrazing.

## 5. Discussion

The results of this paper confirm and extend existing theories of socio-technical transitions in three main ways. First, the manifold set of levers, or pressure points, uncovered through the comparative analysis corroborates the hypothesis that radical system-wide transitions occur when a rich and diverse set of strategies are deployed, and transition champions engage with the concurrent transformation of different segments of the mainstream regime—markets, government policies, physical infrastructures, and social norms and practices [19]—through multiple, sustained reiterations in time.

Second, it also echoes prior findings on the importance of the interplay between different levels of power—relational, dispositional, and structural [50]—in sociotechnical transitions. According to MLP theorists [51], niche innovators spur system transformation by leveraging their *relational powers* stemming from their connectedness and unity with other grassroots entrepreneurs while regime players, in turn, bring about (or resist) change through their *dispositional powers* by using existing legislative and regulatory mechanisms. Finally, landscapes, or the aggregate of niche and regime groups, and the economic, ideological, and environmental settings they operate in are used to collectively entrench (or disrupt) existing systems through their *structural powers*. As our cases reveal, strong networks of grassroots innovators can, thus, mobilize mainstream institutions and businesses to use their dispositional powers and change formal rules and policies, which, in turn, can upset mainstay beliefs and conventions of what is, or should be, normal.

Third, the analysis of the three cases also reconfirmed the already known paradox [29] in transition processes, or the need for radical niche innovations to exhibit some degree of compatibility with the dominant systems and sociotechnical regimes that seek to overturn or reconfigure. In fact, building and maintaining autonomy is a key trait of successful sustainability innovations, but even more so the ability to mobilize existing institutions while maintaining autonomy.

One of the limitations of the research presented in this paper is that, while drawing on a markedly diverse and rich set of cases, we cannot make the claim that our findings are generalizable beyond the three cases analyzed. This was a purposefully qualitative, exploratory case study that afforded an in-depth examination of emerging themes and shared traits across three cases, yet these findings remain grounded in the specific study settings we chose to study. An additional caveat is that agri-food systems are socio-technical and inherently complex and dynamic, and so even local policymakers and activists seeking to apply the findings from this paper need to proceed with caution. The systems that yielded those findings may well no longer exist—coalitions disband and reform, values may shift, and technologies are rapidly morphing into new infrastructures and services. Yet, while developing a universal theory of scaling up niche innovations was beyond the scope of this paper, this does not preclude the possibility that the findings and recommendations we put forward are relevant for, or applicable to, current circumstances or geopolitical contexts other than those we examined.

Future research would benefit from delving deeper into questions about the role of political entrepreneurs in steering niche innovations, the relationship between different streams of funding and the trajectories and longevity of sustainable development initiatives, as well as the tactics that transformative niches of innovations use to cope with failure and seemingly intractable challenges as they seek to transform entrenched systems of production and consumption. An overt examination of the possible downsides of scaling up grassroots innovations or connecting them would also afford a clearer understanding of the possible limitations of approaches seeking to replicate and normalize place-based solutions.

## 6. Conclusions: Pressure Points and Policy Recommendations

To effectively address the sustainability crises our planet faces, including those stemming from a behemoth yet fragile global agri-food system, we have suggested that it is necessary for

decision-makers at different levels of government worldwide to engage three challenges: learning from Global North and South initiatives in tandem, taking stock of social innovations alongside technological fixes, and nurturing grassroots sustainable development initiatives next to, or in place of, top-down corporate and government projects and interventions. In this research we sought to address the question of what key pressure points for guiding socio-technical transitions to sustainability exist and what is the scope for learning from success cases from Global North and Global South countries in tandem. We addressed these questions by exploring the accomplishments of three distinct social movements: the Senegalese ecovillage movement, MST agroecological cooperatives, and the New York City food movement. Our findings reveal that the successes of those movements in reconfiguring dominant systems of production and consumption lie in a rich amalgam of factors, which all point to the importance of movement's "soft skills" and the ability to build robust social infrastructures alongside transformations of the physical environment. Specifically, among these skills are the movement's ability to:

- reframe the key issues at stake;
- remain open to experimentation;
- forge diverse cross-sectoral partnerships and coalitions;
- amass political support and affect policy;
- create self-sustaining new markets;
- nurture and encourage women leadership;
- secure access to land and land tenure;
- build and maintain autonomy from mainstream systems and institutions;
- mobilize public institutions to change rules and practices;
- be actively engaged and participate in policymaking processes.

#### *Policy Recommendations*

Based on the findings from our cross-case analyses, we offer a set of recommendations for government decision-makers at all scales interested using pressure points to steer socio-technical transitions to sustainability. The emphasis on steering and pressure points over command and control and execution of blueprints is key in that contemporary societies, and the systems of provision they rely on, such as the agri-food system, are increasingly complex and tend to evolve rapidly in a nonlinear fashion. Thus, while comprehensive plans, targets, and indicators are essential tools in planning for local and global sustainability, implementation relying on 20th-century theories of change is unlikely to succeed.

An agile planning and implementation, acknowledging the impossibility to have complete information about the systems we seek to transform and their complexity, is therefore a more promising and, in light of the findings of this paper, we argue, necessary approach. Further, to make global sustainability targets and indicators meaningful to local administrations as diverse as the ones we explored in this paper, a granular understanding of the levers (and barriers) that have accompanied agri-food transitions already underway is warranted. Our analysis of sustainability innovations in Brazil, New York, and Senegal revealed a series of pressure points that local actors have acted on in seeking transformative change and durable transitions to healthier, more equitable, and environmentally sound systems and communities. We suggest that future sustainability planning and implementation will thus benefit from grounding action in emergent evidence of what bundles of actions work here and now in addition to, or despite of, institutionalized rules and practices, which often become obsolete by the time a plan gets to the stage of implementation. In particular, we suggest that governments consider the five strategies listed below, with the caveat that they are conceivable only if existing norms, expectations, and institutions change as well:

1. Where resources are scarce, governments, instead of continuing a path-dependent momentum, should support movement innovation and alternatives, which are embedded and responding to local physical and cultural geographies;
2. Include innovative movements in debate and policy making and support movement-led policy that builds new movement capacity and innovation.
3. Support movement autonomy, through supporting conditions for self-sufficiency. By investing first in movement self-sufficiency, this provides a foundation to nurture or strengthen innovations;
4. Support movement value-added ventures, even if value-added alternatives challenge regulations or path dependencies of the present system;
5. Support the design of flexible, territorially-sensitive policies and plans. Rigidity of policies and indicator frameworks, both local and global, is one of the most frequent reasons for their failure and even rejection by local communities.

Yet, while these five strategies were key in scaling up the grassroots innovations we investigated, it would be naive to suggest that local governments can pursue them in the absence of conducive institutions. New political spaces [52] and creative bureaucrats [53,54] open to working at the margins of routinized practices and comfortable collaborations are core prerequisites for engaging with any of these tactics. Organizational innovations, such as the Ministry for Ecovillages in Senegal or the Office of the Director of Food Policy in New York, are two among many other examples of the importance of nonconventional spaces and leaders within existing regimes for scaling up grassroots innovations.

Ultimately, our research reveals that grassroots sustainable development initiatives are advancing some of the most creative system-wide transformations and transitions toward climate adaptation, resilience, and sustainability in the agri-food system. While not universal, and contingent upon foresighted, open-minded governments, we suggest that these five broad strategies, implemented with the participation of grassroots social movements, and embedded in local social and ecological conditions, may help catalyze the creative innovations needed to create socially and ecologically resilient and sustainable forms of collective life.

**Author Contributions:** Both authors contributed to the conceptualization and writing of this manuscript and the ideas it contains.

**Funding:** This research received no external funding.

**Acknowledgments:** We are deeply thankful for the time and energies given by members and allies of the Brazilian Landless Movement, New York City Food Movement, and the Senegalese Ecovillage Movement. Without their openness and interest in the critical investigation of their projects, this research would not have been possible. We are also grateful for the valuable insights and constructive feedback provided by the three anonymous reviewers on earlier versions of the manuscript.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Smith, A.; Seyfang, G. Constructing grassroots innovations for sustainability. *Glob. Environ. Chang.* **2013**, *23*, 827–829. [[CrossRef](#)]
2. Hielscher, S.; Seyfang, G.; Smith, A. Grassroots innovations for sustainable energy: Exploring niche-development processes among community-energy initiatives. In *Innovations in Sustainable Consumption: New Economics, Socio-Technical Transitions and Social Practices*; Cohen, M.J., Szejnwald Brown, H., Vergragt, P.J., Eds.; Edward Elgar: Cheltenham/Northampton, UK, 2013; pp. 133–158.
3. Monaghan, A. Conceptual niche management of grassroots innovation for sustainability: The case of body disposal practices in the UK. *Technol. Forecast. Soc. Chang.* **2009**, *76*, 1026–1043. [[CrossRef](#)]
4. Feola, G.; Nunes, R. Success and failure of grassroots innovations for addressing climate change: The case of the Transition Movement. *Glob. Environ. Chang.* **2014**, *24*, 232–250. [[CrossRef](#)]
5. Seyfang, G.; Haxeltine, A. Growing grassroots innovations: Exploring the role of community-based initiatives in governing sustainable energy transitions. *Environ. Plan. C Gov. Policy* **2012**, *30*, 381–400. [[CrossRef](#)]

6. Kirwan, J.; Ilbery, B.; Maye, D.; Carey, J. Grassroots social innovations and food localisation: An investigation of the Local Food programme in England. *Glob. Environ. Chang.* **2013**, *23*, 830–837. [[CrossRef](#)]
7. *Cultivating Food Justice: Race, Class, and Sustainability*; Alkon, A.H., Agyeman, J., Eds.; MIT Press: Boston, MA, USA, 2011; ISBN 0262016265.
8. Broad, G. *More Than Just Food*; University of California Press: Oakland, CA, USA, 2016.
9. Allen, P. Mining for justice in the food system: Perceptions, practices, and possibilities. *Agric. Hum. Values* **2008**, *25*, 157–161. [[CrossRef](#)]
10. Feng, J.; Glass, T.A.; Curriero, F.C.; Stewart, W.F.; Schwartz, B.S. The built environment and obesity: A systematic review of the epidemiologic evidence. *Health Place* **2010**, *16*, 175–190. [[CrossRef](#)] [[PubMed](#)]
11. Lee, H. The role of local food availability in explaining obesity risk among young school-aged children. *Soc. Sci. Med.* **2012**, *74*, 1193–1203. [[CrossRef](#)] [[PubMed](#)]
12. Pan, L.; Sherry, B.; Njai, R.; Blanck, H.M. Food insecurity is associated with obesity among US adults in 12 states. *J. Acad. Nutr. Diet.* **2012**, *112*, 1403–1409. [[CrossRef](#)] [[PubMed](#)]
13. Robertson, G.P. Greenhouse Gases in Intensive Agriculture: Contributions of Individual Gases to the Radiative Forcing of the Atmosphere. *Science* **2000**, *289*, 1922–1925. [[CrossRef](#)] [[PubMed](#)]
14. Garnett, T. Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy* **2011**, *36*, S23–S32. [[CrossRef](#)]
15. Karriem, A. The rise and transformation of the Brazilian landless movement into a counter-hegemonic political actor: A Gramscian analysis. *Geoforum* **2009**, *40*, 316–325. [[CrossRef](#)]
16. Wittman, H. Reworking the metabolic rift: La Vía Campesina, agrarian citizenship, and food sovereignty. *J. Peasant Stud.* **2009**, *36*, 805–826. [[CrossRef](#)]
17. Holt Giménez, E.; Shattuck, A. Food crises, food regimes and food movements: Rumblings of reform or tides of transformation? *J. Peasant Stud.* **2011**, *38*, 109–144. [[CrossRef](#)] [[PubMed](#)]
18. Patel, R. *Stuffed and Starved: The Hidden Battle for the World Food System*; Melville House Pub: Brooklyn, NY, USA, 2012; ISBN 1612191274.
19. Geels, F.W. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Res. Policy* **2002**, *31*, 1257–1274. [[CrossRef](#)]
20. Geels, F.W. Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective. *Technol. Forecast. Soc. Chang.* **2005**, *72*, 681–696. [[CrossRef](#)]
21. Geels, F.W. Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Res. Policy* **2010**, *39*, 495–510. [[CrossRef](#)]
22. Hughes, T.P. The evolution of large technological systems. *Soc. Constr. Technol. Syst. New Dir. Sociol. Hist. Technol.* **1987**, *82*, 86–89.
23. Silverberg, G.; Dosi, G.; Orsenigo, L. Innovation, Diversity and Diffusion: A Self-Organisation Model. *Econ. J.* **1988**, *98*, 1032. [[CrossRef](#)]
24. Geels, F.W. The hygienic transition from cesspools to sewer systems (1840–1930): The dynamics of regime transformation. *Res. Policy* **2006**, *35*, 1069–1082. [[CrossRef](#)]
25. Van den Ende, J.; Kemp, R. Technological transformations in history: How the computer regime grew out of existing computing regimes. *Res. Policy* **1999**, *28*, 833–851. [[CrossRef](#)]
26. Geels, F.W. Analysing the breakthrough of rock ‘n’ roll (1930–1970) Multi-regime interaction and reconfiguration in the multi-level perspective. *Technol. Forecast. Soc. Chang.* **2007**, *74*, 1411–1431. [[CrossRef](#)]
27. Uyarra, E.; Gee, S. Transforming urban waste into sustainable material and energy usage: The case of Greater Manchester (UK). *J. Clean. Prod.* **2013**, *50*, 101–110. [[CrossRef](#)]
28. Raven, R.P.J.M. Towards alternative trajectories? Reconfigurations in the Dutch electricity regime. *Res. Policy* **2006**, *35*, 581–595. [[CrossRef](#)]
29. Smith, A. Green niches in sustainable development: The case of organic food in the United Kingdom. *Environ. Plan. C Gov. Policy* **2006**, *24*, 439–458. [[CrossRef](#)]
30. Geels, F.W. A socio-technical analysis of low-carbon transitions: Introducing the multi-level perspective into transport studies. *J. Transp. Geogr.* **2012**, *24*, 471–482. [[CrossRef](#)]
31. Rotmans, J.; Kemp, R.; van Asselt, M. More evolution than revolution: Transition management in public policy. *Foresight* **2001**, *3*, 15–31. [[CrossRef](#)]

32. Loorbach, D.; Rotmans, J. Managing Transitions for Sustainable Development. In *Understanding Industrial Transformation: Views from Different Disciplines*; Olsthoorn, X., Wieczorek, A.J., Eds.; Springer: Dordrecht, The Netherlands, 2006; pp. 187–206.
33. Kemp, R.; Loorbach, D. Governance for Sustainability through Transition Management. Work. Paper. 2003, pp. 1–27. Available online: <http://sedac.ciesin.columbia.edu/openmtg/docs/kemp.pdf> (accessed on 6 November 2018).
34. Schot, J.; Geels, F.W. Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy. *Technol. Anal. Strateg. Manag.* **2008**, *20*, 537–554. [[CrossRef](#)]
35. Kemp, R.; Schot, J.; Hoogma, R. Regime shifts to sustainability through processes of niche formation: The Approach of Strategic Niche Management. *Technol. Anal. Strateg. Manag.* **1998**, *10*, 175–195. [[CrossRef](#)]
36. Geels, F.W. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environ. Innov. Soc. Transit.* **2011**, *1*, 24–40. [[CrossRef](#)]
37. Hargreaves, T.; Haxeltine, A.; Longhurst, N.; Seyfang, G. *Sustainability Transitions from the Bottom-Up: Civil Society, the Multi-Level Perspective and Practice Theory*; CSERGE Working Paper 2011-01; EconStor: Kiel, Germany, 2011.
38. Smith, A.; Hargreaves, T.; Hielscher, S.; Martiskainen, M.; Seyfang, G. Making the most of community energies: Three perspectives on grassroots innovation. *Environ. Plan. A* **2016**, *48*, 407–432. [[CrossRef](#)]
39. Seyfang, G.; Longhurst, N. Desperately seeking niches: Grassroots innovations and niche development in the community currency field. *Glob. Environ. Chang.* **2013**, *23*, 881–891. [[CrossRef](#)]
40. Yin, R. *Case Study Research: Design and Methods*, 2nd ed.; Sage: Thousand Oaks, CA, USA, 1994.
41. Kay, C. Reflections on rural violence in Latin America. *Third World Q.* **2001**, *22*, 741–775. [[CrossRef](#)]
42. Robles, W. The landless rural workers movement (MST) in Brazil. *J. Peasant Stud.* **2001**, *28*, 146–161. [[CrossRef](#)]
43. Branford, S.; Rocha, J. *Cutting the Wire: The Story of the Landless Movement in Brazil*; Latin America Bureau: London, UK, 2002; ISBN 1899365516.
44. Freudenberg, N.; Cohen, N.; Poppendieck, J.; Willingham, C. *Food Policy in New York City Since 2008: Lessons for the Next Decade*; CUNY Graduate School of Public Health and Health Policy: New York, NY, USA, 2018.
45. United Nations Development Programme (UNDP) “L’Eco-village de Mbackombel sort de l’ombre”. Available online: [http://www.sn.undp.org/content/senegal/fr/home/ourwork/environmentandenergy/successstories/-l\\_ecovillage-de-mbackombel-sort-de-lombre.html](http://www.sn.undp.org/content/senegal/fr/home/ourwork/environmentandenergy/successstories/-l_ecovillage-de-mbackombel-sort-de-lombre.html) (accessed on 29 October 2018).
46. Wittman, H. Reframing agrarian citizenship: Land, life and power in Brazil. *J. Rural Stud.* **2009**, *25*, 120–130. [[CrossRef](#)]
47. Reynolds, K.; Cohen, N. *Beyond the Kale: Urban Agriculture and Social Justice Activism in New York City*; University of Georgia Press: Athens, GA, USA, 2016.
48. Ritz, S. *The Power of a Plant: A Teacher’s Odyssey to Grow Healthy Minds and Schools*; Rodale Inc.: Emmaus, PA, USA, 2017.
49. Poppendieck, J. *Free for All: Fixing School Food in America*; University of California Press: Berkeley, CA, USA, 2011.
50. Grin, J.; Rotmans, J.; Schot, J. *Transitions to Sustainable Development. New Directions in the Study of Long Term Transformative Change*; Routledge: New York, NY, USA; Abingdon, UK, 2010.
51. Grin, J. The Governance of Transitions: An Agency Perspective. In *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*; Grin, J., Rotmans, J., Schot, J., Eds.; Routledge: New York, NY, USA, 2010; pp. 265–284.
52. Boudreau, J.-A. Making new political spaces: Mobilizing spatial imaginaries, instrumentalizing spatial practices, and strategically using spatial tools. *Environ. Plan. A* **2007**, *39*, 2593–2611. [[CrossRef](#)]
53. Landry, C. *The Creative City: A Toolkit for Urban Innovators*; Routledge: New York, NY, USA; Abingdon, UK, 2012; ISBN 1136554483.
54. Block, T.; Paredis, E. Urban development projects catalyst for sustainable transformations: The need for entrepreneurial political leadership. *J. Clean. Prod.* **2013**, *50*, 181–188. [[CrossRef](#)]

