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Making the most of every available space – urban horticulture in a vacant plot in Cuba.

Cuba's enforced ecological learning experience

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In the early 1990s, Cuba was plunged into crisis as it lost its major source of food, fuel and agricultural input supplies with the end of the Soviet bloc. These losses hit Cuban agriculture particularly hard for four reasons. First, its agricultural system was highly industrialised, so much so that it was using more tractors and applying more nitrogen fertilizer per hectare (192 kg/ha) than similar production systems in the U.S.A., while mechanised irrigation covered over one quarter of cropped land. Second, Cuba was importing most of the inputs and foodstuffs it required for survival: in 1988, for example, it imported 100 percent of wheat, 90 percent of beans, 94 percent of fertilizer, 82 percent of pesticides and 97 percent of animal feed. In comparison, farms controlled by the Ministry of Agriculture were producing just 28 percent of nationally consumed calories. Third, just as Cuba was forced to enter the global sugar market, international commodity prices dropped sharply. Before that time, it had received, from friendly regimes, three times the world price for its sugar. Fourth, over the previous few decades the country had developed very little in the way of diversified agricultural products or light industry, either for export or for domestic consumption.

In 1990, trade with the Soviet bloc collapsed, leading to severe shortages of all imported goods. Over the space of two to four years, the availability of agrochemicals fell by 80 percent, while the drop of fossil fuels was 47 percent for diesel and 75 percent for

petrol. Food imports were cut by half. The overall result was that both agricultural production and food availability fell to critical levels. By 1993, the nation was close to facing a huge food crisis.

Since colonial times, Cuba had never fed itself, and as early as the mid-1980s there had been some awareness of the negative impact of industrialised agricultural practices on food quality and human health, particularly of high nitrate intake in certain foods. Other negative impacts of this farming model included large scale deforestation, salinisation, erosion, compaction of soils and loss of soil fertility. Yields of the major commodity crops were also decreasing. At the same time, the complex structure of agricultural research was not very effective. There was a growing realisation that this approach to agriculture (which tended to consider the various elements separately rather than looking at the system as a whole) did not favour increased self-reliance, and that dependency on inputs should be reduced. Unfortunately, before plans for reform could be further developed, the crisis had begun.

Cuba's successful coping strategies

Yet, within a decade, the country recovered sufficiently to double agricultural production, increase calorific availability by 25 percent, and maintain a consistent and equitable social food programme. Major changes put in place by the State, or developed by lack of choice, included a focus on technologies based on local knowledge, skills and resources, instead of imported inputs. This emphasised the diversification of

agriculture and markets; downsizing of large farms; increased post-harvest efficiency; the development of regional food action plans, enabling greater access to land; the development of a strong urban agriculture movement, raising farm gate prices; investment in agricultural research, extension and training; and a reversal of the number of people leaving rural areas by improving rural conditions and opportunities. Total State subsidy to the agricultural sector fell dramatically, with estimates of drops between 50-90 percent between 1993 and 1996 onward.

Despite the centralised planning, the State gave up much direct control over management of food production and distribution. Initiatives and activities at the grassroots level were now encouraged, and production and food distribution became more localised. Production and yields of staple foods doubled and continued to increase, while most importantly, food availability was restored to acceptable levels. At the end of that decade, Cuba held more sovereignty over its food system than at any time in its recent history, and this new production system showed exceptional resilience throughout the 1990s.

The steady increase in food production, and other gains in the food system, were not only due to using more sustainable production techniques, many other factors contributed: crop diversification and switching to hardier and staple crops, increasing farm efficiency and autonomy through improved tenure and management arrangements, developing more localised production-consumption linkages, recognising the contribution of smallholder production, and increasing the range of incentives on offer to food producers.

Stages of transition

Contrary to popular belief, up to the year 2000 there had been no official State policy to adopt an agroecological or organic production system. Nevertheless, many individual parts of such a system were being employed, such as the development of production centres for biological pest control products, agroecological demonstration farms, ecological training courses, urban *organopónicos* (raised-bed gardens), and a social organic movement (Cuban Association for Organic Agriculture and Organic Agriculture Group). However, the driving force for the increase in agroecological approaches in Cuba over the 1990s was not a deliberate change in people's thinking about agricultural production, but was enforced by the lack of agrochemicals and petrol, and the need for self-sufficiency. There was no policy "gel" to hold these approaches together, nor to prioritise them over more industrialised strategies. Funes (2002), in tracking the development of agroecological farming in Cuba, identified that the principal agroecological techniques receiving widespread application have only been "input substitution". He refers to the period of the 1990s as the "first phase", the basis for further widespread consolidation of agroecological agriculture.

In practice, some farmers, groups and institutions in Cuba were still operating along industrialised lines. Some were substituting agrochemical inputs for biological inputs, whilst a minority had gone further to give up relying on any type of input, and instead focusing on balanced interactions with nature. There was a tendency for ministerial institutions to be more industrially oriented, compared to the few more dynamic, ecologically-oriented projects organised by pioneering farmers, researchers, extension groups or NGOs.

Yet not everyone started from the same position. Some groups, such as the organic movement, or pest and disease research groups, were already working along agroecological principles even early in the 1990s. At this time, other groups, such as the old State farms

which had transformed into cooperatives, had been more highly industrialised, and these had since made huge changes in the 1990s to take on ecological techniques. There were also differences in the transition made in the production techniques for different crops. Certain crops, such as maize, had remained low-input, whereas production of crops such as banana had changed from high chemical input to a more ecologically-oriented approach. High-priority cash crops such as sugarcane had remained relatively industrialised throughout. Thus, although the agricultural sector as a whole may have been in the early substitution phase of an ecological transition, many individuals and groups had undergone huge transformations towards a more agroecological approach from their starting points at the beginning of the decade.

Challenges to scaling up ecological agriculture

The Cuban experience highlights that a lack of agrochemicals and fuel does not necessarily lead to a widespread agroecological production strategy. Further supporting mechanisms would need to be in place, including strong policies. Without this, the existing ecological components of the agricultural system may remain fragmented, while the positive interactions possible with a more integrated approach may not be developed. According to the perspectives and opinions of farmers and agricultural professionals, several key factors would be required to increase and mainstream ecological agriculture. These factors can be classified into three groups: those relating to knowledge, those relating to resource and technology access, and those relating to political and social factors.

The need to develop ecological knowledge systems

The extent of ecological innovation and experimentation was dependent on the availability of relevant knowledge. Almost all farmers interviewed identified the lack of knowledge and training as one of the main limitations to the increased use of ecological approaches. Overall, increasing "ecological literacy" would also serve to avoid some common misunderstandings surrounding ecological agriculture. For example, organic or ecological agriculture was directly equated with low-input agriculture or a system for the poor; in fact it was also referred to as "low-income" agriculture, while agrochemicals were associated with more affluent times. This perception led to hesitancy over promoting ecological agriculture: ecological agriculture would mean low input and therefore low output, and thus be "anti-revolutionary" for not supporting Government policy to maximise yields.

Those farmers who associated ecological agriculture with a lack of agrochemicals had several concerns. Stopping using agrochemicals, for them, meant an increase in incidence of pests and disease, which would give them lower yields. In turn, this would mean a drop in product size and quality; increased workloads due to the lack of tractor fuel; increased risk taking; and fears that the degraded soils would only respond to chemicals. Ecological techniques were felt to be inappropriate for larger farms.

Similarly in the research sector, ecological agriculture was associated with low yields, subsistence farming, and a resource-poor situation generally. Low-input research strategies frequently involved not only zero chemicals but also zero irrigation or mechanisation, and were directed for use on marginal lands. Ecologically oriented projects in Cuba tended to select farmers seen as having lower potential as the target beneficiary group, and this would obviously affect project performance over time. As one extension officer explained: "We will select the producers who have received less benefits and who have less potential, to show that if these farmers can achieve success, then anyone can."

Yet, during the more than three hundred interviews, a huge range of opinions were expressed about the actual performance of agroecological practices. Some felt yield potential to be high, others low. Concrete changes which were suggested to increase understanding and knowledge on ecological farming included using the term “appropriate” rather than “low input” or “resource poor”; publicising research results on the performance of ecological agriculture; increasing understanding of the scientific basis for, and achievements of, ecological agriculture; and education on the targeted role that agrochemicals could play within a nationwide ecological system, such as in dealing with a rare pest plague.

Farmers also requested more strategic development projects to encourage both diversification and some regional specialisation, and to develop alternative energy sources on-farm. Generating knowledge in-country, with new research, was particularly important given the isolated circumstances of Cuba, where it was difficult to access knowledge and information from abroad. Recovering and incorporating traditional knowledge into this process was seen as being very important. To stimulate learning and innovation on cooperative farms, traditional knowledge within the work team, and the practice of one team (or individual) being responsible for the production cycle of a specific plot of land (rather than be continually rotated around the farm as was the old system) were seen as being useful.

Another way to speed up innovation was to provide support to innovators or “ecological pioneers”. These individuals were found on farms, in research institutions, or were founders of organisations. It was noticeable that the most successful and innovative efforts and projects were initiated by such “pioneers” who held a clear vision on appropriate ecological approaches for specific situations. These efforts and projects were continually used as examples of success for others to follow, yet the individuals concerned had frequently worked on their own initiative with little official backing.

In Cuba, dissemination of agroecological techniques was often carried out in the same way as for industrialised agriculture, through top-down and technology transfer methods. This approach was still effective to a certain degree, however, methodologies were also starting to change, and these early attempts at introducing new approaches were yielding interesting insights as well as challenges to their further mainstreaming. Some of these are described in Box 1.

Box 1. Challenges encountered to the introduction of participatory research and extension approaches

- Trained individuals encounter challenges in trying to explain and apply their new knowledge with untrained colleagues.
- Researchers remain distrusted by farmers, because of previous experiences.
- Participation is easier to introduce into the less hierarchical co-operative structures.
- New approaches may threaten the establishment – both older individuals and institutions.
- Playing the role of facilitator makes it more difficult to take direct credit for successes and therefore to justify one’s impact.
- With participatory approaches, the indicator of success is no longer purely yield.
- Farmers are less willing to experiment if they have to meet State production plans.
- Agricultural researchers do not understand social science.

The need to increase availability of and access to appropriate resources and technology

The second major consideration for ecological up-scaling, prioritised by almost all farmers, was the need for increased access to organic inputs, such as biological pest controls and manure. In fact it was not only access but also availability, price and delivery which were of concern to farmers. Lack of resources and technology was also seen as a constraint by agricultural support professionals, who recommended increased investment in the production and quality of biological inputs and their storage times.

The need to ensure supportive political and social factors

While in many respects the political response to the crisis of the early 1990s favoured an agroecological approach, other policy elements worked against this. These elements included the following:

- Environmental legislation was implemented by the Ministry of Science and the Environment but not yet internalised within the Ministry of Agriculture;
- The nationwide policy objective of increasing yields in the short-term conflicted with longer term sustainability objectives;
- Cuban farmers saw petrol fuel as being crucial to the success of their production systems, and there was little being done to develop alternative energy resources. Unless ecological alternatives could address farmers’ concerns of irrigation and traction limitations, they were less likely to be accepted;
- More integrated ecological planning was required. State production plans frequently recommended growing crops which were not suitable to the local climate. Their “intensification” designs also often discouraged the use of green legumes, intercropping and fallows. Similarly, the conventional, centralised seed distribution system worked against farmers developing their own skills and expertise in seed saving;
- There was little incentive for farmers to produce quality products. Food quantities were still unstable, and low cost and high quantity were the most important factors in the market place, while much food was still being channelled, ungraded, through the State ration system.

Certain social factors were identified as being key influences in the scaling-up of ecological agriculture. One discouraging factor, according to farmers, was theft from their fields or stables. If they could not afford a guard, this limited them in the crops they chose to grow, their seed drying and saving, and their keeping oxen. Farmers were also unwilling to adopt technologies and practices that they felt were unproven, particularly in view of the previous top-down extension system that had, to some degree, encouraged dependency and mistrust. Some farmers, for example, were not attempting to search for biological pest control products but were waiting for the State to introduce them.

Some restructuring of organisations appeared to assist with the progress of ecological approaches, such as the integration of previously specialised farms and farm enterprises. Further restructuring was required, such as for the State seed supply service. It was often mentioned that practical change required a corresponding change in mentality, and that “attitudes take time to change”. This perception tended to slow down any attempt to encourage change, because of the long time it might take. In addition, individuals generally did not identify themselves as needing to make a mental shift or receive training; the resistance to change always lay with some other group or individual. In fact, supporters of ecological agriculture in Cuba emphasised the need for a shift in thinking, in order to move from the stage of input substitution to that of agroecological management.



With increased awareness of the importance of organic practices, there are many possibilities for the future of sustainable agriculture in Cuba.

Scaling-up ecological production systems

From the above we can conclude that the removal or absence of agrochemicals (or of private sector agribusiness) does not necessarily imply an ecological production system; such a conversion requires a conscious decision. Yet emerging evidence from Cuban projects and research is suggesting that ecological production is technically feasible and economically viable as a mainstream component of a nation's food security strategy.

Cuba's successes in improving food security and sovereignty, and overall agricultural productivity, demonstrate what it can do when the political will is there. It has yet to apply this will to developing integrated policy measures and an enabling environment for ecological agriculture. One motivation for doing so might come from analysing another aspect of Cuba's transition. Over a period of ten years it has moved from facing serious food deficits and shortages in calorific intake, to a situation where more than one third of the population of Havana is considered to be overweight and related diseases are increasingly common. High pesticide residue levels continue to be found in those crops prioritised by the State for high-input production.

Whilst Cuba has been able to ensure food for its people using a mixture of ecological and industrialised production techniques, it is the broader implications of these strategies that affect the health of the nation, and of the environment. Soil degradation remains a huge problem for the agricultural sector, as do the repeated droughts for which more adaptive and resistant crops and cropping patterns, and sustainable water management systems, are required.

Some positive side effects of the modest changes towards agroecological approaches are already emerging. Indirect environmental and health benefits of the reduction in agrochemical use have already been noted by farmers. Research which has been forced to refocus on ecological approaches has come up with a number of sustainable innovations. The Cuban food system is already benefiting from a more diverse range of fresh food. For the future, other benefits of agroecological production, such as developing a commercially viable organic

export sector and producing high quality produce for the growing internal tourist market, also holds potential.

Cuba is distinctive in its mode of centralised governance, and some might argue that because of this it is difficult to compare these experiences to other situations. However, in many parts of the "free world" decisions over agricultural resources and the food supply chain are centralised amongst a few corporations, reducing the extent of real choices for the consumers or producers. One feature of western farming and food systems in recent years has been that they are becoming more mechanised and uniform. These systems, with long food supply chains, play a large role in how fossil fuels are used. By contrast, Cuba has been moving in the opposite direction, towards more decentralised, less mechanised, regional production and consumption systems, with greater levels of independence, diversity, and complexity. As and when the predicted global fuel supply crisis happens, Cuba's example provides lessons as to how it might be addressed. ■

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