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IN THE FIELD REPORT

Agroecological producers shortening food chains during Covid-19: opportunities and challenges in Costa Rica

Mary Little[1] · **Olivia Sylvester**[2]

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Abstract

The Covid-19 pandemic has compounded the global food insecurity crisis, disproportionately affecting the consumers, farmers, and food workers (UN in Policy brief: impacts of COVID-19 on food security and nutrition, 2020, https://www.un.org/sites/un2.un.org/files/sg_policy_brief_on_covid_impact_on_food_security.pdf). The significant disruptions caused by Covid-19 have called international attention to food security and sparked conversations about how to better support food production and trade. Our paper contributes to a small but growing literature on the impacts and responses of agroecological farmers to Covid-19 in Costa Rica. Specifically, we interviewed 30 agroecological farmers about (1) livelihood disruptions during Covid-19, (2) the areas of food production and sales most affected during this pandemic, and (3) how farmers and consumers are adapting during this crisis. Our findings reveal multiple impacts on agroecological farmers including: economic hardships of lower incomes and inability to pay loans, changes in purchasing and consumption patterns, market disruptions, changes in sales, a decrease in agrotourism, and a shortage of farmworkers. Furthermore, we also report the following farmer adaptation strategies: (1) minimizing distance with consumers to facilitate direct delivery, (2) establishing e-commerce platforms. Based on our findings, we recommend the following: (1) building farmer networks for knowledge sharing, (2) increasing technological support for farmers, and (3) providing government support to ensure that such crises do not increase unemployment among farmers and exacerbate food insecurity.

Keywords Agroecology · e-commerce · Food distribution · Food security · Local food · Resilience

Introduction

A small but growing body of research is emerging on how the Covid-19 pandemic has affected consumer and producer livelihoods and food security in different ways. Food producers are on the frontline of the pandemic (Parks et al. 2020). Lockdowns have changed farmers' ability to transport and sell food. In India, Ceballos et al. (2020) reported that smallholder farmers experienced delays in product sales, due to travel restrictions. Lockdowns have also changed consumer diets. Some consumers have started growing their own food to increase food self-sufficiency (Walljasper and Polansek 2020); other consumers have had less access to fresh produce (Harris et al. 2020). Despite its significant impacts, the Covid-19 pandemic is an opportunity to push for action to reorganize and strengthen our local and global food systems. Blay-Palmer et al. (2020) propose that, in the light of uncertainty, new possibilities and pathways have been opened by the pandemic (Blay-Palmer et al. 2020). One of these possibilities is to examine food supply chain (FSC) resilience in the face of the disruption due to the pandemic (Michel-Villarreal et al. 2021).

Shortening food supply chains has been proposed to increase food system sustainability and resilience (Chiffoleau and Dourian 2020; Michel-Villarreal et al. 2021; UNIDO 2020). Short Food Supply Chains (SFSC) are defined as those that reduce "…the distance between agriculture and final consumption, directly re-connecting farmers to consumers…". Examples of these include sale on-farm, at farmer's markets, internet sales, local shops owned by farmers or through one single intermediary (e.g.,

✉ Mary Little
mlittle@fieldstudies.org

Olivia Sylvester
osylvester@upeace.org

[1] School for Field Studies, Atenas, Alajuela, Costa Rica

[2] Department of Environment and Development, University for Peace, San José, Costa Rica

cooperative or specialized shops; UNIDO 2020, p. 4). Sales methods that remove or reduce intermediaries are known as direct-to-client sales. SFSC have been well studied regarding their sustainability. In comparison to long chains, SFSC they have been reported to: (1) reduce economic uncertainty for farmers since they are not subject to the market volatility of longer supply chains, (2) contribute to the local economy, (3), support more inclusive and equitable participation in the food system, and (4) better preserve agrobiodiversity (Chiffoleau and Dourian 2020). Scholars highlight, however, that the literature on the resilience of SFSC is limited; one specific gap is regarding the strategies that farmers have to face system shocks (Michel-Villarreal et al. 2021). Covid-19 is one important disturbance that can be studied to better understand what strategies best support farmers as well as what factors hinder their ability to continue their livelihoods.

Our case study was designed to better understand: (1) how farmers and consumers have achieved their food and livelihood needs during Covid-19, (2) the areas of food production and access that have been most affected during this pandemic, and (3) how farmers and consumers are adapting and reorganizing during this crisis. We examined this topic with smallholder, agroecological farmers in Costa Rica by conducting interviews with farmers selling at local farmers' markets, one example of an already short food supply chain. Costa Rica has mandated multiple modifications to day-to-day life during Covid-19. Here we will outline some of the modifications that have impacted the two main sections of our framework: Consumer Behavior and Food Supply Chains. Driving restrictions were implemented in March 2020 and have varied since. Specifically, cars were consistently only allowed to drive 1 weekend day. These restrictions resulted in some consumers being unable to go to local markets. Our research contributes to this gap regarding how Covid-19 has impacted smallholder farmers, specifically agroecological producers in Costa Rica.

Conceptual framework

Sustainability and resilience are complementary concepts. Tendall et al. (2015, p. 18) explain sustainability as "the capacity of a system to function in the future…[and] resilience implies the capacity to continue providing a function over time despite disturbances; in other words, sustainability is system performance and resilience can be a means to achieve it during shocks and stressors. Our conceptual framework is focused on one element of food system resilience: how farmers adapt to disturbance and specifically to changes in markets and consumer behavior due to Covid-19. We specifically situate our case study in the literature on SFSC resilience, an area reported by scholars as understudied in general and especially in the context of Covid-19 (Chiffoleau and Dourian 2020; Michel-Villarreal et al. 2021). We acknowledge this is a large area for study and thus we focused on analyzing smallholder farmer responses and adaptations to the impacts of the Covid-19 pandemic.

Methodology

Study design, data gathering, and participant invitation

We used an exploratory qualitative design to examine the impacts of the Covid-19 pandemic on smallholder, agroecological farmers in Costa Rica. We worked with farmers who self-identified as agroecological farmers based on the following criteria: (1) use mainly natural versus synthetic chemical inputs, (2) prioritize traditional and indigenous knowledge and practices, (3) promote genetic conservation and biodiversity, (4) enrich soil health. These four criteria come from the agroecological literature (Third World Network and SOCLA 2015). Specifically, we located farmers' work using the previously mentioned agroecological criteria at two markets in San Jose (Feria Verde Aranjuez and Feria Verde Ciudad Colon) and one in the Caribbean region in the province of Limon (Feria Agrícola y Artesanal de Puerto Viejo). Some, but not all, of these farmers are certified organic. At all three markets, we carried out a complete sampling of all food vendors selling products produced on their farms. A total of thirty producers participated in this study.

We carried out semi-structured interviews with one farmer from each food stall and no farmers declined invitations to participants. All farmers were offered the option to remain anonymous, however, all chose to use their names and personally identifiable information in this study. Our interview questions addressed the following themes: (1) farm characteristics, (2) production and sale methods, (3) the impacts of Covid-19 on production and sale, (4) willingness to sell directly to customers online. Interviews (lasting from 30 minutes to one hour) were done either face-to-face or via phone, depending on the farmer's preference. All interviews were transcribed and processed in Excel. We analyzed open-ended questions using qualitative thematic analysis (Ryan and Bernard 2003). This research was approved by the University for Peace Research Ethics Board. All participants provided their informed consent and chose to use their names associated with their contributions.

Results

Farm demographics

Thirty producers using agroecological production methods in Costa Rica participated in this study (from 18 to

over 70 years old; 22 males and 8 females). Participants reported land holdings between less than 1 hectare to 200 hectares. These farmers primarily produce and sell fruits and vegetables along with a few other foods (eggs, coffee).

Sales: pre and post-Covid-19

A majority of farmers reported a decrease in sales in the first 3 months of the pandemic (22 farmers). Only five farmers reported sales staying the same and three reported that sales increased, supplemented from online or direct deliveries. Some farmers suggested that the increase in sales was related to consumers' desire to eat healthy (pesticide-free) to increase immunity during the pandemic. Farmers also experienced changes in consumer purchasing patterns; specifically, consumers were mainly buying staple food items and purchasing fewer luxury products. The main avenues of sales for farmers were farmers' markets and direct-to-client sales (Fig. 1).

Direct to client sales

The majority of farmers reported using direct sales due to Covid-19. Direct sales methods included: (1) text messages, (2) direct messages on Facebook or Instagram, (3) farm web sales platforms. Those farmers with previous experience with direct sales, reported increases in sales. Farmers that started new direct delivery services reported diverse experiences (Table 1). Some difficulties converting to direct delivery included: lack of time to both farm and run an online sales platform, costs in time and labor to provide delivery and lack of technology skills needed to initiate and run the e-commerce platforms (Table 1).

Immediate and long-term impacts of Covid-19

In Table 1, we outline the immediate impacts farmers reported due to Covid-19 organized by themes and subthemes. Economic hardships were commonly mentioned in relation to incomes as well as in relation to a loss of assets and/or a decrease in agrotourism income. Farmers also reported changes in consumption and purchasing patterns; some reported consumers purchasing less luxury items and others reported an increased consumer demand for organic produce. Market access was reported as limited due to Costa Rican driving restrictions to limit mobility during Covid-19 as well as consumers' fears of catching Covid-19. All farmers reported increased demand for online food sales and/or household delivery. One farmer reported a shortage in farmworkers due to a closing of the Costa Rican land borders and thus limiting migrant worker travel. In Fig. 2, we illustrate farmers' adaptive responses to the impacts found in Table 1.

Long-term impacts

We asked farmers what they perceived as the possible long-term impacts of Covid-19 on their businesses. Some farmers have the knowledge, resources and time to change or add sales methods; however, those in marginal positions will experience disproportional impacts. For instance, a farmer from Finca Tierra de Sueños explained how "some farmers will be ruined because they cannot pay their loans once they lose contracts with restaurants and hotels". Another farmer from Finca Caña Dulce in Guayabo expressed that he and other farmers had used their savings trying to survive reduced sales and tourism visits to their farms; he explained that "the impacts of Covid-19 have put us back decades." Having economic safety nets was reported by others as important to mitigating long-term impacts. Specifically, one farmer from Finca del Bosque explained: "smallholder

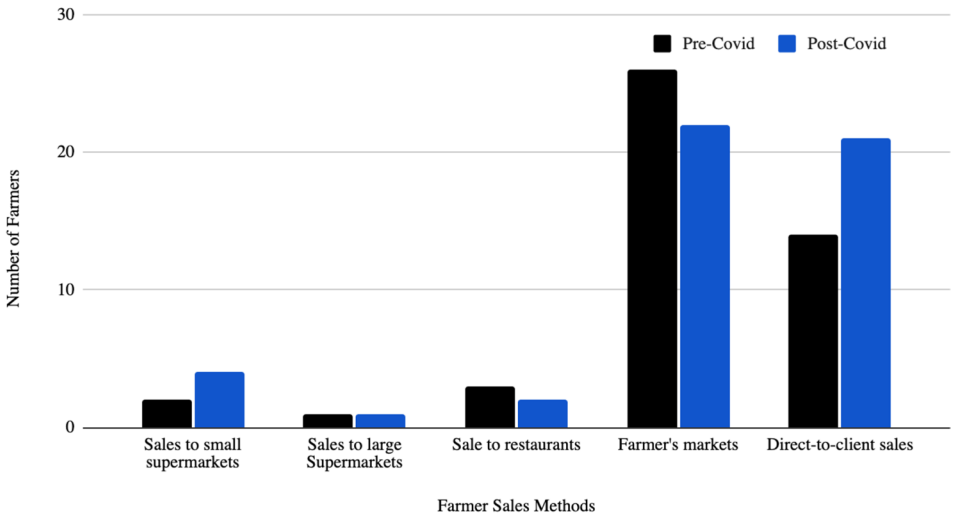

Fig. 1 Methods used by farmers to sell their products pre-Covid-19 and post-Covid-19

Table 1 Impacts reported by farmers due to Covid-19

Themes	Sub-themes	Representative quotes
Economic hardships	Lower incomes	"We aren't making enough to survive" Finca Caño Dulce, Guayabo, Mora
	Loss of land	"If we continue to have fewer customers will have to live on less or even lose the farm." [San Rafael de Gordon, Cahuita]
	Inability to pay loans	"Some farmers will be ruined because they can't pay their loans once they lose contracts with restaurants and hotels." [Finca Tierra de Suenos, Zarcero]
Change in purchasing & consumption	Purchasing more organic/pesticide-free food	"More people want to buy organic because they are concerned about their health" [Rinconcito Organico, Cartago]
	Not buying luxury items	"The pandemic should be positive for organic producers, if they aren't producing luxury goods." [Finca la Isla, Puerto Viejo]
	Buying plants/seeds for home gardens	"Growing own food has become trendier." [San Rafael, Heredia]
Market access	Fear of getting Covid-19	"People are afraid to go to the market' [Orgánicos del Rio, San Ramon]
	Vehicle driving restrictions as part of Covid-19 measures	"Vehicle restrictions have made it so some people (customers) cannot drive to the market" [Caño Dulce, San José]
Changes in sales methods	Increase in demand for directly delivery and online sales	"We faced an overwhelming growth in deliveries which meant we had to reorganize." [Enraizadas, Grecia]
Decrease in agrotourism		"Without tourists entering the country we have had to pause this effort." [Finca Orgánica Vara Blanca]
Shortage of farm workers		"Getting enough workers to pick the coffee crops has been a big challenge in the region [Life Monteverde, Santa Elena]

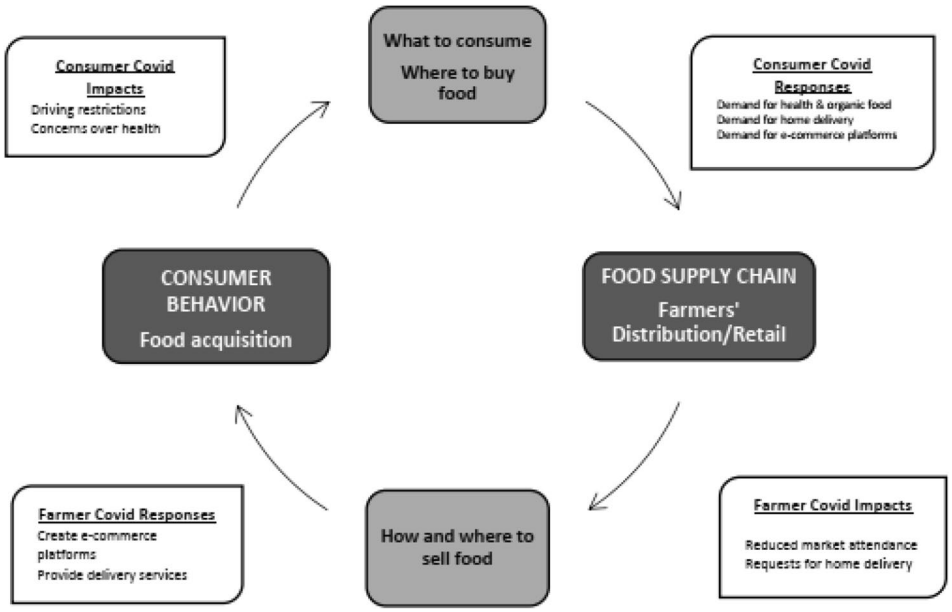

Fig. 2 Factors shaping agro-ecological producers' adaptive responses to Covid-19 and changes in consumer behavior post-Covid-19

farmers now have lower incomes and this will push them out of farming; this means that large-scale producers are going to take over…large-scale producers have more capital and land and they can go for over a year without income and without their business failing when we are in economic crises." Other farmers expressed how the pandemic may increase organic and health food sales and this may create increases in sales over the long-term.

Discussion

A small but growing body of literature has proposed how Covid-19 could impact our food systems (IPES-Food 2020; Stephens et al. 2020), including: (1) market disruptions, including restricted access to markets, (2) increased food waste due to farmers' inability to transport goods, and (3) export restrictions that affect global agri-food markets (IPES-Food 2020; Stephens et al. 2020). These reports pose questions related to how smallholder farmer livelihoods will be impacted such as: "which systems are resilient and which are not? What are the short- and long-term consequences of unequal access to resilience tools and measures? What does the Covid-19 pandemic reveal about the overall functioning of our agricultural systems?" (Stephens et al. 2020, p. 2).

Impacts of Covid-19 on farmers in Costa Rica

The immediate and long-term impacts on agroecological farmers in Costa Rica include: (1) economic hardship (lower income, loss of land, inability to pay loans), (2) change in purchasing and consumption patterns (buying more organic, not buying luxury items, buying more plants/seeds), (3) market disruption (fear of Covid-19 and government driving restrictions), (4) change in sales (increase demand for direct delivery), (5) decrease in agrotourism, and (6) shortage of farm workers (see Table 1). Some of these impacts have been reported elsewhere, including: market disruptions, due to government travel restrictions in India (Ceballos et al. 2020), changes in migrant labor, that for some regions in India resulted in critical losses of produce (Kumar et al. 2021), movement restrictions for farmers as well as a shortage of inputs (due to lockdowns) in China (Pu and Zhong 2020).

Our research finds that not all farmers experience Covid-19 impacts in the same way. For example, some farmers who had a diversity of fruits and vegetables (versus luxury items such as meats or added-value products) found that the demand for their products increased. We also found that it was easier for farmers who already had online platforms or direct delivery services to adapt to changes in consumer needs. Thus, we see that farmers with resources to diversify their production, financial capital, and access to online sales knowledge and skills, were better positioned to adapt to market changes due to Covid-19.

Responses and adaptations

Scholars highlight that the literature on the resilience of SFSC is limited; one specific gap is regarding the strategies available to farmers to face system shocks (Chiffoleau and Dourian 2020). Farmers in this study demonstrate adaptive strategies to adjust to the food chain interruptions caused by Covid-19 reported here (Fig. 1). Having prior direct-to-consumer sales experience or an existing online platform made this adaptive strategy more plausible for some farmers. Farmers who reported increasing direct sales had the following attributes: (1) intergenerational assistance, usually from children, to assist with digital platformers to promote and sell their products, (2) previously established digital platforms or a system of direct delivery. The latter findings shed light on the specific attributes a food system may require to be resilient in the face of shocks. The food systems resilience literature discusses the resilience action cycle where stressors are absorbed and the system reacts and can restore itself (Michel-Villarreal et al. 2021). Here the ability to absorb the Covid-19 shock and to restore the system to become more robust was supported by human capital, in the form of previous online sales skills and knowledge (Gutiérrez-Montes et al. 2013).

In addition to human capital, social capital was also important to react and restore in the face of the Covid-19 shocks. Social capital is the creation of strong ties that enhance bonds and knowledge sharing within groups (Putnam 2000; Pretty 2003), and this form of capital has been reported as key to innovation in farming (Clark 2010). We found that farmers who had relationships with other farmers reported forming networks to create e-commerce platforms or groups for direct delivery; more farmers selling together means more diversity for consumers and also less burden on individual farmers for the increased workload of online and door-to-door sales. Farmers also reported that being part of a collective that offers deliveries can decrease the work burden associated with direct-to-consumer sales. For example, the Enraizadas group's business model included a platform for direct delivery prior to the pandemic and they reported that sales were up 150% since pre-pandemic times. Lastly, farmers that had close relationships with customers and had their contact information reported ease into switching to direct-to-customer sales; some farmers that reported they did not have this information or these relationships, explained that setting up direct sales options was not possible. Thus, social capital also relates to the bonds between consumers and farmers. Financial capital was also important to absorb shocks related to Covid-19. Specifically, smallholder farmers able to withstand decreases in income or that did not have large

debt, reported the ability to maintain their business during the financial shocks related to the Covid-19 pandemic; these same farmers reported how many of their colleagues that had large debt or lacked other financial income were forced to sell assets to survive.

Tendall et al. (2015) mention that resilient food systems have various features including: (1) redundancy, (2) flexibility, and (3) resourcefulness and adaptability. Here we detail some of the specific capitals that support resourcefulness and adaptability (financial, human, and economic) as well as elements that support redundancy and flexibility (different forms of sale, direct-to-customer and at farmers markets). What is also important to note about our research is that SFSC alone were not enough to support resilience during the pandemic. Farmers' markets were affected by driving restrictions and consumer and farmer health concerns, all of which resulted in fewer farmers and consumers coming to farmer's markets. Only the farmers with a certain set of specific capitals were able to absorb shocks and restore their livelihoods with these changes in participation in farmer's markets. Thus, although SFSC have been reported to decrease economic uncertainty for farmers since they are not subject to the market volatility of longer supply chains (Chiffoleau and Dourian 2020), it is important also to note that Covid-19 was a unique shock, a shock that required other skills and elements to ensure that such SFSC could maintain resilience. Specifically, these skills and elements include: (1) technological skills, (2) having access to internet platforms and the ability to deliver food, (3) forming collectives, and (4) bonds between farmers and consumers enabling farmers to communicate directly with customers outside of farmer's markets.

Recommendations

Based on our findings, we highlight the following key recommendations related to resilience in SFSCs in the face of Covid-19 shocks:

(1) Farmer-to-farmer networks and shortening the distance between farmers and customers

E-commerce platforms, which shorten foodways, are improved by stronger farmer-to-farmer relationships. Many of the farmers surveyed for this research have only recently begun to offer direct-to-consumer sales options, which can involve digital tools that are new to farmers. Assistance is necessary for some to adopt new technology. Farmers reported asking colleagues who have been successful on these platforms to provide guidance. Enraizadas farm invited more farmers to collaborate by selling products on their e-commerce platform. La Iguana Chocolate Farm met with other agrotourism providers to improve websites and consider ways to deliver products to customers since the pandemic nearly eliminated direct sales to tourists.

We recommend that government agricultural agencies conduct educational initiatives on e-commerce platform creation to support farmer-to-farmer knowledge exchange and learning. Additionally, we recommend the government explore creating digital green markets by managing local e-commerce platforms. This would free farmers to focus more energy on growing food while controlling the transmission of Covid-19 providing an alternative to in-person market visits while encouraging more people to buy locally and increase local food security.

(2) Technological support

Programs and practices that help expand shortened food chains are key to strengthening links between farmers and their potential customer base. One group from our research (Enraizadas) created an online sales platform before the pandemic. They expanded and improved this platform after the pandemic, a possibility they attribute to their participation in the business incubator University Agency for Entrepreneurship Management at the University of Costa Rica (O'Neal-Coto 2020). Programs at public institutions can facilitate key technological assistance and training.

(3) Government support for agroecology

In this research, all but one of the farmers reported government assistance, beyond exempting farmers from Covid-19 related driving restrictions. To support food security and to strengthen the livelihoods of agroecological farmers, governments should provide support to farmers via programs that address barriers to adaptation during market disruptions.

Conclusions

Overall, our research found that farmers have adapted to Covid-19 conditions by starting or expanding direct delivery and e-commerce platforms; and, as other scholars indicate, this has created extra work burdens (Preiss 2020) that some farmers found challenging. Some mitigated these challenges by working collaboratively with other farmers. Farmers with greater capital (financial, social, and human) found it easier to adapt to market changes. Farmers who had minimal distance between food production and sale were able to continue to sell to consumers despite Covid-19 restrictions on travel and on market access. This distance is not only measured in physical distance but also in the relationships that farmers have developed with customers. Farmers who had access to human capital in the form of technological know-how were able to balance economic losses at markets with income from direct sales. Furthermore, farmers with greater

financial capital had safety nets to buffer losses. These findings illustrate that Covid-19 does not impact all farmers in the same way and those most disadvantaged were those that had a lower diversity of products and those with a lack of access to the financial, human, and social capital needed to adapt their sales methods. These findings also illustrate that SFSC in the form of local farmer's markets are not alone enough to promote food system resilience; instead, farmers in our study required: (1) technological skills, (2) access to technology and internet, (3) forming collectives, and (4) relationships with consumers.

This research was conducted in local organic and agroecological farmers' markets in Costa Rica at the onset of the pandemic. Future research could follow up with farmers to better understand the impacts of the pandemic on their livelihoods over time. Furthermore, it would be interesting to compare the responses and adaptations of organic and agroecological farmer's markets with local markets that sell conventional, non-organic products.

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Mary Little is an associate professor at the Center for Sustainable Development Studies, School for Field Studies (SFS), in Costa Rica. Her background in human rights and justice movements informs her courses on Environmental Ethics and Development at SFS. Her recent research focuses on regenerative tourism and agroecology as a mechanism for climate adaption and economic development.

Olivia Sylvester Ph.D., is the Head of the Environment, Development and Peace Department, and assistant professor at the University for Peace. Olivia's research program has focused on food security, sustainable agriculture, climate change, environmental justice, and gender. Specifically, she works with Indigenous people, women, small-scale farmers, and youth on these topics.