

Using Cooperation Science to Strengthen Maine's Local Food Economy

by Afton Hupper, Sujan Chakraborty, and Timothy Waring

Abstract

While Maine's food system has enjoyed a recent surge in demand for local food, this opportunity for economic growth has been impeded by a difficult business climate for farmers, small business owners, and institutions. We believe this difficult business climate necessitates policy interventions to sustain the local food economy. Cooperation science can be used to tackle the social dilemmas persisting in Maine's local food economy and buttress the argument for increased support from the state. In this article, we implement the framework of cooperation to address the key concerns of farm viability, business succession, and increased food sourcing in local institutions from local producers in Maine.

LOCAL FOOD IN MAINE

Local food can provide many economic, ecological, and social benefits. By keeping financial resources circulating within a region, local food systems create an economic multiplier effect, generating as much as \$0.78 in additional economic activity for every \$1 spent on local food (Henneberry, Whitacre, and Augustini 2009). Locally produced foods also have a much smaller environmental impact than industrial foods: they are often produced using fewer chemical inputs, they reduce the carbon footprint during transportation, and the producers operate smaller, thus less-intensive, production systems (Spielman and Bernelin 2015). Additionally, local food systems provide social benefits by enhancing social equity and democracy among community members (Feenstra 1997). Patrons of local food have established greater democratic control over the food system by opening up new channels of food procurement, including farmers' markets, community-supported agriculture (CSA), buying clubs, and food co-ops, which often operate on the principles of solidarity, reciprocity, and cooperation (Renting, Schermer, and Rossi 2012; Tremblay and Waring 2015). Demand for local food in the United States has been on the rise since the late 2000s, a trend observed also in the state of Maine. In 2013, 80 percent of Maine consumers

preferred food grown, raised, or caught in Maine, and 41 percent of Maine households spent between \$1 and \$50 per month on food grown or produced locally (Maine Food Strategy 2014).

Further, Maine's commitment to supporting small-scale food production has been demonstrated by the state's widespread adoption of the Local Food and Community Self-Governance Ordinance (LFCSGO). This municipal ordinance declares the right of

townspeople to "produce, process, sell, purchase and consume local foods" without the burden of federal and state regulations (<http://localfoodrules.org/ordinance-template>). Since 2011, 45 municipalities from 13 of Maine's 16 counties have adopted the ordinance. Maine Governor Paul LePage signed an Act to Recognize Local Control Regarding Food Systems into law in 2017 (MRSA §401-B, Sub-§7), which recognizes the right of municipalities to enforce their own scale-appropriate food regulations. The spread of Maine's food sovereignty ordinance and subsequent act is a powerful affirmation of sentiment and willingness among Maine people to adopt bipartisan policy to support small-scale food producers.

Despite growing demand for local food in Maine, a number of socioeconomic factors threaten the future of the local food economy. Home to the nation's oldest workforce, Maine's increasing retirement rate poses a threat to its small businesses, jobs, and general economic resilience (GOPM 2016). And small farms are one of the state's most threatened businesses. According to an editorial in the *Portland Press Herald*, the average net income among Maine's farms has trended down to roughly \$20,000 a year in 2012 (PPH 2016), making it nearly impossible for farmers to make a living while maintaining their operations. We see this income issue as a market failure: though small farms contribute to the local economy, ecology, and society, and thus create

positive externalities, market forces cannot sustain these farms. Hence, market mechanisms will not be enough to protect local food businesses as the market will not promote local food producers. Consequently, we believe that thoughtful policy interventions are required.

Local food institutions in Maine are important and special, but also fragile in that they rely heavily on cooperation. We use the framework of cooperation to argue for stronger policies that target social dilemmas and work to capture the benefits of sustainable food systems. Policies that target self-interest may actually backfire (Bowles 2008). Policies that encourage peaceful group competition, which ultimately breeds cooperation, on the other hand, lead to more durable institutions (Waring, Goff, and Smaldino 2017). We conduct an analysis of policies and programs aimed at addressing a handful of issues in Maine's food system. The objective of this paper is to discover the relevant social dilemma in each case and to argue for specific policy recommendations that seem fit from the viewpoint of the cooperation science. Moreover, we hope these analyses demonstrate the power of cooperation science in the policy realm.

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COOPERATION SCIENCE

Cooperation science can improve the way human groups work together to solve collective problems and social dilemmas. A social dilemma is a scenario in which the best interest of an individual is fundamentally at odds with the best interest of the group. A common way to define social dilemmas is to invoke the concept of the tragedy of the commons (Hardin 1968). The idea is that on a shared pasture, herders will tend to compete for grazing space by placing more cattle on the pasture. The additional cattle benefit the individual herder, but they hurt the whole group because the cattle overgraze the common land.

Many of society's challenges pose social dilemmas. In fact, it would appear that the menace of social

dilemma is so severe that natural selection would reduce the abundance of cooperators until the population consists only of people who do not cooperate (Rand and Nowak 2013). This phenomenon leads us to ask, If the incentive to free-ride is greater than that to cooperate, then why do humans cooperate at all?

Research has shown, however, that humans cooperate more than any other species, and it is largely due to this large-scale cooperation that we have been able to adapt to different environments on Earth (Henrich 2015). Cooperation has persisted because social mechanisms have evolved that favor cooperation over noncooperation, including direct reciprocity between individuals, personal reputation, and other mechanisms based on geography and personal/familial relationships (Rand and Nowak 2013).

This paper explores how these social mechanisms can be used to inform and shape policy interventions. Kraft-Todd et al. (2015) found that policy interventions that create observable actions or products and match typical expected behaviors can be more effective than cost-benefit interventions like material rewards or increased efficacy. Observability and descriptive norms both influence reputation and reciprocity, which are factors known to enhance cooperation. Kline, Waring, and Salerno (2017) have shown that competition between groups rather than between individuals can promote group cooperation and hence contribute to sustainable policy solutions. Sports teams that cooperate outcompete those who don't, for example.

The findings from cooperation science literature indicate that the natural urge to free ride, or not cooperate, can be thwarted and cooperation can be promoted by incorporating mechanisms that encourage cooperation into policy solutions. When used appropriately, these mechanisms can alter the relevant incentives so that noncooperation gives way to cooperation, changing a scenario so that it no longer constitutes a social dilemma.

COOPERATION IN LOCAL FOOD INSTITUTIONS

A number of local food institutions rely on cooperation (Tremblay and Waring 2015). Community-supported agriculture (CSA), a business model in which farmers sell shares of their produce to consumers before the growing season, is one example of cooperation between producers and consumers. Due to the various external factors that can affect a farm's produce, this

transaction requires patrons to pay up front for their food despite uncertainty about the yield and quality of food they may receive over the season. Supporters of CSAs act cooperatively; they are willing to take a loss if the yield is low or the produce is not perfect, and their monetary pledge is designed to support the business, not to just acquire food. Though it can be argued that credit and insurance can perform the same task that CSAs do by giving producers money upfront and sharing risk, CSAs provide additional social and health benefits for the members. In their literature review of local food markets, Brown and Miller (2008) have listed that CSA members switch to healthier eating habits, gain positive utility from picking up produce from the farm, and derive a high level of satisfaction from the social and club benefits of CSAs.

Food-buying clubs and co-ops are also good examples of cooperation. Buying clubs are groups of individuals who use their shared purchasing power to obtain bulk quantities of items at discounted rates. Food-buying clubs tend to prioritize natural, local, organic, non-GMO, ethnic, and specialty foodstuffs (Hupper 2019). The need to share purchases within a club creates a social dilemma when members have diverse food preferences. Some clubs also have volunteer requirements, membership fees, and other responsibilities for members, which also require cooperation. Some food-buying clubs eventually grow and develop into food co-ops or formal cooperative stores that are typically worker owned. This has been happening since the 1970s and continues today. A recent example is the Portland Food Co-op, which began in 2008 and operated as a small informal buying club until it was able to open a retail store in 2013, when the transition to a formal cooperative store was complete. Though it is true that many formal cooperatives have eliminated member work requirements, or made them optional, co-ops still require more individual-level contributions of time, energy, and decision-making even when the co-ops grow large. Co-ops allow members to participate in decision-making, making them more democratic than hierarchical firms (ICA 2015). Co-ops' one-member-one-vote principle ensures that their members have full participation rights in the decision-making process, which is not possible in more traditional businesses. Co-ops politically empower the community by giving their members democratic control (Birchall 1997), which helps make them more economically resilient (Birchall 2012).

So, how can cooperation science be used to support local food institutions through policy intervention? An important starting point is identifying a specific social dilemma to address. Once one has been identified, an analysis of the people or groups involved, costs, benefits, and decisions can help determine the direction of the pressure (to cooperate or not) and potential intervention strategies. A key general social dilemma in local food systems is that though the costs of running a small-scale, diversified farming business vastly outweigh earnings, these businesses are beneficial for the local economy and community. A social dilemma emerges if the consumers have to pay a premium to obtain local foods and support small producers; once again individuals (consumers) have to incur personal costs for the greater benefit of the local economy and community. A farmer who operates a CSA relies on altruism from patrons who are willing to absorb some of the farm's risk to ensure the viability of the business. However, since cooperation can only be sustained if those who give also receive, an act of pure altruism can never sustain the CSA model in

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the long term. A permanent solution for the problem of small-farm profitability is to make it possible for local farmers to exist independently of the support from consumers. So, if Maine wants to capture the positive social, economic, and environmental benefits of local food systems, the state must support them and create economic conditions in which small-scale operations may thrive on their own. To stabilize cooperation among consumers, policymakers may consider lowering the costs of patronage by subsidizing small, diversified, local farms. We will explore three ways in which the framework of cooperation can be used to design effective policy for Maine's local food economy.

MAINE FARMS FOR THE FUTURE PROGRAM

Policy Environment

While it may seem obvious, it is worth stating that Maine's food system would not exist without its farmers. Perhaps the biggest challenge facing Maine's food system is the small profit margin of the state's farming operations, especially small farms. The average farm in Maine generates only \$20,000 in net profits annually (PPH 2016), meaning that most Maine farmers must rely on other sources of income to make ends meet, support their families, and cover other expenses. Despite the dismal prospects of farming in Maine, the state has experienced an increase in the number of young individuals moving or returning to the state in hopes of acquiring land and starting a farming businesses. Many of the parents of these so-called second-generation back-to-the-landers dropped out of society and into extreme self-sufficiency beginning in the late 1960s, and now these young farmers are leading the charge to see what sustainability, local food, and organic agriculture can do for the communities into which they were born (Conway 2014). The number of Maine farmers between the ages of 25 and 34 jumped from 278 to 792 between 2002 and 2007 (a 185 percent increase), a trend that continued into 2013 (Harlow 2013).

Farming in Maine, in many cases, has become an act of altruism.

Small farms provide many benefits, as they are more productive, efficient, and ecologically resilient than large industrial monocultures, and they contribute more to the local economy (Rosset 2000). Many farmers have chosen the lifestyle in an effort to improve Maine's ecological, social, and economic welfare, not for their own private gain. Farming in Maine, in many cases, has become an act of altruism. In interviews with young Maine farmers, Conway (2014) found altruistic motivations from a number of them. One farmer started farming because he believed "good food, real food is a

fundamental right," and many other farmers enthusiastically provide good foods to the people living near them.

A handful of state-level policies have been enacted to support Maine farmers. The Maine Farms for the Future (FFF) Program is a competitive grant program administered by the Maine Bureau of Agriculture, Food and Rural Resources that offers financial assistance to Maine farmers looking to improve the long-term economic viability of their business (MRSA 7 §317). The program is available to farmers with at least five acres of productive farmland and a willingness to work with professionals to develop a detailed business plan. Those who successfully complete a business plan may apply for cash grants to implement the necessary changes, which may cover up to 25 percent of the costs outlined in the plan and are capped at \$25,000. This program works in conjunction with the Agricultural Marketing Loan Fund, which provides reduced-interest loans to fund farmers' business plans. Both of these programs work similarly to the Agriculture Development Grant Program and the Nutrient Management Loan Program, which offer financial assistance in the form of reduced-interest loans to Maine farmers to support their business pursuits (<https://www.maineFarmlandtrust.org/public-outreach-new/public-policy/state-policy/>). This program was designed to help existing farming enterprises face the challenges that often come with running a small, low-profit business.

A number of nongovernmental organizations including Maine Farmland Trust (MFT), Farm Credit, Maine Organic Farmers and Gardeners Association (MOFGA), Cooperative Extension, and others have worked to improve conditions for farmers and to preserve and expand Maine's productive farmland. These groups have targeted key issues where the state has yet to act and fill in many gaps in the food system. However, they can only provide temporary solutions to widespread, systemic issues because they do not have legal power, large funds, and cannot influence the tax systems. The existence of these nonprofit organizations suggests that solving these problems requires cooperation. However, without mechanisms to support cooperation, the motivation to continue cooperating dwindles, and in the long run, this ephemeral cooperation turns into random and unstable acts of altruism. The lessons from cooperation science imply that altruism alone cannot solve the problems Maine farmers are facing;

only the state can provide the mechanisms that can foster cooperation between farmers and stakeholders.

The Social Dilemma of Farming in Maine

By contributing to the state's economic, ecological, and social welfare, Maine farmers have been creating positive externalities. But to do so, they have to incur personal costs, which lead to low profitability. While the FFF program recognizes this social dilemma by offering help to farmers with at least five acres of productive farmland, one of the biggest challenges new farmers face is the acquisition of land. According to a recent survey of US farmers aged 40 and younger (Ackoff, Bahrenburg, and Shute 2017), 20 percent of respondents cited "land access" as the reason they stopped farming. The influx of young prospective farmers looking for land in Maine is an opportunity for the state to expand its small, rural economy, but if the state fails to support them, we may lose these young farmers.

Suggestions for Supporting Maine Farmers

To support these new farmers, for example, the state's FFF program could be improved by lowering the costs of farming and boosting the benefits of cooperation. There are a few ways to lower the costs of farming in Maine. First, to ease the burdens on farmers, the program could include health insurance options. In the National Young Farmers Coalition survey, 5 percent of young farmers cited "personal health or health of a family member" and 3 percent cited "health insurance" as the reasons they stopped farming (Ackoff, Bahrenburg, and Shute 2017). Health insurance waivers, offering individual and family coverage plans at no cost to the farmers, would greatly reduce a major household expense and provide greater financial flexibility for farmers to use to build their businesses. A health insurance waiver may also help encourage the movement of young people to the state in pursuit of farming opportunities, creating jobs and producing local food for Maine. With the cost of insurance premiums increasing and the outmigration of many young Mainers who leave the state in search of jobs, health insurance waivers could serve as a critical component of a program to support Maine's food producers and economy at large.

Second, the FFF program could expand its competitive grant funding and reduced-interest loans to include prospective farmers. Some steps have already been taken to help new farmers connect with retiring landowners in the state. Maine FarmLink, a program of

Maine Farmland Trust (MFT), helps connect farmland seekers with farmland owners looking to sell, lease, or make other arrangements to keep their land in production. In addition to providing financial support, the FFF program could collaborate with MFT to make business succession easier on sellers and buyers. Linking retiring landowners with prospective buyers is a great mechanism for both parties to exercise reciprocity, a key factor in cooperation. To ensure that retiring farmers receive benefits for cooperating with MFT and the FFF program, the sale of existing land to prospective farmers could be made income tax-free. This tax benefit would give farmers looking to sell their land an incentive to sell to a prospective farmer rather than to another interested party who may not keep the land in production. The combination of lowering costs and boosting benefits of cooperating among the retiring and prospective farmers would be a powerful way to support cooperation in the local food system.

Both of these steps—health insurance options and land transfer mechanisms—would help the FFF program make farming in Maine a more sustainable profession.

LD 1338: CO-OP CONVERSION TAX INCENTIVE

Policy Environment

Consumer food co-ops have been on the rise in the United States and in Maine. Nationally, there were between 300 and 350 member-owned food co-ops in 2014, and the number of food co-ops in Maine nearly doubled to 11 in that same year (Valigra 2014). Maine currently hosts a total of 14 consumer food cooperatives (<http://www.coopdirectory.org/directory.htm#Maine>). This recent growth is due in part to the increasing demand for local foods in the state, evident in the nearly 15 percent increase in small Maine farms from 2007 to 2012 (Hoey 2014). Cooperatives offer many benefits, including increased economic resilience, self-reliance, job creation, and community benefits (Birchall 2009; Eum 2017; Rieger 2016). Cooperatively structured businesses thrive in regions with high levels of social capital and trust, such as the Scandinavian nations, which boast some of the highest levels of social trust in the world (Birchall 2009). Our research has suggested that co-op shoppers behave more cooperatively than do patrons of traditional grocers (Tremblay, Hupper, and Waring, in review). Also, co-ops tend to do well in harsh economic conditions, making them

well-suited for a place like Maine. Co-ops share profits among workers and/or patrons in addition to being democratically structured and mission driven. However, co-ops face many challenges because they are generally less efficient than profit-driven hierarchical firms.

One proposal to support Maine's cooperative sector may be found in LD 1338, a bill that would provide a small incentive to prevent small businesses from closing by helping the businesses transition to cooperatives. If enacted, this bill would make the sale of any business to an employee or cooperative enterprise exempt from income tax; it would also make any interest income collected by a seller or a Maine bank that financed a conversion income tax-free. The push for such transitions is driven in part by Maine's aging and rapidly retiring workforce, which includes many small business owners who may have trouble selling or passing along their businesses to younger generations (Taylor and Brown 2017). These owners are often faced with the option to sell to development or a larger chain, or to

...people are more likely to cooperate in decisions that call on their intuition....

close the business altogether. Transitioning to worker-owned cooperatives would sustain small businesses as current employees take over when the owners retire. Such transitions not only prevent the loss of current jobs, but also keeps firms operating at the local scale and continuing to generate economic benefits for community members. The conversion to a cooperative structure has already been successful among a handful of Maine-owned businesses. The Cod End Marina in Tenants Harbor transitioned to the Tenants Harbor Fisherman's Co-op in 2016 and is currently owned by more than 20 members. Rock City Coffee in Rockland was sold to employees as a worker-owned co-op in 2018. These businesses are integral parts of the communities in which they thrive, and as co-ops they continue to support the local economy, provide job security, and serve as important local gathering places. LD 1338 would provide a small incentive for businesses to convert to cooperatives, but that incentive could be expanded to make this an even more powerful piece of legislation.

The Social Dilemma of Business Succession

Keeping locally owned businesses open is good for local economies as these businesses keep their profits within the state, but retiring business owners do not have any incentive to ensure that their businesses carry on. Therefore, the conflict between the individual's interest to close the local business and the community's interest to keep the local business open creates a social dilemma. The cooperative behavior on the part of these retiring business owners would be to keep their businesses open, which is not a realistic expectation for all people. In the absence of an incentive to cooperate, such cooperative behaviors would amount to pure altruism. LD 1338, however, can create a reciprocity mechanism for these business owners by making the conversion to co-ops tax-free. If the co-op conversion is tax-free, that lowers the burden for the retiring business owners and gives them motivation to convert and sell their businesses rather than to shut them down. Maine banks also face a similar social dilemma regarding the sale of property; banks' interests lie in closing the businesses and forcing the sale of assets. Funding co-op conversions, on the other hand, serves the interests of society and state. So LD 1337 creates incentives for cooperation among Maine banks by creating a reciprocity mechanism. As this bill simultaneously solves two social dilemmas, it is quite well designed already, but there is room to make it even more effective.

Suggestions for Supporting Co-op Conversion

To motivate retiring business owners to convert their business to co-ops, the reciprocity mechanism inherent in the LD 1338 bill can be intensified. There are several ways this can be done. First, the bill could provide a larger incentive. Tax exemption alone is unlikely to negate the total costs of conversion, which is a difficult process that can take many years. So, the bill could raise the benefits of cooperation by also subsidizing business transitions: paying retirees to convert their businesses to co-ops via tax credits, similar to the way the Opportunity Maine Tax credit reimburses student loan payments for graduates who work and live in the state. By both lowering costs and raising benefits, this bill could tip the balance to support business conversions that support Maine's economic growth and invest in the future of our state.

Second, people are more likely to cooperate in decisions that call on their intuition, yet retirement is often a slow and highly deliberative process. This bill could

include a mechanism to streamline and simplify the decision to transfer a business to cooperative ownership, such as a notification in the mail with a checkbox to indicate the owner's interest in a succession plan. This mailing might include an offer for facilitation services from the Cooperative Development Institute (CDI) or similar nonprofits, to help ease the transition. Informing owners of the choice to transition their business to a co-op and offering assistance with the process would significantly reduce the burden on retiring business owners, thereby making the choice to cooperate much easier.

Third, in addition to intensifying the reciprocity mechanism in this bill, the bill could also include a mechanism to make the process more observable. Making co-op transitions observable to business owners through education and outreach would help promote cooperation. Stories about successful co-op transitions and other outreach materials would encourage prospective retirees to cooperate as they see positive community responses such conversions. These three changes would strengthen the impact of LD 1338 by targeting further cooperation and making co-op conversion easier for local business owners.

LD 1584: LOCAL FOOD SOURCE MINIMUM FOR MAINE STATE INSTITUTIONS

Policy Environment

Though Maine exports more food than it imports, most of the food Mainers eat is imported (Beck et al. 2011). There has been ongoing debate among stakeholders in Maine's food system on whether the state could eventually grow and produce all the food needed to feed itself (Burnham 2009). There are many reasons why so much of Maine's produce is exported and why Maine still relies heavily on imports, but these are large-scale systemic issues and are beyond the scope of this paper. And while trying to isolate Maine from the national and global food systems is not a realistic or productive goal, keeping money in the state and strengthening rural economies is.

One reason that Maine is not more self-reliant is that the economies of scale have created a large disparity in price between local and industrial foods. There is also a mismatch in scale between local production and the demand of the local institutional purchasers. This incompatibility, due to the disparities in prices and demand/supply levels, has constrained farmers' distribution channels and mostly limited them to farmer's

markets, farm stands, and specialty wholesalers like Crown o' Maine Organic Cooperative. While these wholesalers have increased the scale of production and availability of Maine-grown foods, the tight budgets of institutions (universities, hospitals, prisons, schools, large employers, and other industrial-scale purchasers) do not allow foodservice managers the freedom to purchase more local food.

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Such institutions are also challenged in the pursuit of better food sourcing due to volume and processing requirements. For example, many local farms can supply a limited amount of unprocessed carrots, whereas large institutions are in the market for large volumes of pre-washed, cut, and peeled carrots (SACOG 2014). In addition, since institutions are less flexible than smaller patrons (e.g., individuals, restaurants), variation in the quality and quantity of produce throughout unpredictable growing seasons creates a risk for institutions when they buy from small Maine farms. The creation of regional or community food hubs, which aggregate produce from a large number of farms for distribution, is one solution that has been proposed to address this mismatch in scale. Food hubs meet two major institutional needs: they lower the price of food by increasing supply through aggregation, and they offer light processing, which many large purchasers require but which is nearly impossible for many small farms (e.g., washing and peeling, packaging, labeling). Food hubs are likely an important component in the movement toward increased local food access, but they suffer from small profit margins and relatively high failure rates (Fischer, Pirog, and Hamm 2015).

Institutional adoption of local food source minimums appears to be a growing trend across the nation, with many higher education institutions pledging to shift more of their budget toward locally grown and produced foods. LD 1584, a bill that requires all Maine government institutions (except local schools) to

purchase 20 percent of their foods from local producers by 2025, was signed into law in 2018 (An Act to Expand the Local Foods Economy by Promoting Local Foods Procurement, LD 1584). The bill came after the University of Maine System pledged to source 20 percent of food items locally by the year 2020, a goal that was achieved in 2017 (Strout 2018). This legislation creates enforceable regulations with measurable outcomes, making it a great first step toward boosting institutional purchasing of local food. However, this bill can be strengthened if it is modified to address some of the key social dilemmas in the food system and targets them to boost cooperation.

Source minimums...often fail to recognize the disparity in price between industrial and local foods.

The Social Dilemma of Local Food Sourcing

Source minimums are commonly used to boost local food procurement, and while they may be important, they often fail to recognize the disparity in price between industrial and local foods. This disparity presents a social dilemma: the desire to create a strong, local food system is not matched by individuals' and institutions' ability to pay more for food. Since source minimums do not address this price disparity, local institutions will not be motivated enough to go beyond the minimum. It is worth recalling that institutions cannot be expected to continue act altruistically for the greater good of society at their own expense. Consequently, to foster greater cooperation from the institutions so that they go beyond these source minimums, the price disparity has to be targeted. To do so, local foods have to be made more affordable and available, which will eventually lower the cost of cooperation by institutions. The competitive prices of the local foods, added to increased availability, might motivate institutions to buy more local food than stipulated by the source minimum requirements. Lowering the costs of local food may also create the spillover effect of increased accessibility, particularly for underserved populations and local schools, whereas LD 1584 excludes schools.

Suggestions for LD 1584

Regional food hubs can facilitate food processing and distribution, two services crucial for the sustenance of local food producers. Maine's food-processing infrastructure has deteriorated, which has reduced the state's ability to add value to local foods (Maine DAFRR 2006). One report found "the lack of available poultry processing appears to be the most significant barrier for Maine's poultry producers" (PolicyEdge 2011). Additionally, Maine's public institutions often rely on regional distributors that usually source food from outside the state (Coburn 2004). Food hubs, by aggregating products from different farmers, make supporting local foods easier for institutions and provide improved infrastructure, logistics, distribution, storage, and processing (Rogoff 2014). Essentially, they provide farmers with better processing and distribution services, which makes it easier for farmers to reach institutions. Food hubs can fill the role of wholesaler or distributor with a focus on community resilience, creating jobs, and empowering local producers (PolicyLink n.d.). Federal grant funding for food hubs is available through the USDA, but Maine could also establish funds to develop regional food hubs in the state. LD 1431 sought to provide grants and loans for food hub development and was passed overwhelmingly in the legislature, but was vetoed by Governor LePage in 2014 (PPH 2014). With a large amount of bipartisan support and a new governor, it is likely that this, or a similar, bill would now pass in the Maine Legislature.

Though food hubs can help with the food processing and distribution local growers need to reach institutions, by assigning these responsibilities to third parties, farmers run the risk of lowering their margins. Therefore, while food hubs are a viable option to promote institutional purchase of locally produced foods, the state should also think about supporting farmer-owned agricultural co-ops. Agricultural co-ops can take three forms: supply co-ops, marketing co-ops, and production co-ops. The specific form relevant to this issue is the marketing co-op, which organizes the distribution and sale of the produce (Birchall 1997). Occasionally a co-op can take on more than one of these roles. For example, the Port Clyde Fresh Catch, a fishermen's co-op, markets and distributes their fish directly to consumers and wholesale markets (FSNE n.d.). It should be noted that many food hubs are owned by farmers and producers. So we recommend that the state should give more incentives to any farmer-owned

processing and distribution entities, whether they are food hubs or agricultural co-ops.

Food systems can be difficult to change because deviation from the norm can be costly and onerous. LD 1584 could be amended to include an incentive program to facilitate more efficient flows of local food to large-scale purchasers, such as a tax credit for institutions that reach a certain percentage of food purchased locally by a certain date. This incentive might be coupled with a fine imposed on institutions that fail to reach a certain minimum by a certain date. With a system of credits and fines, institutions may start competing against each other for the largest share of local food purchased. A reputation mechanism for cooperation might also be engaged if institutional public image reflects how much of their food the institutions source locally.

Helping Maine's public schools gain access to more fresh, healthy, local produce is another important step in bolstering institutional food programs across Maine. It is challenging for small public schools to cooperate in this push, however, because it requires them to allocate more time, energy, and money to their food programs. While the federal government provides competitive grant funding for farm-to-school programs, which range from \$20,000 to \$100,000 (USDA 2019), it would be helpful if the state matched grants received by Maine public schools. Obtaining grant funding, however, can be a significant hurdle for schools, many of which lack the staff time, resources, and expertise for writing grant proposals. The state could contract Farm to Institution New England (FINE) or a similar organization to make grant writers and consultants available to assist local schools with federal grant applications. By implementing both these suggestions—matching federal grants and making it easier for schools to apply for grants—many of Maine's public schools would be able to increase the amount of healthy local food they serve to students.

DISCUSSION

In this article, we did not strive to find unique policy suggestions based solely on the lessons of cooperation science. Instead, we identified which of the existing policy recommendations would work best given the social dilemmas and market failures of the local food economy. We show how these policies can be improved using various mechanisms that help sustain cooperation.

Although some might ask whether we need cooperation science to make the case for these policy recommendations, we think that cooperation science makes a stronger argument for increasing state support for the local food economy. As cooperation science shows, pure acts of altruism cannot sustain cooperation, which is why the actions of CSAs or nonprofit organizations—which act strictly altruistically—are not enough to support Maine farmers in the long term. This paper specifically examined social dilemmas concerning three stakeholders related to the local food economy in Maine: farmers, retiring business owners, and local institutions. In each of these cases, individual interests come directly in conflict with the interests of the society or the state. To motivate these stakeholders to cooperate for the overall good of society, the mechanisms of cooperation should be engaged. Market forces alone cannot always facilitate an environment where cooperation can emerge, but the state can design policies that apply the mechanisms of cooperation thereby achieving a better outcome for the local food economy and the state of Maine. 🐟

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Afton Hupper earned her BS in ecology and environmental sciences with a minor in sustainable food systems in 2017 from the University of Maine. She conducted undergraduate honors thesis research as a member of Dr. Tim Waring's economics lab and continued at UMaine to earn an MS in resource economics and policy in 2019. Hupper currently works as the outreach and development specialist for the Maine Aquaculture Association in Hallowell, Maine.



Sujan Chakraborty earned his BBA and MBA, majoring in marketing, from the University of Chittagong in Bangladesh. He worked for the central bank of Bangladesh for four years. His job there entailed inspecting financial institutions and making performance reports based on the inspections. He moved to Maine in 2018 to pursue an MS in economics. Chakraborty also works as a researcher in Dr. Tim Waring's cooperation lab.



Timothy Waring is an associate professor of social-ecological systems modeling at the University of Maine. He studies the emergence and persistence of cooperation in environmental dilemmas, to which he applies insights from research on the evolution of culture and cooperation. He studies cooperation in the local food industry in Maine and leads a national network of scholars using evolutionary approaches to study sustainability dynamics.