



Review Article

Supporting Innovation in Integrated Agroecological Production Systems, Employment Creation and Youth Engagement in Productive Processes in Jamaica, Saint Lucia and Trinidad and Tobago

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Abstract

Agriculture must meet the challenges of hunger and malnutrition against a backdrop of population growth, increased pressure on the environment and biodiversity and the challenges associated with climate change, poverty and urbanization. While past efforts focused on increasing agricultural production, today's challenge is to tackle root causes through transformative changes on how we produce, distribute and consume nutritious food that contributes to healthy diverse diets. Agroecology is a promising holistic approach to support this transition to sustainable agricultural and food systems.

This paper is an assessment of agroecology in production systems in the Caribbean based on case studies from Jamaica, Saint Lucia and Trinidad and Tobago. It provides an overview of the challenges to rural women and youth employment including investment gaps. Recommendations on the transformation to more integrated agroecological approaches for improved livelihoods and increased resilience to climate change are presented in addition to ways to promote local production of diverse products, closer producer-con-

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sumer interactions, and the creation of innovative job opportunities for rural youth.

Keywords: Agroecology; Caribbean; Climate change; Resilience; Rural women and youth employment; Sustainable agriculture

Introduction

The Caribbean island states depend up to 90% on imported, often highly processed, food. Obesity and Non-Communicable Diseases (NCDs) are at increasing rates. Foreign exchange is earned mostly from tourism and other industries such as finance, petroleum products and manufacturing. Agricultural production has a negative stigma amongst the population, especially the youth. Despite persons receiving tertiary education in agricultural production, poor access to land and to credit curtails opportunities for pursuing agriculture as a profession. On the other hand, fallow land is available but farm succession is rarely practiced. Agricultural production takes place either following a high external input model (e.g. contract farming), small-scale, or at backyard level. Agroecological production and direct marketing on farmers market exist in an embryonic stage. However, there is scope for their expansion and the development of new innovative products. Consumers are increasingly aware of the health benefits of fresh and diverse diets based on agricultural products produced in an environment friendly and sustainable way.

The low productivity of the agricultural sector in the Caribbean region coupled with high levels of imports continues to threaten local food sovereignty, the sustainability of rural livelihoods systems and the environment. This is in addition to global challenges that place pressures on food and agricultural systems such as, climate change and natural hazards; increasing trans boundary pests and diseases; and inefficient food systems that result in food loss and waste. The current globalized and industrialized food system does not provide convincing evidence that it is sustainable in all three pillars of sustainability (economic, social and environmental) [1-3]. There is a need for a transformational change in agriculture that addresses the different dimensions of sustainability and provides for integrated work across sectors to allow for synergies and reduced trade-offs among sub-sectors. For this transformation to be achieved, change is needed in all parts of the food system, from the seed / animal, to the soil, and to the table. With a holistic understanding and an ecological view, the change needed to restore sustainability to food systems can occur.

What is Agroecology?

Rooted in sustainability, agroecology can be expressed as the "ecology of the food system" [4]. It has the explicit goal of transforming food systems towards sustainability by supporting a balance between ecological soundness, economic viability and social adherence [2]. Agroecology applies ecological concepts and principles to optimize interactions between plants, animals, humans and the environment while taking into consideration social aspects required for a sustainable and fair food system. It helps to build a greater resilience

of ecosystem services and contributes to environmental rehabilitation of land, water systems, increase nutritional diversity, and overall human health. It relies on biodiversity (e.g. nutrient cycling, biotic pollination, natural pest control, locally adapted genetics) rather than external inputs like synthetic fertilizers, pesticides, and imported concentrate feed. It is highly knowledge-intensive, builds upon farmers' collective knowledge and innovations, making it particularly attractive for rural and urban youth. With an emphasis on the importance of social equity such as job creation and gender considerations, agroecology also promotes shorter value chains and encourages direct consumer-producer exchanges. Agroecology is seen as a promising approach for the transformational change to sustainable food and agricultural systems.

Agroecology provides a definition of a complete socio-ecological system where smallholder and family farmers (including fisher folk and pastoralists) are at the center of the food system. It seeks to meet the need for transformational change by addressing the root causes of problems and providing holistic long-term solutions based on the co-creation of knowledge, sharing and innovation, including the combination of local, traditional and indigenous knowledge complemented by multi-disciplinary science.

In response to the global pressures on food and agriculture systems, the 2030 Agenda for Sustainable Development supports and calls for a transformative approach. With its systematic approach, agroecology contributes directly to multiple Sustainable Development Goals (SDG): the eradication of poverty (Goal 1) and hunger (Goal 2); ensuring quality education (Goal 4); achieving gender equality (Goal 5); increasing water-use efficiency (Goal 6); promoting decent jobs (Goal 8); ensuring sustainable consumption and production (Goal 12); building climate resilience (Goal 13); securing sustainable use of marine resources (Goal 14); and halting the loss of biodiversity (Goal 15). Furthermore, agroecology can contribute to achieving the aims of the Convention on Biodiversity, the Paris Agreement, and the United Nations Convention to Combat Desertification.

FAO's Work on Agroecology

The Food and Agriculture Organization of the United Nations (FAO), in 2014, commenced strengthening the global dialogue and laying the groundwork for enhanced co-operation with countries on agroecology. In that year, FAO held the 1st International Symposium on Agroecology for Food Security and Nutrition; this was then followed by a series of regional seminars held from 2015-2017 in five regions (sub-Saharan Africa, Latin America and the Caribbean, Asia and the Pacific, Europe and Central Asia, and the Near East and North Africa). These regional seminars revealed a diversity of perspectives and experiences, as well as identified commonalities between regions and across different approaches to agroecology-including shared challenges, opportunities and objectives.

In guiding countries to transform their food and agricultural systems, to mainstream sustainable agriculture on a large scale, and to achieve Zero Hunger and multiple other SDGs, the 10 elements of agroecology were developed (Figure 1). These are based on the seminal scientific literature on agroecology-in particular, [5] five principles of agroecology and [2] five levels of agroecological transitions.

These elements can be used by national policy-makers and stakeholders to guide agroecological transitions. The following 10 elements are interlinked and interdependent: Diversity; synergies; efficiency; resilience; recycling; co-creation and sharing of knowledge (describing common characteristics of agroecological systems, foundational practices and innovation approaches); human and social values; culture and food traditions (context features) and responsible governance; circular and solidarity economy (enabling environment).

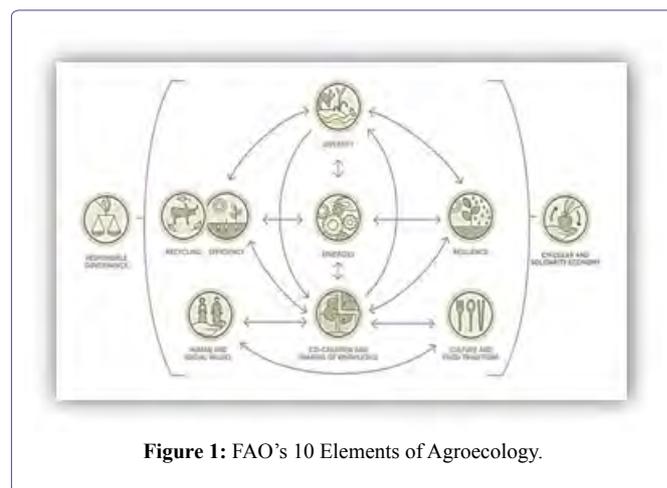


Figure 1: FAO's 10 Elements of Agroecology.

In addition, deriving from [2] five levels of food system change converting conventional agricultural production and food systems to agroecological food systems, the FAO defined four levels that serve as a roadmap in guiding this transition (Figure 2). Each level requires mechanisms in place to strengthen capacities, institutions, legal frameworks, policies and programmers that support transitional processes. The four levels describe a progressive path towards greater environmental, social and economic sustainability and can be implemented in any variation. The first two levels are at producer level. Levels 3 and 4 go beyond the producer level involving the broader food system and societal level. They require co-operation among producers within the same territory, which may require public support.

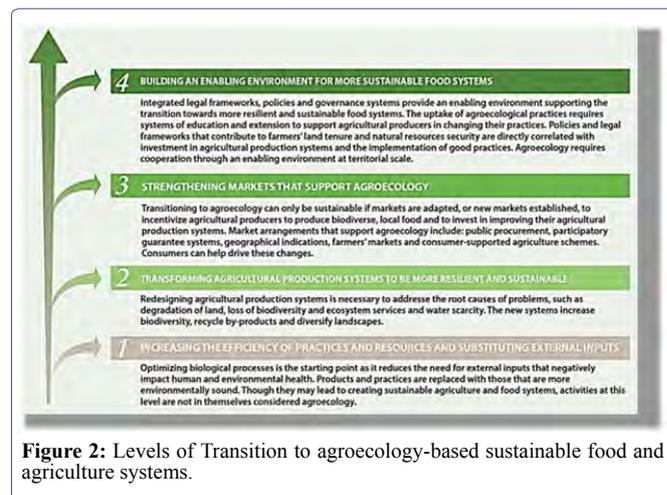


Figure 2: Levels of Transition to agroecology-based sustainable food and agriculture systems.

FAO continues to support countries in the transition to agroecological systems, and in his address at the 2nd International Symposium on Agroecology, the FAO Director-General Jose Graziano da Silva stated “The future of agriculture is not input-intensive, but knowledge intensive. We need the integrated approach that agroecology can offer” (April, 2018). An analysis of FAO’s work plan for 2018-2019 revealed that eight per cent of FAO’s results planned for 2018-2019 support transitions to sustainable food and agriculture through agroecology [6-9]. Two-thirds (64%) of these results are to be delivered in 78 countries across all five geographic regions addressing food security, nutrition and health, access to markets for local production, family and small-scale production, climate-resilient approaches and sustainable natural resource management. Of the eight per cent of FAO’s results, almost 80 per cent of the activities contribute to building enabling environments for more sustainable food systems and livelihoods in addition to contributing to transition levels 1, 2 or 3.

Assessment of Agroecology in Caribbean Food and Agriculture Production Systems

In fulfillment of the mandate from its Member States to facilitate dialogue and promote the benefits, challenges and opportunities that exists in an agroecological system, FAO engaged in an assessment of agroecological production systems in the Caribbean region based on case studies in Jamaica, Saint Lucia and Trinidad and Tobago. This work was conducted in close collaboration with the Centre for Agriculture and Bioscience International (CABI) in Trinidad and Tobago. Its objective was to assess current agroecological approaches and production challenges in the selected countries and to describe opportunities for up scaling agroecology with emphasis on women and youth employment creation.

Methodology

Baseline studies were completed which described the major crop, livestock, forestry and aquaculture production systems and their current status. The process included data collection from producers, extension agents and other relevant stakeholders in the countries that contribute to internal markets and local food consumption. The baseline studies identified existing gaps of knowledge and opportunities to strengthen agroecology through potential public policies and programmes that can support the creation of innovative job opportunities for women and youth in rural areas. This output was achieved by engaging national and regional experts to undertake a desk review and compile a situation report of the main production systems, with considerations for gender and agribusiness to ensure that viable project ideas are sustainable and promote inclusion of women and youth throughout the systems.

Case studies within these countries were highlighted and assessed with guidance from the 10 elements of agroecology and the transitional levels to an agroecological system. National consultation workshops with key stakeholders were held in each of the countries to present the findings of the baseline report and further develop recommendations to support agroecological transitions.

A six part webinar series was organized to promote the concept of agroecology and to continue the dialogue on how agroecology can be mainstreamed in the Caribbean. The topics covered different aspects that are pertinent to mainstreaming agroecology which included: Better integration of livestock in cropping systems; inclusion of women

and youth participation in agroecological systems; training and agribusiness development in agroecology. Additionally, a Dgroups “Sustaining Caribbean Food Production Systems through agroecology” was created as a platform for discussions, knowledge sharing and a database of agroecology related publications.

Two videos were produced to document existing agroecological systems in the Caribbean as well as to explore the potential for scaling-up. These videos focused on integrated practices and highlighted experiences of agroecology practitioners.

Further to these activities, a regional forum on the “Promotion of Agroecology in the Caribbean” was held in November, 2018 to present the assessment of agroecology in production systems in the Caribbean based on the selected countries; to validate recommendations for mainstreaming agroecology in the region; and to agree on the priority areas for development into project proposals on agroecology. There was a consensus on recommendations for mainstreaming agroecology in the Caribbean and priority areas that should be addressed through a regional project which will be provided later in this review.

Summary of Assessment Findings

The macroeconomic environments in which family farmers operate were quite similar in the three countries. Agriculture contributed 7.3% GDP in Jamaica, 2.4% in Saint Lucia and 0.5% in Trinidad and Tobago, while employing a significant percentage of people at 17.2%, 14.6%, 3.6% for Jamaica, St. Lucia and Trinidad and Tobago respectively; however, the labour force is aging and the average age of a farmer in these countries is between 40-65 years. The general trend in all three countries is decreasing agricultural exports and increasing imports. Main challenges included land tenure / availability of suitable land; adverse weather conditions; high cost of production based on imported inputs; abuse of agri-chemicals; low productivity; high labor cost /unavailability and unproductive labor; praedial larceny; lack of relevant research: Outdated/ inappropriate technologies; limited financing for women and youth; ineffective extension; and poor infrastructure.

Data collected revealed that there are no direct incentives encouraging women and youth to engage in agriculture. However, rural youth have greater opportunities for exposure and entry to agriculture than urban youth, who are challenged for space, and exposure to agriculture in their community. Mainstreaming gender equality and targeting youth is necessary in order to unlock the full productive potential of agriculture and ensure that these two groups benefit in the process. The Caribbean small-scale farmer is predominantly a male between 41 and 54 years of age who cultivates under five acres (2.5 hectares) of land and this can even include landless farmers. An excess of 80 per cent of farms in the Caribbean are deemed to be family farms thereby involving also women and youth in different capacities.

Women and youth are the two main groups where unemployment rate is high. In keeping with the 10 elements of agroecology, in particular the element of Human and Social Values, encourages an equity based approach in agroecology to ensure that vulnerable groups have an opportunity to participate and benefit to the extent that it is seen as a tool for empowerment of women and a viable career option for youth. It presents opportunities for creativity and innovation to further encourage youth given their general disenchantment with agriculture. Long version video - <https://dgroups.org/?6pr3kc1a> and short version - <https://dgroups.org/?9tv78dkb>

Women are active in agriculture in the Caribbean in commercial and subsistence farming, but more particularly in the area of agro processing, marketing and distribution. Official statistics reveal that about 30 percent of women are registered as farmers in Jamaica and St. Lucia, and 25 percent in Trinidad and Tobago. The figures are similar in the agriculture labor force which is dominated by men (about 75 percent in Jamaica and Trinidad and Tobago). It is generally felt that women's involvement in agriculture is overlooked and therefore they often do not benefit from various interventions from Governments and development partners. Women generally experience challenges that include limited access to finance and land. Social, regulatory and cultural barriers may also restrict their agricultural production activities. In addition, collateral requirements for obtaining finances are often prohibitive. Women are less likely to hold land titles and are therefore often not in charge of decision-making. They may have smaller lots than men, and their mobility is often limited due to lack of access to transport or reproductive responsibilities. Women may not be adequately compensated for work in agriculture due to household dynamics. There may be less contact with extension services resulting in inadequate extension support. Women's role in agriculture may not be recognized and therefore they may not be targeted for training.

Agroecology can help rural women in family farming to develop higher levels of autonomy through knowledge, collective action and some levels of commercialization. It can empower them at household, community level and beyond, for example, through greater participation in producer groups. It is noted that empirical analysis shows that women's participation is essential for agroecology and its expansion, and that women are often the leaders of agroecology projects [10].

Over half the population in the Caribbean islands of Jamaica, St. Lucia and Trinidad and Tobago are under 34 years. Generally, the Caribbean has a high youth unemployment rate (in excess of 25%) and more female (both youth and adults) are unemployed compared to males. Agriculture is a viable career option for youth and while it is not one of the highly preferred areas of study at the tertiary level there is still some level of interest. In Jamaica, one percent of the registered farmers are below 30 years of age with approximately 30 percent being female. This situation may be similar in other Caribbean territories given continued reports of lack of youth involvement in agriculture. Youth's perception of agriculture however limits their participation. While young person's regard agriculture as being an important sector, they generally have a negative perception including: that it is labor intensive; provides low income; has limited opportunities as a career compared to e.g. medicine, law and engineering. Many youth therefore regard agriculture as a last- resort career option.

Some employment opportunities for women and youth, as identified in Jamaica, St. Lucia and Trinidad and Tobago, are general agriculture production utilizing agroecological principles with the outputs being marketed as agroecologically produced and targeting a more health conscious group of consumers; such goods usually command a higher price. It is necessary to adopt production systems utilizing innovation to overcome challenges of resources, for example, multi-tiered aquaponics systems where land is limited; utilize manure, compost and other natural fertilizers reducing the need to purchase synthetic fertilisers and boosting soil health and commercial production of bio-inputs for sale to farmers (examples include: Bio fertilizer (e.g. Algas Total Plant Tonic), biopesticides; compost; wood vinegar).

Additional opportunities include production of value-added products from primary products which were produced utilizing agroecological principles (e.g. yoghurt, cheese).

Additionally, to make agriculture more attractive to young person's the use of Information and Communication Technologies (ICTs) are areas that must be encouraged. This can be done by targeting existing youth groups and/or programmers to introduce agroecological principles; conduct gender sensitive training for supporting agencies; support farmer mentoring programmers especially for youth and include an agribusiness component to strengthen and encourage entrepreneurial focus.

There is the need to establish enabling environments to facilitate women and youth access to employment opportunities given their more vulnerable status. Policies developed must be focused on offering greater support to women and youth through the institution of equity measures to ensure that these groups are able to effectively access resources provided through interventions.

In most Caribbean countries, agricultural policies are outdated and do not favor sustainable production methods. Most policies are developed in a top down approach on a sector basis as opposed to national interests. Normative policies establish the rules and expectations that govern the socio-economic aspects of the society. To develop policy tools to unify demands around agroecology, the Caribbean must include agroecology in national, sub national, regional, sectoral and local plans and strategies. Equally important to implementing agroecology are transition policies that visualize and pursue change, turn discrepancies into opportunities moving to an advanced, sustainable and regenerative economy. They provide support for society to become independent of production and consumption, while respecting both the communities affected by previous practices and the families that depend on their work in the agricultural sectors. Several key policy decisions can be implemented to encourage the scaling up of agroecology and these include: building capacity to manage the environment, agrobiodiversity and agroecology; creating knowledge in people of all ages, especially producers, to enable them to combine their empirical knowledge with ecological learning; support ethical-political training of the people who can lead organizational processes; and guarantee access to land, water and genetic resources.

In promoting agroecology throughout the Caribbean, there is an urgent need to build capacity through training. To successfully practice agroecology, practitioners must have some basic skills that include: A comprehensive understanding of the 10 elements of agroecology; commitment to the principles of business development and management and to effectively integrate these principles and practices into their enterprises (individually or through service providers); ability to be innovative in the face of on-farm challenges and willingness to share best practices and experiences.

Based on a review and analysis of the agriculture programmers offered by the University of the West Indies, the University of Trinidad and Tobago (UTT) and community colleges-Sir Arthur Lewis (St. Lucia); Samuel Prescod (Barbados); TA Marry show (Grenada)-a proposal was discussed on the creation of an agroecology master farmer training programmer. In designing a training programme for agroecology it is important to consider the unique characteristics of agroecology that include: Bottom-up and territorial processes;

multi-disciplinary; delivery of Contextualized solutions to local problems; innovations-based; relying on the co-creation of knowledge, combining science with the traditional, practical and local knowledge of producers.

The agribusiness assessment focused on “People, Planet and Profit” to unlock the potential agri- economics for combating climate change, rural poverty and achieving zero hunger. The key needs identified to promote agroecology in agribusiness were: Land; finance; alternative energy and eco- friendly technologies; labor; indigenous seeds varieties and livestock breeds or fish stocks; and access to markets. Also, mixed farms (not necessarily fully integrated) are favorable since they have multiple income streams and marketing outlets also increasing the resilience of production, income and labour. However, there is a low level of support provided to the local value chain which should be addressed.

General recommendations for mainstreaming agroecology included promoting a business approach that involves enhancing the value chain to reduce external inputs and actively encourage the production and use of local inputs. This can be done by establishing a producers’ network that has direct producer-consumer relations to adequately supply what is needed and prevent food waste and loss. Providing programmers for farmer-to-farmer training, thereby strengthening the value chain while generating local knowledge. Also through sensitizing extension agents to the general principles of ecological crop management, including the use of compost and biopesticides and integrated pest management for controlling pests and diseases to ensure that safe products enter the marketplace. In addition to facilitating data collection on producers to determine what is produced, where, and how much to support planning and policy decisions.

Recommendations and Conclusion

Derived from the regional forum, general considerations and recommendations to mainstream agroecology in the Caribbean in support of achieving the SDGs, are as follows:

1. Develop regional framework to mainstream agroecology in the Caribbean including considerations of outcomes for landscapes and seascapes
 - Develop regional information platform providing access to systematic documentation on sustainable practices and traditional knowledge
 - Re-align trade tariffs favoring domestic agricultural production
 - Develop branding at different levels: Farm, GI, green markets, participatory guarantee systems
2. Updating national legal frameworks and policies in gender-sensitive manner to create an enabling environment to mainstream agroecology into the food system contributing to social, economic and environmental sustainability across state agencies (e.g. school feeding/public procurement)
 - Support sustainable land use and secure tenure (lease) for agricultural production with focus on youth.
 - Redirect and link subsidies and incentives currently supporting high-external input dependent agricultural production to agroecological production

- Establish and enforce existing regulations relating to environmental pollution
 - Consider implementing payments for environmental services or other sustainable financial incentives encouraging environmental measures
 - Encourage generation and use of alternative energy production and water harvesting on-farm and along the value chain
 - Ensure collection of sex-disaggregated and by age class, data on agricultural producers and production supporting policy decisions
3. Raise awareness among all stakeholder groups and strengthen rural-urban linkages (in education system, consumers, producers, research etc. including through demonstration farms, communal and school gardens and centers or excellence) and on the nexus between human and environmental health
 4. Influence existing initiatives (e.g. agricultural youth programmers) to adopt agroecology principles
 5. Build capacity on 10 elements of Agroecology and facilitate knowledge exchange on practices among farmers (e.g. FFS, mentoring), on innovations between farmers and researchers, between players of the value chain and consumers using also social media and other ICTs
 6. Encourage integrated multi-disciplinary systems research (e.g. valuating environmental services, total factor productivity, developing bio pesticides) and education (based on revised curricula including business training)
 7. Promote use of neglected underutilized crops, crop wild relatives and other wild foods and new domestic ants (e.g. agouti, wild hogs)
 8. Support development of innovative new products
 9. Facilitate the development of networks for advocacy, development of enabling environment to ensure that agroecology is being mainstreamed
 10. Establish support services for farmers and enabling young people to commence farming (women and men) and encourage establishment of Small to Medium Enterprises (SMEs)
 11. Develop /adapt tools/mechanization suited to local conditions for both production and processing and women and men
 12. Facilitate access to adapted genetic resources

The above list highlights the many priority areas of concern and summarizes the daunting tasks required by Caribbean countries to achieve the SDGs set. FAO has partnered with other UN agencies in the launch of the Scaling up agroecology Initiative to continue strengthening agroecology in its Member States. This initiative focuses on three interrelated Areas of Work: (1) knowledge and innovation; (2) policy processes; and (3) building connections. Five key actions were developed to facilitate these areas of work: (1) Strengthen the central role of family farmers and their organizations in safeguarding, utilizing and accessing natural resources; (2) foster experience and knowledge sharing, collaborative research and innovations; (3) promote markets for agroecological based products for health, nutrition

and sustainability; (4) review institutional policy, legal and financial frameworks to promote agroecology transitions for sustainable food systems; and (5) take agroecology to scale through integrated and participatory territorial processes.

As Small Island Developing States (SIDS) are prone to many of the global challenges food and agriculture systems face, it is vital that agroecology is considered and mainstreamed in Caribbean countries to provide for food and nutrition security.

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