Article

Building Resilience in Social-Ecological Food Systems in Vermont

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Abstract: There is an expanding interest in Local Food Systems (LFSs) in Vermont, along with a growing effort to create adaptive governance to facilitate action. In this case study, we investigate how adaptive governance of LFS can provide ideas and act as a catalyst for creating resilience in other social-ecological systems (SESs). By participating in meetings and interviewing stakeholders inside and outside the Vermont LFS network, we found that consumers were highly motivated to participate by supporting environmental issues, the local economy, and interactive communities, as well as building social relationships. Farmers experienced better income and increased respect in the local community. All participants found adequate "safe space" to share new ideas and explore partnerships. Their identities and values were also place-specific, reflecting the working landscape of Vermont. Adaptive governance was built on equal partnerships, where problems were discussed and responsibilities were shared among many stakeholders across geographic areas and multiple sectors. Some skepticism was expressed towards mainstreaming local food production and sales. Challenges remain to more fully include farmers, for-profit players, and low-income consumers in the network. This might limit the resilience and sustainability of the LFS. Because SESs are held together by common culture and identities, the risk of non-adaptive social patterns exemplifies one key challenge for future adaptive management towards resilient and sustainable outcomes. There is a critical need for developing relevant theory and conducting further research on LFSs and their potential roles in local SESs.

Keywords: adaptive governance; resilience; sustainability; local food systems

1. Introduction

Human uses of natural resources are embedded in complex social-ecological systems (SESs) [1]. Each SES is unique, and could be defined as "a subset of social systems in which some of the interdependent relationships among humans are mediated through interactions with biophysical and non-human biological units" [2] (p. 6). In a complex SES, such as a food system, different elements and players that include natural resources and agroecological systems, and actors that include farmers, processors, marketers, consumers, farmer organizations and policy makers, interact at various scales, from local to global. These all interact to create desired outcomes, unintended outcomes, and the

capacity to adapt to changing conditions [3]. In short, the goal is to create a resilient SES, which is able to reorganize itself and recover after disturbance, learn from that experience, and develop new structures and processes to adapt to changing conditions while still retaining its essential function [4–6].

The way food is grown, distributed and consumed affects and shapes local communities environmentally, economically, and socially. In a broader arena, global food systems are under increasing pressure to produce sufficient, nutritious, and safe food for the growing human population, to reduce negative environmental impacts of production, and to adapt to a changing climate [7–9]. Meanwhile, countervailing forces such as farmland conversion to non-food production, massive food losses and wastes, and climate changes are threatening food security globally [10]. Although production and consumption decisions and actions take place at a local level, they operate within this global context. Some of these large-scale challenges may be addressed, in part, by re-localizing and democratizing food systems [3].

Understanding Local Food Systems (LFSs), as a type of SES, can offer insights into pathways for future governance of SESs [11]. However, little research has addressed how LFS participants engage in LFS governance, and how LFS governance structure motivates stakeholders and supports resilience. In fact, despite numerous studies of LFS, little research has investigated the social-ecological complexities, including how values and social interactions promote learning across societal and organizational scales.

The purpose of this study is to address these knowledge gaps by studying how the adaptive governance structure of Vermont's LFS enhances its resiliency through social interactions and networks among both members and non-members of the Vermont Farm to Plate (F2P) network. The F2P was initiated in 2009, and is one of the most comprehensive LFS network governance strategies in the U.S. [12]. We use a case study to explore Vermont F2P participants' key motivations and identities, as well as their institutions and adaptive governance strategies. We then use these lessons to explore how LFS governance in Vermont can inform future governance and research of SES resilience.

2. Theoretical Framework and Scope of the Study

LFSs, in all of their complex interactions between people and the environment, can be a rich source of knowledge and inspiration for fostering resilience [13] in other SESs. Applying SES thinking, food systems connect people to food production, which is reliant on biophysical and economic factors through interdependent supply chain relationships at multiple scales, from local to global [7–9]. The term "local" does not have a precise meaning in the food systems context, and is typically based on consumer preferences, for example, within a U.S. county, state, or other defined distance [14]. LFSs are defined and change according to local values and goals of participants as well as the local environment [15]. When we talk about an LFS, we seek to find a scale that encompasses a sense of both the ecological and the food security resources and challenges in the LFS.

LFSs are composed of both formal and informal structures, ranging from laws and regulations, to markets, private rules, taboos, and patterns of behavior within the dominant culture, which arise from individual and collective identities and motivations [9]. Personal intrinsic motivation arises from identification with an activity that satisfies the human need for autonomy and competence, but also relatedness—"a sense of belongingness and connectedness to the persons, group, or culture disseminating a goal" [16] (p. 64). Collective identity develops as actors build more personal relationships, ties of reciprocity, and trust through personal connections with each other [17]. Seeing oneself as part of a collective "we" and acting on behalf of one's community creates another level of motivation. Thus, personal identities and motivations arise hand in hand with the social structures reflecting cultural identity and place identity, formed by place-specific ideas, beliefs, preferences, values and objectives [18].

Cultural factors, such as the extent to which the group shares a common identity and the depth and richness of local knowledge [19,20], are central to the creation of rules and governance [21,22]. This social embeddedness [17,23] extends social relationships to economic and civic activities as well,

giving rise to phenomena such as managing common resources by accepting individual trade-offs for the collective well-being [24,25]. These relations can be considered as formal and informal structures, forming knowledge and values. Kofinas and Chapin III [26] emphasize that a person's sense of place motivates creative abilities and actions and opens one of the greatest opportunities to enhance ecosystem stewardship, which can extend to LFS participation. Ultimately, the collective identities and motivations of the participants shape the informal and formal institutions that define patterns of behavior and processes for governance within the institutional structure.

We use Vermont's F2P network to explore adaptive governance of LFSs. In Vermont, the food system participants and government have defined their LFS [27]. In 2009, Vermont's Food System Network, F2P, was initiated and became one of the most comprehensive LFS network strategies in the U.S. [12]. Contrary to the general trend in the agricultural sector worldwide, local food initiatives in Vermont have attracted more people to food and farming, generating additional revenue streams and diverse sales channels for local farmers and marketers. Local food production has long been a source of identity for people in Vermont. As an example, Vermont has the highest concentration of local food markets per capita in the U.S. and is ranked as the state most committed to buying local food [28]. However, local products still represents only 6.9 percent of total food expenditure in Vermont [29], indicating the potential limitations of LFSs to contest the dominant globalized food system [30].

Given the systemic challenges of providing food security in an era of climate change and population growth that will create persistent shocks and stresses on the food system, building resilience in the food system is a key goal on a global scale [7–9]. We define resilience as the ability of the food system, including the major human players in this system, to learn from experiences and develop diverse capacities for new structures in order to maintain itself and improve its desired outcomes [4–6]. Inspired by Cote and Nightingale [20], Colding and Folke [19] and Van Vugt [21], resilience requires attention in social, political, economic, and ecological dimensions. We focus here on the social aspects of resiliency, while recognizing that environmental motivations to join the LFS are shaped by the cultural rules of the SES.

A great deal of the resilience in food systems, or lack thereof, is due to decisions by human players that reverberate through economic, social, and political aspects of the food system [8,9]. The human actions that govern food systems arise from the complex interactions with non-human and human elements of the food system up and down the supply chain and across scales, embedded in our personal and collective values, motivations, and institutions that govern our behavior and interactions [9]. We will explore Vermont's LFS adaptive governance by applying a framework of the four factors necessary for resilient human systems: (1) learning to live with change and uncertainty, (2) safeguarding social diversity for reorganization and renewal, (3) using different kinds of knowledge, and (4) creating capability for self-organization [31].

Within an LFS adaptive governance framework, we expect to see a willingness to live with change and insecurity through the network's willingness to tackle perceived existing and emerging problems. The LFS movement we describe can be seen as a reaction to the fact that a large share of the food system today rests in the hands of economically powerful and highly concentrated corporate interests [32]. This new agrarian wave is characterized by decentralization, democratization, self-sufficiency, and small-scale participatory cultural economies [33,34]. LFSs offer space for community members to engage in market and non-market activities rooted in a particular place [13]. As a response to lack of local control and motivated by the need to build resilient food systems, proponents of local food systems [35–37] link urban and rural areas, expand marketing options, and initiate civil engagement and public funding through grassroots movements [38]. These initiatives come with personal and collective risk of investing resources without seeing desired results, reflecting a willingness of living with uncertainty and change to achieve desired outcomes.

Social diversity is the second key factor in increasing social learning and adaptation that contributes to resilience [31,39]. The diversity, trust, and respect enhanced by the social network contributes to its ability to collaborate and resolve conflict [39]. One way of diversifying the LFS is by

expanding economic partnerships across scales, which can change the social relations of production and the way actors relate to each other [40]. However, Ikerd [41] argues that economic forces could damage the social embeddedness and environmental values that are a positive quality in an LFS, undermining aspects of resiliency [42].

Another way to tap into social diversity would expand LFS involvement across all parts of society, particularly low-income and marginalized communities which have lacked the economic and social power to participate [43,44]. Increasing social diversity by including marginalized communities is inherently difficult because social structures tend to reproduce themselves; the strong personal and cultural identities and shared institutions that built the LFS in the dominant culture can reinforce inequities that the players intend to overcome [45]. It is likely that governance networks based on already established civic engagement and institutions will replicate the social relations already present, creating an impediment to increasing diversity, participation, and ultimately changing system outcomes [46,47].

The third factor in enhancing resilience requires using different kinds of deep, rich local knowledge in the LFS network, which also improves by expanding social diversity [19,20]. In resilience theory, it is implicit that local community and resource users possess valuable knowledge about the social, economic and ecological conditions of the system to which they belong [48]. People involved obtain valuable knowledge and develop memory for monitoring and managing future challenges [49]. Hahn et al. [50] stress the importance of a group to acquire social memory based on common language and mutually agreed upon visions of problems for SES networks.

Ultimately, the willingness to work toward a problem solution, engage with social diversity, and use different kinds of knowledge all create the fourth factor leading to resiliency: the capacity for self-reorganization. Self-reorganization is a process of social learning and adaptation, which is the ability of groups to detect gaps or overlaps in the system, to seek solutions to challenges and contribute to conflict resolution, facilitating a process for improving practices over time [31,39]. The transfer of social learning takes place through feedback loops between stakeholders who interact in multiple processes to define problems and implement solutions [51,52]. Our collective capacity to understand vertical and horizontal institutions and our ability to learn can lead to cultural shifts toward more sustainable management and governance of natural resources [53], and perhaps also improve the effectiveness of governance [54]. LFS institutions with a long history of engagement and their corresponding values and motivations contribute to their capability for self-organization.

Civil society is the key in governance, where norms of behavior thrive and legitimacy of the political process operates [55]. Thus, social structures appear critical in promoting resilience because they can be designed for adaptation [19]. Adaptive governance in LFSs and elsewhere is an institutional structure that emphasizes the importance of social learning by interactions and collaboration across scales, and their ability to maintain effectiveness outside of government channels, for instance, through networks and partnerships [56,57].

We consider the success of adaptive governance as its capacity to incorporate different identities, values, knowledge, and through their experiences to facilitate development of resilient LFS. Increasing vulnerability of SES due to climate change and other environmental challenges calls for more governance strategies that can deal with uncertainty and change [54,56,58]. However, knowledge about diverse and contested interests and how it affects SES resilience is limited [59]. Lessons from LFS success and failure can provide insight into other SES governance challenges.

3. Materials and Methods

Although SESs involve the multiple interactions between humans and nature, it is essential to investigate the human component as a key driver creating and sustaining these systems [60]. Baxter and Jack [61] recommend a single instrumental case study approach to understanding the phenomena of LFSs and their resilience as SESs. Vermont was chosen because it is recognized as a state highly committed to local food with a well-defined institutional structure [28].

3.1. Case Study Background

Located in the Northeast U.S., Vermont's local food and agricultural systems are highly important to the state. Local food production has long been a part of Vermont's culture, and with the "back to the land movement" in the 70s, organic farming and establishment of local cooperatives set the stage for today's LFS movement.

The Vermont legislature created the F2P initiative in 2009 to facilitate a collective approach to strengthen Vermont's food systems, increase economic development, create jobs, and improve access to healthy local food. Over 350 organizations are part of F2P network, from non-profits, government entities, educational institutions and businesses representing production, distribution, manufacturing to marketing of local products [12]. F2P is self-governed through collectively managed working groups. The F2P network implements a common vision and future goals, which initiatives and organizations work toward collaboratively. The state is involved in F2P through the Agency of Agriculture, of which the role is to convene the LFS actors, promote local food to consumers, and facilitate the process for LFSs to grow in Vermont. Local food has been entering institutions such as hospitals, schools, universities, food shelters, and retirement homes. Educational programs are also reaching children in school, entrepreneurs, farmers, students, and others in civil society, and through these programs, various arenas for distribution and consumption of local food are increasing.

Since 2012, Vermont has been ranked as the state in the U.S. most committed to local food, based on the U.S. Department of Agriculture statistics assessing direct farm marketing sales, number of farmers markets, farm-to-school programs, food hubs, and grants [28]. Vermont has experienced a 14 percent increase in new farmers from 2007 to 2012 (compared to a 20 percent reduction nationally), and the rate of farmland converted to built-up land has been reduced by 61 percent (compared to 48 percent nationally) from one five-year period to the next (2002–2007 to 2007–2012) [62]. Based on U.S. labor statistics, it is estimated that 6000 new jobs and 779 new businesses have been established between 2009 and 2015, while the food system provided 16 percent of all private-sector jobs in the state in 2012 [63]. The Vermont food sector's overall gross sales have increased from US$7.6 billion in 2009 to US$10 billion in 2015 [64]. The share of food expenditures on locally produced food in Vermont has increased from 2.5 percent in 2010 to 6.9 percent in 2014 [29].

3.2. Case Study Design and Data Collection

Within the tradition of constructivist-qualitative approaches in social sciences, we used snowball sampling as a research method to gather social knowledge, understand social networks, social dynamics, and social capital [65,66]. Stakeholders from all stages in the LFS supply chain, collaborating organizations, and leaders were identified and interviewed during the harvest season of 2015. All 24 interviewees are listed in Table 1 according to their respective role in the LFS and involvement in the F2P network.

In order to understand the context of Vermont's LFS, governance papers were reviewed, and informal observations and field interviews were conducted (Table 1). This was primarily done in network meetings, community events, farm activities, at farmers markets, and other engagements with local communities. Information about stakeholders outside the LFS was mainly covered by experiences gathered by policy actors, members of F2P, non-profit organizations, and local inhabitants. However, when examining social networks, we recognized that perceived values, motivations and senses of belonging are strongly defined by the people themselves, including values they do not support outside the LFS network.

A stakeholder meeting was organized near the end of the research to share preliminary findings. Stakeholders could comment on results, share their views and raise questions about the preliminary results to develop a deeper understanding of the different mechanisms promoting resilience.

All views of activity or purpose are heavy with interpretation, bias and prejudice, implying that there are multiple possible descriptions of any real-world activity [67]. We found people's perceptions of social reality most important, and there was obviously no "correct" answer. While multiple perspectives were possible, we found limited contradictions. As SESs are context-dependent and place-specific, concrete findings are not necessarily applicable to other locations. However, as case

studies can contribute to theory development, general social–economic–ecological interactions will likely be useful to inform the understanding of similar situations elsewhere.

Table 1. List of informants and their role within the Local Food System (LFS) and the Farm to Plate (F2P) network.

	Representatives Interviewed from Different LFS Organizations	Role in the LFS	Member of the F2P Network
Interviews	Farm to Plate Network	Policy actors	X
	University of Vermont, Real Food Challenge		X
	Vermont Agency of Agriculture		X
	University of Vermont Medical Center, nutrition services		X
	Vermont Food Venture Center (Non-profit organization supporting LFS in Hardwick)	Non-profit organizations	X
	Vermont Fresh Network (farmer–chef partnerships)		X
	Intervale Center (strengthening Burlington community food systems)		X
	New Farms for New Americans (social service agency)		
	Northeast Organic Farming Association of Vermont		X
	Artist	Activist	
	Blue Heron Farm	Farmers	
	Bread and Butter Farm		
	Savage Gardens (CSA)		
	Surfing Veggie Farm		
	Snug Valley Farm		
	Diggers Mirth Collective Farm		
	La Lumiere Farm		
	Hi-Land Farm		
	Integrity Farm		
	O'Bread Bakery at Shelburne Farms		
	Vermont Farm Tour	LFS-related businesses	X
	High Mowing Seeds		
	Skinny Pancake (restaurant)		X
	Black River Produce (regional food supplier)		X
Observations/ informal conversations	Green Mnt Farm to School (connecting schools, farms and communities)	Farm to Plate members	X
	Clean Yield (financial advisor company)		X
	Agrilab Technologies (composting systems)		X
	Salvation Farms		X
	Adams Berry Farm		
	Agroecology Department, University of Vermont		X
	Participants in nine farm activities	Participants	
	Around farmers at farmers markets	Farmers	
	The Dish, Arts Riot Burlington (activity center)		
	Around 20 local community members in Richmond, Burlington, Hardwick and Montpelier	Inhabitants	
Stakeholder Meeting	University of Vermont's Center for Sustainable Agriculture	Non-profit organizations	X
	Vermont Food Bank		X
	Housing Vermont (non-profit housing organization)		X

4. Results

4.1. Consumers' Motivations to Participate in Local Food Systems

The LFS were embedded in formal and informal social networks. Stakeholders were engaged in the LFS through culinary events, partnerships, policy-making sessions and other collaborative work. According to farmers and a non-profit organization, in the past, the Vermont food coops have been influential in connecting people to local food. The food coops became a meeting point for people to stay connected, socialize, remain up to date on community events, and buy fresh produce directly from farmers. Today, the representatives from another non-profit organization and LFS-related businesses still describe a strong culture of engaging in community events and being active citizens for improving the community. They related this to the "community spirit" that several interviewees referred to as "we in Vermont", where social capital was created through knowledge sharing, common exposure to a special food culture, attitude changes, and over time, emergence of stronger social networks.

For activists, farmers, representatives of non-profit organizations and F2P members, there was an added value in shopping locally to support your neighbor and local businesses. "Supporting your next-door neighbor" was the statement most frequently mentioned among consumers as a motivation to engage in the LFS. "The traditions of growing your own food have been a very strong tradition in Vermont for a hundred years, to buy from your neighbors or support your local community. Those are values that have never gone away here" (representative, LFS-related business).

One stakeholder explained that "there is a very progressive, probably well educated, sometimes affluent, segment of our societies (might be today's hippies), which understand and are interested in buying locally, supporting the farmer down the road, not the anonymous farmer anywhere on the planet. That's good for Vermont, that's good for our economy, and that's the kind of community we want to be part of. That's a big segment of our population" (representative, non-profit organization). However, the informants representing policy actors and a non-profit organization raised concerns that this segment of the food system is primarily elitist. Potential non-participating consumers may prefer local food, but find the cooperatives and farmers markets too costly, distant, or culturally inaccessible. The informants emphasized that existing social networks were concerned about how to attract new "regular people" to LFS, as opposed to only involving the already interested groups.

4.2. Farmers' Motivations to Participate in Local Food Systems

Diverse market channels occur in the LFS, which are direct-to-consumer, value-added sales-to-restaurants and institutions, and wholesale-to-distributors. Some LFS producers found wholesale through food hubs or supermarkets to be a valuable income strategy. Wholesale throughout the year could finance seasonal activities, such as strawberry and vegetable harvests, and Community-Supported-Agriculture (CSA) shares provide the same advantages, explained by one farmer. However, only the mid-sized farms worked with larger supermarkets. Two farmers, one interviewee from LFS-related businesses, and a representative from policy actors, all expressed that farmers scaling up local food production, as well as the entrepreneurs selling value-added products, change the intent of the systems. This all adds up to a "commercialization" question on what is local, moving away from the initial values that the LFS initiatives were built upon. Generally, products sold as "local" often generated higher prices than conventional products and direct sales reached higher price points than selling in bulk. However, living from the land does not always pay very well, according to two farmers and an informant from an LFS-related business. From some producers' points of view, farming is a way of life rather than a career only to provide a salary. They prioritized making organic food available to anyone at affordable prices, instead of charging the highest possible price.

Stakeholders explained that the perception of farmers has changed considerably over time. One informant explained the situation they faced at farmers' conferences twenty years back, when the average farmers were getting older and older. "Nobody knew who would fill those positions when they would retire. But now we see all these young people who want to be involved in farming at some

level. That's very encouraging. Before, people referred to poor farmers, or dirt farmers, but today, farmers in Vermont feel like 'rockstars'" (owner, LFS-related business).

According to producers at the farmers market, participation at the market gave them time off the farm (to get out more) and a space to socialize and meet with friends, discuss marketing strategies with their colleagues, and get feedback from their customers. This appears to impact farmers' enthusiasm and is an emergent property and clear advantage that results from the LFS. Farmers also enjoyed making personal connections to their neighbors and their communities, and the opportunity to add something to the cultural diversity in Vermont. Some referred to this as sharing tastes and culinary experiences, as well as introducing people to new food.

4.3. Local Food Systems Participants' Identities

Informants from policy actors, non-profit organizations and LFS-related businesses, and other inhabitants emphasized that many people in Vermont grow up close to farmland, and this impacts peoples' values related to food and farming. There is a close link between people, nature, and the landscape, and many people express gratitude for the beauty of these Vermont's landscapes. "We have a lot of people that are connected to the land", explained by one business owner (LFS-related business). The appreciation of farmland also comes from inhabitants not directly connected to agriculture; "many people drive past farms and farm landscapes every day. It is hard to be too distanced from it." (representative, non-profit organization).

One of the state grant programs reports that Vermonters desire a strong working landscape for all its scenic, cultural, economic, environmental, and recreational benefits [68]. Many interviewees, and representatives from LFS-related businesses, non-profit organizations, and policy actors all expressed an obligation to steward the land and take care of the local environment. An informant from a non-profit organization and two farmers linked inhabitants' values to the "back to the land movement", which addressed closeness to the land, environmental consciousness, and support for neighbors and the local economy. Producers interviewed took pride in providing their community with fresh, healthy food. They mentioned words like taste, quality and *terroir* when talking about local produce. Terroir is a French term that describes the uniqueness of place, including soils and climate and culture, and this has been used extensively for marketing branded products with an identity of a specific region or local community.

In this way, some interviewees explained that many Vermonters see the working landscape and businesses based in food systems, forests, and agriculture as their cultural heritage. "I think the agrarian connections result in a lot of enthusiasm, even for those who do not associate themselves with the local food movement." (representative, non-profit organization). The word "passion" was frequently used to describe their motivation. "We need people with passion. People with shared passion for the same issues," explained the representative of Food and Nutrition at University of Vermont Medical Center. "And we need people and places to go to every day with some hopefulness," the representative said.

4.4. F2P Adaptive Governance Processes

According to the members of the F2P network who were interviewed, collaboration created a space for social learning. Members participate in sharing of information, knowledge and expertise and thus access new ideas and acquire wisdom from others across scales and groups in the LFS. Farmers stated they learned farming techniques and distribution opportunities, and consumers understood the values and costs of environmentally friendly and local food. Other actors gained understanding and knowledge about local food and market opportunities. Managers learned about policy-making, how to detect gaps in the food system, and then adapt to future measures. Social learning occurred through the way the network socialized, communicated and discussed conflicts and problems.

One policy actor explained that participation in this group challenged the members to think and act collectively in the mutual interests of businesses, the local community, and the environment.

"The big opportunity for us now is waste reduction", one restaurant manager explained. "Through the F2P we learned that our business can donate our food waste (in this case excess food) and receive a tax reduction at the end of the year" (representative, LFS-related business). This way, the network offers incentives to promote responsibility and caring for sustainable alternatives while ensuring an economic return for their efforts. As expressed by a stakeholder, "I love talking about trash now" (representative, LFS-related business). Another example was a fishing event for farmers and chefs, which led to an incentive for those managing farms to mitigate pollution of the lake. Certification for restaurants serving food from farms with sustainable farming practices was suggested. Actions have also been taken to improve the working conditions and work opportunities for migrant workers. "We don't know all the answers to our food system problems. But we are trying to find out what works. Maybe some things could have been done differently," a representative from a non-profit organization explained.

Members referred to each other by first name, and expressed that this personal connection to the people within the group helped them acknowledge that they were part of a larger team, committed to meeting shared goals. "When people know each other, like we do here in Vermont, they hold each other accountable," said an informant from a non-profit organization. At times, they were confronted to handle disagreements, conflicts or problems. According to a representative from policy actors, some themes or issues could involve sensitive conversations, but the regular interactions among people knowing each other helped members feel more confident to bring up larger issues through conversations at meetings. They have built a common language and rules of interaction. "Looking ahead, maybe there is no need for the organization F2P in the future. Maybe this network provided members with valuable learning and a platform for communication that the LFS organizations could carry on themselves" (informant, policy actor).

Some stakeholders questioned the lack of farmers and representatives from for-profits participating in the network. According to them, the intention was to include more of these groups, but many producers would be working long days in the field, and thus were not able to attend meetings. Thus, informal feedback loops were established where farmers could stay updated on news and information without having to be present at all the network meetings. Examples are the online database and conference calls initiated by Vern Grubinger at Vermont Extension Services where farmers share information. However, some farmers interviewed at farmers markets had not heard about the F2P network. Representatives from LFS-related businesses and producers expressed clear incentives for participating in the network. They argued that if there were more for-profits attending the meetings, this would be an incentive for other representatives from this sector to attend.

5. Discussion

First, we discuss the adaptive government outcomes expressed through the personal and collective identities and motivations created in formal and informal structures within the LFS. Thereafter, we examine the existence of the four key conditions for resilience—willingness to live with uncertainty and change, social diversity, using different kinds of knowledge, and the capability for self-organization [31]. The relative success of adaptive governance in Vermont's LFS is then considered, along with the lessons for other LFSs and SESs.

5.1. Social Embeddedness Creates LFS Motivations and Enforces Collective Identities

Collective LFS identities build social structures [17] and thus norms and rules for interaction and decision-making. This can be understood as social embeddedness, the integration of social relations and behavior within an SES [17,23]. In this study, personal motivations and collective identities seem closely connected to place identity, environmental concerns and social responsibility.

Consumers participating in the LFS were willing to pay extra to support local farmers. Their engagement was motivated by the concern for their neighbor farmers, their social responsibility and intentions to support responsible natural resource management in the region. This resonates with

what Kofinas [25] found, where private interests were disregarded to support the collective well-being. Freyfogle [24] recognizes this as typical for the "new" agrarianism. We encountered interviewees that were motivated to act for the betterment of the community in Vermont. Participants in the F2P network also articulated their desire for a more sustainable and resilient food system. Further, agriculture and its working landscape were considered as key elements of Vermont's identity. These values can be characterized as a place identity, but also a place attachment as the positive connections to a place, formed by place-specific values and preferences developed within the SES [18]. In Vermont, these identities motivated actions to value working landscapes and support local farming. Kofinas and Chapin III [26] emphasize this as a sense of place and opportunities to enhance ecosystem stewardship.

Resilience research has often assumed that values in SES mainly were concerned with the environment [59]. However, we also found that social values are important motivations to participate in the LFS. Seeing oneself as part of a collective "we" and acting on behalf of one's community revealed another level of responsibility. Social implications of the LFS actors' interactions seem positive, as they contribute to individual and group well-being.

SES resilience depends on corresponding rules established and accepted by all the actors [1]. We found values and identities among LFS players enhanced through the F2P network. Common events, such as social and culinary spaces for people to connect with their local community, reinforced collective identity, which has also been identified as important in other LFS research [17]. Hence, we found both formal and informal social structures are crucial to promote social responsibility and environmental and social awareness.

5.2. Success of LFS Network Governance: a Two-Sided Story

Adaptive governance in the LFS requires four factors to create resilience, namely its capacities to live with change, to use different knowledge to learn from experiences, to safeguard diversity for reorganization, and to self-organize in order to promote resilient and desired outcomes [31].

Capacity to live with change is perhaps difficult to assess, and was not a clear finding in this case. However, the whole system was established as a response to changing food markets: local food production taken over by large-scale and mainly economic-motivated actors. Further, the system's capacity to learn and adapt facilitates its ongoing capacity to live with these changes and manage future challenges [49].

Social learning and co-management of resources are central features in sustaining the LFS over time. Through network meetings, all the actors including managers, consumers, environmentalists, producers, retailers and chefs could together identify gaps or discuss practices that need improvements. This process contributed to making the system more capable of adapting better solutions and learning for more effective future actions. The outcomes from these cross-scale interactions lead to "down-scale and up-scale effects", where opinions from the grassroots level can reach up to the policy level.

Folke et al. [56] suggest that "successful social transformations toward adaptive governance for ecosystem management seem to be preceded by the emergence of informal networks . . . that help facilitate information flows, identify knowledge gaps, and create nodes of expertise . . . ." (p. 19). The F2P network demonstrates an ability to address gaps found by Nickerson [27] such as the need to coordinate efforts and facilitate communication among people in various LFS initiatives.

However, we still found potential to include groups that did not participate. This was the case not only for many farmers and for-profit actors, but also for low-income consumers. Social diversity is considered important to secure knowledge and build SES resilience [31]. Thus, lack of involvement from central stakeholder groups might limit social learning capacity, both in the F2P and in the LFS network, in general. Homogenous interests and values in LFS might even be the "social glue", and thereby increase its capacity for self-organization, but may also limit its capacity for diverse learning to handle change. This lack of social diversity is found in other LFS research [44,69].

We found that one reason behind the lack of participation of farmers in F2P was available time, but the network also lacked incentives for more producers and for-profit businesses to participate.

Environmental, economic and social objectives might become incommensurable, where the strong economic interests in large-scale production and distribution represent other cultural values than the ones reflected in the existing LFS culture. A stable demand for local food has enabled many local growers to engage in the LFS, and their economic viability is crucial for sustaining the LFS. By entering the larger commercial marketplace, the LFS farmers risk losing their identity formed by place, environmental stewardship, and social connections, along with their economic livelihood through price competition in the global marketplace. Stakeholders raised concerns that sourcing local food in the commodity market would pose a challenge to the values and social meanings that local food initially embraced.

Cultural exclusion of marginal groups with lack of power to participate [43,70] might be the case for low-income consumers. Common values and identities can also be understood as one of the main factors challenging the potential to develop social diversity. When new players challenge existing SES values by exposing potential trade-offs that pose a cost for existing privileged participants in order to expand the social network, it might lead to exclusion or lack of willingness to participate. Fabyini et al. [59] express it elegantly: "Institutions reflects social structures." (p. 3). They also reproduce them.

Given the sociological dynamics, we can question whether LFS governance in itself has enough power to establish the holistic learning essential to create SES resilience. These dynamics seem to be a limitation to growth of the system to a wider SES. Strengthening feedback loops and multiple channels of communication could be critical in sustaining the LFS over time. Alternatively, the community's value of inclusion must arise in order to overcome the social or economic costs of expanding the notion of who "belongs" in the collective "we". At the same time, we could also question whether larger LFSs are manageable. Smith et al. [40] and Ikerd [41] predict little optimism with regards to the commercial system's capacity to serve social and environmental stewardship. It will depend on SES governance capacities to resolve conflict and provide solutions. Given the fact that networks are built upon common values and identities, this seems challenging.

5.3. Conditions for Self-Organizing for Resilience

Social structures define the legitimacy and effectiveness of political processes [55]. Therefore, governance should adapt to local values to create sustainable outcomes. We found people engaged in an activity because they felt personally committed, and the personal identification of the values shared within the LFS might have promoted what Ryan and Deci [16] call intrinsic motivation. This demonstrates how the LFS can connect people, produce social stewardship and increase motivations to act for improved social, economic and environmental outcomes [13]. This is what Migliore et al. [17] articulate as processes for creating collective identity. This is indeed detected in Vermont's LFS.

However, legitimacy of both interaction patterns and outcomes should be acknowledged by various stakeholders within the LFS. Their participation can also be argued as a matter of democratic and social justice, and thus their rights to shape access to all food system components [7]. This is closely linked to principles of adaptive management. We found that food costs may exclude some people who might have interest in participating. This is also found elsewhere [23]. It might even reinforce inequities that participants struggle to overcome [45]. If social sustainability is a key to addressing resilience, these aspects need to be further addressed in research and when designing governance of LFS.

Because the LFS in Vermont has been established for a long time, we cannot assess the relative impact of initially established formal institutions provided by the F2P network. However, we found that the network created arenas where conflicts could be resolved and solutions were created, mainly by the F2P members themselves. It is also likely that governance benefitted from already established structures, the existing variety of ideas and place-based values reflecting the social reality [46,47]. The long history of LFS institutions and their corresponding values and motivations in Vermont contribute to their capability for self-organization, one of the key factors in building resilience [31].

However, limitations in social inclusion and the corresponding limitations in capacity to learn, possibly due to its homogenic stakeholders, reduce its ability to handle change and self-organize at larger scales.

6. Conclusions

Food production and nature are inherently interlinked, and building social-ecological knowledge and increased stakeholders' engagement in sustainable land management is almost an imperative for maintaining the LFS. Given the small but important role of LFS in Vermont and a comprehensive network of adaptive governance to facilitate action, this case study investigated how LFS can provide ideas for creating resilience in other SESs. We investigated social interactions and networks of LFS actors, their key motivations and identities, adaptive governance and its potential to promote LFS resilience.

We found strong LFS values and motivations for their working landscapes, environment, local community and economy, mirrored in the Vermont F2P network. Key positive governance experiences appear to be systems: (1) rooted in the local community itself; (2) built on local knowledge and identities; (3) including cross-sector/multi-stakeholder involvement; (4) maintaining feedback loops across scales; and (5) promoting collective efforts engaging multi-stakeholder groups across the food system. These factors created common identities and a notion of shared responsibility to promote resilience and sustainable LFSs.

Hahn et al. [50] argue that social memory facilitates the ability to establish common language and shared visions of problems, which can be seen as important for the self-organizing capacity of social LFS networks. We found this among the F2P members. However, social diversity is also considered important for learning and resilience [31,39], and creation of sustainable outcomes [59,71–73]. We found that challenges remain to include a more diverse set of stakeholders in the F2P network and in the LFS. Social diversity might challenge established common values and identities, and resilience research has been criticized for assuming homogenized social complexity [59]. We need more research to understand how social dynamics occur and how they can be accommodated in adaptive governance to promote resilience and sustainable SESs.

Our snowball sampling provided insights to understand social networks, but might have limited our knowledge of conflicting opinions outside the LFS. Broader research is required to deepen the knowledge of diversity as regards values and players inside and outside the LFS. Fabinyi, et al. [59] also suggest more research on the "social" dimension of the SES, especially power relations and creation of social diversity outcomes. We distinguished SES resilience from its production of sustainable outcomes. Thus, it seems fruitful to scrutinize the social dimension in social interaction and learning, and to provide socially sustainable outcomes. However, further inter-disciplinary theory developments are required to increase the social dimension in the SES, its resilience and sustainability.

Guthman [42] highlights that sustainability might lose its social and environmental dimensions when trying to adapt it to the commodity market. Because the involvement of large-scale commercial and multinational actors with different goals might threaten the social and ecological basis of the LFS, this hinders a broader involvement of commercial players. If this is a prerequisite for sustainability and resilience, more attention must be given to exploring how the LFS can continue to grow while at the same time being directed toward their original intent. These dilemmas are likely to be found when idealism meets commercially oriented marked values, also in other SESs.

Inspired by ideas from adaptive governance, we see the LFS as a system in progress, and hope that consensus can be built around the original intent, so that they can strengthen their role as a resilient and sustainable component of the total food system.

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