Aigamo alongside *Nouminren:*

Situating Japanese Integrated Rice-Duck Farming in the Food Sovereignty Movement

Honors Thesis

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Abstract:

Japanese integrated rice-duck farming (*aigamo*) emerged in the late 20th century as an alternative method for growing rice avoiding the standard practice of applying synthetic fertilizers, pesticides, and herbicides. In the current agricultural moment of de-agriculturalization and farmland abandonment in Japan, the *aigamo* method offers an alternative approach for farmers that promotes farmer innovation and self-sufficiency, new markets, a diversified agroecosystem, and food sovereignty. Zooming further out, the *aigamo* method exists in a global food economy where smallholder agriculture is increasingly overshadowed by free-trade agreements threatening foodways worldwide. By situating the *aigamo* method in conversation with agroecology and food sovereignty, this paper reveals how the *aigamo* method is a localized endeavor at addressing a global agrarian crisis. By incorporating fieldwork conducted in 2024 in Japan, this paper aims to update the English literature on *aigamo* today and present it alongside the Japanese food sovereignty organization *Nouminren*.

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Acknowledgements

In a way, this project hatched because of Erik Andrus, when I met him for the first time in 2023. During my time farming rice for Cornell research, Erik guided me through each step and answered my frequent calls when I had questions or concerns about the rice plants. His help continued a year later when he introduced me to Daigo Fukunaga and Shinya Mimura, initiating the foundational relationships for my research trip. I hope this thesis holds value for Erik and, at the very least, helps spread the word on rice-duck farming in the US.

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particularly at the Kroch Library and Mann Library. Access to the library system has been a luxury and instrumentally helpful in my research. I found Ayumi-san's farm after reading a chapter she co-wrote in *Bite Back,* which led me to email her and spend ten days with her family. As the world becomes more digitized, I hope students still manage to appreciate the value of libraries and physical collections.

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Finally, I'd like to dedicate this work to my mom and dad. They've supported me and trusted me as I pursued a self-designed major allowing me to develop projects like this.

Methodologies

This thesis is a result of the different research methodologies and typologies. Initially through participation as an intern developing quantitate research on growing rice. Then, following the curiosities I developed during the internship, a secondhand research literature overview was completed before planning an independent primary research project abroad. The core of this paper focuses on the primary research conducted in Japan, working with and interviewing farmers and field innovators. Interdisciplinary at heart, this work connects multiple years of work conducted in different settings – volunteer experiences, internships, independent studies, and research travel grants — culminating in a senior honors thesis under the CALS Social Sciences realm.

My interest in Japanese organic farming began in high school when I read Masanobu Fukuoka's *The One-Straw Revolution*. His radical philosophy of "do-nothing" farming inspired my application to Cornell's College of Agriculture and Life Sciences (CALS) and subsequent studies in agroecology. Almost three years later, in the spring of 2023, Japanese agroecology presented itself in a Cornell Cooperative Extension (CCE) internship advertisement for the New York Rice Project. Led by the Kao-Kniffen Lab with mentorship from Vermont rice farmer Erik Andrus, the new project was designed to trial the viability of growing cold-tolerant Japanese rice varieties in New York. Interested, I read Andrus' farm website and was introduced to the Japanese organic rice farming method called integrated rice-duck farming (Andrus, n.d.). Quickly fascinated by the technique, I applied for the summer position.

That summer, I worked primarily in the field preparing and maintaining the research rice paddy and gaining hands-on experience with the crop. In July, I visited Andrus' Boundbrook

Farm in Vergennes, Vermont and had the chance to witness the ducks in action. I spent a few days working with him, setting up his electric fences, and tending the ducks. Andrus learned from the source decades ago in Japan by Takao Furuno. Since then, he's implemented the practice in Vermont, growing eight acres of organic rice with ducks.

When the first season of rice was harvested and my internship ended, I read Furuno's book, *The Power of Duck*, and spent time mapping out the agroecology of integrated rice-duck farming (see appendix). In the Spring of 2024, I called Andrus and posed the idea of writing a senior thesis on the political ecology of integrated rice-duck farming in Japan. Supportive and fond of the idea, Andrus put me in contact with rice-duck farmers in Southern Japan, including Takao Furuno himself. Over the next few months, with the help of my advisor Professor Law, and the Asian Studies department, I drafted grant proposals and received three Cornell grants in support of my research plan. Through email exchanges with Andrus' contacts in Japan and an organic farmer I found online, I outlined a six-week travel-research itinerary for myself. To each farmer I emailed, I explained my background in agroecology, my intentions for an honors thesis, and offered my hands in a work-exchange arrangement. I'd spend a few days or a week working with each farmer on their farm, documenting and asking questions along the way, in exchange for a place to stay and shared meals. Eager to share their stories and appreciative of the extra hands during planting season, farmers agreed. With a loose itinerary formed, I left the option open for rearrangement. The flexibility allowed for spontaneity. Before departing I formed a preliminary list of questions with Professor Law and Erik Andrus. The questions stemmed from my experience growing rice organically the previous summer, readings I'd done on integrated rice-duck farming, and my previous three years of influential classes regarding agroecology. To name a few, "Agrarian Change" taught by Rachel Bezner Kerr, "Peasant Economies and

Ecologies" taught by Paul Kohlbry, "Religion and Ecological Sustainability" taught by Jane-Marie Law, and "Forest Farming as an Agroforestry System" co-taught by Steve Morreale, Kenneth Mudge, Chad Cully, and Tom Whitlow.

My goals as an Interdisciplinary Studies major focusing on agroecology have been to expand my academic study of agriculture to include the social sciences. A political ecology approach to agriculture examines how social, economic, political, and cultural factors shape how natural resources are distributed and ultimately used. In addition to the technical agroecological methods farmers use, these multifaceted relationships play crucial roles in creating sustainable agricultural communities. Through this framework, my research explores the factors allowing integrated rice-duck farming to be implemented today in Japan, such as farmer environmental conceptions, government programs, access to machinery, and knowledge and natural resource sharing. Though broad in scope, my idea was to limit preconditioned expectations that could sway my research. I was very aware that little literature on rice-duck farming has been published in English since *The Power of Duck* in 2001 and that an updated synthesis of the method in English is needed.

Once in Japan, my approach was to immerse myself with each farm I visited: helping prepare meals when I could, helping with farm tasks, learning machinery techniques and other hard skills, and asking questions throughout the day. Besides being out in the field during the farm tasks, the kitchen became another site to learn about integrated rice-duck farming. Through engaging in cooking, eating, and drinking, I got a glimpse of the cultural and culinary significance of rice. Like soybeans, rice is transformed into dozens of sweet and savory edible and drinkable forms through processes such as fermentation, milling, grinding, and cooking. I learned to appreciate the numerous ways rice was being expressed in cuisine and enjoyed daily.

I kept a pocket notebook for field notes and recorded voice notes and interviews on my phone with a microphone attachment. In total, I interviewed six different rice farmers, asking mostly the same questions to each. A fundamental flaw of this process was my unfamiliarity with the Japanese language. I'd type the question out in English using Google Translate, and farmers would read the question in Japanese and respond in Japanese. With these recordings, I planned to work with a translator upon returning and transcribe them into English. This posed challenges to asking follow-up questions or gauging how effective the interviews were during the trip. Though not a perfect system, the formal interviews were insightful and provided a form of qualitative data for my research. During these somewhat formal interviews, farmers had time to gather their thoughts and were not distracted by fieldwork.

An additional part of my work was documentation through photography and videography. I shot film photography and digital video each day to document and share the practice. This work was publicly displayed in October 2024 at the Soil Factory in Ithaca, New York. Some photos will also be included in this paper as primary source documentation. Since returning from fieldwork, I gave a guest lecture in Professor Law's "Introduction to Japan" class and spoke at a webinar conference hosted by Cornell titled, "A Feathered Fortress: The Duck-Rice Aigamo System for Flood-Resilient Agriculture" (CALS, 2024). These experiences have allowed me to organize my field notes and work towards an honors thesis. My readings have focused on Japanese organic agriculture, food systems, and the global food sovereignty movement. With that, the aim of this paper is to situate integrated rice-duck farming in Japan into the food sovereignty movement and share the story and practice with an English-speaking audience.

i. Introduction

After picking up her daughter from kindergarten in town, Ayumi picked me up from Rokugō Station in her red Suzuki. The three of us drove inland and up the mountains, taking the windy back roads to avoid the rush-hour traffic. Late May marked the beginning of typhoon season and the beginning of rice planting season. Weeds cracked through the asphalt, and ferns draped heavy over the already narrow roads. As Ayumi hurried home to start dinner for her three kids, she pointed to passing tea fields and explained that the mountains of Fujieda were once covered with tea farms. Today, tea production is way down, and Ayumi is one of the few growers in the area. She'd just finished the first tea harvest of the year and now was working on tea packaging and plum processing while her husband, Hiro, prepared the rice fields for planting.

As we drove into the valley, rice paddies emerged in between houses and in the nooks of any available flat land. Unlike Hokkaido, the largest rice-producing region in Japan, in Fujieda, flat land is sporadic. Farmers often have multiple sub-one-acre plots in different shapes and spread out from one another. We passed some rice fields that were recently filled with mountain water and some that were waterless and overrun with grasses. The latter, Ayumi explained, are abandoned rice fields: "Many farmers are getting too old to cultivate their land and struggle to find anyone to take over their fields", she said.

That night over dinner, Hiro explained to me that as one of the youngest rice farmers in the area, many of his fields were offered to them for free by older farmers who were retiring and didn't want to see their fields go neglected. In exchange, Hiro gives those farmers a yearly supply of his rice harvest. After dinner, Hiro put the kids to bed, and Ayumi showed me to my sleeping quarters: a beautiful tiny room inside their newly built egg-washing shed just wide enough for a futon mattress. She told me that tomorrow we'll buy special fitting rice paddy boots

at the agriculture supply store, and then I can help Hiro cultivate the rice paddies. Then, in the afternoon, the ducklings should arrive in the mail, and I can help set up a brooder coop for them since they're only one day old and need a heat lamp. By 7:30pm, we'd said goodnight, and I set a 5:30am alarm for breakfast.

During the first evening of being in the Japanese countryside, I had seen two notorious crops now dwindling in local agriculture: rice and tea. I'd seen the harsh reality of an aging farmer labor force, the difficulties of finding agriculture successors, and informal farmland deals. I'd learned about the rarity of organic produce in Japan. And, I'd gotten a glimpse into the busy life of a young organic farming household growing various crops, raising chickens for eggs, ducks with rice, and organizing community events, all while raising three children and leaving time to host a visitor like me.

My goals over the next month and a half staying on different rice farms were to unpack what is at stake in these realities. How are foodways being challenged in Japan today? How are organic farmers creating alternate incomes in a shrinking agriculture sector? What philosophies motivate organic farmers today? How are alternative farming practices designed and shared? How do organic farmers carve out markets in Japan's neoliberal economy where free trade has increased price competition? How are these experiences similar to other smallholder agriculture food systems in the world? And in what ways are they unique to Japan?

In particular, I was here to study the alternative rice-growing technique called integrated rice-duck farming (commonly referred to in Japan as *aigamo*). Invented in 1988 in Southern Japan, the *aigamo* method involves raising ducklings in a rice paddy. The ducks eat emerging weeds and harmful pests and fertilize the paddy through their droppings, avoiding the practice of applying synthetic chemical herbicides and pesticides. With little published English literature on

the *aigamo* method in the last 20 years, I was interested in learning how the technique is used today. Seemingly faultless as an agroecosystem not reliant on any off-farm inputs and a beautiful example of integrating crops with livestock, I was curious to learn why the *aigamo* method is not widespread. What factors limit its popularity? For those who do use the *aigamo* method, how does it create unconventional opportunities for organic farmers?

Through a framework of critical agrarian studies, food systems and foodways studies, and agroecology, this thesis aims to situate the example of integrated rice-duck farming in Japan into the global movement toward food sovereignty. The topic of food sovereignty will be carefully explained starting in section three; however, for clarity, I define food sovereignty as the right of all people to be able to produce and consume nutritious food aligning with cultural identities and environmental stewardship. This paper considers agroecology as both an applied science and as a means of production involved in supporting food sovereignty. This approach avoids the apolitical tendency of academic studies on agroecology that discount the social contexts of farmers to push for a purely technological approach to sustainable agriculture. Instead, by applying a political ecology framework to agroecology, this paper engages the subject by recognizing that both the practices that incorporate ecosystem services into agriculture as well as the social structures supporting those farmers are vital in creating healthy food systems. I believe in agroecology for its ability to create resilient, self-sufficient, and knowledge-based agroecosystems that can enhance food sovereignty while contributing to the greater ecology of the farm's locale.

After a narrative methodology section describing the background to this research paper and the methods used and this introduction chapter, the second chapter will contextualize Japan's food system in the current corporate food regime centered on free trade. The next section will

focus on the global food sovereignty movement with a focus on Japan's food sovereignty organization, *Nouminren*. Then, chapter four will be devoted to the ecology of the *aigamo* method, followed by a chapter on how the method is used today. That chapter will primarily focus on my research findings in Japan and unpack how the technique has evolved in the last 35 years. Afterwards, chapter six will focus on Takao Furuno and his role as a pioneer and innovator in agriculture research. The final section will tie it together by situating the *aigamo* method and *Nouminren* in conversation and discussing the merit of doing so.

ii. Japanese Rice During the Corporate Food Regime

Rice has held a central role in Japanese foodways for over 2,000 years (Ohnuki-Tierney, 1995). In the last 30 years, this role has become continuously challenged by international and domestic pressures to comply with the neoliberal free-trade framework and deregulate rice in Japan. The timing of these pressures coincides with what Philip McMichael in *Food Regimes and Agrarian Questions* claims is the "corporate food regime": "an era governed increasingly by financialization and neoliberal advocacy of market rule, stretching from the 1980s through the late 2000s" (McMichael 2013, 41). Neoliberalism, free-trade, market-oriented-trade, liberalization, or globalization, are all ways to describe the shift in trade policy where agriculture protectionism is restricted, forcing farmers to compete internationally for the global lowest market prices. Using McMichael's food regime analysis as context can help place Japan's rice discussion temporally in the current corporate food regime and relate it to the broader food sovereignty movement emerging in 1996, much out of a response to the agrarian consequences of neoliberal trade policy.

Although food systems in Japan varied between different dynasties and periods of Japan's history, rice has been and continues to be "consistently linked to the political narrative of nationalism" (Freiner, 2019). Nicole L. Freiner in *Rice and Agricultural Policies in Japan: the Loss of a Traditional Lifestyle*, writes, "Rice growing in Japan constitutes a complete lifeworld that is informed by state-directed forces as well as the pull of tradition felt in communities in rural areas and the centrality of rice to the Japanese diet" (Freiner, 2019). In the following paragraphs, I'll touch on these "lifeworlds" after World War II, focusing mostly on the period of neoliberalism.

After World War II and the American occupation (1945-1952), the agricultural workforce quickly dropped as industrialization and other economic sectors developed quickly. As a result, farmers began earning less than non-farm workers, leading to the 1961 Agriculture Basic Law (ABL) that used a "Production Cost and Income Compensation Formula" to provide rates to farmers that were similar to those in other industries (Anderson et al., 1986). This act was a definitive measure that indicated the level of policy support given to protect rice farmers. Ohnuku-Tierney in *Rice as Self* describes this as the moment when, "Government policy changed from protecting consumers in times of crisis to protecting farmers in times of economic growth" (Ohnuku-Tierney, 1995, 16). Despite such initiatives, when urban factories stretched to rural areas, many farmers gave up farming or became part-time farmers, earning much of their income off the farm (Freiner, 2019).

In the 1960s, Japanese trade protectionism decreased in many sectors, not including agriculture. By the early 1970s, a few agricultural products in Japan (excluding rice) were liberalized in free trade as a means to acquire cheaper food for consumers and adhere to international pressures to open agriculture trade (Mulgan, 2012). The 1973 global grain shortage and US soybean embargo strengthened arguments in Japan for protectionism as food self-sufficiency was justified through food security logic. A nation's food self-sufficiency rate is the ratio of food consumed that is produced domestically. Hence, during global grain shortages or embargos, a nation with a high food self-sufficiency rate is more food secure. If Japan imported most of the food consumed domestically, the country's food security could be at risk during periods of political conflict or market failures. Aurelia George Mulgan and Eric Saxon argue that,

> The Japanese obsession with food security has deep historic roots in memories of periodic famines and food shortages over past centuries, and in the realization that Japan's location and extremely high ration of population to agriculture make it vulnerable to external development that could threaten food supplies. The value the nation places on these functions of the farm sector has given rise to an ideology of support — a modern version of agriculture fundamentalism — that is built into Japan's agricultural legislation (Anderson et al., 1986, 98).

The argument for protectionism, to an extent, reached households not involved in agriculture but who recognized agriculture's importance for national food security. The financial cost of such an argument, extended to consumers since rice was sold at a price five times that of in the U.S. (Burgess, 1986).

This understanding of the relationship between food security and international trade was contrary to the United States's neoliberal trade logic. In 1989, during trade negotiations, the USDA trade representatives stated, "The U.S. has always maintained that self-sufficiency and food security are not one and the same. Food security — the ability to acquire the food you need when you need it — is best provided through a smooth-functioning world market" (Ritchie, 1993). Hence, while the US argued that food security is not achieved through a high domestic self-sufficiency index but through free trade, many in Japan feared free trade was a direct threat to the nation's food security.

To clarify, food security, stated by the FAO at the 1996 World Food Summit, "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO,

2006). The apolitical nature of the concept of food security which does not articulate *how* food security is reached left room for interpretation. McMichael points to this by writing, "The paradox of the corporate food regime is that at the same time as it presents as the condition for food security, it immiserates populations through the exercise of monopoly power. The perverse consequence of global market integration is the export of deprivation, as "free" markets exclude and/or starve populations dispossessed through their implementation" (McMichael, 2013).

Since the 1960s, Japan's food self-sufficiency ratio has decreased rapidly (Figure 1) along with the number of individuals involved in agriculture. The number of rice farmers (part-time included) has declined from 12 million in 1960 to 4 million in 1980 and 2 million in 2010 (Freiner, 2019). Arguably, these declines stem from interrelations between agriculture deregulation, lower farmer wages, aging farmer populations, and high urban migration.

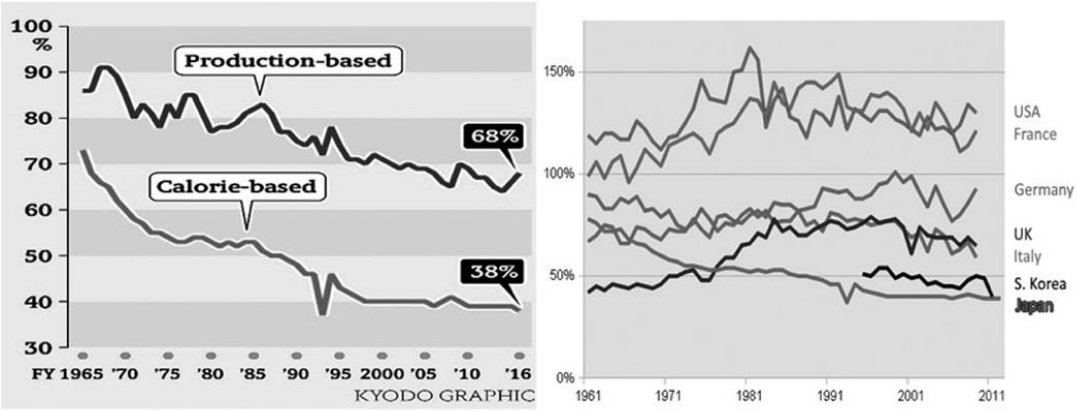

Figure 1: Japan Self-Sufficiency Index (1965-2016)
(Rangarirai Gavin Muchetu, 2020)

Up until the recent Trans-Pacific Partnership (TPP), rice has been an outlier to the nation's low self-sufficiency index because of Japan's heavy protectionist measures (Freiner, 2019). The persistence of rice protectionism began to dwindle in 1986 when the U.S. Rice

Millers Association (RMA) filed a formal complaint against Japan's strict rice import ban, marking the beginning of rice deregulation in Japan (Burgess, 1986). Although the RMA's request to set a 2.5% quota on the Japanese rice market was ultimately denied by Japan, the conversations around unfair rice protectionism grew during the General Agreements on Trade (GATT) Uruguay Round Agriculture Agreement (URAA) of 1986-1994 (Ohnuki-Tierney, 1995). The URAAs ambition to include agriculture in the free-trade market-orientated principles of GATT ultimately led to the development of the World Trade Organization (WTO) and the Agreement on Agriculture (AoA) in 1995 (Weis, 2007).

The AoA was a series of globally shared rules on to what extent governments can administer agricultural protectionism, specifically allowing certain types of subsidies and transitioning away from tariffs. In Tony Weis' book *The Global Food Economy* Weis describes this moment as "The first time, multilateral rules restricting the sovereignty of governments to establish their own agricultural policies" (Weis, 2007, 128). In a similar tone, McMichael describes this moment as, "The institutionalization of the "free trade" regime necessary to a market vision of "food security"' (McMichael, 2013, 39). For Japan, the Ministry of Agriculture, Forestry, & Fisheries (MAFF) was faced with the difficult challenge to adapt to WTO standards while still shielding rice farmers and the rice foodway in Japan. MAFF responded in two ways. First, before URAA negations ended, MAFF raised the tariff on rice, which allowed Japan to have a higher existing tariff at the start of the WTO (Fernier, 2019). Then, MAFF replaced the 1961 Basic Food Law with a 1994 "New Basic Law". Using Aurelia Georges Mulgans's book "Japan's Agriculture Policy Regime", Fernier summarizes the main aspects of this law below (Figure 2).

Chap. 1: General Provisions	Priority on securing quality, reasonably price stable food supply Reliance on domestic supply as basis Role of agriculture in conservation, water, and maintenance of cultural traditions Focus on development of rural areas and role of farmers, farmer's organizations Outlines responsibilities and duties of state and local governments, legislature, consumers, and the food industry
Chap. 2: Basic Principles	
Section 1	Food self-sufficiency as a key goal
Section 2	Use of tariffs and import restrictions when domestic industry threatened
Section 3	Securing farmland for agriculture and farm management
Section 4	Support of rural areas to compensate for disadvantageous conditions

Figure 2: Key Aspects of 1994 New Basic Law (Fernier, 2019)

Although going against aspects of the WTO, MAFFs implementation of this law "solidified its power" (Fernier, 2019). "Maintenance of cultural traditions", prioritizing "food self-sufficiency", and "support rural areas to compensate for disadvantageous conditions" are aspects indicating MAFFs rice protectionist philosophy enduring during this period of intense neoliberalism. Likewise, loopholes in the AoA were found and exploited by Japan, as well as the US, to support domestic producers in ways still abiding by WTO standards. These include direct payments to producers, insurance programs, decoupled income support, and government service programs (Fernier, 2019, 58). As a result, governments, especially wealthier ones, could lower production costs in their country to an extent, decreasing global market prices. McMichael describes the global phenomenon as an "artificial (subsidized) world price… deployed against smallholders everywhere" (McMichael, 2013, 46). In the case of Japanese rice, Japan's wealthy position in the global economy allowed it to temporarily limit the effects of the WTO on domestic rice farmers. Despite such efforts, in 2019 Japan imported 770,000 metric tons of foreign rice, half arriving from the US (Fernier, 2019, 66).

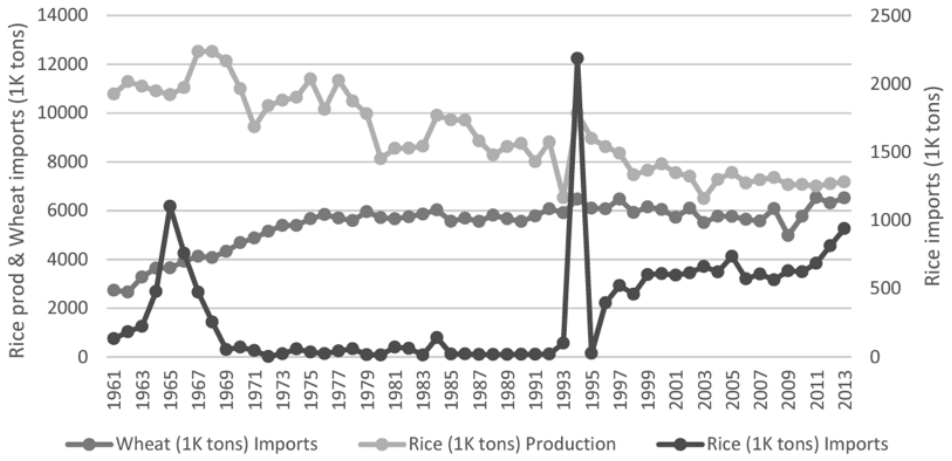

Figure 3: Production and importation of rice and wheat in Japan (1960-2014)

(Rangarirai Gavin Muchetu, 2020)

Rice deregulation continues today, along with declines in Japan's self-sufficiency index through trade agreements like the Trans-Pacific Partnership (TPP) between Australia, Brunei, Chile, Malaysia, Mexico, New Zealand, Peru, Singapore, Vietnam, and Japan. At this stage, Japan has conceded to allowing up to half of the nation's supply of rice to be imported (Fernier, 2019). Between the AoA, TPP, and other free-trade agreements, protecting domestic rice in Japan has become increasingly difficult, taking a toll on rural livelihoods. Agriculture land abandonment has doubled between 1995 and 2015, reaching 10% of Japan's arable land (Jentzsch, 2016).

iii. Rice Foodways and Food Sovereignty in Japan

This section will focus on rice foodways and food sovereignty in Japan, unpacking some of the flawed assumptions of neoliberal economic conclusions. I define foodways as the relations and traditions involved in the production and consumption of food in a particular time and space. Alyshia Gálvez's book, *Eating NAFTA: Trade, Food Policies, and the Destruction of Mexico*, will help shape many questions this section seeks to examine regarding the disruption of domestic foodways through globalized agriculture markets. Using a similar framework to Gálvez's book on the impact of the North American Free Trade Agreement (NAFTA) on farmers in Mexico, I argue that neoliberal trade policy, baked in the logic of comparative advantage, can damage foodways. By forcing smallholder farmers to unfairly compete with subsidized international prices, many farmers are encouraged to scale up and incorporate unsustainable practices or even displaced from their livelihoods entirely.

Just weeks before the signing of NAFTA in 1994, US President Bill Clinton said, "We cannot stop global change. We cannot repeal the international economic competition that is everywhere. We can only harness the energy to our benefit. Now we must recognize that the only way for a wealthy nation to grow richer is to export, to simply find new customers for the products and services it makes" (Alyshia Gálvez, 2018). For Mexico, and specifically the average farmer, NAFTA is proving to be the opposite of what Clinton envisioned. In brief, after ten years of NAFTA, the U.S. exported 400% more corn to Mexico than before NAFTA, the price of domestically grown corn in Mexico decreased by 70%, an estimate of 2 million Mexican farmers abandoned their farms, and illegal immigration into the U.S. from Mexico increased by 75% (Alexander, 2018). Without oversimplifying the example of maize in Mexico, I'd argue its

outcomes can be understood as a global warning. In a free-trade oriented global market, what are the costs on farmers, traditional diets, health and nutrition, and the environment?

In a comparable way to maize in Mexico, rice in Japan holds inherent and deep-rooted significance in Japanese tradition, diets, culture, identity, landscapes, livelihoods, and heritage. Aside from the obvious role rice has in Japanese diets – often eaten with all three daily meals – rice has been used as currency during the Edo period, rice straw is used in furniture and clothing, rice agriculture is linked with local deities, in various ritual occasions, and deeply associated with the image of the Japanese countryside. In *Rice as Self,* Emiko Ohnuku-Tierney describes rice as having "a cultural valuation that is far greater than pure economic value" (Ohnuku-Tierney, 1995, 14). As Gálvez questions in *Eating NAFTA*, what is lost, and who pays when "globalization goes wild" and domestic foodways are disrupted by trade (Gálvez, 2018)? Japan's experience with neoliberalism comparatively is not as far along as Mexico's, but an understanding of NAFTA's disruption of Mexico's foodways and ecologies may offer foresight into the case of rice in Japan.

In 2005, food self-sufficiency conversations in Japan broadened to incorporate the language of food sovereignty when *Nouminren,* the "Family Farmers Movement", officially joined the international peasant organization La Vía Campesina. Emerging in 1993, La Vía Campesina presented itself at the World Food Summit in Rome by stating, "Food sovereignty is the right of each nation to maintain and develop its own capacity to produce its basic foods respecting cultural and productive diversity… Food sovereignty is a precondition to genuine food security" (La Vía Campesina, 1996). In a 2002 FAO global summit, food sovereignty was rearticulated as "the right of peoples, communities, and countries to define their own agricultural, labor, fishing, food and land policies which are ecologically, socially, economically and culturally appropriate

to their unique circumstances" (NGO/CSO Forum for Food Sovereignty, 2002). By emphasizing the *right* to define foodways, food sovereignty captures the apolitical nature of food security and articulates the agrarian crisis transpiring out of the corporate food empire. Gálvez points out the difference between food security and food sovereignty by claiming,

> Food security is a purely market-based concept. For food security to be achieved, it does not matter how, where, and by whom food is produced. A nation can be maximally food secure even when it produces no food whatsoever, if it has the resources to purchase all the food its people need. Thus, within logics of comparative advantage, Mexico, the ancestral birthplace of corn, need not continue to produce corn, but might be better served producing Volkswagens and Audis, and purchasing corn and other foods from foreign nations (Gálvez, 2018).

In the last 30 years, La Vía Campesina has grown to include 180 organizations from 81 countries, including *Nouminren* in Japan (La Vía Campesina, 2025). *Nouminren* was first established in 1989 to "promote the autonomous development of Japanese agriculture and make farmers' livelihoods more stable" (Kinezuka & Montenegro de Wit, 2020). As a strong advocate for agricultural self-sufficiency, rural livelihoods, ecological integrity, and free-trade skepticism, *Nouminren* resembled many characteristics of other global farmer movements during the 1990s heightened trade liberalization.

The top six of sixteen demands of *Nouminren* are to (1) reestablish agriculture as a significant production industry of Japan. (2) Protect farmer's rights to land. (3) Withdraw from policy deepening Japan's reliance on imported agriculture products. (4) Prevent large corporations from achieving monopolies over the production or distribution of agricultural

goods. (5) Form a safer food supply. (6) Improve the current position of women in rural livelihoods and support the development of agriculture successors (Nouminren, 2006). Summarized from *Nouminren's* "Action Agenda", published on their website in 2006, there is seemingly a lack of emphasis on organic farming or agroecology. In more recent years, the organization has put more stress on the importance of agroecology for preserving traditional farming and ecosystems (Farmers' Movement Adopts Policy of Agroecology, 2023). When I spoke with Shushi Okazaki at the *Nouminren* headquarters in Tokyo, he also mentioned the recent promotion of agroecology coming out of *Nouminren* articles.

Ayumi Kinezuka, farmer and *Nouminren* member, critiques neoliberalism, claiming it is "turning the soils and agrarian knowledge of Japan into simply an island of extractive possibilities for business. This corporative-friendly approach, ushered in and enabled by free trade pacts like TPP, will adversely affect not just farmers but all people of our country" (Kinezuka & Montenegro de Wit, 2020). For a foreign or domestic corporation aiming to increase its margins in the neoliberal global food economy, crops can become reduced to commodities and measured in metrics such as yield. As a result, the corporate food regime operates aloof from smallholder farmer livelihoods and traditional foodways around the world. In a similar way Kinezuka writes about the extractive nature of agribusiness, van der Ploeg describes the agribusiness conception of land as being "reduced to being a mere 'parking lot' where industrialized farming is located (van der Ploeg, 2010). By broadening the self-sufficiency discussion in Japan to include food sovereignty, *Nouminren* not only expanded its mission to include questions of rights and decision-making of farmers but also situated their struggle inside the global corporate food regime and with the La Vía Campesina movement.

Figure 4: *Nouminren* protest ("Stop Japan-U.S. Free Trade Agreements!") (Nouminren, n.d.)

Rice agriculture in Japan during a globalized food economy where free-trade policies shape agriculture production, is deteriorating rapidly. What is at stake when a staple crop embedded in a nation's foodways begins to fade as fields are abandoned is a concept immeasurable. Kinezuka touches on this by claiming, "Japan is experiencing the erosion of regionally specific traditional cultures, an uptick in health problems linked to imported processed food, and widening income disparities in a country renowned for a strong middle class… hourly income for rice farmers has dropped as low as 256 yen (about USD $2.25) which is about one-third of the minimum wage in the country" (Kinezuka & Montenegro de Wit, 2020). Gálvez's book *Eating NAFTA* explains Mexico's experience under harsh free-trade agreements well and could offer a framework for a future book on the disruption of Japanese foodways during an era of neoliberalism.

The short section on rice in Japan during the corporate food regime and food sovereignty reaction barely scratches the surface of the story of rice politics in Japan. Yet, finding commonalities between different smallholder farmer experiences across the planet points to a global agrarian crisis and movement for food sovereignty. Although fitting into McMichael's food regime analysis well, rice in Japan is its own complex story, layered with politics and

history. *Nouminren's* position as a member of La Vía Campesina has allowed the organization's plea for food sovereignty in Japan to reach people around the world in hopes of helping re-imagine agriculture in Japan. In the midst of all this, many farmers find means to adapt and continue to exist as agriculturalists in an everchanging globalized food system.

iv. Ecology and beauty of the *aigamo* method

Figure 5: Rice-duck paddy in Fukuoka Prefecture, 2024
(Photograph by author)

Integrated rice-duck farming, referred to in Japan as *aigamo*, is a niche rice-growing technique where ducks are raised in an enclosed rice paddy for their symbiotic interactions with the agroecosystem. The ducks feed on weeds and insects, fertilize the paddy through their organic waste, and lower the paddy's methane emissions by agitating stagnant water. These ecosystem services avoid the use of pesticides, herbicides, and synthetic fertilizers. For millennia, Chinese farmers have periodically herded ducks in and out of rice fields to control weed pressure (Furuno, 2012). Inspired by this ancient technique, in 1988, Japanese farmer Takao Furuno began raising ducks entirely in rice fields. Instead of acquiring ducks only when weeds had established, Furuno experimented with rearing ducks in his rice paddies starting the week after the rice has been transplanted. This section will unpack the timeline and technique of integrated rice-duck farming, revealing the ecology and beauty of the *aigamo* method.

In early June, during the first two weeks after transplanting the rice seedlings, one to two-week-old *aigamo* ducks (a crossbreed between a male *kamo* wild duck and a female *ahiru* domestic duck) are released into rice paddies flooded with at least 10cm of water (Furuno, 2001). The day before release, an electric fence and small railings are set up around the perimeter of each rice paddy to keep the ducklings from veering out of the paddy but mainly to prevent predators from entering. In Japan often these are crows, raccoons, and weasels. Some farmers also run thin fishing lines or wires over the top to prevent crows from catching the young *aigamo* ducks. The risk of crow predation decreases as the ducks mature and grow.

The one day of paddy safeguarding preparation is laborious and requires many hands but is recognized as an important investment or insurance for the ducks. For the next two months, the ducks swim freely in the paddy, foraging on insects, amphibians, and weeds. Unlike other forms of pest management, the presence of ducks as pest-managers in a rice paddy increases biodiversity: “Ducks do not annihilate insects in the way that pesticides do. They control their numbers so there is no damage to the crop. It is typical for a duck paddy field to have more than three times as many spiders as a nearby conventional field” (26-27). Ducks also repeatedly brush up against the rice plants encouraging more vertical growth, thicker stems and well-developed roots underwater. Furuno calls this the “rice stimulation effect” (31).

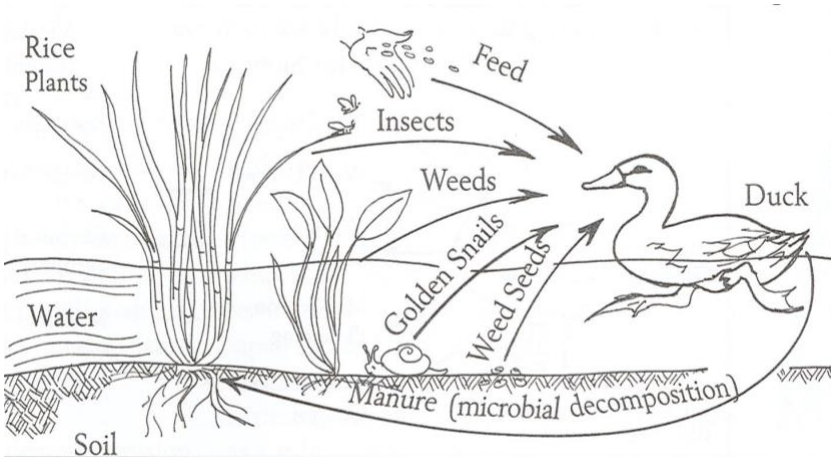

Figure 6: *Aigamo* position in agroecosystem

(Furuno, 2001)

Aigamo farmers don't apply any insecticides or herbicides and don't manually pull or plow weeds out. Instead, they monitor their ducks and work on other farming projects. If the ducks are doing well and weed pressure is low, they'll require supplemental duck feed. The interactions involved in feeding the ducks occasionally also helps form a trusting relationship between the ducks and the farmers (Furuno, 2001). This makes it easier when the time comes to remove the ducks from the paddy. Before the rice plants begin to produce seed and the paddies get drained, the ducks are taken out of the field, processed, and sold to restaurants. Having fed on protein-rich insects, wild plants, and duck feed, the ducks are marketed as high-quality organic duck meat. In Southern Japan, this tends to happen in early August. The ducks don't eat the rice leaves because they are rich in silica, making them rough and hard (Furuno, 2001). However, they would eat the rice ears when they start to produce seed which highlights the importance of timing in the *aigamo* method. By mid-August, the rice plants are well established and can outcompete any weeds that may emerge. The paddies are drained to allow for mud to harden in preparation for the harvest combine. In early fall, the rice is harvested and sold as organic rice,

often directly to consumers, for a price higher than conventional rice. *Aigamo* farmers don't need to learn how to operate large-scale weeding machinery or how to apply correct concentrates of pesticides. Instead, they must learn how to sync their rice- growing calendars to the rapid growth of baby ducklings. This requires critical time management on when to seed rice in trays, when to receive the ducklings in the mail, when to transplant the rice, when to release the ducklings, and when to remove them. If the farmers don't remove the *aigamo* ducks in time, the ducks will harvest the rice instead of the farmers. Hence, in this agroecosystem, there is an intimate day-to-day relationship between farmer, rice plants, and ducks.

The *aigamo* method is a remarkable example of integrating livestock with crops and the synergies this can provide. The ducks support the rice crop with pest control, weed control, and as a fertilizer source. The rice paddy supports the ducks with a lush habitat filled with a natural diet. On top of these ecological collaborations, for farmers, the ducks are also understood as livestock that can be sold. Hence, expanding rice farming from a monoculture to a polyculture, and diversifying their farm. In the last 35 years, Furuno has shared the method with rice farmers in Japan, South Korea, China, Thailand, Malaysia, Vietnam, the Philippines, and the United States.

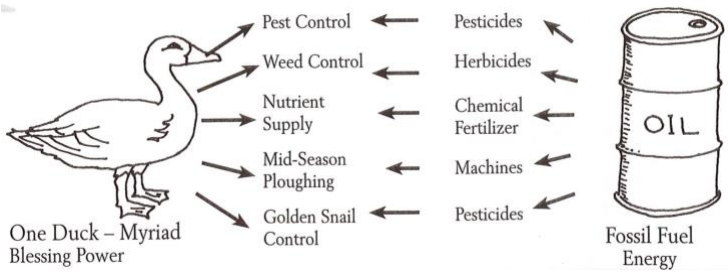

Figure 7: "One Duck – Myriad Blessing Power"

(Furuno, 2001)

v. *Aigamo* initiatives in Kagoshima Prefecture

In 1956, a petrochemical and plastics factory in Minamata, Kumamoto Prefecture, was found dumping mercury in the Minamata Bay (McCurry, 2006; Rosenberger, 2014). The resulting bioaccumulation in fish poisoned roughly two million people and was one motivation for Daigo Fukunaga's entry into organic agriculture (*Rice and Ducks: A Winning Combination (Lesson 8)*, 2006). After a 1990 newspaper article on the new *aigamo* method, Fukunaga and other farmers in the Kagoshima community learned the technique together. Today, at age 76, Fukunaga has expanded his rice-duck farm from 10 ares to 80 ares (roughly 0.25 acres to 2.0 acres). During my one-week stay with Fukunaga, I helped prepare his fields for planting, experienced two community planting events he hosted, visited his farmer friends in Kagoshima, learned about the ongoing *aigamo* robot research at Kagoshima University, and got a sense of the small but powerful rice-duck farming community in Southern Kyushu.

In addition to farming rice and raising chicken for eggs, Fukunaga is keen on teaching the *aigamo* method to the younger generation. Every year in early June, just as the rice planting season begins, Fukunaga spends three afternoons hosting the local kindergarten and elementary school at his farm. To prepare, Fukunaga flattens out his smallest paddy with a tractor and fills the paddy with water to a muddy slurry consistency. When the kids arrive, he explains to them that he's an organic rice farmer, shows them his tractor, and describes how ducks help him farm rice. After a short rice lesson, the kids take off their shoes and run around in the paddy, playing relay races and catch with each other. After stomping around in the paddy, the kids go back to school and returned the following day to help hand plant a small section of the same paddy.

Figure 8: Fukunaga with Elementary School Students
(Photograph by author)

This is Fukunaga's version of an ancient Kagoshima rice planting festival called *Seppetobe*. The word *Seppetobe* translates to "jump with all one's might". Before large machinery, the playing and stomping during *Seppetobe* festivals were an effective way to till the paddy in preparation for planting (*Japanese Traditional Festival Calendar*, 2019). Since the Bonroku era (16th century), on the first Sunday of June, young men dressed in all white would play, dance, and sing in the unplanted rice field while carrying a ten-meter-high bamboo rod, representing a tall and healthy future rice crop. On top of the bamboo rod is a wooden ornament called Shibe. When the festival is over, the Shibe is taken off the bamboo rod, and a small piece is given to every family and functions to protect each family from any evil spirits for the year. In the corner of the paddy, a three-meter-high sculpture of "Deodon", a local deity, is brought over by little children and positioned to watch the festival (Japan Agriculture News, 2016). After the *Seppetobe* event, locals begin planting the rice. At its core, *Seppetobe* is a planting festival to bring together the community to hope for an abundant crop.

Figure 9: *Seppetobe* with Elementary School Students, 2024
(Photograph by author)

During my visit, Fukunaga referred to the kindergarten and elementary school field trips as *Seppetobe* festivals. Though they didn't include a Shibe, dancing, or all white clothing, Fukunaga's annual event continues the *Seppetobe* tradition as it brings together community via rice farming. In addition to leaving out aspects of the ancient *Seppetobe* festival, Fukunaga adds new parts such as the initial lesson he gives rice farming. In the current cultural moment of de-agriculturalization, *Seppetobe* connects schools to local agriculture, giving children the chance to learn about and possibly develop enthusiasm for organic farming in their town. When asked why the younger generation is less interested in farming, Fukunaga said, "The school education and government intentions are not revolved around rice farming anymore". Although rice fields are observable throughout the countryside, Fukunaga explained that most kids have never set foot in a rice paddy before. In addition to hosting field trips, Fukunaga gives presentations at local schools on organic rice farming. Unlike other agriculture community events that involve a large

planting or harvest, hand planting a rice field, even with dozens of people, takes hours longer and is less precise than with a transplanter. The kids take up three afternoons during peak rice planting season, but for Fukunaga, these events are community oriented and are to "hopefully make rice farming more prominent again in the future".

One afternoon during my visit with Fukunaga, we drove to an agriculture experiment station part of Kagoshima University working on research relating to the *aigamo* method. Led by Professor Takayama, there were two ongoing *aigamo*-related experiments: the *aigamo* robot trial and Call duck trial. In its second year of research, the *aigamo* robot project aims to replace *aigamo* ducks with a remote-controlled (ultimately AI-controlled) "robot duck" that rolls around the paddy, squishing emerging weeds and preventing water stagnation. According to Takayama, the two main problems with the *aigamo* method today are handling the ducks and keeping the ducks safe from predators. Learning to raise ducklings, releasing them into a rice field, and eventually removing them, is difficult for many farmers – especially those farming alone. The *aigamo* robot could potentially help overcome the challenges of raising livestock for rice farmers interested in organic rice production.

When *aigamo* ducks are released into the rice paddy they are just a week or two old and are at high risk from predators. The ducklings remain at high risk from crows or other birds for the first few weeks as they grow. An electric fence along the perimeter of a rice paddy can help prevent raccoons but not crows. Today, most *aigamo* farmers set up string or fishing lines over the rice paddy to minimize crow damage. The *aigamo* robot would remove these anxieties from farmers and reduce the labor of preparing the paddies for ducks, such as setting up string and electric fencing.

Figure 10: Kagoshima University *aigamo* robot, 2024
(Photograph by author)

Perspectives on the developing *aigamo* robot vary in the rice-duck farming community. For some, the new technology has high potential to make organic rice farming easier and more accessible to conventional rice farmers interested in converting to organic. Others doubt the robot will be affordable and point out the robot doesn't manage pests like the ducks or convert the weeds and pests to natural fertilizer. Hence, it is unclear whether the *aigamo* robot will be used in organic systems or in conventional rice paddies. Perhaps this technology would simply replace the use of herbicides but not pesticides or synthetic fertilizers.

Another rising opportunity in rice-duck farming is the emerging research on the use of Call ducks instead of *aigamo* ducks for rice-duck farming. Call ducks, the smallest breed of domestic duck, could potentially reduce duck handling and predator risks in different ways than the *aigamo* robot (*Call Ducks*, n.d.). To see how this is, it's first necessary to understand the importance of duck size in rice-duck farming. When *aigamo* ducks are released one week after transplanting rice, both the ducklings and rice sprouts are small. A young palm-sized duck can't topple a rice sprout. As the ducks grow, so does the rice. This is why *aigamo* ducks are only used

for one season of rice. Reusing them the following year, the fully grown ducks could topple the young rice plants.

The Call duck, however, grows up to be less than one kilogram and is proving to be able to live alongside rice sprouts and could potentially be reused in rice paddies for three to five years. In addition, a mature Call duck is big enough to be less at risk of predators than a young *aigamo* duckling (Figure 11). Though this alternative technique lacks the yearly revenue from selling mature *aigamo* duck meat, it removes the burden of duck processing– a procedure unfamiliar to many rice farmers.

Figure 11: One week old *aigamo* duck (left) and three-year-old Call duck (right) (Photograph by author)

Although university support seems rare for the *aigamo* method, the efforts towards an *aigamo* robot appear to be gaining traction for research. Visiting Professor Takayama's field research site, I was incredibly impressed by the number of studies going on simultaneously and the efficient use of space and resources. Both rice-duck-related research projects seem promising

and will hopefully be shared in a longer report soon. In Northern Japan, a Nissan engineer is also developing a different prototype of the aigamo robot (Vincent, 2019).

When Fukunaga drove me back to the Kagoshima central train station at the end of the week, he received a call from a farmer friend we'd visited the day before who released his *aigamo* ducklings into his rice paddy during our visit. Of the 30 ducklings he released, ten died overnight from the cold. Before releasing ducklings into the paddy, many farmers first ensure the ducklings have developed waterproof feathering and strong swimming capabilities. This is done by introducing the ducklings to a small pond (without rice) during the days prior to their release into the rice paddy. This pond, which Furuno calls the "duck school", greatly reduces the risk of hypothermia for ducklings getting released into the rice paddy.

After hearing the news, Fukunaga offered to drive ten of his own ducklings to his friend's farm tomorrow and add them to the rest of the group. For Fukunaga, who has many more ducklings, losing ten ducklings doesn't disrupt his duck to field-size ratio as much as for his friend. This moment illustrated another communal characteristic of rice-duck farming, which was further demonstrated during my time visiting Furuno the following week.

vi. Takao Furuno and farmer ingenuity

In the Fukuoka Prefecture of Northern Kyushu, Takao Furuno, along with his wife and sons, farms ten hectares organically – seven hectares of rice and three hectares of vegetables. As the founder of integrated rice-duck farming, Furuno's farm size is significantly larger than the national average (excluding Hokkaido) of 1.6 hectares (Hisano et al., 2018). In one season, Furuno raises 2,000 *aigamo* ducks for his rice paddies and sells another 2,000 ducklings to other rice-duck farmers in the area. The fields dedicated to rice and those dedicated to vegetable crops alternate each summer, and during winter months are all used for vegetable production. This form of crop rotation breaks pest cycles and lowers diseases as the field conditions change drastically between a flooded rice paddy and a dryland vegetable bed. For over 35 years, Furuno has been perfecting the *aigamo* method and sharing his work with anyone interested. As a somewhat local celebrity in the region, Furuno often receives farm visits from chefs, news reporters, and high schools.

My stay with Furuno coincided with a large workday focusing on preparing a planted rice paddy with fencing and string before releasing the ducklings. As a labor-intensive step, Furuno had help from two of his sons, two chefs from Fukuoka City interested in learning about organic farming, and me. We spent the morning mowing overgrown grass around the 0.6-hectare paddy and ensuring the bank edges were clear of larger weeds. After lunch, we laid out the electric fence and a smaller barrier around the paddy. The final step was setting up string lines over the paddy for crow protection and building a small wooden hut for the ducks to go under during any storms.

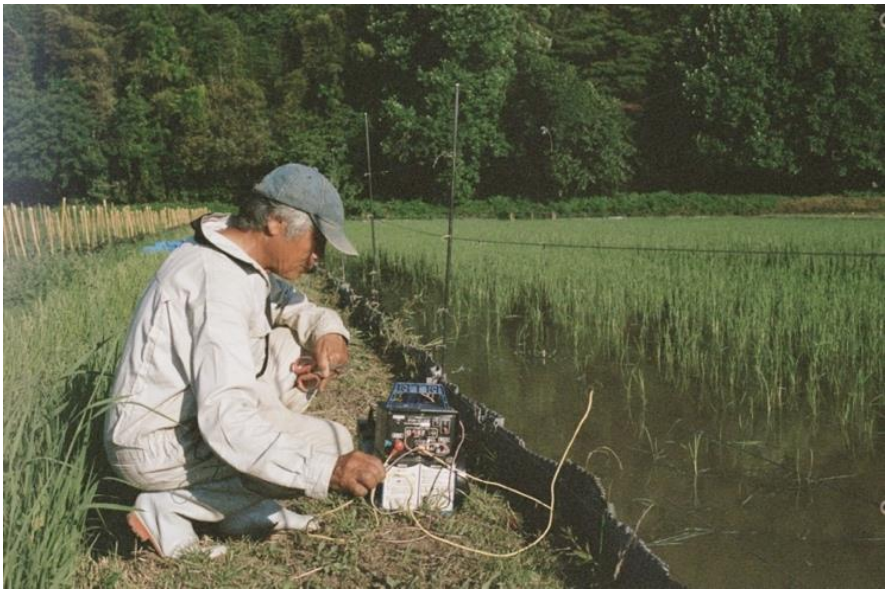

Figure 12: Furuno testing electric fence, 2024
(Photograph by author)

By five p.m. the paddy was fully set up, and we gathered 60 ducks from the duck school in crates and walked them over to the paddy. Releasing them one by one, we watched each duckling find its way to the other ducklings to explore their new home. At this point, the work was done, and for the next two months, these ducks will maintain the paddy mostly on their own. After spending nearly half an hour watching the duckling swim and checking on the electric fence, Furuno turned to me and said, “Now is the happiest time, when I release the ducks... When we are looking at ducks, we forget about time”. At 73 years of age and farming ten hours a day in the heat of subtropical southern Japan, Furuno maintains joy in his work.

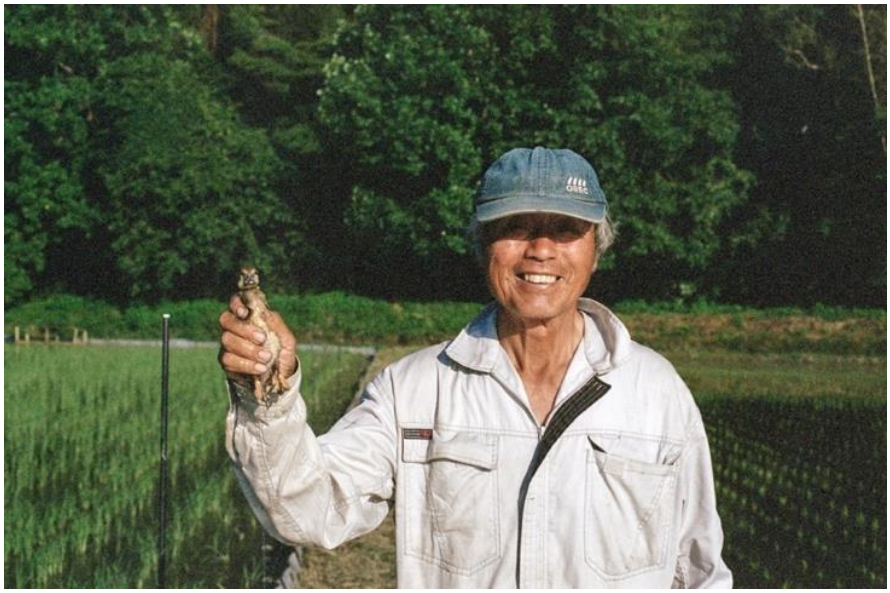

Figure 13: Furuno holding an *aigamo* duckling, 2024
(Photograph by author)

When we returned to his house, the two chefs from Fukuoka City were preparing a celebration dinner, so Furuno asked if I wanted to see his newest invention in the meantime. Since resolving the issue of weeds in his rice paddies with the *aigamo* method, Furuno has been working to use organic methods to limit weed pressure in his vegetable fields. His new *hawking* tool does just that. Inspired by a pitchfork, Furuno converted an old broom into a hand-pulled weeding tool. Dozens of L-shaped bent wire prongs are attached in rows to the bottom of a wooden plank which is attached to a broom shaft. When the tool is dragged over a row of newly sprouting crops, the prongs angle about an inch into the soil and vibrate lightly through the soil. This small soil disturbance can pull out any emerging weed roots without going deep enough to damage the crops' deeper roots. Furuno explained how the *hawking* tool is especially useful during the first two weeks after crop germination, when weeds are just starting to emerge and have weak root structures. Furuno first designed the *hawking* tool in 2016 and has since made adjustments using different wire angles and materials.

Figure 14 and 15: Hawking Tool, 2024
(Photograph by author)

Furuno's *hawking* invention has parallels to the *aigamo* method regarding the philosophy of problem-solving. To handle the issue of weed pressure as an organic farmer, Furuno sought out new designs based on the resources he had access to. Unlike expensive machinery run of fuel and designed by large manufacturers not to be repaired, Furuno's *hawking* tool was intentionally designed to be accessible to any farmer. Like the *aigamo* method, the *hawking* tool doesn't require off-site supplies or expensive technology. Instead, it is knowledge-based and prioritizes "ecological capital", a concept coined by Jan Douwe van der Ploeg. As opposed to a farmer with economic capital, who can purchase expensive machinery or synthetic inputs, ecological capital is that which can be sourced from one's land. To farm in a way utilizing the ecological capital of land requires knowledge of ecology, craftsmanship, and a general relationship to land (its microclimate, wildlife, soils, seasonal variations, etc.).

The self-sufficiency that ecological capital enables can lower the costs of production and generate a sense of independence (van der Ploeg, 2010). These terms and ideas can all be encompassed under agroecology and are characteristics apparent in Furuno's ethos as an organic farmer. When asked about the importance of farmer-led research, Furuno highlighted how often farmers factor in variables such as time management and other practical decisions better than non-farmer researchers. Rather than simply buying an agriculture product to fix an on-farm problem, Furuno chooses to think deeply about the issue and what kind of tool could be useful. When the tool doesn't exist yet, he designs it himself. During his *hawking* demonstration, Furuno was keen I try pulling the tool myself. He taught me how to grip the handle, what speed to walk with, and how to maintain a straight line. This methodology of knowledge transferring from farmer-to-farmer, or in my case farmer-to-student, highlights the pedagogy of Furuno's work.

In both the *aigamo* method and the new *hawking* tool, Furuno used his experiences as a farmer to develop solutions for problems he faces without any impulse to patent the design for profit. On the contrary, he aims to share exactly how anyone can build the Hawking tool, just like he did with the *aigamo* method by writing a book and participating in permaculture conferences globally. This approach is the antithesis to much of the technology-based agriculture initiatives today such as precision agriculture machinery, climate-smart agriculture, Roundup-ready crops, carbon-offset arrangements, and seed patenting (Pimbert, 2015). An example encapsulating the contrasting philosophy is the ongoing scandal with John Deere tractors. In the last ten years, John Deere customers have criticized the company's repair policies that make it impossible to diagnose a repair by independent mechanics or farmers themselves. Instead, farmers have been subjected to high prices and long wait times at John Deere dealerships. Arguably, farmers only own the tractor's hardware and not its software. By buying a John Deere

tractor, a farmer essentially buys a “license to operate the vehicle” (Berliner, 2021; Rimmer, 2025). This is precisely what Furuno is fighting against. When demonstrating the *hawking* tool by pulling it over newly planted green onions, Furuno pointed to the tool and jokingly said to me, “not AI”, encapsulating his attitude towards new agriculture technology that to some extent disregards the farmer’s own knowledge and experiences. When asked if there were any government initiatives or programs to help support the *aigamo* method, like every other farmer I asked, said no. However, Furuno framed this reality as a positive by comparing his farming practice to meditation. To make his practice simple, he avoids bringing external factors into his life and strives to be entirely self-sufficient and non-reliant. For Furuno, subsidies and other forms of government support, in a way, hinders his independence.

After demonstrating the *hawking* tool and technique, we returned for dinner. To celebrate the birthday of his eldest son and the work we’d accomplished that day, we had a feast of a dinner: fresh shrimp with rice, zucchini salad, hand-prepared sushi, Kagoshima Wagyu beef, beer, wine, and homemade rice-duck sake. Just as I was impressed by Furuno’s work ethic, I was blown away by the generosity and grand meal I got to share with his family and friends. There was an obvious correlation between farmers passionate about organic methods and having a deep appreciation for food.

vii. *Aigamo* and *Nouminren*; Agroecology and Food Sovereignty

The *aigamo* method has yet to be put in conversation with *Nouminren* or the food sovereignty movement in general. Though *Nouminren* has over 50,000 members reaching all 47 prefectures in Japan, every farmer I stayed with or met in Kyushu was unaware of the work of *Nouminren* (Kako, 2014). With *Nouminren's* headquarters in Tokyo, it is likely *Nouminren* is less prominent in Southern Japan. Similarly, the term "agroecology" was equally unheard of. In a recent research article titled "Political shifts toward family farming and agroecology in Japan*",* Kae Sekine writes, "In Japan, the notion of agroecology remains relatively unknown among agri-food stakeholders, politicians, journalists, and even scientists in recent years… but this does not suggest the absence of agroecological practices in the country" (Sekine, 2024).

To some extent, the ever-changing language used to describe farming as organic, agroecological, regenerative, natural farming, or sustainable agriculture can begin to become hard to follow, especially on an international, multilingual perspective. As agriculture terms are lost in English-to-Japanese translation, co-opted by large companies in agribusiness, or replaced by a more updated word, often the actual farming practices change at a much slower rate. Though hard to keep track of globally, often each descriptive word serves a clear and important function whether it be regulation standards, access to certain market labels, or even legibility to international organizations. In the case of agroecology and food sovereignty, the language is now becoming well tied to organizations like La Vía Campesina and carries a political standpoint on smallholder farming.

Like Sekine's point on agroecology in Japan, the fact that *aigamo* farmers didn't declare themselves as agroecologist doesn't suggest an absence of agroecology in their work. Instead,

without getting lost in terminology, what's important is recognizing how their farming practices implement ecological concepts to grow crops sustainably and pinpoint how these practices make smallholder agriculture feasible during the corporate food regime.

Rather than suggesting that *aigamo* farmers should be members of *Nouminren* or that *Nouminren* needs to promote *aigamo* farming, mentioning the two side-by-side helps situate the *aigamo* method in Japan's food system by providing the context of smallholder struggles in Japan. By doing so, the *aigamo* method becomes more than just an ecologically sound way of growing rice but one that can be seen to provide farmer autonomy in an industrializing food system, one that recognizes the importance of ecological capital for smallholder farming, and one that was invented during heightened trade liberalization in Japan and the rise of food sovereignty movement internationally.

In a 2010 publication in *The Journal of Peasant Studies* titled, "The peasantries of the twenty-first century: the commoditization debate revisited", van der Ploeg argues the modern-day smallholder farmer who succeeds outside of global markets and uses sustainable techniques is, in a way, engages in an act of resistance against the corporate food regime. Unlike a protest, strike, legal battle, or civil disobedience, "resistance resides in the fields" and "within spaces of production" (van der Ploeg, 2010). Van der Ploeg continues and writes,

> An important feature of these new forms of resistance is that they entail searches for, and constructions of, local solutions to global problems. Blueprints are avoided. This results in a rich repertoire with the heterogeneity of the many responses becoming one of the propelling forces that induce new learning processes (2010).

Expanding on this idea, setting the *aigamo* method in conversation with the broader food sovereignty movement can showcase some of the existing "local solutions to global problems" and "induce new learning processes". Understanding the ways in which *aigamo* farming succeeds in enhancing food sovereignty may be insightful for *Nouminren*, La Vía Campesina, or those participating in smallholder agriculture. Without suggesting every farmer should convert their farm to a rice-duck farm, the case of the *aigamo* method demonstrates the value of farmer ingenuity, agroecology, and, more specifically, integrated crop-livestock systems. Hence, understanding the *aigamo* method may provide insight to farmers not only working with rice but also those interested in developing their own closed loop agroecological system to improve self-sufficiency.

Unlike many organizations globally that are advocating for food sovereignty, a central argument of *Nouminren* has been regarding food safety. Genetic and heavy metal contamination, chemical residues from pesticides and herbicides, and radioactivity are all concerns with food arriving into Japanese ports (Kinezuka & Montenegro de Wit, 2020). In terms of chemical residues, Japan generally has stricter tolerances than other countries, such as the United States. That being said, many chemical compounds have yet to be given a threshold value simply because they are never used in Japan. In "The Agricultural Free Trade Debate: Poisoning the Planet and its Inhabitants", Darrell Gene Moen points out that after the 1992 GATT Uruguay trade negotiations, Japan's Health and Welfare Ministry increased tolerance levels of 108 agriculture chemicals (Moen, 1999). In terms of rice, Moen writes,

> The United States allows 2ppm [parts per million] of methoxychlor, a chemical applied to prevent spoilage in storage bins, while Japan has no tolerance set because the chemical is not used in Japan; that the permissible residual level of malathion (applied pre-harvest

> and post-harvest) is 8ppm in the U.S. and 0.1ppm in Japan; and that the standards for chlorpyrifos-methyl, a post-harvest insecticide used on rice, is 6ppm in the U.S. and 0.01ppm in Japan (1999).

In response to Japan joining the WTO in 1996, *Nouminren* opened a "Food Research Lab" to conduct tests for chemical residues, analyze genetically modified organisms (GMOs), and detect sodium iodide radiation and heavy metals (Kinezuka & Montenegro de Wit, 2020). As stated on the *Nouminren* website, the goal of the Food Research Lab is to "protect food security as a basic human right" and "publish the results of the analyses openly and widely" (*NOUMINREN Food Research Laboratory*, 2025).

While some criticize food sovereignty's broad definitions and goals, the expansiveness of the food sovereignty movement is precisely what has allowed it to organize around the world. Raj Patel describes this by saying, "Food sovereignty is a big tent…The idea of a 'big tent' politics is that disparate groups can recognize themselves in the enunciation of a particular programme" (Patel, 2009). Hence, for *Nouminren* to be a member of the broader La Vía Campesina organization, they are adding Japan to the map of the globe where smallholder farming has been jeopardized by free trade, industrial farming, deforestation, environmental pollution, or land grabbing. Japan's emphasis on food safety presents a unique way food safety can be put in relation to food sovereignty. *Nouminren's* claim for food sovereignty is leveraged with arguments for food safety and with their findings at their independent Food Research Lab.

Hence, like how Patel claims that "disparate groups can recognize themselves in the enunciation of a particular programme", smallholder farmers in Japan work in disparate worlds as smallholder farmers in Central America or in Northern Africa, yet through organizations like La Vía Campesina, parallels can be drawn in their experiences. As agriculture free trade is a

worldwide phenomenon, tracking the impacts of free trade agreements on smallholder agriculture globally is one way to draw parallels and point out discover flaws in policy.

Like other kinds of agroecology, Furuno's *aigamo* method and *hawking* tool includes a farmer-to-farmer pedagogy that resembles traditions of other agroecological techniques. For example, the *Campesino a Campesino* (CaC) movement in beginning in Central America in 1970s (Holt-Giménez, 2006; Mier y Terán Giménez Cacho et al., 2018). When referring to a group of *campesinos* sharing soil conservation techniques in Meseta Central Mexico, Holt-Giménez writes, "Their manner was warm and unassuming, their curiosity infectious. These teachers were a far cry from the government extension agents I knew who gave formal lessons in classrooms, read from coveted books, and used unintelligible technical words to teach about modern agriculture" (Holt-Giménez, 2006). I felt similar learning from Furuno and watching the local high school visit to learn about *aigamo* and *hawking:* an unconditional desire to share practices which originated from a farmers' experience out of a wish to make farming easier and more sustainable using agroecology. This horizontal pedagogy reflected in Furuno's work was apparent at Ayumi's farm and Fukunaga's farm where community rice planting events were hosted. As mentioned, the rice planting events I experienced today were less about utilizing a mass of labor but rather a chance to share knowledge and engage with community.

Figure 16: *Hawking* tool demonstration for high school, 2024
(Photograph by author)

In the current moment of farmland abandonment, rural depopulation, and intense agriculture modernization, agroecology presents an alternate reality for agriculture. The *aigamo* method in specific offers a fascinating way of developing new approaches, heavily inspired by ancient techniques, to adapt to the current agricultural climate.

Epilogue: gleanings from the *aigamo* method

In many ways, this paper is a culmination of my academic work as an undergraduate at Cornell University. As an Interdisciplinary Studies major, I've had the opportunity to take a range of courses, sometimes seemingly unrelated to one another, and group them in a way that no CALS major currently offers. Together, these courses made up my major focused on agroecology. The flexibility of Interdisciplinary Studies allowed for a great deal of independence, which directly enabled this research project. Unlike more conventional majors, my major had no capstone course or organized final project which made an honors thesis an appealing way to conclude my studies with a comprehensive piece of work. Though not a requirement, I'm glad I pursued an honors thesis. Between my internship, fieldwork in Japan, and the reading and writing stages, I learned a tremendous amount and writing this paper was a nice way to reflect on it all.

Throughout my time as a student in CALS, there's been an obvious tension between the distant nature of academia, particularly regarding agriculture or development, and the embodied experiences of farmers and farming. It's something I continue to grapple with as move on from Cornell into the real world. In the face of climate collapse and political turmoil, what path can produce the most fruit for myself and the greater good? From my view, there is a much more tangible outcome to physically working in agriculture, growing food for people, restoring land, and fostering a community around it than a career in academia writing from a distance, working on a single publication for a decade that may only be read by a small number of other academics. This paper for example, though a minor project compared to a dissertation or published piece, will likely only be read by a handful of people. This concerns me not because I feel as if the hours I devoted to this project make it deserving of an audience, but because it reveals how

unproductively ideas are shared in the setting of academia. If part of the goal of academic research is to work towards a better future, it's important to question the efficacy of the structures set in place. Are they using resources efficiently? Are they allowing information to be shared easily? Are they collaborative?

Takao Furuno's work revealed to me an alternative reality to agriculture research. One that embodies the agricultural experience and farmer knowledge to develop innovative on-farm research that can be shared with farmers globally. Furuno's work also challenges the failed imaginary dominant in most agriculture research of "scalability", where ideas that can't be directly amalgamated into conventional large-scale practices are often dismissed under the imaginary of scalability. Furuno's *aigamo* method, and more recent *hawking* tool, is aimed to be easily approachable for smallholder farmers, and as it continues to circulate internationally the constraining notion of scalability is being reimagined. In addition to the technical aspects of Furuno's practice, the positive sentiment he radiates was equally moving. Despite the extraneous labor Furuno engages with daily, my impression was that he carries a purely positive attitude in his work. This is something hard to encapsulate in language but working alongside him was a special experience that I'll always remember and hope to bring forward in my life.

As this was my first experience conducting field work, I got a sense of what it's like to juggle taking fieldnotes, being fully present in the interactions I was having, finding moments to record formal interviews, and making photographs all while not interrupting the actual farm tasks I was helping. Perhaps obvious, the experience taught me how important it is to be comfortable with the camera you're working with (and other equipment like microphones for interviews), how helpful it is to be familiar with the language, and to be patient and polite throughout it all.

Although I've now just officially completed this thesis, it doesn't feel like I've closed the door on the project. Instead, I consider this work as potentially a prolegomenon to future work. Whether this could be a component of a master's dissertation or evolve into a documentary or more photography work, I hope to come back to this story, revisit the farmers I stayed with, and continue to share the practices and philosophies of agroecology and food sovereignty movement.

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Ithaca, New York

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Appendix

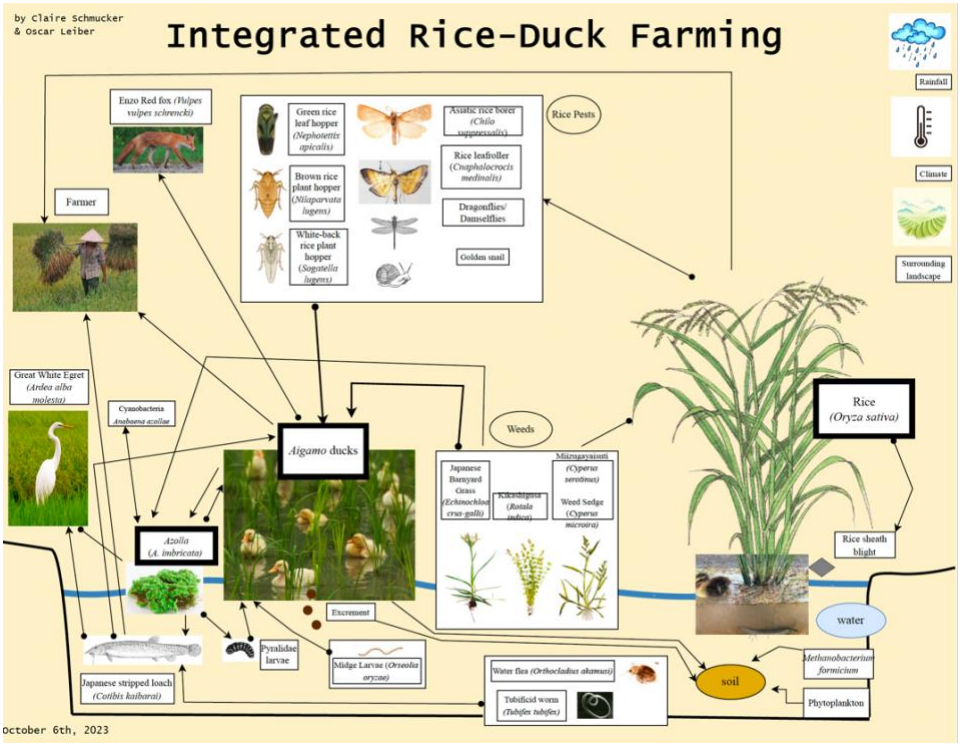

Figure 17: *Aigamo* agroecosystem map made by Claire Schmucker and Oscar Leiber, 2023

Figure 18: Boundbrook Farm in Vergennes, Vermont, 2024
(Photograph by author)

Figure 19: Outdoor rice nursery and transplanter in Shizuoka Prefecture, 2024
(Photograph by author)

Figure 20: Duckling unboxing in Shizuoka Prefecture, 2024
(Photograph by author)

Figure 21: Mini truck carrying rice flats in Fukuoka Prefecture, 2024 (Photograph by author)