Agroecology and the Repeasantization of Global and Local Food Systems

Ruby Haack
Department of Economics, Sarah Lawrence College

Political Economy of Global Climate Change

Dr. An Li

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The industrialization of the agricultural economy has muddied the small-scale farmer's relationship with both the land and their farming-self, as they resort to high-input technologies and single-crop plantations to maximize their profits and establish themself in an entrepreneurial context (Stock et al., 2014, p. 8). Following the globalization of the Green Revolution, neoliberal policies such as the privatization of food systems or the deregulation of global markets have allowed transnational corporations to invest in natural resources found in the Global South (Ross et al., 2013, p. 2). Small-scale farmers are thus struggling to keep up with this new influx of export crops. This has led to the depeasantization of smaller farming communities, as individual farmers give up their traditional practices in order to compete in the global agricultural economy. This doesn't just degrade the land, but it also isolates farmers from the collective, as they act on individual interests rather than what may be good for the larger community. La Via Campesina, an international peasant's rights organization, has thus introduced the concept of "repeasantization," in which farming communities are reintroduced to traditional agroecological farming techniques that replenish the soil and connect farmers to their rural communities. By encouraging the repeasantization of the small-scale farming populations, La Via Campesina hopes that farmers can take control over their own production systems, act independently from monopolistic agribusinesses that control the input markets, improve what Rosset et al. calls the "economic viability of peasant agriculture," and foster a symbiotic relationship with the land on which they work (201, p. 165).

In order to understand the role La Via Campesina plays in the repeasantization of small-scale food systems, it is important to understand the relationship between peasantization and agroecology, and how this acts as a driving principle of their activism. This movement specifically uplifts the autonomy of rural communities and peasants, defined by the UN Declaration of Peasants as any person who engages in small-scale agricultural community and holds an emotional or cultural attachment to their land (Wittman, 2011, p. 4). According to Rosset et. al in "The Campesino-to-Campesino agroecology movement of ANAP in Cuba: social process methodology in the construction of sustainable peasant agriculture and food sovereignty," the definition of agroecology originated as a scientific term "that seeks to understand the internal functioning of agricultural ecosystems," but its use and definition varies by sociopolitical context (2011, p. 163). In the context of repeasantization, agroecology is used as an umbrella term that explores how environmentally sustainable farming methods can reconnect the farmer with the soil and provide them with ownership of their land. These methods include reusing biomass to avoid the use of synthetic fertilizers, using mulch to blanket the soil and preserve organic matter, and prioritizing companion planting in order to increase biodiversity, promote soil fertility, and manage pests (Rosset

et.al., 2011, p. 163). However, in addition to its scientific praxis, La Via Campesina uses the term to define a greater, Freirian movement, using peasant pedagogy and decentralized teaching methods to reintroduce small-scale farmers to their traditional modes of production (Rosset et al., 2011, p. 165). In this sense, agroecological farming practices cannot be separated from their peasant origins, and by recentering the food system around these practices, repeasantization will take place.

By following La Via Campensina's lead towards radical repeasantization, producers can shift away from industrial farming techniques and towards agroecological modes of production, decreasing greenhouse gas emissions in the agricultural sector and making small-scale farms more resilient to climate change. By using the Marxist theory of metabolic rift as a theoretical framework, this essay will explore how farmer autonomy can help mend the breach between the land and the producers, creating an agricultural system that is economically and environmentally sustainable and culturally competent.

A Brief History of the Green Revolution

Thomas Malthus, English economist of the late 1700s, predicted in his *Theory of Population* that the world population would grow faster than food could ever be produced, leading to inevitable global hunger. However, Malthus did not consider how technological advances could combat these rising issues of overpopulation. Thus came the Green Revolution, and with it, the increase of synthetic fertilizers and fossil-fuel powered machinery, used to increase the speed of production.

The Green Revolution began in Mexico in the 1940s (Sonnenfeld, 1992, p. 32). It was funded by the Rockefeller Foundation and introduced to the Mexican government as an opportunity to "initiate national development during a contraction in the world market" and industrialize alongside the Global North (Sonnenfeld, 1992, p. 31). In its implementation, the Mexican government sided with commercial landholders and prevented small-scale peasant farmers from being competitive agents in the emerging agricultural economy (Sonnenfeld, 1992, p. 31). The Green Revolution required the use of petrochemical-derived fertilizers, genetically modified seed hybrids, large-scale machinery, and farm management techniques that increased production at the expense of the soil, such as monocropping (Sonnenfeld, 1992, p. 32). Additionally, agricultural monopolies developed what Sonnenfeld calls "technology packages" that forced farmers' reliance on these interdependent products (1992, p. 32).

The Green Revolution soon globalized, and this input-intensive farming practice yielded excessive outputs. For example, in Mexico, corn production increased to 14.1 million tons in 1985 from a mere 1.6 million tons 45 years prior (Sonnenfeld, 1992, p. 33). It was soon assumed that these outputs would disproportionately benefit poorer communities since families in poverty typically spend a larger fraction of their real income on food (Boyce, 1993, p. 62). The Green Revolution was thus disguised as a social justice initiative, allegedly used to combat food insecurity in poor countries. However, with the

increase of agribusiness in developing countries, wealth disparities were only exacerbated. Urban industrial capitalists reaped the largest rewards by exploiting unequal trading agreements between agricultural and industry sectors (Sonnenfeld, 1992, p. 34). Poorer farmers were excluded from advancing technologies and didn't have the political influence to demand subsidies alongside their large-scale counterparts (Boyce, 1993, p. 100). Large landholders had better access to loans than small farmers, further polarizing rural incomes (Sonnenfeld, 1992, p. 35). In the Philippines, absolute poverty increased (Boyce, 1993, p. 121). While both the rural and urban poor could benefit from the declining prices of rice, the urban poor benefited disproportionately, as they weren't also the ones taking a loss from the costs of production (Boyce, 1993, p. 121). This additionally exacerbated rural-urban inequality and widened the disconnect between producer and consumer.

But the industrialization of agriculture didn't just intensify social inequities and wealth disparities, it also became one of the largest global polluters. According to the IPCC, the agricultural and forestry sectors currently make up 25% of greenhouse gas emissions (Chang, 2021, p. 4). Over the last 50 years, the seasonal rise of carbon dioxide emissions has increased by 15% (Zeng et al, 2014, p. 359). Corn, soybeans, wheat, and rice – the four main crops cultivated through Green Revolution technologies – aggregately constitute 64% of the calories consumed across the world (Andrews, 2014). The production of these crops has doubled since 1961, and has resulted in a billion metric tons of carbon captured and released yearly (Andrews 2014). Industrial agriculture also clears forests in order to create more grazing space, destroying regional biodiversity that had the potential to absorb carbon from the atmosphere (La Via Campesina, 2007).

The use of agrochemicals and nitrogen-based fertilizers can also contaminate waterways, and fossil-fuel powered machines can release more greenhouse gasses into the atmosphere. The production of this fertilizer makes up 1-2% of both global energy use and greenhouse gas emissions (Chang, 2021, p. 4). Approximately 1 kg of nitrous oxide is released into the air for every 100 kg of nitrogen fertilizer that is applied to the soil, "which is 300 times stronger than carbon dioxide in its greenhouse gas effect" (Chang, 2021, p. 4). This contribution to climate change only further destabilizes small scale farmers. Climate change increases the likelihood of droughts, floods, and pest infestations that must then be eradicated by synthetic pesticides (La Via Campesina, 2007). Without the inherited indigenous knowledge guiding them as they work the land, small-scale farmers are often not best equipped to navigate unpredictable situations. Thus, they are left at a disadvantage when competing with agricultural monopolies who use inorganic materials to stabilize the land.

The power imbalance between government-backed commercial farmers and small-scale peasantries has led to the displacement of many indigenous communities in the Global South. Peasant farmers are left without sovereignty and without rights, subject to the legal obligations imposed by

agribusinesses. Agricultural monopolies thus deteriorate the land and the communities on which the land relies.

Introduction to the Metabolic Rift: A Marxist Theory

According to Marx's theory of metabolic rift, capitalism and global trade are dependent on the "robbing of the soil" and "expropriation of the earth" (Foster & Clark, 2018, p. 1). He describes the metabolic interaction between man and the environment as the natural process that replenishes the fertility of the soil. Through agroecological farming and consumption practices, man and the earth can live symbiotically. However, with the capitalist pressures to produce excessively and trade internationally, this relationship is disturbed. Man, in turn, resorts to unsustainable modes of production, exploiting the earth and robbing the soil of its nutrients in a parasitic fashion. In addition, those in charge of the means of production exploit the humans who aid in that production, seen solely as a mechanical tool, their exploitation used to maximize profits. This relationship between employer and employee reflected what Foster and Clark called the "expropriation of human bodily existence" (2018, p. 2). German chemist Jutus von Liebig calls this the "robbery economy," the system on which we rely in the Global North (Foster & Clark, 2018, p. 2).

Globalized trade further exacerbates this metabolic rift through a "system of spoliation" (Foster & Clark, 2018, p. 3). This occurs when food and fibers are sold thousands of miles from the land where it was produced, preventing the plant materials from returning back to its original soil. The site of production is thus exhausted by the growth demands of plants and is not replenished by the natural life cycle: the decaying of plant matter. During the Second Agricultural Revolution, farmers and traders heavily relied on this system. In the early 1840s, English farmers began importing excessive quantities of guano in order to fertilize their depleted soil (Foster & Clark, 2018, p. 3). This guano, accumulated from years of nutrient-rich pelican, boobie, and cormorant excrement, was extracted from a large deposit off the coast of Peru (Foster & Clark, 2018, p. 5). The abolition of the English Corn Laws – a result of the 1845 potato famine in Ireland – catalyzed what Foster and Clark call "new regime of the international food system" (2018, p. 3). Farmers were allowed to import cheap grain, giving rise to a new, highly-intensive form of agriculture, which depleted soil quality and left farmers desperate for nitrogen-, phosphorus-, and potassium-based fertilizers (Foster & Clark, 2018, p. 4). As a result, two million metric tons of guano were imported into Europe, producing 200 million more hundredweights of grain than what would have been produced without guano (Foster & Clark, 2018, p. 5). This fed 26 3/4 million people for an entire year (Foster & Clark, 2018, p. 5). However, capital-intensive agriculture requires excessive inputs in order to produce excessive outputs. Without the natural replenishment of nutrients from plant decay, the land grew more dependent on synthetic fertilizers, despoiling the soil and increasing the land's

reliance on guano. As a result, British and American industrial agriculturalists depleted global guano resources. This exhaustive use of resources demonstrates how colonialist tendencies shaped modern-day industrial agricultural practices. Additionally, the capitalist appropriation of natural resources is characterized by white colonists' assumed ownership of land. Furthermore, Foster and Clark note that this gave "rise to bourgeois private property and capital accumulation" (2018, p. 4).

The corporeal rift is characterized by the phenomenon that allows humans to exist in the natural world as a contributing agent (Foster & Clark, 2018, p. 4). John Bellamy Foster and Brett Clark argue that humans have what Foster and Clark call a "fundamental corporeal nature" (2018, p. 10). We are dependent on our environment to provide us with sustenance, yet we also take part in the cultivation of crops and tilling of the land. Thus, harm done to nature affects humans on an existential level. Since humans are expected to work the land and reap rewards from its production, the expropriation of the environment also leads to the expropriation of human welfare (Foster & Clark, 2018, p. 11) The capitalist obsession with private property also has led to the displacement of rural people, stripping indigenous communities from their native land. This repossession acts as a barrier between these communities and their cultural ties to the land, creating both a rift in the metabolic relationship between humans and nature, as well as the corporeal relationship between humans and their purpose as natural beings. Thus, industrialized agriculture doesn't just deplete the lands' nutrients, but it also uproots communities from their sense of place and personhood.

La Via Campesina's Role in Advocacy

Neoliberalism and globalized capitalism disrupts the relationship between the individual and nature, as well as the relationship between the individual and the collective (Stock, 2014, p. 1). Under a capitalist system, identities are typically defined by one's role as a producer or consumer, and autonomy is equated to entrepreneurial and financial powers (Stock, 2014, p. 1). However, this framework neglects the inherent relationship between the laborer and the land. The farming-self relies on the entangled relationships between the animals, the land, and the market (Stock, 2014, p. 162). However, as Stock explains, it can't be reduced to a "professional self," because "it is more than a job – it is a way of life" (2014, p. 162). The farming-self thus contributes to the concept of agrarian citizenship, which, as Wittman notes, is "a form of citizenship based not solely on issues of rural political representation, but also on a relationship with the socio-ecological metabolism between society and nature" (2009, p. 806). La Via Campesina is a transnational movement founded on this principle, pioneering the fight towards global food sovereignty.

La Via Campesina was founded in 1993 in response to the increasing globalization of agricultural monopolies (La Via Campesina, 2021, p. 2). Now representing 182 local and national organizations

across 81 countries found in Europe, Asia, Africa, and the Americas, their mission is to provide a voice to peasants and small-scale farmers so they can participate in conversations surrounding the farming markets and international trade (La Via Campesina, 2021, p. 2). As a movement, they advocate for peasants rights, seed and food sovereignty, land and agrarian reform, and the localization of food production and distribution (La Via Campesina, 2021, p. 2). The food sovereignty movement works to ensure communities of rural farm workers have the right to control their food systems and production in an effort to preserve their autonomy, culture, history, and ecological environment (Wittman et al., 2011, p. 3). La Via Campesina believes in the corporeal nature of humans and the metabolic relationship between the land and the farmer, and thus centers their work around the peasant identity. With the increasingly unpredictable climate, La Via Campesina has begun to recognize how these metabolic rifts also contribute to climate change and how agroecological farming practices can reduce the emissions of one of the most polluting industries.

La Via Campesina outlines how small-scale agriculture can be an attainable alternative to the high-input, carbon-intensive farming practices found in industrial agriculture. They argue that small-scale farming is labor intensive and thus requires less energy use, as it allows the ecological system to work through its natural processes unencumbered, rather than specializing the means of production like the Fordist factory line typically found in industrial agriculture (La Via Campesina, 2007). By allowing the organic soil matter to store carbon dioxide, growing nitrogen-fixing plants to replenish soil nutrients instead of using nitrogen-based fertilizers, and encouraging local production and consumption to avoid transportation emissions, agroecological methods can create a system of farming practices that is healthy for the soil, decreases emissions, and centers farmer autonomy.

Case Study: A History of Cuba's Shift from Industrial to Agroecological Modes of Production

Cuba had operated on a latifundio-minifundio system before its Revolution in 1959, a distribution and tenure agreement where peasant families farmed on small plots of land (Rosset et al., 2011, p. 165). Cuba's agricultural economy used industrial farming models, such as monocropping and chemical inputs, to grow tobacco and sugarcane that were then sold as exports (Chang, 2021, p. 5) While political leadership in the early years of the Cuban Revolution initially tried to shift away from sugarcane and tobacco exports and strengthen their agricultural biodiversity, Rosset et al. explains that they "ended up strengthening the export monocrop" in order to be accepted into the international socialist division of labor's trade agreements and avoid U.S. opposition (2011, p. 165). This also exacerbated their dependence on imported food and decreased their ability to sustain themselves with locally grown crops. Fifty-seven percent of food was imported, as 30% of agricultural land was used for sugarcane, which made up 75% of export revenues in the year 1989 (Rosset et al., 2011, p. 165). With the focus on

monocropping once again, Cuba became increasingly reliant on agricultural inputs and large-scale machinery, often attainable only through foreign trade. Forty-eight percent of their fertilizers were imported, and 82% of their pesticides were as well (Rosett et al., 2011, p. 165). Cuban farmers had the most tractors per unit of land and per person (Rosset et al., 2011, p. 165). But these agricultural technologies were not sustainable, as the monocrops were not resilient against pest infestations. As a result, crop yields started declining in the 1980s, after a history of excessive fertilizer use (Rosset et al., 2011, p. 165).

In the early 1990s, Cuba lost their trade agreement with the Soviet Bloc, and thus lost their access to imported fertilizers, petroleum, pesticides, equipment, and equipment repair parts (Altieri & Funes-Monzote, 2012, p. 1). Under a three year period, Cuba lost 85% of its external trade and 80% of its synthetic fertilizers and pesticides imports, leading to the collapse of the Cuban food system (Chang, 2021, p. 5). Following this international conflict, nearly half of all of Cuba's sugar refineries were forced to close, causing Cuba's GDP to fall over 30%. Chang further explains that this led the country to "post the worst growth in per capita food production in all of Latin America and the Caribbean," (2021, p. 6). While the regional average of growth in the period between 1986-1995 was -2%, Cuba's was -5.1% (Chang, 2021, p. 6). However, after abruptly transitioning away from chemical inputs and adapting new agroecological means of production, Cuba was able to successfully rebound and boost their food supply. In the period between 1996-2005, their annual growth rate per capita was 4.2%, compared to the regional average of 0% (Rosset et al., 2011, p. 166).

Campesino a Campesino: The Repeasantization of Cuban Small-Scale Farmers

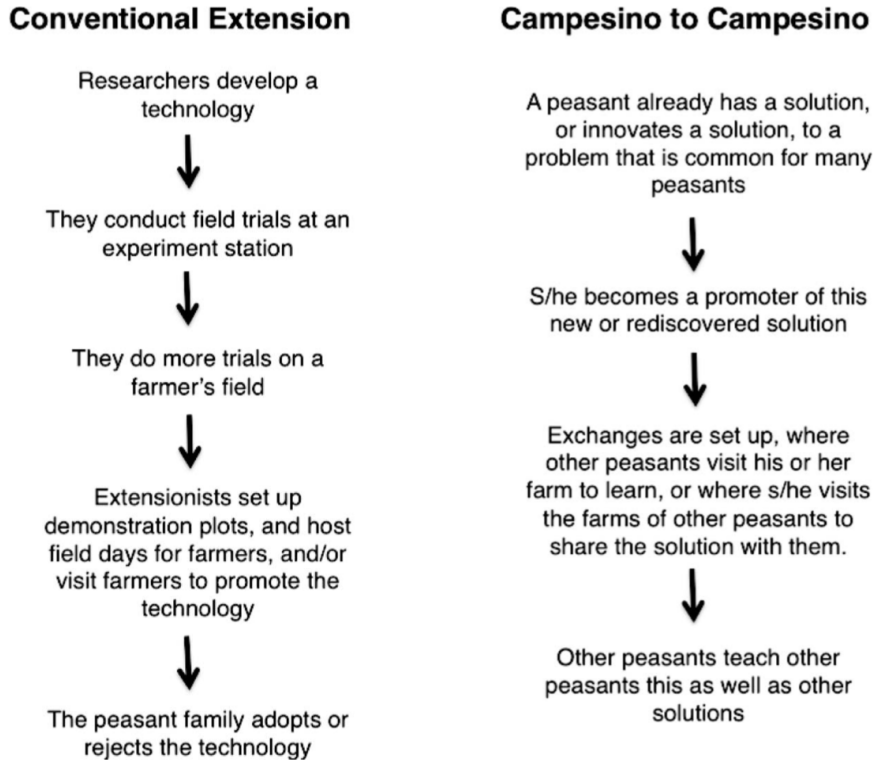

Figure 1. From "The Campesino-to-Campesino agroecology movement of ANAP in Cuba: social process methodology in the construction of sustainable peasant agriculture and food sovereignty" by P.M. Rosset, S.B. Machín, J.A.M Roque, & Á. Lozano 2011, p. 169

The grassroots Campesino a Campesino (CAC: translates to "Farmer to Farmer") movement was introduced by the National Association of Small Farmers (ANAP) in 1997 (Chang, 2021, p. 3). CAC is founded on Freirian principles that emphasize the student's subjectivity and validate their peasant identity (Rosset et al., 2011, p. 169). The amplification of student voice shifts the power dynamic away from a hierarchical teacher-student relationship that models historical power structures between the oppressed and the oppressor (Freire, 2000, p. 173). Instead, it is centered around one of symbiosis, where the label of teacher is interchangeable between parties, and where both are open to the knowledge of the other. CAC assumes that farmers will be more receptive to new agroecological farming methods if they are to be taught by a fellow farmer (Rosset et al., 2011, p. 169). This pedagogical method prioritizes peer-to-peer learning in order to socialize "the rich pool of family and community agricultural knowledge which is linked to their specific historical conditions and identities" (Rosset et al., 2011, p. 170). With peasant needs at the forefront, peasant identity is emphasized, and through this horizontal pedagogical method, traditional agricultural knowledge is both salvaged and celebrated (Rosset et al., 2011, p. 170). With this reconnection to their roots, peasant farmers can feel equipped to step into their agrarian identity and find connection with their land.

The CAC program's key agroecological principle is healthy and nutrient-rich soil. In order to repel pests without the use of chemical-intensive pesticides, peasants use worm humus and chicken manure, which simultaneously replenish lost nutrients (Chang, 2021, p. 11). The use of these additives is one technique of many that contributes to what ANAP calls "self-generated field fertility," preserving the natural nitrogen and phosphorus composition of the soil (Chang, 2021, p. 11). Additionally, by keeping the natural forests that grow on their land, peasants prevent soil erosion and strengthen their farms against storms (Chang, 2021, p. 11). These methods center around harnessing, rather than disrupting, the natural biological processes that take place in the soil. By acting with that process, rather than imposing a synthetic one, humans are taking part in their corporeal nature, mending the metabolic rift that divides them from the land, and healing alongside the soil.

In order to effectively integrate the CAC program into individual small-scale farms, the assimilation process must be slow so as to not overwhelm the farmers (Rosset et al., 2011, p. 170). These new methods will first only be tried on a small part of their plot of land, and the number of new methods introduced at a time will be limited (Rosset et al., 2011, p. 170). In order to encourage further participation, it is important to first introduce agroecological methods that have what Rosset et al. calls a "rapid positive impact" (2011, p. 170). Then, by experimenting incrementally on their own land, farmers can test what combination of methods will work best in their specific context (Rosset et al., 2011, p.

170). CAC also heavily relies on the "multiplier effect," in which peasants take control of their own experimentation and advocacy, and the process thus "begins to demonstrate a self-catalyzing momentum" (Rosset et al. 2011, p. 170).

Also essential to the CAC program is the "neighbor-emulating-neighbor" principle that takes place in rural and small communities (Rosset et al., 2011, p. 177). Through word-of-mouth and peer-to-peer learning, these agroecological methods "spill over" to neighboring communities (Rosset et al., 2011 p. 177). In Cuba's case in 2011, this had reached over one-third of all peasant families who are ANAP members (Rosset et al., 2011, p. 177). On all peasant farms, 62% used organic soil inputs and 82% used organic pest management (Rosset et al., 2011, p. 177). However, as of 2018, 200,000 families, which makes up half of Cuba's entire small-scale farming population, participates in the program.

There was also a strong increase in the percentage of national food output peasants had produced. In 2006, peasants, most of whom belonged to ANAP, produced 65% of the nation's food while only controlling 25% of the available farm land (Altieri & Funes-Monzote, 2012, p. 1). In 2007, their production of vegetables increased drastically above 1988 levels to 145%, the year before production declined by 65%, despite the fact that producers used significantly less chemical-intensive inputs in 2007 (Altieri & Funes-Monzote, 2012, p. 1). In 2008, despite occupying only 27% of the agricultural land, peasants produced over half of the fruit, vegetables, corn, beans, rice, pork, and milk output (Rosset et al., 2011, p. 181). These abundant outputs were successfully grown without agrochemicals, such as synthetic fertilizers or pesticides. For example, in 2007, after a 77% decline in 1994 , beans grew 351% over 1988 levels, using 55% less agrochemicals (Ross et al., 2011, p. 181). Using 85% less agrochemicals, the yields of roots and tubers increased 145% above 1988 levels by 2007 (Ross et al., 2011, p. 181). However, the production of sugar, which is an industrial crop, grown with extensive use of carbon-inputs, dropped by 3% in 2007, even after the initial drop in 1994 where yields had decreased 25% below 1988 levels (Ross et al., 2011, p. 181). The ecological farming system used by peasant farmers produced the highest yields. While correlation can not be confused for causation, this data suggests that agroecological methods and traditional knowledge can be used to reduce the farming sector's global chemical use while keeping up with demand.

Table 1. Changes in Crop Production and Agrochemical Use

Crop	Percent production change		Percent change in agrochemical use
	1988 to 1994	1988 to 2007	1988 to 2007
General vegetables	-65	+145	-72
Beans	-77	+351	-55
Roots and tubers	-42	+145	-85

Figure 2. From "The Paradox of Cuban Agriculture" by M. A. Altieri, & F.R. Funes-Monzote (2012, p. 2)

Cuba's Use of Industrial Farming Methods in a Modern Context

Despite their agricultural successes using environmentally sustainable farming methods, early-2000s agribusiness representatives called for a return to hyper-industrialized production to maximize crop yields in the face of an increasingly unpredictable climate. In response to the devastation caused by three hurricanes in 2008, Cuba increased their dependency on U.S. imports, importing 55% of the nation's total food (Altieri & Funes-Monzote, 2012, p. 4). Capitalizing on the unrest and instability of this time, agribusiness representatives advocated for programs that would "guarantee food security and reduce food imports," increasing the use of synthetic fertilizers, large-scale machinery, and monocropping (Altieri & Funes-Monzote, 2012, p. 4). Despite its evident inefficiency and unsustainability, there are areas of land designated specifically to the cultivation of potatoes, rice, vegetables, and soybean, using exclusively high-input industrial agriculture methods (Altieri & Funes-Monzote, 2012, p. 4). While these industrial farms make up less than 10% of agricultural land, the technologies and inputs used for irrigation, fertilization, and harvesting require million dollar investments and have long-term environmental consequences (Altieri & Funes-Monzote, 2012, p. 4). These industrial farms also require machinery to be imported, 90% of which from Brazil, further emitting greenhouse gasses into the atmosphere through transportation exhaust (Altieri & Funes-Monzote, 2012, p. 4). And with the reliance on agricultural inputs, Cuba is then forced to either import pesticides or produce their own. In 2011, "Juan Rodríguez Gómez," a pesticide company located within Havana, Cuba, produced 100,000 liters of glyphosate for neighboring farms, an herbicide used to prevent weed growth (Altieri & Funes-Monzote, 2012, p. 4).

The argument that these developed agricultural practices would stabilize food production in an unstable climate neglects the fact that these practices further contribute to the greenhouse effect that farmers now must navigate. These excessive inputs separate the producer from their land, widening the rift that has been exacerbated by global climate change. Additionally, these inputs are inaccessible for the peasant farmer, as the prices of petroleum-based fertilizers and large-scale equipment have recently increased (Rosset et al., 2011, p. 162). La Via Campesina argues that the purchase of synthetic or chemical-intensive inputs doesn't just destroy the land and undermine the natural process of plant cultivation, but it also perpetuates the systems of exclusion that marginalize peasant farmers and keep them in a perpetual state of poverty (Rosset et al., 2011, p. 162).

Agroecology and Its Resilience to Climate Change

Cuba is in a particularly vulnerable position as climate disasters intensify and grow more irregular. In 2011, they already had experienced hurricanes, unpredictable rainfall, and severe droughts

(Rosset et al., 2011, p. 181). Thus, Cuba, and other developing countries that are geographically vulnerable to climate-related disasters, must adopt an agricultural system that is resilient to unpredictable growing seasons. Agroecological methods vary based on the region and climate. Thus, there is a diverse array of techniques that can be applied to a changing climate while still maintaining stable yields. La Via Campesina argues that these methods don't just allow for flexibility, but also create a natural infrastructure that protects crops from climate-related disasters (Rosset et al., 2011, p. 181). The climate resilience of agroecological methods are measured by their biological-physical resistance, meaning how much initial damage the crops can sustain, biological compensation, referring to the growth from lower-story crops after-impact, and biological recovery, meaning the regrowth of plants and leaves after the disaster (Rosset et al., 2011, p. 182). For example, after Hurricane Ike in 2008, monocrop plantations in Las Tunas saw devastating losses. There were industrial farms where over 95% of plants had fallen (Rosset et al., 2011, p. 182). Meanwhile on the peasant farms, only the taller 50% of crops had been knocked down, demonstrating the crops' strong biological-physical resistance during the initial impact of the storm (Rosset et al., 2011, p. 182). With the taller crops gone, the lower crops were capitalizing on the new sun exposure, and new leaves grew on the branches that had been ripped from the wind (Rosset et al. 2011, p. 182). Additionally, unlike the laborers on the industrial farms, peasant families had collected the fallen trees and replanted them that next morning, and some seeds were transplanted to grow in the plots left by lost trees (Rosset et al., 2011, p. 182). The delicate care peasant farmers pour into the reconstruction of their farms demonstrates how a deep connection to peasant culture, identity, and land fosters higher yields and a more environmentally sustainable farming system. The rift between the producer and the land is mended through a hands on connection with the soil. Large-scale machinery and agrochemicals would only further distance the farmer from their products and from their small-scale community. The repeasantization process allows the farmer-self to feel gratified in their contribution to the land and, through these agroecological methods, they are actively participating in the memorialization of their peasant ancestors.

Conclusion

Through agroecological methods, peasant farmers can produce high yields without the use of agrochemicals, reducing their contribution to the greenhouse effect and re-finding purpose as a member of the peasant community. I also demonstrate that agroecological techniques don't just help reduce global warming, but can also be the most effective agricultural method in the face of a tumultuous, ever-unpredictable climate. I use the Campesino a Campesino (CAC) program in Cuba to explore how these methods can feed the nation as well as mend the metabolic rift historically exacerbated by the industrialization of the agricultural sector. The CAC is an exceptional example of peasant organization

and mobilization. The social dynamics of the movement speaks to the power of the collective, and how horizontal pedagogical methods can disrupt traditional power systems through just the process of sharing information. Once that information is put to work through hands-on processes with the land, small-scale farmers can reclaim ownership of both the land and their peasant identity. Since these marginalized communities are typically on the frontlines of climate disaster, peasants need a platform to prevent future destruction and promote a sustainable way of life.

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