

Agroecology, the Interaction between Agriculture and Environment: An Example from Cuba

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Abstract— Living in the Amazon it was unavoidable to observe the problem emerged from the high level of burnings in the rain forest this year of 2019: the tension that exists between agriculture and environmental conservation was on focus every day. Some farmers, very much interested in profiting with the plantation of soybean revealed no care for the preservation of the forest. On the hand, many small farmers just thought the opposite: the need to preserve the forest and keep producing food. In fact, many Amazonian people, not only Amerindians, believe that it is possible to balance the needs of rural people to utilise natural resources to eat and earn an income and at the same time to protect the forest or the environment in general. So, environmental cost may be minimized, not increased, with agricultural activity. Future generations depend on the continent's vast forests and watersheds remaining intact in the Amazon as in the whole world. In this study we address the benefit of thinking on Agroecology. The city of Havana, Cuba is an example which we will explore here, regarding its benefits relating to Agroecology, production and distribution after the 1989 socialist crisis and the economic blockade. The crisis resulting from the embargo imposed by the United States was aggravated by the socialist crisis in Eurasia, a context in which the social movement of urban agriculture emerged, with Havana being the main locus. We can understand urban and peri-urban agriculture as the social agricultural movement developed in urban and peri-urban spaces by small farmers, aiming at subsistence and/or commercialization. Through sustainable practices, production demonstrates success in generating jobs and income, food security and sovereignty. The production, technical assistance and sales outlets are growing steadily – which corroborates the urban agriculture movement, supported by the government via an ecological and efficient low-cost agricultural policy and combining traditional knowledge with cutting-edge technology as the key to success.

Keywords— Peri-urban and Urban Agriculture. Havana, Cuba. Agroecology.

I. INTRODUCTION

Besides being a range of agriculture technique, we believe that Agroecology is also a way of thinking or rethinking our relationship with nature. In this sense, agroecology means to accept and embrace the complexity of nature, the consequence of our actions towards nature, not in the forest, but also in the city, as is the “urban agriculture”. Urban and peri-urban agriculture is a phenomenon in expansion, especially in developing countries, where urban food supply systems are not accessible to the whole population. Urban dwellers are increasingly supplementing their daily diets and strengthening their household budgets by growing their own food (according to information available on the CEPAGRO website *apud* SANTOLIN, 2010). The practice of urban agriculture occurs in or around cities or metropolises, corresponding to a survival strategy of urban

dwellers for food subsistence or for commercialization and generation of family income.

As Olivier de Schutter argues in his preface to the book *Agroecology: A transdisciplinary Participatory and action-oriented Approach* (2016), agroecology contributes to the preservation of the soil, favours better nutrition and helps to balance the competition between the large-sized farms and the small farms. However it is still marginalized mainly because the economic interest of agrobusiness. In peripheral and semi-peripheral countries, the case of Cuba excels in terms of the development of agro-ecological and sustainable agriculture. The province of *La Ciudad de Habana* stands out for its production, the engagement of urban dwellers and the use of sustainable agricultural practices. It is worth remembering that the practice of urban agriculture was an alternative to face food shortages resulting from the economic blockade imposed by the United States and the socialist crisis in

Eastern Europe and the Soviet Union. Meanwhile, in recent years, a strong agricultural movement in cities and settlements has been developed in Cuba, which is called Urban Agriculture (COMPANIONI *et al.* 2001), whose success is related to political and economic issues.

Given the importance demonstrated towards urban agriculture, Cubans have come to be respected for their mobilized knowledge and ability to cultivate and produce in areas that are so tiny and have little potential. The executive secretary of the urban and peri-urban agriculture program, Nelson Campanioni, considers that this agriculture allows “taking advantage of all the available land, through sustainable methods such as agroecology, vermicomposting, among other techniques. [...] In this program the production is intended to obtain meat, grains, vegetables, fruits and roots, animal breeding and dairy products as well as to develop forestry.” (*website Cuba liberdade*, 2011).

The popular initiative observed in urban agriculture mobilizes sustainable methods combined with the rational use of the territory, which, depending on government support, is the key to Cuban success – which has made Havana the leading city in urban agriculture in Latin America, according to FAO. In order to assess the performance of Latin cities, the Foundation considered three challenges that should be faced when constructing its urban vegetable gardens: lack of space in cities, soil quality and unreliable water supply (GAETE, 2014).

The capital city of Cuba is the largest center of urban agriculture as regards popular initiative, agricultural production in tons and number of urban farmers. The organoponic production, corresponding to the cultivation of vegetables in the water, in places with poor and small soils was crucial to reach this achievement. Given what was exposed above, the problem to be debated is evident: How has Havana been able to solve the food shortage produced by the American economic blockade since 1962 and aggravated by the socialist crisis of the late 1980s?

II. THE POLITICAL AND ECONOMIC SITUATION OF CUBA: A BRIEF HISTORY

As already evidenced, the city of *La Habana* represents a sustainable urban agriculture model, supported by Agroecology, combining traditional knowledge and cutting-edge technology, with low cost and high income, as well as generating employment, income and solving the issue of food security. The city and the country faced the impact of the Economic Blockade and Socialist Crisis in Cuba by making strategic use of Urban Agriculture.

The economic and political blockade imposed by the United States on Cuba, in 1962, was a consequence of the Cuban Revolution, which trod the independence of the American domination. This blockade prevented the commercialization of primary and industrial products in the country, by trading partners and politicians linked to the United States. Recently, the Netherlands was fined by the United States for trading with Cuba and breaking the trade agreement established with the Americans, which meant not trading with the Caribbean country.

During the first years of 1990s, due to the disintegration of the socialist bloc in eastern Europe, Cuba lost its main trading partners and, at the same time, the United States intensified the economic blockade against the island. Consequently, the black market flourished and product prices soared. Many edibles were “diverted” from state distribution chains to supply this black market, causing shortages in the rationing system. Fresh fruits and vegetables, even when produced in sufficient quantities, often rotted in the fields or in the storerooms because the transportation system was also in crisis (BOURQUE & CAÑIZARES, 2005).

The impact of the disintegration of socialist Eastern Europe and the intensification of the American economic blockade on the Cuban economy motivated Cuban agricultural investments, as there was an increase in the price of products and food shortages, as well as the rotting of vegetables and fruits due to the transport crisis, caused by the lack of fuel. (BOURQUE & CAÑIZARES, 2005). Thus,

With the fall of the socialist bloc and the loss of these preferential markets, the Cuban economy suffered a severe blow that resulted in a decline in production due to the interruption of import supply. In 1989, 57% of the proteins and more than 50% of the calories consumed by the population arrived in the country as imported products, as well as 97% of the animal feed. (CRUZ, 2005 *apud* SORZANO, 2009) [Translated from Spanish].

Considering that the country imported more than 50% of protein and caloric foods consumed by the population, the negative effects of the fall of the socialist bloc, the loss of the main markets, the reduction of production and the interruption of imports were very large

(CRUZ, 2005 *apud* SORZANO, 2009). From these effects came others, according to Sorzano:

The impact of the crisis began to be seen in a series of transformations in the economic, technological and social aspects that cause differentiated regularities to be registered in the agricultural sector such as those experienced at the beginning of the Revolution (1959) and those that occur since 1989, a time that will mark a new era in the evolution of Cuban agriculture. (SORZANO, 2009)[Translated from Spanish].

As a result of the economic crisis, there were social, economic, and technological changes that reflected in the development of urban agriculture, so that, "The effects of the fall of the socialist camp and the implications that it had on trade, in an open economy like ours, are observed in the behavior of the laundering of GDP growth between 1988 and 2005"(SORZANO, 2009) (Translated from Spanish). Besides,

Between 1975 and 1985 the average annual growth of the economy was of the order of 7%, based on a model supported by the international economic relations of the socialist countries that provided credits, technological assistance and market for agricultural products. The effects of the crisis that is unleashed in the early 1990s put an end to this economic growth with a marked sign of spatial and social equity and, introduces us to a stage of reforms in an international context characterized by the consolidation of world capitalist unipolarity. (SORZANO, 2009) [Translated from Spanish].

With the fall of the Soviet Union, the United States became the only world superpower and center of power. Cuba lost its largest trading partner in the export

and import of products, especially human and animal food, as well as fuel. Faced with the adversities exposed above, the Cuban population and government reacted through economic reforms in different spheres. In this context, there has been a reform in food production through urban agriculture since 1990.

In the food issue, Cuba and Havana had the Cuban government's support to make the claims and initiatives of the popular urban agriculture movement viable, through support and infrastructure measures to farmers, such as technical assistance, land distribution, sales outlets, agricultural technologies, seed shops and agricultural orientation, vegetarian restaurants, organic fertilizer centers, among others.

It is also worth mentioning the investments in agroecological agriculture based on the organic earthworm humus and on the principles of sustainability of rational use of resources and local potentiality. According to PEÑA et al. (2002) 1 t of earthworm humus is equivalent to 10 tons of manure, probably because the technology used in Cuba is more efficient than that used in Brazil (AQUINO, 2002). The country's largest worm farm is located in the province Pina Del Río. According to Aquino (2002), Cuba's largest earthworm center is located in Pinar Del Río and produces 100,000 tons per year of earthworm humus from "cachaça" (a sugarcane plant by-product). Agricultural technology is constantly being renewed and researched at an existing agricultural research center in Havana, which is also the headquarters of the Ministry of urban agriculture.

III. URBAN AGRICULTURE IN CUBA AND IN THE CITY OF HAVANA

In 1989, more than 57% of Cuba's caloric consumption was imported from the Soviet Union. With the collapse, Cuba suddenly became solely responsible for feeding its population, including Havana's 2.2 million inhabitants (WARWICK *apud* MARQUEZ, 2013). The population and the Cuban government resisted the situation of unemployment crisis, lack of transport, energy and the fall of access to food. One of the innovations coming from the crisis was the urban agriculture movement that emerged in the nineties from the initiative of the population to overcome food shortages in the country. Having embraced the idea, the Cuban government provided support to popular urban agriculture by creating infrastructure for the small agricultural production, aiming at subsistence and commercialization. The government complied with the popular initiative and, instead of inhibiting it, directed policies to foster it, so that in 1994 the newly created Department of Urban Agriculture

carried out some key actions: adapted the regulations by incorporating Usufruct planning, making it not only legal, but also free to adapt unused and public land to the disposal and potential productive territory; trained a network of extension agents, community members who monitor, educate and encourage the building of community vegetable gardens in the neighborhoods; created seed houses to provide resources/information; and established a direct selling infrastructure for Agricultural Markets to make these gardens profitable (WARWICK, MURPHY, PINDERHUGHES *apud* MARQUEZ). In the following photo, we can observe a vegetable garden in the capital of Cuba.

Thus, the Cuban agricultural policy generated food for subsistence and income generation, as with the socialist crisis there was great unemployment. Urban agriculture has generated more than 8000 jobs. Meanwhile, Gaete (2014) points out “that 90,000 residents of Havana (...) produce food”. One of *La Havana's* most significant achievements in urban agriculture is the development of organoponics, a technology developed in 1987 that allows you to grow vegetables in the water, an alternative to small and low-quality soil locations such as regions around roads and steep slopes (GAETE, 2014).



Vegetable gardens in Havana. Photo by BOURQUE & CAÑIZARES, 2005.

Gaete (2014) also draws attention to the expansion experienced by urban agriculture, driven by the creation of the Provincial Delegation of Agriculture and of two national programs for the development of agriculture in the city and the periphery. Government support for the establishment of two national urban and peri-urban agriculture programs was important to leverage this type of agricultural production with regards to technical assistance, financing, etc. In addition, the city's Strategic Plan also targets non-urbanized spaces that are mainly cultivated by women and youth. It should also be noted that at the end of last year, Havana had 97 urban gardens occupying 39,500 hectares, that is, half of its surface. In addition, it is estimated that there are 89,000 patios and

5,100 lands (less than 800 m²) devoted to domestic consumption to which 90,000 inhabitants are related. These facts are reflected in surprising figures: in 2013, 58,000 tons of products were commercialized, of which 6,770 were delivered to schools, hospitals and other services. (GAETE, 2014).

As it can be inferred, urban agriculture in Havana takes many forms and horticulturists use different methods depending on the size, location and quality of the land. Existing forms can be divided according to the methods used and the type of social organization (BOURQUE & CAÑIZARES, 2005). The different types of methods are intensive vegetable and flower gardens, organoponic gardens, and small diversified farms.

In densely populated urban areas, where vegetable gardens are smaller (less than two hectares), Cubans use the intensive cultivation method or the organoponics method. Intensive gardening is chosen when the existing soil is healthy and provides adequate drainage, and seeds and seedlings can be grown directly on the existing soil. Elevated raised beds, built on supporting structures, are often used to protect plants from torrential rain and to ensure more efficient use of organic fertilizers.

In turn, in areas where the soil is poorer, rocky, compacted, contaminated, or simply where it does not exist, especially when it is not possible to drain, or in paved spaces, the organoponic method, which uses raised beds, where soil and compost are placed "imported" from another location, is adopted. Raised beds are usually built with any material at hand, including old tiles and rocks, or broken concrete blocks. The soil is taken from another part of the region and mixed with equal amounts of organic material to fill the beds. Both systems are extremely intensive. Horticulturists seek to prevent any flowerbed from being empty for more than 48 hours, without plants or without being sown, and they all use very high proportions of compost and other organic soil conditioners (González, 2000; MINAGRI, 1999; Murphy, 1999 *apud* BOURQUE & CAÑIZARES, 2005).

Outside the cities, where more land is available, suburban farms exceed two hectares. Due to their larger size, these farms may associate more livestock and fruit and forest trees with the vegetable production, typical of smaller gardens. These farms are also highly diverse and can produce longer cycle crops, which in smaller areas would represent inefficient use of the limited space available. These peri-urban farms produce a large amount of starchy and grain tubers. There are many different forms of urban farm organization, and two main types of land tenure regime. Farmers who have traditional private plots in both urban and suburban areas are called "parcels" and are usually organized into credit and service cooperatives (CCSs). Since 1993, when the government began handing over land to people for the free and permanent right to use them, a new category of farmer was created: the "usufructuary". Today, more and more usufructuaries are joining CCSs (BOURQUE & CAÑIZARES, 2005).

When several farmers come together, form a cooperative, and apply for land and loans as a group, they establish a Basic Cooperative Production Unit (BCPU). The State gives them land (larger than what would be offered to people in isolation) and provides the infrastructure such as fences, sales outlets, tool shelters, irrigation systems and early production loans, which the cooperative will pay off little by little. Interest rates are

low and land is free as long as they repay their loans before the due date (BOURQUE & CAÑIZARES, 2005). Many state-owned agricultural companies have been experimenting with a new scheme whereby they divide the state land surrounding the city and hand over the plots (up to 20 hectares) to new farmers. In many ways, these farmers are like the usufructuaries, but they must continue producing what the company traditionally cultivated and selling to that company. Contracts are based on production quotas and prices are set before sowing, so that the production above the established quota gets a higher value or can be sold directly to consumers for even better prices. A good example is the orchards of the national fruit and vegetable production company, *CultivosVarios*.

About 400 farmers spread around Havana grow vegetables, flowers, grains and medicinal plants under mango and other trees that have been sown 20 years ago. This experience in the Havana area transformed *CultivosVarios*, which just five years ago lost 10 million pesos annually, and today generates more than one million pesos a year. In the past three years, all land located around various Cuban cities has been converted to this system, which is now being experimented with in other sectors, such as livestock and dairy production (BOURQUE & CAÑIZARES, 2005).

As a result of adopted policies, of the resources employed, of land use regulatory reforms, and of the strong market demand, and also due to the actions of the government and community members, the urban agriculture movement is flourishing vigorously in Havana and all over Cuba. The figures for the number of vegetable gardens, cultivated areas, total production, and yield of intensive production farms using raised beds, and their percentage in the total production of food consumed demonstrate the vigor of this trend (BOURQUE & CAÑIZARES, 2005).

According to Medina (2001), urban agriculture in Havana is expressed in the form of "family vegetable gardens, state self-consumption, popular organoponics, agricultural offices" (translated from Spanish). The predominant form is organoponics, it can be used in many places regardless of soil quality and availability of large spaces. Aquino (2002) states that "organoponics constitutes a closed system for the production of vegetables and condiments that are not directly linked to the soil. They are built in unproductive, flat areas near the recipient of the final production. (MINAG, 2000). [...] The substrate used in organoponics consists of a mixture of organic matter and soil". In general, the period 1989-1994 can be said to mark subsistence urban agriculture in the city of Havana, at the beginning of the economic crisis in

the country, produced by the economic embargo and socialist crisis. The subsequent period (from 1994 to the present) marks the permanence of self-consumption and commercialization of urban agricultural production. The urban agriculture developed in Havana stands out for social inclusion through job and income generation, food security, access to healthy food of better nutritional quality and agroecology through the use of sustainable agricultural techniques.

IV. FINAL REMARKS

Despite the economic embargo imposed by the United States on Cuba since 1962, the socialist crisis of the European countries and the Soviet Union, its main trading partner, the country has managed to rebuild itself, especially with regards to agriculture, in particular urban agriculture, which provides food supplies, improves the health of city dwellers through the consumption of healthy and fresh organic foods and generates income for 90000 residents of the city of Havana.

The national urban agriculture movement emerged from the people as a food alternative to the problems created by the economic crisis. The initiative and invention of the urban dwellers of this agriculture had state support, regarding the financing infrastructure, public land distribution, food distribution at fairs, sales outlets, restaurants, vegetarian restaurants, schools, hospitals, among others. The involvement and dedication of urban farmers and of the State is the main success factor of this type of agriculture.

Sustainable and ecological agriculture, based on Agroecology with the production of organic earthworm humus, composting, the reuse of water, organic food and cow grafts and others are the hallmark of this agriculture. Allied to ecological agriculture, both low cost and high generation of income consolidate the relevance of urban agriculture to the peripheral countries that need to combat hunger, poverty, unemployment and human indulgence.

In this way, Cuba and the city of Havana show that it is possible to overcome the issue of hunger and of ecological urban agricultural production, simply by having political will through agricultural policies that support the development of urban agriculture by city dwellers.

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