
COMMENTARY

Cuba's agrifood system in transition, an introduction to the *Elementa* Special Feature

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Cuba's experience in sustainable agriculture and agroecology has been the subject of much international attention, particularly as advocates of agroecology aim to demonstrate the feasibility of implementing alternatives to industrial agriculture on a national scale to support ecological resilience, food security, food sovereignty, and human wellbeing. Such attention has increased since relations between the U.S. and Cuba began to normalize, stimulating speculation as to how this will affect Cuba's advances in sustainability. The Special Feature *Cuba Agrifood Systems in Transition* analyses the nuances of agroecological development in Cuba. We emphasized amplifying the voices of locally-based researchers and practitioners by targeting manuscript invitations to Cuban scholars and publishing in both Spanish and English. We outline the process, challenges and goals of this unique endeavor and introduce seven articles, all contributions from Cuba except for one, which is a collaboration between U.S. based and Cuba based scholars. These articles unpack some of the complexities of Cuba's agrifood system transition and draw on specific information and experiences to discuss successes and challenges of this transition. We thus underline the instructive value of the Cuban experience regarding the path to agrifood system sustainability and hope to spark new collaborative opportunities as scholars and citizens around the world look to develop agrifood systems that will sustain human society long into the future. *Please refer to Supplementary Materials*, DOI: <https://doi.org/10.1525/elementa.335.s1>, for a full text Spanish version of this article.

Keywords: Agroecology; Food systems; Sustainable food production; Food security; Food sovereignty; Democratization of knowledge; Cuba

La experiencia de Cuba en la agricultura sostenible y la agroecología ha recibido una importante atención internacional, en especial porque los defensores de la agroecología buscan demostrar la factibilidad de implementar alternativas a la agricultura industrial a una escala nacional para respaldar la resiliencia ecológica, la seguridad y la soberanía alimentarias y el bienestar humano. Esa atención no ha hecho sino aumentar desde que las relaciones entre Estados Unidos (EE.UU.) y Cuba empezaron a normalizarse, y se está especulando actualmente sobre cómo afectará esto a los avances de Cuba en materia de sostenibilidad. Este breve artículo de introducción presenta un resumen de la publicación especial *El sistema agroalimentario cubano en transición*, que tiene el fin de contribuir al conjunto de publicaciones que analizan los matices del desarrollo agroecológico en Cuba, con un énfasis en amplificar las voces de los protagonistas basados a nivel local al invitar a que contribuyan académicos cubanos y publicar en español e inglés. Presentamos el proceso, los desafíos y los objetivos de este esfuerzo único y destacamos la presentación de los siete primeros artículos, todos procedentes de Cuba a excepción de uno, que es una colaboración entre académicos basados en EE.UU. y Cuba. Mediante el análisis de algunas de las complejidades de la transición del sistema agroalimentario cubano y la presentación de estudios detallados y rigurosos sobre sus éxitos y desafíos, esta publicación tiene el fin de mejorar el entendimiento de los lectores sobre el camino para lograr la sostenibilidad del sistema agroalimentario conforme a la evolución del mismo en Cuba. Con esto, esperamos subrayar el valor instructivo del caso de Cuba y generar nuevas oportunidades de colaboración,

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ya que académicos y ciudadanos de todo el mundo están tratando de desarrollar sistemas agroalimentarios que sustenten a la sociedad por mucho tiempo. *La versión en español de este artículo se puede encontrar en Materiales Suplementarias*, DOI: <https://doi.org/10.1525/elementa.335.s1>.

Palabras clave: Agroecología; Sistemas alimentarios; Producción sostenible de alimentos; Seguridad alimentaria; Soberanía alimentaria; Democratización de saberes; Cuba

Introduction

Cuba, the largest island in the Caribbean, looms large in discussion and debate regarding the global political economy. Discussions about the country often elicit strong opinions, whether hailing it as a beacon of anti-imperialism or vilifying it as a repressive one-party state. Against this charged backdrop Cuba has become well known in a different way, in recent years, for its unique transition toward sustainable agriculture and food (agri-food) systems. Cuba is frequently cited as an important example for the planet of how to manage a shift away from the dominant model of industrial food production toward more sustainable alternatives, based on the principles of agroecology (see Altieri and Funes-Monzote, 2012; Funes-Aguilar and Vasquez-Moreno, 2016; Funes-Aguilar et al. 2002; Rosset and Benjamin, 1994).

Most of the literature – both popular and scholarly – frames Cuba's agrifood system transition within the context of the collapse of the Soviet Union in the early 1990s. That significant geopolitical shift led to a sudden and severe decline in Cuba's ability to import the necessary inputs, such as chemical fertilizers and pesticides, oil, machine parts, irrigation equipment, and animal feed, for its industrialized agricultural production. This drop in inputs, coupled with a drastic reduction in subsidized food imports, provoked a dramatic crisis in both agricultural productivity and food security on the island. Cuba responded by adopting a sustainable agrifood system model in both policy and practice. For example, the country invested in research and development on ecological alternatives to agrochemicals; built up the national ox herd to help replace tractors; and – perhaps most famously – incentivized organic food production on its urban and peri-urban *organopónicos* and spread agroecology in rural areas through the National Association of Small Farmers' (ANAP) Peasant to Peasant Agroecology Movement.

Cuba's experience has been the subject of much international attention, particularly as advocates of agroecology aim to demonstrate the feasibility of implementing alternatives to industrial agriculture on a national scale to support ecological resilience, food security, food sovereignty, and human wellbeing. Such attention has only increased since the December 2014 announcement by then Presidents Barack Obama and Raúl Castro that diplomatic relations between the United States and Cuba would begin a process of normalization. Although the Trump administration has shifted U.S. policy back to Cold War era rhetoric and hostility, some degree of opening and re-engagement is now inevitable, if slow-going, with a number of trade deals already underway, including in the agrifood sector (Fernandez et al. 2018). This has led

to intense speculation about the extent to which Cuban agroecologists can or will maintain efforts to transition toward more sustainable food systems in the face of new access to U.S. markets and investment (Fernandez et al. 2018; Altieri, 2016).

Goals of and context for this Special Feature

The papers in this special feature were written as Cuba sits on the cusp of substantial changes, both internally and with respect to its geopolitical positioning, a particularly important moment to closely examine Cuba's agrifood system transition. While some elements of that transition may be relatively common knowledge, as Fernandez et al. explain, the Cuban case is “perhaps as widely known as it is misunderstood.” Mirroring the polarized views of Cuba's political economy as a whole, its agrifood system tends to be understood either as an organic, food sovereign utopia or as a backwards, underdeveloped sector desperately requiring modernization and revitalization through foreign investment. This special feature presents a more balanced perspective, analyzing the nuances of agroecological development in Cuba, highlighting important innovations that have been implemented and examining some of the significant challenges that continue to be faced.

As editors of this special feature, we targeted invitations for manuscript submissions to Cuban scholars and practitioners living on the island. We welcomed submissions from other authors while our chief concern was to amplify the voices of locally-based protagonists in Cuba's agrifood system transition and allow them to directly share their work with English- as well as Spanish-speaking international audiences. To date, Cuban authors have led few English-language publications on this topic. Instead, non-Cuban researchers and journalists, or authors of Cuban descent living outside of Cuba have authored much of what has been published in English about the Cuban experience (Rosset and Benjamin, 1995; Alvarez and Messina, 1996; *The Greening of Cuba*, 1996; Rosset, 1997; Deere, 1997; Altieri et al. 1999; Murphy, 1999; Enriquez, 2000; Messina, 2001; Enriquez, 2003; Royce, 2004; McKibben, 2005; Claussen, 2007; Wright, 2009; Koont, 2011; Chan and Roach, 2013; Gürcan, 2014; Graddy-Lovelace, 2018). Such publications have played an important role in communicating the successes and lessons of the Cuban case to global audiences. However, English-language readers also need greater access to work by the people most intimately engaged in Cuba's agrifood system transition, namely the researchers and practitioners who drive and monitor its progress and who, as citizens and residents, participate in it on a daily basis.

To date, the most notable English-language publication highlighting the work of Cuban authors is the volume,

Sustainable Agriculture and Resistance: Transforming Food Production in Cuba, co-edited by a number of leading Cuban agroecologists, including Fernando Funes-Aguilar, co-editor of this special feature, and authors of other papers in this special feature (Funes-Aguilar et al. 2002). That collection was published by the California-based non-profit organization Food First, which has played an essential role in raising awareness in the United States – and the English-speaking world more generally – about agroecology in Cuba. There have also been a handful of peer reviewed papers first-authored by Cubans (Febles-Gonzalez et al. 2011; Funes-Monzote et al. 2009a; Funes-Monzote et al. 2009b) and a number of others resulting from collaborative efforts between non-Cuban and Cuban researchers (Deere et al. 1994; Altieri et al. 1999; Nelson et al. 2009; Simon-Reardon and Perez, 2010; Rosset et al. 2011; McCune et al. 2011; Altieri and Funes-Monzote, 2012).

It is important to be explicit about some of the reasons why Cuban-authored English-language publications on the Cuban agrifood system transition remain in the minority. This issue is not unique to Cuba; rather, much of the most widely cited publications on a range of issues located in the Global South is authored by researchers from – or at least working at institutions in – the Global North (Canagarajah 2002, Salager-Meyer 2008). This is, in part, a product of more generalized power imbalances between the Global North and South, as processes of knowledge production and dissemination reflect deeply rooted imperialist-colonial relationships of inequality (Escobar, 1998; Melber, 2015). Such inequalities contribute to a number of structural issues that negatively impact publishing opportunities for authors from the Global South (see Canagarajah, 1996 and 2002; Salager-Meyer, 2008 and 2014).

We directly confronted some of these structural issues during the process of inviting, managing the peer review and editing papers for this special feature. For example, limited internet access in Cuba, particularly to high speed, reliable connections, proved problematic for a variety of reasons. Even researchers at top institutions regularly find their internet access slowed or cut off entirely, leaving them unable to use *Elementa's* online editorial platform, slowing email communication with editors, and making it difficult to conduct online research such as finding and downloading articles or other data. Incorporating leading peer reviewed journal articles into their discussions was especially problematic for the Cuban authors, as the majority of top-quality peer reviewed research is only accessible through subscriptions, the fees for which are out of reach for the Cuban institutions where these authors conduct their work. A related issue was that article writing styles, including paper structure and bibliographic norms, did not always match editorial expectations – yet another challenge that widely affects authors from outside of the Western world seeking to publish in leading international journals (Canagarajah 1996, 2002).

Other resource-related barriers, not directly encountered in our work on this special feature, make it difficult for Cuban scholars to conduct the research that is a necessary precursor to publication. The Cuban government

is well-known for valuing and investing in education; however, research funds are scarce and channeled primarily into projects that the state deems to have the highest potential social value (Reardon, 2016). This leaves many researchers without funds to purchase equipment or cover travel costs for field work. Such challenges are common across the Global South but, in the case of Cuba, are exacerbated by U.S. economic sanctions that create additional barriers to, for example, importing and servicing scientific equipment, and engaging in collaborative international research (Reardon, 2016). These constraints on the country's research sector mean that finding reliable data on a range of subjects can be nearly impossible (Mesa-Lago and Pérez-López, 2005) and this lack of basic data creates a severe impediment for Cubans seeking to conduct high quality research on the island.

The U.S. blockade against Cuba has other impacts on research and, more specifically, publication. One impact stems from some U.S.-based publishers' conservative interpretation of sanctions language regarding the legal ability of Cuban authors to publish with U.S. entities. As authorized under the Office of Foreign Assets Control (OFAC) license 31 C.F.R. 515.577, publishing transactions are not permitted from Cuban authors who are "government employees". However, this language is vague given the fact that most research and academic institutions are government institutions, including in Cuba. This lack of clarity has resulted in U.S.-based publishers rejecting Cuban authors for fear of non-compliance (Roman, 2018). Elsevier has been a leader in criticizing the OFAC rule and succeeded in obtaining clarifying language from them which states that government employees of sanctioned countries are authorized to publish if they are from an academic or research institute (Seeley, 2015).

Another significant barrier constraining publication opportunities for Cuban authors is that, as non-native English speakers, they tend to be disadvantaged by a global scholarly publication system heavily dominated by the English language. The country's prioritization of education and research has resulted in a robust academic community that publishes widely in national venues, including magazines and peer-reviewed journals; however, many forgo more international audiences and more widely read venues in order to publish in their native tongue. A quick review of references cited in this special feature's papers will give readers a sense of some of the more widely utilized Cuban outlets, many of which are managed by research centers in the country. Unfortunately, most of these publications are not included in scholarly indices such as the Web of Science and thus are not easily obtained by researchers working outside of Cuba. In addition, the majority are only available in Spanish. As a result, the rich and valuable information contained within them is largely inaccessible to non-Spanish-speakers. Canagarajah (1996, 2002) analyzes how such politics of knowledge can relegate non-native English speakers to publication in peripheral journals, negatively impacting the scientific community as a whole.

This special feature addressed the language issue by inviting manuscripts in either Spanish or English and

committing to a fully bilingual peer review and publication process, thereby making it easier for Cuban authors to make submissions. Additionally, our ability to publish the papers together in English and Spanish makes them accessible to as wide an audience as possible, both within and outside of Cuba. Fostering such linguistic diversity has been recommended as a strategy to enrich the academic publishing world (Kuteeva, 2014), and bilingual publication has been identified as a way to increase the impact of publications from the non-native English-speaking world (Salager-Meyer, 2014). However, while we are excited by the promise of our approach, we also recognize that bilingual peer review and publication in an English-language journal is a resource-intensive (Salager-Meyer, 2014) and logistically complicated endeavour that would prove challenging to implement on an ongoing basis or larger scale.

Elementa editorial staff also allowed us a great deal of flexibility in pulling together this special feature, for example by accepting submissions and revisions directly via email, allowing some fluidity with deadlines, and providing significant support with respect to meeting manuscript formatting requirements. As guest editors, our existing relationships with many of the special feature authors were also an essential ingredient for success. These reciprocal, trust-based relationships eased our ability to collectively navigate the complex bilingual publication process. We also took advantage of a number of international conferences as well as travel to Cuba to arrange in-person meetings between editors and authors. Such face-to-face meetings were essential for clarifying messages from peer reviewers as well as Elementa's editorial expectations.

Our embeddedness in a community of practice dedicated to Cuba's agrifood system transition, along with Elementa's openness to creative media, also made it possible to include a set of short videos in this special feature. These videos, produced in collaboration with Americas Media Initiative and Cuban documentary filmmaker Ernesto Perez-Zambrano, allow readers to put faces to the names of some contributing authors, and paint a vibrant and engaging picture of the agroecological transition in Cuba that makes its lessons accessible to a wider audience than the articles would reach alone. Furthering this goal of accessibility, Elementa's status as an Open Access journal explicitly encourages a variety of submission styles including practice and policy bridge papers. By facilitating a diversity of authors that includes practitioners as well as scholars, and making all its published materials freely available, Elementa is contributing to processes of knowledge democratization that we deeply believe in and are pleased and proud to support. This approach is particularly appropriate for a publication dedicated to Cuba's agrifood system transition because, as Miranda et al. (2018) explore, democratization of knowledge has played an important role in the country's move toward more sustainable agricultural development.

Overview of Special Feature

At the time of writing this introduction, the special feature's publications included seven articles along with five videos that address a range of topics related to Cuba's agri-

food system transition. The framing paper by Fernandez et al. provides an in-depth synthesis of the most up-to-date literature and data on the Cuban agrifood system, with a focus on the country's agroecological movement. The paper notes the uneven progress of that movement, and analyzes its successes and challenges, particularly in a context of shifting geopolitical relations with the United States. This paper, co-authored by leading scholars and practitioners from within and outside of Cuba, is also a result of efforts by the Cuba-U.S. Agroecology Network (CUSAN) to foster collaboration on agroecology research and action between those two countries.

The contribution by Nova and Figueroa, building upon an outline of relevant agrifood policies in the Fernandez et al. paper, delves deeply into the specifics of how Cuba's agrifood policy landscape changed from 2007 to today by providing an overview of key laws, executive orders, and resolutions. Nova and Figueroa describe Cuban efforts aimed at reducing dependence on food imports, chiefly by facilitating access to unused land for farming, but also by decentralizing decision-making and introducing moderate market reforms. They suggest that these efforts have had limited success, offer some analysis to explain why, and present proposals for the future. These include a call to expand property rights for farmers, further integrate market mechanisms into the Cuban economy, and adopt a systemic (as opposed to issue-specific) approach to reforms.

Fernandez et al. and Nova and Figueroa have a strong focus on the political economy of Cuban agrifood system transition whereas papers by Pérez et al. and Sánchez et al. offer readers in-depth information from a more agronomic perspective. Pérez et al. present a detailed account of the evolution of biocontrol in Cuba. The use of living organisms such as parasites and nematodes to manage pest populations, as a sustainable alternative to chemical pesticides, has been a key pillar in the Cuban agroecological movement. Pérez and her team, leaders in this field, describe how biocontrol has been conducted in the past and offer proposals for its future evolution, arguing for more holistic, conservation-based approaches to biocontrol as a way to maximize sustainability.

The use of agroforestry has also played an important role in Cuba's transition to more sustainable food production, and work by Sánchez et al. reviews and synthesizes the results of more than 20 studies on agrosilvopastoral systems which integrate agroforestry into cattle grazing lands. They argue that an agrosilvopastoral approach can significantly increase both meat and milk production, drawing conclusions that have direct relevance for food security in Cuba and beyond, particularly where resource constraints may limit animal productivity and where dietary protein availability is a concern.

The studies examined by Sánchez et al. were all conducted by researchers at the Indio Hatuey Pasture and Forage Research Station, a lead institution for agroecological research located in Matanzas province that forms part of Cuba's extensive network of agricultural research centers. This research station is used as a case study by Miranda et al. to demonstrate how research and extension

approaches have changed in Cuba since the early 1990s. At the heart of these changes has been a move away from a reductionist, top-down model of scientific research to a more holistic, horizontal model that allows greater space for complexity and innovation, and includes a strong emphasis on applying research results to contribute to sustainable rural development by applying the principles of agroecology and food sovereignty.

A paper by Leyva and Loes presents their work to develop and apply an index to measure agrobiodiversity on farms as a tool to advance sustainability. They describe why an agrobiodiversity index is important for agroecology, how their index was developed, and showcase results from its application with urban and suburban farms in five Cuban provinces. Similarly, the Casimiro and Casimiro article shares how they developed a tool to measure socio-ecological resilience at the farm level by examining 20 years of transition toward agroecology on their family farm, *Finca del Medio*, in central Cuba's Sancti Spiritus province. By evaluating how this 10-hectare mixed farm has increased its socio-ecological resilience through the adoption of agroecological principles and practices, Casimiro and Casimiro present a microcosm of Cuba's agrifood system transition and make a compelling argument, from the farmers perspective, about the practical possibilities for developing sustainable food systems.

While the paper by Casimiro and Casimiro certainly goes a long way toward painting a picture for readers of the reality of farm life in the Cuban context, the videos included in this special feature truly transport the audience to Cuban farms, markets, agricultural research sites, and communities. They introduce key figures in the Cuban agroecological movement (including authors who have contributed to this special feature) and bring to life the research and action that has supported the country's agrifood system transition to date. The first piece features Guest Editor Fernando Funes-Aguilar and his son, fellow agroecologist Fernando Funes-Monzote, whose *Finca Marta* farm has become an important agroecology practice and learning centre. The second video highlights the leadership role that Cuba's National Association of Small Farmers (ANAP) has played in the country's agroecology movement. In the third video, viewers have an opportunity to see the Indio Hatuey Research Station, cited in a number of papers in the special feature. Gender relations is the focus of the fourth video, showcasing the role of women as well as youth in Cuba's agrifood system transition. In the final video, participants offer some reflections on the future of Cuba's agroecology movement, including discussion of new market opportunities such as entry into the certified organic market.

The papers that we introduced above address a handful of aspects of Cuba's experience with agroecology and agrifood systems transitions. There are many more topics to explore. There is need for greater examination of gender equity in the context of a transition to more sustainable food systems. This issue has become central to the SIAL (*Sistemas de Innovación Agrícola Local*, or Local Agricultural Innovation Systems) initiative that was touched on by Miranda et al. As that project continues to evolve – for

example by developing increased linkages with local government structures as well as Cuba's unique private sector – it offers a wealth of potential to inform conversations regarding participatory and multi-stakeholder governance processes. The Ministry of Agriculture recently came out with a gender strategy for the whole sector, and an analysis of this would be a very welcomed contribution.

Other subjects touched on in the special feature's articles and videos that would be worthy of more in-depth attention include: the role that ecological economics can play as agroecology is integrated into Cuba's new economic model; farm cooperative structure and function; participatory plant breeding; farmer-to-farmer horizontal learning processes; the relationship between climate change, agroecology and resilience; and the potential synergies between sustainable food system transition and renewable energy development. These last two subjects point to intersections between food systems and climate change. Cuba provides ample opportunity for research on the impacts of the climate crisis (as the country experiences increasingly severe droughts and hurricanes and less predictable weather patterns) as well as on how agroecological practices can contribute to climate change adaptation and mitigation.

Closing comments

This special feature is part of *Elementa's* Sustainability Transitions domain, which aims to share knowledge that can directly contribute to efforts to move our world toward greater sustainability. Rather than focusing on problem definition, this domain seeks solutions-oriented contributions from scholars and practitioners across disciplinary and geographic spaces “who are forging ahead with strategies to shift towards sustainability.” In their work to build more sustainable food systems and advance agroecology, scores of Cuban farmers, researchers and others are doing just that. In the face of challenging circumstances, people in Cuba are working hard to find and implement solutions that help the country transition toward more sustainable agrifood systems. These solutions include political and economic reforms (as discussed by Fernandez et al. and Nova and Figueroa), innovations in agronomic practices (e.g. controlling pests with living organisms rather than chemicals as outlined by Pérez et al. and incorporating trees into animal pasture as presented by Sánchez et al.), and changes to research and extension approaches (as narrated by Miranda et al. and Leyva and Loes). And Casimiro and Casimiro demonstrate operationalizing these innovations to help build socio-ecological resilience on farms and, by extension, in communities.

We began this introduction to the special feature by noting how well known some of the basic elements of Cuba's agrifood system transition may be. This special feature unpacks some of the complexities of this transition and presents in-depth, rigorous discussions of its successes and challenges; and aims to increase readers' depth of understanding regarding Cuba's path towards agrifood system sustainability. In so doing, we hope that the special feature underlines the instructive value of the Cuban case and sparks new collaborative opportunities

as scholars and citizens around the world look to develop agrifood systems that will sustain human society long into the future.

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Competing interests

The authors have no competing interests to declare.

Author contributions

- Contributed to conception and design: MF, EN, KAL, GF, FFA
- Drafted and/or revised the article: EN, MF, KAL, GF, FFA
- Approved the submitted version for publication: MF, EN, KAL, GF, FFA

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