



Amplifying Agroecological Farmer Lighthouses in Contested Territories: Navigating Historical Conditions and Forming New Clusters in Japan

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Individual agroecological farms can act as lighthouses to amplify the uptake of agroecological principles and practices by other farmers. Amplification is critical for the upscaling of agroecological production and socio-political projects emphasizing farmer sovereignty and solidarity. However, territories are contested spaces with historical, social, cultural, and economic contexts that can present challenges to the effectiveness of farmer lighthouses in catalyzing localized agrarian change. We explore these amplification dynamics through fieldwork in a particular region of Japan employing interviews and data derived from an assessment of nine farms using ten amplification indicators. The indicators include social organization, participation in networks, community leadership, and degrees of dependency on policies or markets among others, as well as degree of adoption of on-farm agroecological practices, all of which capture farmer lighthouses' potential to amplify territorial upscaling. At the same time, we trace the historical development of a previous generation of Japanese farmer lighthouses practicing organic agriculture in alignment with agroecological principles that experienced, to varying degrees, push-back, co-option, and successful territorialization in rural communities. We find that many of the same social and cultural territorial dynamics are still influential today and affecting the amplifying effect of agroecological farmer lighthouses, but also find examples of new clustering around lighthouses that take advantage of both the historical vestiges of the previous generation's efforts as well as contemporary shifts in practice and agrarian orientation. This research calls for a detailed dissection of the dynamic and contrasting processes of agroecological territorialization and the ways in which diverse contexts shape agroecological upscaling.

Keywords: farmer lighthouses, agroecology, upscaling, amplification, new entry farmers, farmer-to-farmer networks

INTRODUCTION

Agroecology has been identified as one of the main solutions to addressing environmental unsustainability, food security, and socio-economic inequity in contemporary agriculture and food systems (Altieri et al., 2012; Wezel et al., 2016; FAO, 2018; Lamine and Dawson, 2018; Frison and Clément, 2020). Successful examples of agroecological farms and farmer networks, particularly based in Latin America, have fueled interest in the study of how such farms and networks thrive despite the lack of formal policy support. Research into what hinders the spread of agroecological uptake and drives upscaling processes has flourished in recent years (Mier y Terán Giménez Cacho et al., 2018; Bergez et al., 2019; Magrini et al., 2019; Wezel et al., 2020). The lack of financial incentives or subsidies, absence of support for niche markets or sales mechanisms, and the dearth of funding for research and extension, as well as political-economic control of genetic, technological, and information resources are just some of the factors that hamper agroecological upscaling (Holt-Giménez, 2006; Duru et al., 2015; IPES-Food, 2016; Giraldo and Rosset, 2017; Holt-Giménez et al., 2021; Muñoz et al., 2021). While these structural issues are important and need addressing in their own way, there is also a need for more investigation into how agroecological practices are initiated and scaled up and out at the farm, community, and regional levels (Wezel et al., 2016; Mier y Terán Giménez Cacho et al., 2018; Nicholls and Altieri, 2018; Magrini et al., 2019; Dale, 2020). We describe this process as the amplification of agroecology. Amplification is critical for the upscaling of agroecological production and socio-political projects emphasizing farmer sovereignty and solidarity.

Amplification catalyzes agroecological knowledge and on-the-ground practices to thrive and spread, to involve or recruit more farming families, and to eventually lead to scaling out and territorialization. The focus of this study is on one type of amplification pathway or “amplifier” for agroecology: agroecological lighthouses (Nicholls and Altieri, 2018). Individual agroecological farms can act as lighthouses become centers of learning and influence to amplify the uptake of agroecological principles and practices by nearby farmers and those from surrounding territories. Studies have shown that farmer lighthouses, such as demonstration farms and NGO-led operations, are effective in providing models of agroecological practices in action and in educating farmers and visitors (Warner, 2007; Laforge and Levkoe, 2018; Nicholls and Altieri, 2018; Ryschawy et al., 2019). Research has also revealed how *campesino a campesino* networks create opportunities for farmer-to-farmer learning and spread agroecological practices and principles, as farmer lighthouse leaders can demonstrate and share successful examples with others (Holt-Giménez, 2006; Holt-Giménez et al., 2010; Rosset et al., 2011).

Despite these success stories, rural and agricultural territories are contested spaces with historical, social, cultural, and economic contexts that can present challenges to the effectiveness of farmer lighthouses in catalyzing localized agrarian change.

This research explores these amplification dynamics through two questions. First, what is the amplification potential of farmer lighthouses and how can we assess it using a farm-level set of evaluation indicators? Evaluative frameworks to assess agroecological practices at the farm-level have already been developed (Mottet et al., 2020; Nicholls et al., 2020). Equally important in determining the amplification potential of farmer lighthouses is the degree to which farmers are integrated with social networks, their ability to demonstrate leadership in the community, and their level of autonomy in relation to policy, markets and external inputs. An evaluative framework that incorporates all of these elements would provide a useful tool in investigating amplification dynamics. Second, how do farmer lighthouse leaders overcome or negotiate contestation to agroecological territorialization? We know that scaling processes are not linear and regimented, but are unfixed and dynamic, simultaneously contested and championed by various societal actors (Levidow et al., 2014; Rivera-Ferre, 2018; Giraldo and McCune, 2019; Muñoz et al., 2021). The process of establishing agroecological lighthouse farms, how farmers are able to create and maintain networks of knowledge sharing and influence, and how these efforts merge to re-territorialize rural farming communities and surrounding regions where conventional agriculture is dominant are all questions that require more inquiry. Research in this area is largely based on examples from Latin America, with only limited examples in Asia and the Global North (Castella and Kibler, 2015; Wezel et al., 2018; Anderson et al., 2019b; Carlisle et al., 2019; Ong and Liao, 2020). This research focuses on the amplification dynamics of territorialization processes and how they play out in the context of Japanese agriculture and rural society.

Rural Japan, like many Global North countries, is undergoing pronounced depopulation and farmer aging. The agricultural sector is experiencing both a de-agrarianization of family farming alongside a mixed process of re-agrarianization (Hisano et al., 2018). Conventional, highly specialized agriculture is being encouraged while at the same time interest in diverse forms of small-scale sustainable agriculture are growing. Japan has a history of organic farming movements and other forms of agroecological production that have developed and evolved over decades, and multiple generations of agroecological farmers are now interacting and territorializing rural space in unique ways, including clustering (Zollet and Maharjan, 2021).

In this paper, we developed a rubric of ten amplification indicators and used it to assess the amplification potential of lighthouse farms and farmers in the Japanese context. Through fieldwork and retracing the historical development of the organic movement in Japan, we find that Japanese farmer lighthouses purposefully create cooperative relationships in their local communities to minimize social friction, form inclusive knowledge networks, encourage diverse forms of resilient production, and take advantage of unique cultural contexts to enable clusters of support. This approach builds on the past experiences of successful agroecological lighthouse farmers and further develops the discussion on the dynamic and contrasting processes of agroecological territorialization and the ways in which diverse contexts shape agroecological upscaling.

LITERATURE REVIEW

Amplification and Territorialization Processes

Agroecological scaling processes have been a target of study for some time and have provided a rich vocabulary to describe the various ways agroecological practice and knowledge can spread (Box 1; Ferguson et al., 2019). In general, scaling up portrays the process of grassroots agroecological principles traveling to the level of public and private institutions and scaling out is the process by which more people (farmers, families, communities) in greater physical areas are aware of or practice agroecological principles (Rosset and Altieri, 2017; Mier y Terán Giménez Cacho et al., 2018). Amplification and territorialization capture scaling up and scaling out as interlinked processes, but target different scales of focus.

Amplification targets person-to-person interaction as amplifiers, such as lighthouses and traditional farming, and how agroecological knowledge and practices move through individual and community networks and enable the creation of supportive policies and markets (Nicholls and Altieri, 2018). The ways in which knowledge and local resources are utilized and practices are performed and reproduced by individuals and networks, and how these activities influence society and policy are of particular focus. Territorialization is an overhead view of a physical area or territory and describes how different symbolic and material characteristics come to dominate or contest a territory (Guzmán Luna et al., 2019). As Guzmán Luna et al. (2019, p. 765) state, “territorialization is never definite,” which highlights the role of diverse actors, food systems, markets, values, and policies simultaneously contesting space (Maye et al., 2016; Berti, 2020). We argue that amplification and territorialization are complementary processes that integrate aspects of both scaling up and scaling out in a constructive way.

The integration of amplification and territorialization processes is consistent with the creation of “agroecological territories” (Wezel et al., 2016). Wezel et al. (2016, p. 140) define agroecological territories as territories “where (a) a transition toward sustainable agriculture based on agroecological practices exists, (b) biodiversity and resource conservation is taken into account, (c) territory-linked embedded food systems exist, and (d) stakeholders support the transition toward sustainable agricultural and food systems.” We would add that these agroecological territories and the embedded knowledges, practices, and stakeholders therein are likely standing in opposition to the constellations of actors, practices, markets, and policies that compose contemporary food systems and industrial agriculture. This resonates with the importance given in agroecology to traditional farming systems and landscapes, which are often characterized by greater functional diversity and resilience compared to agrarian landscapes patterned by industrial or monoculture production (Altieri et al., 2015). Moreover, such landscapes can produce the goods and services humans need for their sustenance and well-being in a sustainable way (Plieninger et al., 2018). Agroecological territories therefore link individual farm-scale activities with the surrounding ecological and socio-cultural landscape and the local food system

in order to amplify agroecology and further territorialize and re-territorialize in the face of pressures from contemporary food systems.

Two additional concepts are relevant to the discussion on amplification and territorialization: territorial resilience and territorial mediators (McCune et al., 2017; Guzmán Luna et al., 2019). As agroecological amplification and territorialization occurs, agroecological-territories develop resilience or “the collective capacity of the actors to continue to facilitate the development of territorial responses to external disturbances” (Gilly et al., 2014, p. 596, cited in Guzmán Luna et al., 2019). Guzmán Luna et al. (2019) identify six variables for territorial resilience: agrobiodiversity maintenance, food sovereignty, learning and innovation, resistance to depeasantization, and social, economic, and political aspects of territoriality. These variables are essential for successful agroecological amplification and territorialization. In addition, McCune et al. (2017, p. 354) center their attention on how social movements drive territorialization by creating politically, socially, and culturally significant elements, termed territorial mediators, that “facilitate the rooting of agroecological social processes in a given territory.” Territorial mediators have pedagogical significance for individuals and might be particular “moments or activities experienced by learners, or certain people or mentors” that influence one’s sense of political identity (McCune et al., 2017, p. 359). We see similarities between territorial mediators and agroecological amplifiers in the form of lighthouses and farmer leaders. In both instances, farmer-to-farmer learning and the presence of charismatic leadership can amplify agroecological knowledge and practices throughout a given territory. Territorial resilience and mediators provide unique lenses to analyze amplification dynamics as part of broader processes of agroecological territorialization.

Agroecological Lighthouses, Amplification Dynamics, and Territorialization

The focus of this paper is agroecological lighthouses and their ability to amplify the uptake of agroecological principles and practices by other farmers from surrounding territories. Agroecological lighthouses are diversified farms that serve as models on how to “design and manage farms based on agroecological principles” (Nicholls and Altieri, 2018, p. 7). Equally important are the farmers of lighthouse farms, who play a key role in promoting agroecological principles in the surrounding community and amongst farmers from other regions. For the purposes of this paper, the lighthouse farm and lighthouse farmer are inseparable, as the design and operation of a lighthouse farm is contingent upon the ability and orientation of the lighthouse farmer. A single lighthouse can provide an inviting and protective space for agroecological farming to develop, as well as influence farmers in nearby geographical areas to adopt or, at the least, be accepting of agroecological production. As an actual lighthouse radiates light against dark ocean nights, so too do agroecological lighthouses provide pathways alternative to the industrial agricultural model.

BOX 1 | Key words and their definitions relevant to agroecological scaling processes.

(De-)(Re-) agrarianisation: De-agrarianisation refers to the process through which the reproduction of strictly agrarian and land-based livelihoods (particularly small-scale and/or family farming) becomes increasingly difficult, due to changing social, material and biophysical conditions. Re-agrarianisation refers to the reversal of this process, with an increase of the agrarian-based economy and agrarian-related activities (Hebinck, 2018).

Amplification: the process through which agroecological practices are initiated and scaled up and out at the farm, community, and regional levels. Amplification refers specifically to processes occurring through social interaction (e.g., the expansion of agroecological knowledge and practices through individual and community networks). It also concerns the way in which this expansion enables the creation of policies and markets supportive of agroecology.

Cluster: the concept of cluster emerged in the field of economics, where a cluster is defined as a “geographically proximate group of interconnected companies and institutions in a particular field, linked by commonalities and complementarities” (Porter, 1998, p. 199). A cluster is characterized both by spatial proximity and by knowledge- or resource-sharing, collaboration and competition.

Agroecological lighthouse: an individual agroecological farm representing a model of agroecological practices in action and acting as a center of learning and influence to amplify the uptake of agroecological principles and practices.

Scaling out (Outscaling): the horizontal process through which the awareness and/or practice of agroecological principles extends to more people over a wider geographical area.

Scaling up (Upscaling): the vertical process of grassroots agroecological principles traveling from the grassroots to the institutional (public and private) level. It is worth noting that the “scaling” of agroecology is often meant as a combination of scaling up and out processes (Mier y Terán Giménez Cacho et al., 2018).

Territorialization: similar to scaling and amplification in that it refers to the process leading increasing numbers of people over increasingly vast territories to practice agroecology and/or engage in the consumption of agroecologically produced food, but with a specific focus on the physical area or territory where the process occurs. Also describes how different symbolic and material characteristics come to dominate or contest a territory.

Agroecological lighthouses and lighthouse farmers promote agroecological principles through networking, leadership, and teaching, and through the demonstration and dissemination of production and managerial practices at the farm level. There is an expanding literature on transformative learning (Anderson et al., 2019b), farmer’s knowledge networks (Laforge and Levkoe, 2018), peasant-to-peasant processes of horizontal learning (Val et al., 2019), “wisdom dialogues” (*dialogo de saberes*) (Anderson et al., 2019b), and communities of practice (Dolinska and d’Aquino, 2016) that detail the different ways agroecological knowledge is passed from farmer-to-farmer. We argue that agroecological lighthouses and lighthouse farmers are critical links in farmer-to-farmer chains as well as amplifiers in disseminating agroecological knowledge and practices within and beyond territories. Beyond dissemination of knowledge and practices, agroecological lighthouses and lighthouse farmers possess and create social capital in rural communities and can utilize this capital to create relationships with different local and extra local actors. Lighthouse farmers are effective leaders and use different types of social capital (such as bonding, bridging, and linking) to build trust and leverage cooperation, connect disparate networks to engage in collaboration, and create links between sections of society in which formal or institutionalized power play a role (Cofré-Bravo et al., 2019).

The importance of social capital for lighthouses’ ability to amplify agroecology places emphasis on understanding what social and cultural factors might be influential in amplification and territorialization processes. The presence of social institutions or organizations that are part of a larger social movement is consistently seen as a powerful force for agroecological upscaling. For example, Mier y Terán Giménez Cacho et al. (2018) identify the presence of social organization and social movements as a critical factor for upscaling agroecology across five cases based around the world,

including the *Campesino a Campesino* movement in Latin America. Nicholls and Altieri (2018) profile four different NPO-led lighthouses in Latin and South America that each receive thousands of visitors annually. Zero Budget Natural Farming in India is also an example of a successful agroecological upscaling due to “a social movement dynamic...charismatic and local leadership... (and the) generation of a spirit of volunteerism among members (Khadse et al., 2018, p. 192). Magrini et al. (2019) point to the importance of shared values between farmers and consumers as well as co-determining rules and protocols that can support niche markets and institutionalization of agroecological principles in the community. Finally, Dale (2020, p. 3) argues that building social and political alliances is critical in the advancing of “counter-hegemonic agroecology.” Beyond social movements and organizations, charismatic leadership, shared values among actors, and the formation of alliances are also decisive factors in amplifying agroecology via lighthouses.

Taking these examples from the literature into account, there are still many gaps in understanding about agroecological lighthouses and the ways in which amplification dynamics play out in rural communities, as well as how lighthouse amplification ultimately impacts territorialization processes. Little is known on how agroecological lighthouse farms and farmers become established nexus points of learning and how lighthouses eventually provide “space” for agroecological territorialization to be successful. Agroecological territories are created over a period of time—What role do lighthouses play in recruiting new settler farmers or in creating enclaves of agroecological farms within the dominant, contemporary food system. How do these pockets form, grow, stagnate, then kick off again? Is there evidence of lighthouse pioneers from one territory moving elsewhere to establish another locus of influence? In one of the few studies that focuses on agroecological scaling in Japan, Zollet and Maharjan (2021) examined the phenomenon of clustering of new entry sustainable farmers. They define a cluster as being

both a “spatial co-location” and having active elements such as knowledge mobilization, collaboration and competition that allow clusters to develop and evolve over time (Beckie et al., 2012, as cited in Zollet and Maharjan, 2021 p. 4). Important factors leading to the formation of clusters included local acceptance of the style of small-scale farming for self-sufficiency and the presence of pioneer farmer leaders as “attractors” (Zollet and Maharjan, 2021, p. 16). This paper aims to build on this work and further explore the relationship between lighthouse formation and clustering.

In addition, territorialization is articulated in diverse ways based on socio-cultural and environmental contexts. The literature on agroecological territorialization is largely based in Latin America and there is a need to examine how the process unfolds in other locations. The forms of territorial resilience (Guzmán Luna et al., 2019) and territorial mediators (McCune et al., 2017) that can aid or diminish amplification processes for lighthouses may be different in different contexts, requiring further elaboration. For example, Peano et al. (2020) share the example of school gardens as demonstration agroecological farms in urban African cities as important places to share food culture, environmental conservation, and reimagine the urban food economy. We research how lighthouse farms help to create agroecological territories in the context of Japan.

Strong and vocal social movements and social organizations have also been key in the upscaling of agroecology in Latin America and places in Asia, such as India (Khadse et al., 2018). How essential are social movements and social organizations for lighthouse farms and farmers in amplification and territorialization processes? In Japan, there is a history of social movements associated with organic farming, but it can be argued that these have not been as vocal or influential as those seen in the *La Via Campesina* movement in Latin America (Hatano, 2008; Kondoh, 2014). As the next section describes, the Japanese organic farming movement was started a generation ago and continues today. At the same time, there is an increase in new entrant farmers wanting to practice sustainable forms of agriculture who are less motivated to become part of an existing social movement, than to escape the drudgery of modern society (McGreevy, 2012; McGreevy et al., 2019). What role does the previous generation of lighthouse farms and farmers, established as part of the organic movement, play in amplifying and territorializing agroecology in Japan?

History of Amplification and Territorialization: Interfacing Environmental Movements, Lighthouse Farmers, and Local Community

Before the 1970s, several citizen movements were organized to speak out against numerous cases of widespread environmental pollution resultant of Japan’s post-war industrialization, but the connection between chemical pollution and food production wasn’t made until the establishment of the Japan Organic Agricultural Association (JOAA) (Tabeta and Masugata, 1981; Ichihara Fomsgaard, 2014). The JOAA is a nationwide network, established mainly by medical scientists, agronomists, and

people involved in agricultural and consumer cooperatives. At first, the association was more of a place for researchers and information exchange, but as agricultural pollution and pesticide contamination became social issues, it gradually absorbed producers involved in non-chemical farming and consumers seeking safe food, and developed into a driving force for alternative agriculture and the organic farming movement in Japan (Ichihara Fomsgaard, 2014; Kondoh, 2014).

We should note that the term agroecology has only recently been introduced into Japan, but agroecological principles are largely embodied in the organic agriculture and natural farming movements and captured by the JOAA in its Prospectus document published at its establishment in 1971. In that document, the importance of maintaining the health of farmers, consumers, and the natural environment is emphasized, as is the need for farmers to improve and develop alternative methods from those in conventional agriculture (JOAA, 1971). The organic farming movement also advocated for self-reliant and self-sufficient localities with farms being ecologically and functionally complex and integrated into the local natural environment. This can be connected to the preservation and revitalization of Japan’s traditional, pre-modernization agricultural landscape, called *satoyama* (Takeuchi et al., 2003). *Satoyama* is a production landscape shaped through the interactions between people and nature and characterized by high levels of biodiversity, resilience and self-sufficiency (Takeuchi et al., 2016). Furthermore, agriculture is seen as a civic partnership, essential to the health and survival of society, and that these elements should be prioritized over economic rationalization (JOAA, 1971). *Teikei*, solidarity-based partnerships between farmers and consumers where food is purchased directly (much like community-supported agriculture or CSA), are the embodiment of the organic movement and are run democratically under the aim of mutual assistance (Kondoh, 2014).

As farmers began to realize the harm caused by high-input agriculture, organic farming spread, and a few examples of successful territorialization took hold, including those led by young farmers groups (Matsumura and Aoki, 1991), agricultural cooperatives (Takeyoshi et al., 1988), and local governments (Kohmoto, 2005; Masugata, 2008), as well as those led by lighthouse farmers. Two lighthouse cases in particular stand out: Ogawa Town in Saitama Prefecture and Kisuki Town in Shimane Prefecture.

Yoshinori Kaneko started Shimosato Farm, an organic farm producing vegetables, fruit, rice, wheat, and some animal products, in 1971 in Ogawa Town, Saitama Prefecture. He questioned the industrialization and commercialization of conventional agriculture and was eager to find alternatives. A few years after establishing his farm, he began to form direct marketing relationships with consumers (*teikei*) and attract and accept trainees. Inspired by farm schools in Europe, Kaneko created farm tours and farm stay options for trainees to learn through first-hand experience (Shimoguchi et al., 2015). Kaneko’s farm averages about 10 trainees per year and approximately half of them continue on as independent farmers (Shimoguchi et al., 2015). Throughout the 1980s, trainees began to settle and

farm in Ogawa Town. In addition, cooperation within the region developed between organic farms and local food manufacturers, as agricultural produce was processed into various organic products, for example tofu. These economic relationships became so strong that in the 2000s, some local conventional farmers converted to organic farming in order to sell their products through the sales channels developed by Kaneko (Oguchi, 2012). As a result of Kaneko's pioneering leadership in developing independent sales channels, cooperation with local industries, and training successors, Ogawa Town is now well-known throughout Japan as an organic farming town.

Around 1960, dairy farmers in Kisuki Town, Shimane Prefecture, began to consider chemical fertilizers and agricultural chemicals as a potential hazard when their cows displayed poor health. Chukichi Sato confronted this issue and worked with his fellow farmers to introduce wild grass-based feed and regulate the use of pesticides and chemical fertilizers on grass. In 1972, the Kisuki Organic Farming Study Group was established to promote organic farming in the region. Sato was also the president of a company called Kisuki Dairy, which was jointly established by a number of dairy family farmers in the town. The company aimed at small-scale, agroecological dairy farming as a means of self-sufficiency in mountainous regions. From the perspective of quality rather than quantity, the company has been producing pasture-raised milk and natural cheese since the 1980s, and has become known nationwide as a manufacturer of high-quality dairy products. Kisuki Dairy employees have access to social insurance and various welfare programs like any company. In Kisuki Town, the activities of two groups, the Organic Farming Study Group and Kisuki Dairy, interacted with each other and many initiatives were undertaken. In the process, the town government began to actively promote organic farming, and cooperation with conventional farmers expanded in the 1990s. Finally, in 1999, the town created a multi-faceted farm incorporating various small-scale food processors and businesses around the concept of slow food. The farm also accepts new organic farming trainees. At the same time, organic food manufacturers such as wineries, tofu shops, and bakeries have gathered together and formed an agroecological and high-quality food cluster (Masugata, 2008; Iguchi, 2013).

One notable aspect we can derive from these examples of first-generation lighthouse farmers is their ability to build economic and social relationships with the local community. In Japan, after World War II, the Allied government redistributed farmland and many small-scale autonomous farmers were born. Agricultural cooperatives were institutionalized as farmers' organizations to bring these new farmers together and democratically promote agricultural productivity, efficiency and improve the status of farmers. Japan Agricultural Cooperatives (Nokyo or JA) provided a variety of services, such as joint purchase of materials, joint shipment of agricultural products, instruction in farming techniques, finance, and insurance in case of crop failure. The JA became, and in many places still is, a core institution within rural communities. In the 1960s, chemical pesticides and fertilizers were promoted to improve productivity and contribute to the modernization of agriculture. Overall, the JA actively promoted the use of high-input conventional farming methods.

Technical guidance, material sales, and purchase of agricultural products were provided as one-stop services. In this social context, practicing agroecological farming methods meant taking a different path from the farmer groups that formed the local community. This not only created the risk of social conflicts, but also meant that they would have to purchase materials, learn techniques, and market their products on their own. The Japan Organic Agriculture Association and teaching centers, such as the Natural Farming Research Center in Nagano Prefecture, were able to provide support for technical guidance and sales channel development. However, building relationships with local communities was a serious challenge for all farmers, especially in the beginning stages.

In both the Ogawa and Kisuki cases, the farmers tried to integrate into the local community, cooperated where they could, and continued to work agroecologically at their own farm. While small-scale conventional farming was becoming harder to sustain nationwide, in both towns, it became clear that successful organic farming represented a business advantage. As a result, the conventional farmers in the area came to recognize the economic rationale for agroecological farming. The two towns have now formed viable value chains with agroecological farming at the core, leading to the revitalization of the region.

Policy Environment Lacking Support

Supportive policies are often cited as a way to bolster agroecological upscaling through the establishment of financial incentives or viable markets. However, organic agriculture in Japan has received limited policy support from both the Ministry of Agriculture, Forests, and Fisheries (MAFF) and JA. When the JOAA was formed in 1971, many agronomists as well as the government and JA criticized the organic farming movement. They regarded the organic farming movement as regressive to the modernization of agriculture, and no support was offered through policy or research (Adachi, 1991).

In the 1980s, more and more businesses began to specialize in organic produce, and co-ops began to expand their direct marketing operations. There was also a trend for high-end supermarkets and department stores to carry organic produce as a featured product. MAFF finally began to take up organic farming as a policy topic in the late 1980s, mainly in view of the high value-added nature of organic agricultural products. The causes of this were a reevaluation of organic farming, influenced by the agricultural policy shift in Europe and the U.S. to focus on environmentally friendly agriculture and a rise in domestic demand for healthy and gourmet food (Masugata, 1994). At the same time, there was an increase in the distribution of agricultural products claiming to be organic and the Fair-Trade Commission pointed out the confusion in labeling. The JAS organic certification scheme was established in 1999, but the costs and administrative hurdles associated with the process limited its use to large-volume producers, dissuading the majority of small-volume organic farmers from using it (Hatano, 2008). JOAA has been consistently critical of such certification regulation by MAFF and its reluctance to place *teikei* as the core market mechanism for organic agriculture. Although attention to organic farming and environmental conservation agriculture

has increased, support by JA cooperatives has also remained weak. Many JA cooperatives are engaged in joint shipments to wholesale markets and, by the JA's logic, the fact that organic agricultural products vary widely in appearance and quality make them unsuitable for this system (Oba and Otahara, 1999).

Nearly 40 years after the establishment of the JOAA, a law on organic agriculture was finally enacted in 2006: The Act on the Promotion of Organic Agriculture. JOAA and the Japan Society of Organic Agriculture actively participated in the policy development and drafting process. However, although MAFF actively promoted organic farming immediately after the enactment of the law, as time went by, the attitude that organic farming should be regarded only as a high value-added production again became the mainstream, and the law has largely been criticized due to lack of enforcement (Nakajima, 2017; Taniguchi, 2017). For example, an initiative to create organic farming model towns (*Yukinogyo Moderu Taun*) was launched in 2009, and a few municipalities were able to take advantage of the system (including Ogawa Town), but funding was cut shortly after the Cabinet deemed the impact to be too limited (Honjo, 2017). In 2017, MAFF estimated that there were 23,000 hectares devoted to organic farming in Japan, making up only 0.5% of total agricultural land (Ministry of Agriculture, Forestry, and Fisheries (MAFF), 2019).

Currently, MAFF is pursuing an agricultural policy that would see Japanese farmers increase exports of high-valued niche products through high-tech, monoculture production. Previously barred from the agricultural sector, non-farm corporations have been allowed in, signaling a shift to a corporate farming model for agriculture (Jentzsch, 2017; Hisano et al., 2018). Pressured to take action to decarbonize all sectors of its economy, the Japanese government has agreed to implement a new "Green Food System Strategy" by expanding organic agriculture to 25% of total agricultural land area, as well as significantly reduce chemical use (Ministry of Agriculture, Forestry, and Fisheries (MAFF), 2021). Looking closely at the plan, however, reveals that it is driven by high-tech infrastructure, capital-intensive investments in AI and robotics, and GMO crops, which are in opposition to agroecological principles by creating dependencies on external resources, marginalize local and traditional knowledge, decrease diversity and ecological synergies, and, on the whole, promote further corporatization of the sector.

METHODS

We set out to examine the ways agroecology was being amplified by nine lighthouse farmers in west-central Japan in two ways: (1) Through on-farm assessments and in-person interviews using a set of ten amplification indicators during the summer of 2019 and (2) by performing follow-up online interviews in January 2021 to validate the assessment and deepen our understanding of amplification and territorialization processes experienced by the farmers.

The amplification indicators used in this study are listed in **Table 1** and were selected because of both their presence in the literature on agroecological upscaling and ability to capture

particular aspects of successful lighthouse farms. The indicators closely mirror key drivers for agroecological upscaling put forth by Mier y Terán Giménez Cacho et al. (2018) but diverge to emphasize individual farmer and on-farm dimensions.

The indicators were arranged into an assessment rubric that provides three levels of detail for each indicator to aid in the assessment, shown in **Table 2**. For example, indicator C. Participation in networks for sharing experiences and knowledge shows for the lowest score (1) "Don't engage in knowledge exchange"; for the middle score (2.5) "Occasionally participates in knowledge exchange, sharing practices, technical information"; and for the high score (5) "Actively participates in farmer to farmer exchanges, open to visitors, engages in training (own farm or other places to teach), is a promoter." Using the rubric, each indicator can be scored on a scale from 1 (low) to 5 (high) depending on how well the criteria are adhered to by the farmer.

The rubric was used as part of a pilot survey on nine farms in the summer of 2019. Representatives from organic farming networks were contacted via social media or professional networks and asked to identify exemplary organic farmers in the area who were highly respected by their peers as farmer leaders. Five farmers were identified in Kyoto, three in Hiroshima, and one in Hyogo Prefectures. All farms self-identified as either organic or following natural farming precepts, while two were certified as organic. Following the cultural standard of farm (household) representation, all farm representatives we interviewed were male, of ages ranging between 35 and 60, with a minimum of 10 years of farming experience (some were more established with more than 30 years of experience). All except farmers 4 and 6 are first generation farmers, meaning they had no familial heritage in farming and initiated their farm on their own. Such farmers predominantly rented their land (average farm size 1.5 hectares). Farmers 4 and 6 are farm successors with full ownership of their land. All farmers were self-employed, specializing in vegetable production for mostly urban consumers, and the majority of their total income came from their farming activities. A summary of agroecological farming practices by the farmers can be found in **Appendix 1**.

Farm visits were conducted in the summer of 2019 and the assessment rubric was used to score each indicator. During the farm visits, farmers were interviewed informally, with the rubric as a guide. Each farm visit included a tour of the farm and the whole engagement lasted ~2 h each. Farms were scored by four researchers and scores were discussed together after the visit to arrive at the final assessment.

After the survey using the rubric, scores were analyzed and the four farmers with the highest scores were selected as the most successful lighthouse cases and asked for a follow-up interview. Due to COVID-19 precautions, these interviews were conducted online. The interviews lasted for 1 to 2 h and aimed at validating the effectiveness of the assessment tool from the farmers' perspective and to deepen our understanding of processes and dynamics of agroecological amplification and territorialization in connection to lighthouse farmers. A set of open-ended interview questions (**Appendix 1**) was used to facilitate the conversation and covered topics such as the farmer's relation to their surrounding community, the process of initiating

TABLE 1 | Ten indicators to assess the amplification potential of selected farms and farmers.

Indicators	Description	Identified in the literature
1. Motivations to search for alternatives	What are the farmer's motivations? Are they primarily motivated by economic profit (associated with a low score), or is the health of the farm's agroecosystem and surrounding environment, as well as the wellbeing of the rural community and society at large a concern?	Mier y Terán Giménez Cacho et al., 2018; Nicholls and Altieri, 2018
2. Level of social organization	To what degree is the farmer an active member of farmer organizations at either a local, regional, or national level? Are they isolated or only concerned with their own practice?	McCune et al., 2017; Khadse et al., 2018; Mier y Terán Giménez Cacho et al., 2018; Dale, 2020
3. Participation in networks for sharing experience and knowledge	To what degree is the farmer engaged in farmer-to-farmer knowledge exchange, hosting students, interns or trainees, otherwise open to visitors who want to learn?	Laforge and Levkoe, 2018; Anderson et al., 2019a; Val et al., 2019
4. Use of effective, efficient and accessible traditional and modern agroecological practice	To what degree is the farmer respectful and/or incorporate diverse forms of knowledge (traditional, local) and practice relevant to their own agroecosystem? Is emphasis placed mainly on rationalizing agriculture and external inputs?	Altieri and Nicholls, 2012; Nicholls and Altieri, 2018; Mestmacher and Braun, 2020
5. Autonomy: Dependency on external inputs, markets and policies	Does the farmer have control over their terms of engagement in the marketplace, to determine prices and their methods of farming?	Nicholls and Altieri, 2018; Anderson et al., 2019a
6. Leadership (mobilizing discourse, encourages and influences community by example, generates enthusiasm in community)	Does the farmer play a role in mobilizing discourse, encouraging, and influencing different communities (both agricultural and local) by example?	Khadse et al., 2018; Cofré-Bravo et al., 2019; Zollet and Maharjan, 2021
7. External allies (working linkages with Universities, NGOs, extension agents, etc)	To what degree does the farmer work in collaboration with external allies such as universities, non-profit organizations, or extension agents? Are they networked with relevant potential partners?	Wezel et al., 2018; Anderson et al., 2019a; Cofré-Bravo et al., 2019
8. Benefits from local/national conducive policies	Does the farmer take advantage of relevant policies to benefit their practice or farm?	Mier y Terán Giménez Cacho et al., 2018; Nicholls and Altieri, 2018; Nicol, 2020
9. Favorable markets (participates in alternative food networks, direct links with consumers, etc.)	Does the farmer participate in alternative food networks with direct links to consumers? Do they form economic relationships based on solidarity, rather than depend on mainstream markets over which they have limited control?	Mier y Terán Giménez Cacho et al., 2018; Magrini et al., 2019; Berti, 2020; Nicol, 2020
10. Focuses on principles and processes rather than technologies and "magic bullets"	Is the farmer knowledgeable of and practicing agroecological principles? Or are they attached to recipes, "magic bullet" solutions, or the use of specific techniques or ingredients that do not take into account the uniqueness of each farm?	Nicholls and Altieri, 2018; Wezel et al., 2020

their farms, and their own conceptualizations of lighthouse farmers. The interviews were then transcribed and answers were compiled according to the ten indicators to assess the amplification potential of selected farms and farmers.

RESULTS

In the following section, we share results on each of the ten indicators from the survey and content from follow-up interviews of farmers to highlight significant elements of farmer lighthouses in the Japanese context. We then use the same data to describe the establishment process of agroecological lighthouse farms, how farmers were able to create and maintain networks of knowledge sharing and influence, and how these efforts merged to territorialize rural farming communities and surrounding regions. All farmers surveyed in the study will be referred to by a number.

Amplification Potential Assessment Motivation to Search for Alternatives

This was the highest scored indicator for all farmers surveyed with an average score of 3.83 out of 5. This can be attributed to the fact that organic agriculture has historically been rooted in a critique of modern industrial agriculture and is generally understood as being based on coexistence with the natural environment and way of living over a set of techniques (Nakajima et al., 2010). Farmer 7 emphasized the importance he places on recycling locally available resources to coexist within the surrounding ecosystem distinguishing himself from organic farmers who merely purchase off-farm organic inputs. Similarly, Farmer 5 described his agricultural practice as abiding by a traditional "*satoyama*-style," reflecting the conscious embedding of their practice in the landscape, through, for example, active use of forest leaf litter and limiting his use of livestock manure, which he felt might have heavy metals and other toxins. Farmer 9 also relies on leaf litter collected from nearby forest as

TABLE 2 | Set of ten indicators used as an agroecology amplification assessment rubric.

Indicator	Scoring criteria		
	Value 1 (Low)	Value 2.5 (Medium)	Value 5 (High)
1. Motivations to search for alternatives	Just economically/profit motivated	Both economic and environmental. Maybe focused on their own farm	Deep reasons, human/social, autonomy, well-being. Concern extended to the community
2. Level of social organization	Individual, isolated, work alone, don't connect with the community	Well-connected in community, but not connected with outside. Well-connected outside of the community, but not locally	Well-connected with the local community and outside of the community (regional/national/international)
3. Participation in networks for sharing experience and knowledge	Don't engage in knowledge exchange	Occasionally participates in knowledge exchange, sharing practices, technical information	Actively participates in farmer to farmer exchanges, open to visitors, engages in training (own farm or other places to teach); is a promoter
4. Use of effective, efficient and accessible traditional and modern agroecological practice	IPM, ignores traditional knowledge (i.e., old knowledge is a practice of ignorance); rationalization of external inputs; combine organic and conventional	Input-substitution	Highly advanced agroecological farming practices, blending different forms of knowledge/techniques (traditional/scientific/modern), farm redesign
5. Autonomy: Dependency on external inputs, markets and policies	Debt, high dependency on external schemes/subsidies, depend on intermediaries (middlemen), don't set their own price	Sometimes there is control over these factors; external inputs purchasing happens occasionally, sometimes deal with middlemen	Control over the terms of engagement with the market (); determine prices themselves, no use of external inputs, not dependent upon subsidies/extension
6. Leadership (mobilizing discourse, encourages and influences community by example, generates enthusiasm in community)	Not a leader in any way. Follower, not inclusive	Has a discourse, can mobilize enthusiasm, but not followed by practice or vice versa; limited impact on neighbors/local community	Motivate and influence communities, charismatic leaders, has disciples (guru-student); has a philosophy AND technique (discourse matched with practice); make special effort to be inclusive (youth, women, local authorities); impacts policy making processes, impacts local farmers/neighbors
7. External allies (working linkages with Universities, NGOs, extension agents, etc)	No allies, no relationship with groups who might be allies Not open to working with scientists, other experts Actively dismissing science	Limited allies, connectivity with external allies, not the best allies Open to science collaboration, but not active in the research co-design (i.e., "Just tell me the results")	Close ties with universities, NGOs, extension Relationships have palpable outcomes/outputs that solve problems/enhance practices etc Open to participatory science collaboration (Co-creation processes visible)
8. Benefits from local/national conducive policies	Don't take advantage of policies that they could use; completely ignorant of policy options that might help; actively against policy interventions; only act if there is a policy option	Sometimes take advantage of policy, but don't fully implement the practice; Just in it for the monetary reasons	Strategically, take advantage of policies; results are obvious
9. Favorable markets (participates in alternative food networks, direct links with consumers, etc)	Depends on mainstream markets solely; market determines their sales circuits	Varied, one products in mainstream markets, another in an alternative (i.e., coffee farmers, cash crop farmers)	Actively involved in local, alternative markets (by-passing the mainstream markets/options); strong solidarity relationships with consumers
10. Focuses on principles and processes rather than technologies and "magic bullets"	Dogmatically attached to recipes and magic bullets; secret ingredients	Mixed, apply certain principles Open to other options, but some reliance on magic bullets Limited understanding of agroecological processes Enacting practices without understanding the underlying effects	Deeply understands agroecology, skeptical of claims of magic bullets; Don't work with recipes; flexibility in their approach because they understand principles/processes

Indicators were assessed and assigned a value between 1 and 5 according to the criteria described for each indicator (1 corresponding to poorest performance, 2.5 a medium value, and 5 indicating high performance).

organic amendments in his soils, as was the practice before the introduction of chemical fertilizers. In general, each farmer lighthouse saw their farming practice as being more than a process of growing commodity crops but, as Farmer 7 put it, a “way of thinking” about how to better interact with the larger environment.

Level of Social Organization

This indicator had the second lowest overall score on average (2.81). Those who scored high for this assessment were all active members of farmer study groups, both in their own communities as well as across multiple communities. Several were in study groups that had taken advantage of a government supported funding scheme to expand eco-friendly agricultural production in Japan (Farmers 3, 5, and 10). If organic farmer colleagues were nearby, they actively communicated on what others were growing, what kind of fertilizers they were using, and coordinated when necessary (Farmer 7). Also connected to indicator 1, all of the farmer lighthouses emphasized the importance of interacting with local conventional farmers. Many conventional farmers in the community produce vegetables for self-consumption and have significant place-based and traditional knowledge that can be accessed if cultural norms (deference for the elderly, etc.) are navigated effectively (McGreevy, 2012). Both new farmers originally from outside the community as well as local farmers demonstrate preferences for certain kinds of knowledge that can create misunderstanding and lack of knowledge exchange for the less socially adept (McGreevy, 2012). Farmer lighthouses were also affiliated with regional organic agricultural associations (Farmer 3 and 5) and actively participated in online seminars to learn about the latest technologies and discourses around organic agriculture. Despite COVID-19 induced restrictions, social ties have been maintained and, in some cases, strengthened due to the normalization of online exchanges and seminars.

Participation in Networks for Sharing Experience and Knowledge

Farmers with overall high scores had either initiated or played a key role in farmer-to-farmer study groups. Farmer 9 organized weekly study groups among local hobby farmers or gardeners who tend to be more open to organic techniques. Others organized study groups for any and all farmers in their local communities that aimed at expanding “ecologically friendly” practices.¹ By casting the net widely, rather than explicitly making it exclusively an organic group, Farmer 7 intended to strengthen production capacity and improve the community’s environmentally-friendly image. He clarified, however, that it was possible to do that in his community because there were fewer full-time conventional vegetable farmers, who he suspected would not be as open to alternative methods of production. All farmer lighthouses had one to two trainees who stayed and learned under them for at least 1 year and all attracted trainees to their farms without active recruiting. Trainees often settled

and started their own farms in communities nearby where the lighthouses were located.

Use of Effective, Efficient, and Accessible Traditional and Modern Agroecological Practice

The overall score for this indicator was slightly above average among surveyed farmers (3.11). Both farm visit observations of farming practices and interviews contributed to the score. All of the lighthouse farmers were very open to different forms of knowledge and methods of agriculture, and were very active in trying to incorporate knowledge from their neighbors, as well as maintaining active exchange with relevant research institutions and organizations that hold online seminars on agricultural techniques, as described in the description for indicator 2.

Dependency on External Inputs, Markets, and Policies

All farmers cited that they had control over how they engaged agricultural markets due to the fact they were all utilizing box schemes or B2B direct consumer sales channels where they can determine their own price. Farmer 9, for example, sells directly to his customers and has full control over the price at which he sells. Dependency on external inputs, however, was evident as many were dependent on plastic mulch, manure or organic amendments procured from off-farms, which may explain the relatively low average score of 2.72.

Leadership

Leaders are often described as being charismatic and many people would come to learn their techniques and philosophy. Effective leaders are inclusive, opening up their farm to anybody who comes independent of their age, gender, nationality, or social position and create new communities of exchange and interaction. In such a way, they are often able to impact policy making processes. To this point, all of the lighthouse farmers receive many visitors on their farm, ranging from consumers, vendors, middlemen, students, as well as local politicians. They try to value diverse perspectives and people from all walks of life, and as a result, there are constant requests for people who want to visit and people who want to come and train under them. According to Farmer 9, one way to maintain their social and political influence in their communities was to obtain organic certification. Due to strong, trusting relationships established with his customers, he does not feel like he needs a government issued certification to sell his products, however, he maintains the certification in order to maintain legitimacy when talking with government officials. This way, he can better voice his opinions when discussing policies such as incorporating locally grown organic produce in local school lunches. All of the lighthouse farmers helped establish and were leaders of their respective organic agriculture research groups.

External Allies

According to the assessment survey, this was the factor that most farmers seemed to struggle with the most, reflected in the lowest average score of 2.17. Of the nine farmers surveyed, most had regular interactions with other farmers, but collaborative

¹In Japan, “eco-farmers” are defined as farmers who have successfully halved their synthetic input use.

partnerships with researchers or other specialists were limited. The four farmers who scored the highest and were interviewed, however, were extremely active and engaged regularly with researchers and extension agents. All of the farmer lighthouses hosted regular study groups. Farmer 5, for example, presents at academic conferences, maintains close relationships with local universities, hosts student visitors, and gives talks at local junior and senior high schools. Farmer 3 was an active member of JOAA and regularly attended IFOAM and URGENCI meetings as a delegate.

Benefit From Local/National Conducive Policies

While available subsidies to support organic agriculture have increased, they can also be considered a hassle, taking away valuable time that could be spent doing other things. Farmer 3 described how many Japanese organic farmers tend to also be anti-government, leading to an aversion to receiving any form of support from the government. While this may be associated with the older generation, it is still a noticeable factor for many farmers seeking a more autonomous lifestyle, away from the mainstream. For these reasons, the degree to which the surveyed farmers took advantage of available policy support varied greatly (with an average score at 3.00). Regardless, all the lighthouse farmers were very open to working with the government, and took advantage of the generous government subsidies available to new entry farmers, which many would struggle without (McGreevy et al., 2019). For example, when Farmer 9 was looking for farmland to initiate his agricultural career, he took advantage of information centers and the agricultural land bank scheme managed by the government to gain access to affordable land to rent. He chose to take advantage of this government mediated system, rather than purchasing his own, because it provides 10 year contracts to farmland, offering sufficient stability while saving on expenses. Farmer 5 applied for subsidies together with his own trainees who had set up their own organic farms nearby. Lighthouse farmers were all very open to collaborating with other farmers to obtain support from the government, as well as actively engaging with policy makers.

Favorable Markets

All lighthouse farmers had a strong network of customers to whom they could sell on their own terms, reflected in the second highest score of the ten indicators (3.6). As an organic farmer who cannot rely on conventional market mechanisms, establishing a reliable consumer base is a necessity. Those located closer to cities tended to have an easier time selling their produce. Farmer 9 who lives in northern Kyoto described their isolation as the largest limitation for those who become organic farmers in his region (which is located 2 to 3 h from the nearest urban center). To solve this challenge, he recently established a company as part of his farm to enable him to hire aspiring farmers in the community, as well as create a food processing center and a weekend cafe to make efficient use of and add value to produce that they cannot sell fresh.

Focus on Principles and Processes Rather Than Technologies and “Magic Bullets”

This indicator is closely reflective of the agroecology farm assessment tool conceived by Nicholls et al. (2020), which centered on the practices of each farmer based on agroecological principles including the recycling of nutrients and energy, enhancing soil organic matter and soil biological activity, diversifying plant species and genetic resources over time and space, integrating crops and livestock, and optimizing interactions of farm components. Most of the organic farmers scored relatively high on this indicator, as the development of organic agriculture in Japan, as previously described, is founded on a concern for ecologically sustainable farming methods based on the recycling of local resources, similar to the same set of agroecological principles. As organic produce is becoming more mainstream, however, there is concern around extensive reliance on technologies in the form of plastic mulch or minerally enhanced fertilizers. One farmer who scored low in this category was dogmatic in his focus on natural farming methods, and did not recycle or add any form of nutrients to his soil. In contrast, the farmer who scored the highest during this assessment used live mulch, instead of plastic mulch, to optimize biological interactions within his farm.

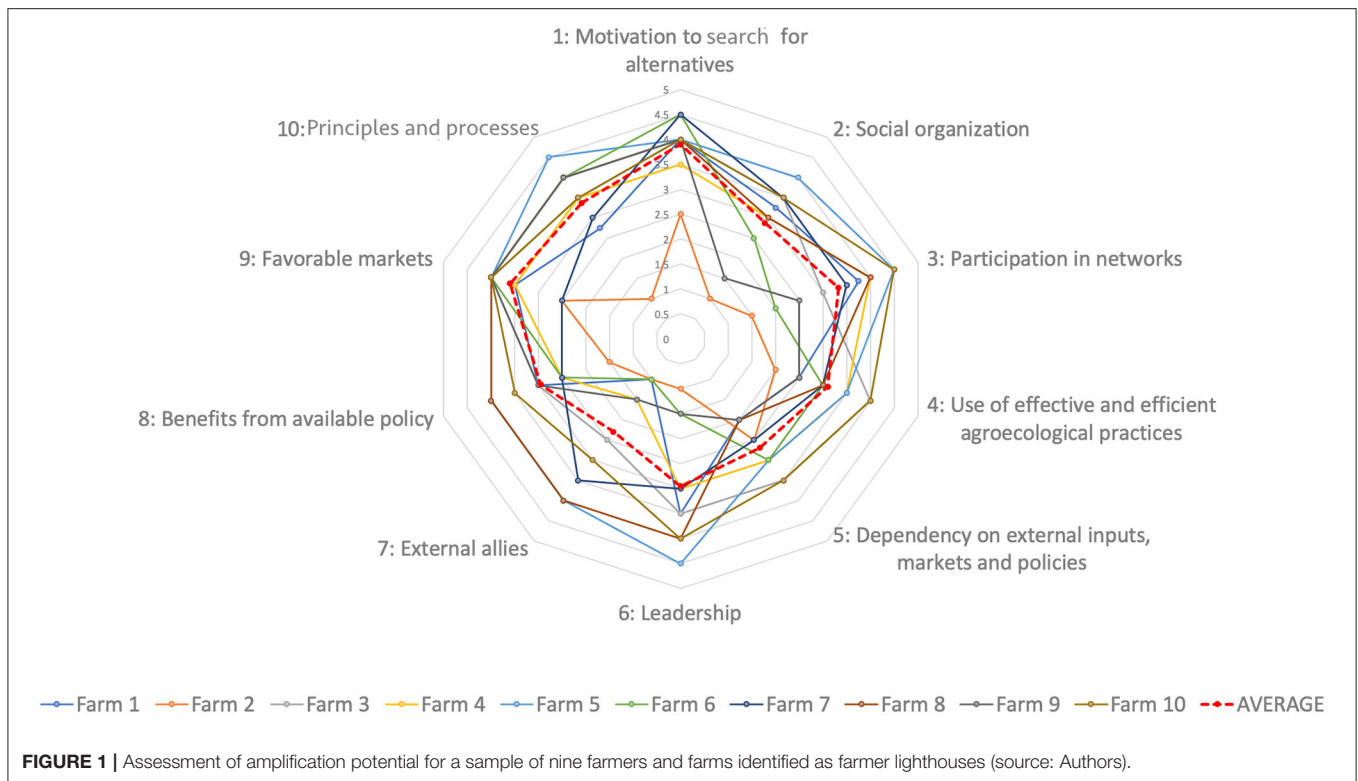
A compilation of amplification assessment scores and their averages is displayed in **Figure 1**.

Amplification and Territorialization Processes

The four farmers who scored highest in the assessment were interviewed to provide further detail and experience regarding amplification and territorialization processes in their rural communities.

Establishing Farms and Knowledge Networks

Each of the farmers had a unique story of how they established their farms and knowledge networks. Farmer 7 started farming as a part of his graduate studies, because of his collaboration with his advisor, did not choose where he started to farm. He relied on members in the community who were graduates of his university to get himself established in the community. Farmer 5 also decided to become a farmer as a university student. Once he decided, he visited around 100 farms to gain a deeper perspective on the state of the agricultural sector. Of those he visited, half were in the prefecture he ultimately chose to settle in, a quarter were suggested by those he visited, and the final quarter were conventional farmers he visited to understand what not to do. He chose to settle in a place with optimal climatic factors as well as the presence of traditional farmers in the community from whom he could actively learn. Farmer 3 started farming because he was interested in farming as part of a cooperative. He purposefully chose to settle in a rural community in which a group of thirty producers worked collectively to sell to an established consumer group of around 1,500 members. Joining this local farmer network proved to be a decisive factor in establishing his farm. Even though this cooperative has since decreased to only two producers and about 200 consumer members (primarily due to producer aging and changing consumer demographics), he



maintains robust farmer networks at the regional scale. Farmer 9 started as a conventional farmer and chose to convert to organic after 6 years of farming. He describes the conversion as eliciting support from his neighbors:

“At that time, the conventional farmers in the community were supportive and agreed that I was trying to do something good, although they all expressed worry. To learn organic farming, I visited many farms around the region, but also learned a lot from the Natural Farming Research Center. They were researching the differences between till vs. no-till, live mulch vs. plastic mulch, etc. Also, there was a retired professor from Kyoto University who had a study group once a month. I learned a lot from him. The reason why I settled here was because of the opportunity to have a relatively large plot of land leased over a long period of time.” [Farmer 9]

Community Relationships and Clustering

None of the lighthouse farmers interviewed indicated that they had experienced social friction or pushback from the rural communities in which they live and farm. Cognizant of the economic and social hardships of previous generations of organic farmers, the lighthouse farmers were selective in choosing the location of their farms to maximize opportunities for direct sales channels and minimize contact with communities in which their form of production would be a target for friction. For example, Farmer 7 cites the fact that his village is not a major production area with a strong JA cooperative presence as a reason for enhanced social relations.

“Because of the proximity to an urban center and the existence of a direct sales market in our village, many new entry farmers have established themselves in my community who came after me. The fact that our village is not a major agricultural production area, made it easier for people like me, practicing something different, to be accepted. If it were a community with many full-time conventional vegetable farmers, it would probably be more difficult to emphasize organic practices. For this reason, I have not experienced any push back from the community. Rather, many in the community share the techniques they use in their kitchen gardens that do not rely on synthetic inputs.” [Farmer 7]

Many of the lighthouse farmers cited that, in fact, their farming neighbors were very interested in learning production techniques that don’t utilize chemicals. The lighthouse farmers maintain are very open to interaction and learning opportunities with conventional vegetable farmers and anyone interested in their methods.

“I have very good relations with the people in the community. While some worried if I could make it as a full-time vegetable farmer, that came in the form of care, where many brought me a lot of food to eat. Once they realized that I was able to support myself, they became curious about my techniques.” [Farmer 5]

The ability of lighthouse farmers to form mutually beneficial social relationships with their farming neighbors also allowed them to establish fertile space for new entry farmers to settle and cluster in the area. This inclusivity and non-confrontational attitude were shared among all of the interviewed lighthouse

farmers and not only strengthened their knowledge networks, but allowed access to certain locally-held resources such as rentable land or equipment.

“Many people in the community visit me to ask how I am able to grow quality vegetables without the use of chemicals. Otherwise, all other farmers are a part of the same teikei groups, or a different organic cooperative. Other than that, we established an Organic Agriculture Research Association in our region, and we try to be open to anybody in the region who might be interested, no matter what kind of agriculture they practice.” [Farmer 3]

In addition, evidence of successful and productive farming helped to win the respect of local farmers and initiate the legitimization of agroecological farming principles in the community, making it easier for new entrants who share an interest in agroecological approaches to cluster in the area. Farmer 9, for example, has established himself in his community as a source of inspiration and expertise among conventional farmers.

“I think conventional farmers would rather not spray or at least minimize their use of pesticides. They are worried, however, about the impact that would have on the quality of their products. So, they often come by and ask why I am able to grow such beautiful vegetables without any pesticides. I haven’t convinced anybody to become organic, but I try to understand the challenges they face and try to help wherever possible.” [Farmer 9]

Diverse Lighthouses as Amplifiers and Sources of Resilience

Each lighthouse farmer had a keen understanding and appreciation for diverse agricultural practices co-existing at the territorial level. This diversity was seen as a strength in creating an inclusive organic movement, amplifying territorialization, and as a source of resilience to continue production into the future. Appreciation of the rural communities that accepted many of them as an outsider in the first place may explain the unique position diverse-yet-co-aligned production practices hold for them, as these same communities accepted them and allowed them to thrive.

“Yes, I see certain people who practice a different management style than myself as sources of inspiration, or lighthouses. They all have different and unique wave lengths, and I want to find my own light, and my own brightness, within their light.” [Farmer 7]

“I don’t have specific lighthouse farmers I go to. I try to learn whatever I need to from as many people as I can.” [Farmer 5]

Farmer 3 sees networks of lighthouse farms driving and supporting agroecological territorialization. He values diverse production practices as a way to survive and maintain resilience at the landscape level.

“It’s not one lighthouse, but we try to maintain many small lighthouses to light the entire landscape. It’s more sustainable that way. There are people who want to be left alone and I think that’s fine, but if you are isolated, it becomes farming merely for self-gratification. I try to be active in a community because I don’t want

to get left behind with new technical innovations that come up. It’s more stimulating that way, and we grow as a community. In our organic community, there are many kinds of farmers, ranging from farmers who add precise amounts of organic inputs to maximize their monocrop yields, to those who do no-till, no-input style natural farming. Overall, I think this kind of diversity improves our ability to survive collectively, and an effort to homogenize practices would be dangerous.” [Farmer 3]

Farmer 9 pointed out that certain species can also act as a form of biological lighthouse, amplifying agroecology at the agroecosystem level.

“A lighthouse is not limited to humans. To me, ladybugs are lighthouses. They embody functional biological diversity on the farm, and their presence guides me.” [Farmer 9]

DISCUSSION

Lighthouses Amplifying Community Ties and Clustering

An important aspect to consider when looking at barriers for the territorialization of agroecology is how agroecological farmers, including lighthouses, co-exist and interact with established farming systems and other territorial actors. In Japan, agroecological farmers are not only farming in a way that differs from mainstream conventional farming: they are also often outsiders to the local community, which underscores the importance of the characteristics of the locally dominant farming mode (e.g., part time vs. full time farming) and by extension of the socio-cultural aspects (mindset, values) of the local community (Zollet and Maharjan, 2021).

Zollet and Maharjan (2021, p. 19) found that farmer clusters—which often develop in part to the presence of lighthouse farmers—create “supportive ‘communities (of practice) within the community’ without at the same time distancing themselves from local society.” There is further evidence of these aspects in the findings of this research: the lighthouse farmers interviewed experience little to no pushback from the communities where they settled because such communities had a high proportion of part-time farmers, many of which were still partially engaging in traditional farming practices compatible with agroecological farming. Furthermore, because many are new entrants into their communities to begin with, lighthouse farmers tend to have a non-confrontational attitude toward practices different or conflicting with theirs, which might have further contributed to the acceptance of their practices by the local community. The quote by Farmer 9 also emphasizes the importance of using effective agroecological practices (indicator 4) that can give good results even without pesticides, a factor that was important in convincing local conventional farmers that agroecological practices are legitimate. Supportive “communities of practice” within a diverse farming community, even though they may not all be practicing agroecology, provides stakeholder support for the agriculture and food system transition, a key component in the creation of agroecological-territories (Wezel et al., 2016).

In addition, the results highlight the importance of access to appropriate knowledge to facilitate learning and innovation, which has been recognized as essential in the successful territorialization of agroecology (Guzmán Luna et al., 2019). Among Japanese agroecological farmers, formal technical support and extension by mainstream agricultural organizations is generally deemed inadequate and restrictive in the type of knowledge and support offered (Zollet and Maharjan, 2021). Lighthouse farmers play an important role in this sense: all lighthouse farmers interviewed were actively engaged in learning and producing agroecological knowledge, as well as disseminating their practice through proximate networks (e.g., trainees, neighboring farmers within their community) but also with actors outside of their immediate circle (e.g., through online agricultural seminars, interaction with researchers, and consumers). The fact that many new farmers settle close to the lighthouse farmers where they completed their traineeship period further supports the process of agroecological territorialization, potentially leading to the creation, as aspired by Farmer 3, of “many small lighthouses to light the entire landscape.”

Beyond facilitating transformative learning, lighthouse farmers are also able to establish relationships with different local and extra local actors, thus displaying the ability to use bonding, bridging and linking social capital (Cofré-Bravo et al., 2019). A common example where bonding social capital is put to use is the establishment of common market channels or venues among agroecological farmers within a cluster, which in turn supports territorialization by making agroecological farmers’ products more visible locally. Bridging social capital is more evident in the relationship with local community members, including conventional farmers, and in the ability of lighthouse farmers to create positive interactions with them. This might partly explain the capacity of lighthouse farmers to mitigate the effects of “dark social capital,” such as closed attitudes to community outsiders and the rejection of agroecological practices by local conventional farmers and their organizations. For example, McGreevy found that new entry farmers in upland farming villages faced both social and knowledge-competency barriers to forming beneficial community relationships due to different knowledge cultures and notions of “good farming” (2012). New entrant organic farmers in particular are often unsuccessful in their farming operations, which can delegitimize agroecological practice in the eyes of locals. The results here show that successfully mitigating social friction might rest upon the intentional choice of more “open” communities or the demonstration of farming success. Finally, linking social capital can be seen in the role played by lighthouse farmers in interacting with institutional actors, such as local governments, a characteristic shared among all the interviewed lighthouse farmers.

Uniqueness of Territorialization in the Japanese Context

In the Japanese context, the discussion on territorialization and territorial resilience can be connected with culturally-specific concepts such as *satoyama*. The characteristics associated with

satoyama landscapes mentioned by some of the farmers are the culturally significant agroecological territories of past agricultural regimes (Wezel et al., 2016). The idea of using and cycling resources within the community or region, including skills, money, and local employment in sustainable agriculture, and more money being spent locally is important for the maintenance of traditional *satoyama* landscapes and also a tenet of the Japanese organic farming movement. This echoes the importance of resource flows in agroecology (Rosset and Altieri, 2017; Nicholls et al., 2020) and can also be linked to the (re)use of traditional knowledge to enhance the effectiveness of farmers’ practices and their independence from inputs provided by external actors. Some of the lighthouse farmers interviewed, most notably Farmers 5, 7, and 9, are explicitly connecting their farming philosophy and practice to a wider discourse of resource circulation that goes beyond agriculture and into broader principles of circular economy applied to the local context (Mori, 2020), which resonates with the idea of agroecological territories and with the principles of territorial resilience proposed by Guzmán Luna et al. (2019). The historical significance and modern-day vestiges of *satoyama* landscapes, as well as efforts to reintegrate agricultural practice into traditional circular resource flows also make them a unique form of territorial mediator (McCune et al., 2017). *Satoyama* is a highly resilient “cultural matrix” that can communicate across different groups and interests, and influence how community and farmer identity is formed and activated in agroecological territorialization (Guzmán Luna et al., 2019).

Second, the Japanese organic movement did not originate as a farmer-driven movement. Fears of food contamination and environmental pollution were acted upon by consumer groups and experts to form multi-stakeholder platforms, such as the JOAA, and promote safe and sustainable alternative agriculture. This is a very different experience from those described in the literature originating in Latin America, where vocal, farmer-led social movements drive agroecological territorialization in opposition to an industrial agricultural “empire” (van der Ploeg, 2009). This isn’t to say that the farmers in this study didn’t deal with opposition or resistance to their farming practices, as each was isolated from core rural institutions and marketing channels associated with the JA and were not provided a supportive policy environment to enhance their farms. However, the willingness of lighthouse farmers in this study to work alongside conventional farmers and create relationships to share knowledge and local resources points to the nuanced context rural Japan faces: the need to reduce de-agrarianization, but at the same time find economically and socially viable agroecological and repeasantized pathways (Hisano et al., 2018; McGreevy et al., 2019). We should also point out that *satoyama* landscapes were created and managed by traditional agricultural practices and that deagrarianization and the degradation of *satoyama* landscapes are intimately linked. Farmer-driven social movements are cited as a key element in successful agroecological upscaling (Khadse et al., 2018; Mier y Terán Giménez Cacho et al., 2018; Wezel et al., 2018), but Japan provides a counterexample where careful deployment of

social capital at the community level amplifies legitimacy and territorialization.

This appreciation of diverse yet cooperative communities is also seen in the successful historical cases of Kaneko and Sato's lighthouse farms. In both cases, the farmers labored diligently to create economically successful farms that attracted attention, after which they partnered with local actors to form new collaborations and further territorialize. The most successful lighthouse farmers in this study follow a similar trajectory, but are strategic to encourage the growth of cooperative networks and avoid "leading by conviction." Organic farmers in rural Japan can have a reputation for being overly dogmatic and unwilling to compromise personal dictates on how farming should be done (Knight, 2003), pointing to the importance of indicators 1 (motivation to search for alternatives) and 10 (principles and processes). The highest scoring lighthouse farmers in this study were able to build on the historical examples of success to prioritize community-level cooperation that leads to territorialization.

Limitations and Amplification Methodology

The research had a few limitations. More time could have been allocated for the evaluation, especially for assessing how the farm and farmer are able to create and maintain social relations and networks. The assessment was conducted by evaluators who had preexisting in-depth knowledge of the territory, but this may not be the case if replicating the methodology. Adequate time should be allocated to become familiar with the territory, as there is the risk of painting a partial or inaccurate picture of the farmers' role as an agroecological lighthouse. We addressed these limitations by conducting follow-up interviews with farmers to elucidate specific aspects of their social networks, practices, and experiences. Our sample was also dominated by male farmers, which no doubt led to missing some of the gendered nuisances associated with agroecological amplification driven by women farmer lighthouses (Mier y Terán Giménez Cacho et al., 2018).

In order to facilitate further research on farmer lighthouses, the amplification assessment rubric presented here is a first step. The assessment rubric could be further developed (e.g., through more detailed description of each indicators' levels) as a self-assessment tool for farmers interested in evaluating their role as lighthouses and their strengths and weaknesses regarding their potential to contribute to agroecological territorialization. More broadly, it could also support processes of farmer-to-farmer transformative learning as a tool for collective self-reflection or by farmers within a cluster to evaluate the possibility to improve their practices as a group.

CONCLUSION: COOPERATION ON-THE-GROUND VS. CONTESTED TERRITORIAL FUTURES

In their paper on *formación* and territorial mediators, McCune et al. (2017, p. 369) write: "territorial transformation is not a subject-object action carried out directly by a social movement; instead, it is a mediated process in which diverse subjects assume

specific tasks in specific moments, creating social feedbacks and emergent principles." This insight is crucial in understanding agroecological amplification and territorialization in rural Japan now and into the future. Lighthouse farmers in this study detailed numerous moments in which they entered into cooperative relationships with diverse farmers, mediated farmer-to-farmer learning, and amplified agroecological principles in their communities via on-farm practices and knowledge exchange. Through these processes, new opportunities to maintain and expand agroecology were activated for the next generation of farmers, creating positive feedback in the community in the form of viable markets and access to local resources. Agroecological practice by lighthouse farmers revalorized culturally significant identities at the landscape level, such as *satoyama*, which further propelled territorialization. In these ways, lighthouse farmers led on-the-ground efforts of cooperation, in spite of the contested future for agriculture in Japan.

The prioritization of a neo-liberal, corporate agriculture is now beginning in earnest in Japan, as was evident in the lack of policy support for small-scale, environmentally friendly farming (Hisano et al., 2018). While this trend is more pronounced in the literature as a challenge for agroecological upscaling in Latin America (Giraldo and Rosset, 2017; Mier y Terán Giménez Cacho et al., 2018), the top-down encouragement of capital-intensive corporate agriculture (both conventional and organic) in the discourse at the national level has yet to have significant impact in the farming communities where this research took place. Instead, and without government support, interest in and experimentation with diverse forms of small-scale agroecological farming was flourishing and was able to coexist with conventional farmers because of high-quality produce and the ability of farmer lighthouses to integrate with rural communities. It remains to be seen whether or not farmer lighthouses will retain their "light" if and when the presence of corporate industrial farming expands its presence. Policy to support the amplification of agroecology in Japan could take the form of establishing guaranteed market opportunities for organic produce through public procurement schemes, recognizing, and subsidizing farmer-to-farmer networks as trainers and knowledge brokers for agroecological knowledge, expanding financial support for new and small-scale farmers in the form of direct payments, and more funding for research on how conventional agriculture can transition to agroecology.

"Diverse subjects assuming specific tasks in specific moments" also draws attention to the need for more research on socio-cultural, historical, and environmental contexts that influence agroecological amplification and territorialization processes (McCune et al., 2017, p. 369). This research highlights the unique situation in rural Japan, but comparative research with other countries experiencing de-agrarianization, de-peasantization, and rural aging might reveal new insights as to how amplification and territorialization are experienced or catalyzed by farmer lighthouses in diverse contexts. The agroecological movement, as well as other movements for sustainable agriculture, has developed to the point that the historical legacies and efforts of previous generations of farmer lighthouses is also a subject of

great interest. In this study, the current generation of farmer lighthouses, both heritage and new entrants were able to learn from the lessons of past lighthouses and make best use of the context in which they are able to farm, but this may not always be the case. There may also be fertile ground to explore the potential role of biological or ecosystem-embedded lighthouses as an amplifying presence.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Institute for Humanity and Nature, Ethics Committee. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

SM, NT, MK, CN, and MA: conceptualization and methodology. SM, NT, MK, CN, MA, and SZ: formal analysis, writing—original draft preparation and subsequent draft writing—review

REFERENCES

- Adachi, K. (1991). Organic farming and its standards. *J. Rural Probl.* 27, 120–129. doi: 10.7310/arf1965.27.120
- Altieri, M. A., Funes-Monzote, F. R., and Petersen, P. (2012). Agroecologically efficient agricultural systems for smallholder farmers: contributions to food sovereignty. *Agron. Sustain. Dev.* 32, 1–13. doi: 10.1007/s13593-011-0065-6
- Altieri, M. A., and Nicholls, C. I. (2012). “Agroecology scaling up for food sovereignty and resiliency,” in *Sustainable Agriculture Reviews, 11th Edn*, ed E. Lichtfouse (Dordrecht: Springer Science+Business Media), 1–29. doi: 10.1007/978-94-007-5449-2_1
- Altieri, M. A., Nicholls, C. I., Henao, A., and Lana, M. A. (2015). Agroecology and the design of climate change-resilient farming systems. *Agron. Sustain. Dev.* 35, 869–890. doi: 10.1007/s13593-015-0285-2
- Anderson, C. R., Bruil, J., Chappell, M. J., Kiss, C., and Pimbert, M. P. (2019a). From transition to domains of transformation: getting to sustainable and just food systems through agroecology. *Sustainability* 11:5272. doi: 10.3390/su11195272
- Anderson, C. R., Maughan, C., and Pimbert, M. P. (2019b). Transformative agroecology learning in Europe: building consciousness, skills and collective capacity for food sovereignty. *Agric. Hum. Values* 36, 531–547. doi: 10.1007/s10460-018-9894-0
- Beckie, M. A., Kennedy, E. H., and Wittman, H. (2012). Scaling up alternative food networks: Farmers’ markets and the role of clustering in western Canada. *Agric. Hum. Values* 29, 333–345. doi: 10.1007/s10460-012-9359-9
- Bergez, J., Audouin, E., and Therond, O. (eds). (2019). *Agroecological: From Theory to Practice in Local Participatory Design*. Switzerland: Springer Nature. doi: 10.1007/978-3-030-01953-2
- Berti, G. (2020). Sustainable agri-food economies: re-territorialising farming practices, markets, supply chains, and policies. *Agriculture* 10:64. doi: 10.3390/agriculture10030064
- Carlisle, L., De Wit, M. M., DeLonge, M. S., Calo, A., Getz, C., Ory, J., et al. (2019). Securing the future of US agriculture: the case for investing in new entry sustainable farmers. *Element Sci. Anthropocene* 7:17. doi: 10.1525/elementa.356

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SUPPLEMENTARY MATERIAL

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- Castella, J. C., and Kibler, J. F. (2015). *Towards an Agroecological Transition in Southeast Asia: Cultivating Diversity and Developing Synergies*. Vientiane: GRET.
- Cofré-Bravo, G., Klerkx, L., and Engler, A. (2019). Combinations of bonding, bridging, and linking social capital for farm innovation: how farmers configure different support networks. *J. Rural Stud.* 69, 53–64. doi: 10.1016/j.jrurstud.2019.04.004
- Dale, B. (2020). Alliances for agroecology: from climate change to food system change. *Agroecol. Sustain. Food Syst.* 44, 629–652. doi: 10.1080/21683565.2019.1697787
- Dolinska, A., and d’Aquino, P. (2016). Farmers as agents in innovation systems. Empowering farmers for innovation through communities of practice. *Agric. Syst.* 142, 122–130. doi: 10.1016/j.agry.2015.11.009
- Duru, M., Therond, O., and Fares, M. (2015). Designing agroecological transitions; a review. *Agron. Sustain. Dev.* 35, 1237–1257. doi: 10.1007/s13593-015-0318-x
- FAO (2018). *The 10 Elements of Agroecology: Guiding the Transition to Sustainable Food and Agricultural Systems*. Rome: FAO.
- Ferguson, B. G., Aldasoro Maya, M., Giraldo, O. F., Mier, M., Morales, H., and Rosset, P. (2019). Special issue editorial: what do we mean by agroecological scaling? *Agroecol. Sustain. Food Syst.* 43, 722–723. doi: 10.1080/21683565.2019.1630908
- Frison, E., and Clément, C. (2020). The potential of diversified agroecological systems to deliver healthy outcomes: making the link between agriculture, food systems & health. *Food Policy* 96:101851. doi: 10.1016/j.foodpol.2020.101851
- Gilly, J. P., Kechidi, M., and Talbot, D. (2014). Resilience of organisations and territories: the role of pivot firms. *Euro. Manag. J.* 32, 596–602. doi: 10.1016/j.emj.2013.09.004
- Giraldo, O. F., and McCune, N. (2019). Can the state take agroecology to scale? Public policy experiences in agroecological territorialization from Latin American. *Agroecol. Sustain. Food Syst.* 43, 785–809. doi: 10.1080/21683565.2019.1585402
- Giraldo, O. F., and Rosset, P. M. (2017). Agroecology as a territory in dispute: between institutionalization and social movements. *J. Peasant Stud.* 45, 545–564. doi: 10.1080/03066150.2017.1353496

- Guzmán Luna, A., Ferguson, B. G., Schmook, B., Giraldo, O. F., and Aldasoro Maya, E. M. (2019). Territorial resilience the third dimension of agroecological scaling: approximations from three peasant experiences in the South of Mexico. *Agroecol. Sustain. Food Syst.* 43, 764–784. doi: 10.1080/21683565.2019.1622619
- Hatano, T. (2008). The organic agriculture movement (teikei) and factors leading to its decline in Japan. *J. Rural Food Econ.* 54, 21–34.
- Hebinck, P. (2018). De-/re-agrarianisation: global perspectives. *J. Rural Stud.* 61, 227–235. doi: 10.1016/j.jrurstud.2018.04.010
- Hisano, S., Akitsu, M., and McGreevy, S. R. (2018). Revitalising rurality under the neoliberal transformation of agriculture: experiences of re-agrarianisation in Japan. *J. Rural Stud.* 61, 290–301. doi: 10.1016/j.jrurstud.2018.01.013
- Holt-Giménez, E. (2006). *Campeño a Campeño: Voices From Latin America's Farmer to Farmer Movement for Sustainable Agriculture*. Oakland, CA: Food First Books.
- Holt-Giménez, E., Bunch, R., Irán Vasquez, J., Wilson, J., Pimpert, M. P., Boukary, B., et al. (2010). Linking farmers' movements for advocacy and practice. *J. Peasant Stud.* 37, 203–236. doi: 10.1080/03066150903499943
- Holt-Giménez, E., Shattuck, A., and Van Lammeren, I. (2021). Thresholds of resistance: agroecology, resilience and the agrarian question. *J. Peasant Stud.* 48, 715–733. doi: 10.1080/03066150.2020.1847090
- Honjo, N. (2017). Enactment and enforcement of the organic agriculture promotion act, their achievement and remaining issues (I): reviewing the past ten years' operation of the act. *Jpn. J. Organ. Agric. Sci.* 9, 6–18. doi: 10.24757/joas.9.2_6
- Ichihara Fomsgaard, S. (2014). *Institutionalisation of Social Movements: A Comparative Perspective on Organic Agriculture Organisations in Denmark and Japan*. [Ph.D., Thesis], Aalborg University, Aalborg (Denmark).
- Iguchi, T. (2013). "Formation of a watershed self-sufficient area based on the Kisugi dairy," in *Local Self-Sufficiency Networks*, eds. T. Iguchi, T. Masugata (Tokyo: Commons), 30–80.
- IPES-Food, International Panel of Experts on Sustainable Food Systems (2016). *From Uniformity to Diversity: A Paradigm Shift From Industrial Agriculture to Diversified Agroecological Systems*. Available online at: http://www.ipes-food.org/images/Reports/UniformityToDiversity_FullReport.pdf
- Jentzsch, H. (2017). Abandoned land, corporate farming, and farmland banks: a local perspective on the process of deregulating and redistributing farmland in Japan. *Contemp. Japan* 29, 31–46. doi: 10.1080/18692729.2017.1256977
- JOAA (1971). *Prospectus: Proposals for Organic Agriculture*. Tokyo, JOAA.
- Khadse, A., Rosset, P. M., Morales, H., and Ferguson, B. G. (2018). Taking agroecology to scale: the zero budget natural farming peasant movement in Karnataka, India. *J. Peasant Stud.* 45, 192–219. doi: 10.1080/03066150.2016.1276450
- Knight, J. (2003). "Organic farming settlers in Kumano," in *Farmers and Village Life in Twentieth-Century Japan*, ed A. Waswo, and Y. Nishida (New York, NY: Routledge Curzon), 267–292.
- Kohmoto, D. (2005). Farmers' attitudes toward promoted organic agriculture in transformation. *J. J. Hum. Geograp.* 57, 1–24. doi: 10.4200/jjhg1948.57.1
- Kondoh, K. (2014). The alternative food movement in Japan: challenges, limits, and resilience of the teikei system. *Agric. Hum. Values* 32, 143–153. doi: 10.1007/s10460-014-9539-x
- Laforge, J. M., and Levkoe, C. Z. (2018). Seeding agroecology through new farmer training in Canada: knowledge, practice, and relational identities. *Local Environ.* 23, 991–1007. doi: 10.1080/13549839.2018.1515901
- Lamine, C., and Dawson, J. (2018). The agroecology of food systems: reconnecting agriculture, food, and the environment. *Agroecol. Sustain. Food Syst.* 42, 629–636. doi: 10.1080/21683565.2018.1432517
- Levidow, L., Pimpert, M., and Vanloqueren, G. (2014). Agroecological research: conforming—or transforming the dominant agro-food regime? *Agroecol. Sustain. Food Syst.* 38, 1127–1155. doi: 10.1080/21683565.2014.951459
- Magrini, M. B., Martin, G., Magne, M. A., Duru, M., Couix, N., Hazard, L., et al. (2019). "Agroecological transition from farms to Territorially agri-food systems: issues and drivers," in *Agroecological Transitions: From Theory to Practice in Local Participatory Design*, eds. J. E. Bergez, E. Audouin, and O. Therond (Cham: Springer), 69–98. doi: 10.1007/978-3-030-01953-2_5
- Masugata, T. (1994). Tendency in organic agriculture in Japan and other countries and labelling/standards of organic agricultural products. *Agric. Market. J. Jpn.* 2, 1–11.
- Masugata, T. (2008). *Network of Organic Farming Movement and Teikei*: Tokyo: Shinyosya.
- Matsumura, K., and Aoki, T. (eds.) (1991). *Regional Development of the Organic Farming Movement: A Case Study of Takahata Town, Yamagata Prefecture*. Tokyo: Ie-no-hikari Association.
- Maye, D., Kirwan, J., Schmitt, E., Keech, D., and Barjolle, D. (2016). PDO as a mechanism for reterritorialisation and Agri-Food governance: a comparative analysis of cheese products in the UK and Switzerland. *Agriculture*. 6:54. doi: 10.3390/agriculture6040054
- McCune, N., Rosset, P. M., Salazar, T. C., Saldívar Moreno, A., and Morales, H. (2017). Mediated territoriality: rural workers and the efforts to scale out agroecology in Nicaragua. *J. Peasant Stud.* 44, 354–376. doi: 10.1080/03066150.2016.1233868
- McGreevy, S. R. (2012). Lost in translation: incomer organic farmers, local knowledge, and the revitalization of upland Japanese hamlets. *Agric. Hum. Values* 29, 393–412. doi: 10.1007/s10460-011-9347-5
- McGreevy, S. R., Kobayashi, M., and Tanaka, K. (2019). Agrarian pathways for the next generation of Japanese farmers. *Can. J. Dev. Stud.* 40, 272–290. doi: 10.1080/02255189.2018.1517642
- Mestmacher, J., and Braun, A. (2020). Women, agroecology and the state: new perspectives on scaling-up agroecology based on a field research in Chile. *Agroecol. Sustain. Food Syst.* 45, 1–26. doi: 10.1080/21683565.2020.1837330
- Mier y Terán Giménez Cacho, M., Giraldo, O. F., Aldasoro, M., Morales, H., Ferguson, B. G., Rosset, P., et al. (2018). Bringing agroecology to scale: key drivers and emblematic cases. *Agroecol. Sustain. Food Syst.* 42, 637–665. doi: 10.1080/21683565.2018.1443313
- Ministry of Agriculture, Forestry, and Fisheries (MAFF) (2019). *Current Situation and Policy on Organic Agriculture in Japan*. Tokyo: Sustainable Agriculture Division; Agricultural Production Bureau. Available online at: <https://www.maff.go.jp/e/policies/env/sustainagri/attach/pdf/organicagri-1.pdf>
- Ministry of Agriculture, Forestry, and Fisheries (MAFF) (2021). *Green Food System Strategy - Achieving Both Productivity Improvement and Sustainability of Food, Agriculture, Forestry and Fisheries Through Innovation*. Tokyo. Available online at: <https://www.maff.go.jp/j/kanbo/kankyo/seisaku/midori/team1.html>
- Mori, A. (2020). Management and vision of yamazato farm hanaafu in rural village of aki in hiroshima. *Jpn. J. Organ. Agric. Sci.* 12, 40–50. (In Japanese)
- Mottet, A., Bicksler, A., Lucantoni, D., De Rosa, F., Scherf, B., Scopel, E., et al. (2020). Assessing transitions to sustainable agricultural and food systems: a tool for agroecology performance evaluation (TAPE). *Front. Sustain. Food Syst.* 4:252. doi: 10.3389/fsufs.2020.579154
- Muñoz, E. F. P., Niederle, P. A., de Gennaro, B. C., and Roselli, L. (2021). Agri-Food markets towards agroecology: tensions and compromises faced by small-scale farmers in Brazil and Chile. *Sustainability* 13:3096. doi: 10.3390/su13063096
- Nakajima, K. (2017). Critique of Japanese organic agriculture in retrospect during the first 15 years of the 21st century. *Jpn. J. Organ. Agric. Sci.* 9, 29–32. doi: 10.24757/joas.9.2_29
- Nakajima, K., Kaneoka, Y., and Nishimura, K. (2010). *Techniques and the Concepts of Organic Farming*. Tokyo: Commons (In Japanese).
- Nicholls, C. I., and Altieri, M. A. (2018). Pathways for the amplification of agroecology. *Agroecol. Sustain. Food Syst.* 42, 1170–1193. doi: 10.1080/21683565.2018.1499578
- Nicholls, C. I., Altieri, M. A., Kobayashi, M., Tamura, N., McGreevy, S. R., and Hitaka, K. (2020). Assessing the agroecological status of a farm: a principle-based assessment tool for farmers. *Agroecol. Sur.* 48, 29–41. doi: 10.4206/agrosur.2020.v48n2-04
- Nicol, P. (2020). Pathways to scaling agroecology in the city region: scaling out, scaling up and scaling deep through community-led trade. *Sustainability* 12:7842. doi: 10.3390/su12197842
- Oba, N., and Otahara, T. (1999). "Promotion of environmentally conscious agriculture through agricultural cooperatives," in *The Nokei Ronso: The Review of Agricultural Economics Hokkaido University*. Available online at: <http://hdl.handle.net/2115/11186>
- Oguchi, K. (2012). Establishment of the regional relationship and the development of organic agriculture: a case study of saitama prefecture Hiki County ogawa town. *J. Rural Stud.* 18, 36–43. doi: 10.9747/jars.18.2_36
- Ong, T. W. Y., and Liao, W. (2020). Agroecological transitions: a mathematical perspective on a transdisciplinary problem. *Front. Sustain. Food Syst.* 4:91. doi: 10.3389/fsufs.2020.00091

- Peano, C., Massaglia, S., Ghisalberti, C., and Sottile, F. (2020). Pathways for the amplification of agroecology in african sustainable urban agriculture. *Sustainability*. 12:2718. doi: 10.3390/su12072718
- Plieninger, T., Kohsaka, R., Bieling, C., Hashimoto, S., Kamiyama, C., Kizos, T., et al. (2018). Fostering biocultural diversity in landscapes through place-based food networks: a “solution scan” of European and Japanese models. *Sustain. Sci.* 13, 219–233. doi: 10.1007/s11625-017-0455-z
- Porter, M. (1998). *On Competition*. New York, NY: HBS.
- Rivera-Ferre, M. G. (2018). The resignification process of agroecology: competing narratives from governments, civil society and intergovernmental organizations. *Agroecol. Sustain. Food Syst.* 42, 666–685. doi: 10.1080/21683565.2018.1437498
- Rosset, P., and Altieri, M. (2017). *Agroecology: Science and Politics*. Black Point, NS: Fernwood Publishing. doi: 10.3362/9781780449944
- Rosset, P. M., Machín Sosa, B., Roque Jaime, A. M., and Ávila Lozano, D. R. (2011). The Campesino-to-Campesino agroecology movement of ANAP in Cuba: social process methodology in the construction of sustainable peasant agriculture and food sovereignty. *J. Peasant Stud.* 38, 161–191. doi: 10.1080/03066150.2010.538584
- Ryschawy, J., Sarthou, J., Chabert, A., and Therond, O. (2019). “The key role of actors in the agroecological transition of farmers: a case-study in the tarn-aveyron basin,” in *Agroecological Transitions: From Theory to Practice in Local Participatory Design*, eds J. E. Bergez, E. Audouin, and O. Therond (Cham: Springer). doi: 10.1007/978-3-030-01953-2_8
- Shimoguchi, N., Inazumi, H., Yasue, H., and Omuro, K. (2015). Impact of farm-based learning practices on young farmers: case from an organic farm in Ogawa Town, saitama prefecture, Japan. *J. Int. Soc. Southeast Asian Agric. Sci.* 21, 143–167.
- Tabeta, M., and Masugata, T. (1981). *The Organic Agriculture Movement in Japan*. Tokyo: Nihon Keizai Hyoronsha.
- Takeuchi, K., Brown, R.D., Washitani, I., Tsunekawa, A., and Yokohari, M (eds.) (2003). *Satoyama – The Traditional Rural Landscape of Japan*. Tokyo: Springer-Verlag. doi: 10.1007/978-4-431-67861-8
- Takeuchi, K., Ichikawa, K., and Elmqvist, T. (2016). Satoyama landscape as a social-ecological system: historical changes and future perspective. *Curr. Opin. Environ. Sustain.* 19, 30–39. doi: 10.1016/j.cosust.2015.11.001
- Takeyoshi, H., Kohno, N., and Suzuki, H. (1988). *Organic Agriculture-Initiatives of Agriculture Cooperatives*. Tokyo: Ienohikari Kyokai (In Japanese).
- Taniguchi, Y. (2017). Looking back on ten years after the enforcement of the act on promotion of organic agriculture. *Jpn. J. Organ. Agric. Sci.* 9, 2–5. doi: 10.24757/joas.9.2_2
- Val, V., Rosset, P. M., Zamora Lomeli, C., Giraldo, O. F., and Rocheleau, D. (2019). Agroecology and La Via Campesina I. The symbolic and material construction of agroecology through the dispositive of “peasant-to-peasant” processes. *Agroecol. Sustain. Food Syst.* 43, 872–894. doi: 10.1080/21683565.2019.1600099
- van der Ploeg, J. D. (2009). *The New Peasantries: Struggles for Autonomy and Sustainability in an Era of Empire and Globalization*. London: Routledge.
- Warner, K. D. (2007). *Agroecology in Action: Extending Alternative Agriculture Through Social Networks, Vol. 23*. Cambridge, MA: The MIT Press. doi: 10.7551/mitpress/1164.001.0001
- Wezel, A., Brives, H., Casagrande, M., Clement, C., Dufour, A., and Vandenbroucke, P. (2016). Agroecology territories: places for sustainable agricultural and food systems and biodiversity conservation. *Agroecol. Sustain. Food Syst.* 40, 132–144. doi: 10.1080/21683565.2015.1115799
- Wezel, A., Goette, J., Lagneaux, E., Passuello, G., Reisman, E., Rodier, C., et al. (2018). Agroecology in Europe: research, education, collective action networks, and alternative food systems. *Sustainability* 10:1214. doi: 10.3390/su10041214
- Wezel, A., Herren, B. G., Kerr, R. B., Barrios, E., Gonçalves, A. L. R., and Sinclair, F. (2020). Agroecological principles and elements and their implications for transitioning to sustainable food systems: a review. *Agron. Sustain. Dev.* 40, 1–13. doi: 10.1007/s13593-020-00646-z
- Zollet, S., and Maharjan, K. L. (2021). Overcoming the barriers to entry of newcomer sustainable farmers: insights from the emergence of organic clusters in Japan. *Sustainability* 13:866. doi: 10.3390/su13020866

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