

OPPORTUNITIES FOR ADVANCING WOMEN'S SUSTAINABLE AND GREEN LIVELIHOODS

FOOD SECURITY, SMALL-SCALE WOMEN FARMERS AND CLIMATE CHANGE IN CARIBBEAN SIDS

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OPPORTUNITIES FOR ADVANCING WOMEN'S SUSTAINABLE AND GREEN LIVELIHOODS

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Nidhi Tandon*

Two waves of change— long-term climate change and immediate-term economic crises— are bringing the issue of food security into sharper relief— particularly in those Caribbean countries where food security is already volatile and faces a series of risks and challenges to the primary components of food security: food availability; food access; safety and nutritional quality; and stability and sustainability of supply (CARICOM, 2010). Climate change adds urgency. It also drives a renewed focus and prioritisation, and ensures that adaptation is wholly integrated into natural resource management, land use policies and, especially, into broader long-term macro-economic frameworks.

Within this broader context, there is need for concurrent change and adaptation at four distinct but inter-related levels:

- at the community level, where women are most engaged;
- at national government level in addressing the country's diverse needs; and
- at the regional and international community levels, particularly through CARICOM, which retains the mandate to secure, advance and negotiate the region's interests through collective action on agricultural interests.

Without a synergy of effort between these four levels, food security will continue to be compromised. Any and all policy relating to food security from production to harvest to value-adding processes and marketing must involve women. A commitment to food security and women's productive, regenerative, stewardship and conservation roles needs to be integrated into these multilateral treatments with specific financial allocations in the specific Small Island Developing States (SIDS) sub-programme. Studies on investment behaviour also show that women are more likely than men to take a long-term view on their financial risks and savings, and are more risk averse and less inclined to be swayed by short-term profit motives (Adshade, 2012; Badunenko, Barasinska and Schäfer, 2010).

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In other words, *there could be an opportunity here to better leverage the savings and investment behaviour of both women and men to recover from systemic debt.* In the context of changing climates and increased stresses on the natural environment, women farmers need consistent, relevant and intelligent support, in a timely manner, to enable them to 'scale up' their critically important roles in food security, health and biodiversity conservation. They need to be central in the solution by managing a peer-to-peer network of training, sharing of technical knowledge and distribution of information, to ensure their sustainable livelihoods and the long-term sustainability of their communities.

The Caribbean islands have a lot to offer each other. Policy proposals such as those contained in the Caribbean's Regional Food and Nutrition Security Policy pay heed to the imperative of activating and reinforcing inter-island collaboration and sharing mechanisms at many levels. These include fostering country-level coalitions for food security and increasing knowledge of best practices at the smallholder level and access to innovation by supporting revitalised extension services, technology transfer and communities of practice (for example, North-South, South-South, cross-commodity and farmer-to-farmer exchanges), with an emphasis on women farmers.

Caribbean islands, through CARICOM, need to arrive at their own conclusions and policy determinations on how to manage these changes; otherwise, they will find that their agendas could be predetermined by the priorities and terms set by donors and private-sector interests¹ which may not always align with the specific interests and ethno-cultural and gender nuances of development in SIDS. *This is an important juncture for Caribbean peoples to frame their own solutions to food and nutritional security— and what this entails in an unpredictable climate context.*

Given that hunger and poverty are concentrated in rural areas, targeting local food systems represents the single biggest opportunity to increase food production, boost food security and reduce vulnerability (Lederman and Perry, 2005). Local, ecologically sound food systems have huge potential to provide livelihoods, occupations, employment, healthy lifestyles and socio-cultural meaning to a very large share of the Caribbean working population.

SECTION I: CONTEXT AND SYNOPSIS OF KEY ISSUES AND THEMES

1 STUDY SCOPE AND TREATMENT

Women living off the land: In this study, the experiences of ‘women farmers’ in the agricultural productive system are taken to include small-scale farming (‘small farming’), farm labour, fisheries and aqua farming, husbandry and poultry farming, forestry-related production, as well as their roles in water management, land stewardship and natural habitat and coastal marine conservation. Women’s specific production activities range from growing seeds and saplings to harvesting and storing, to processing for household consumption, and marketing and selling for local markets and for the tourist industry. The study treats women’s productive, regenerative, stewardship and conservation roles as inherently inter-linked and inter-dependent.

Outline of study: The study has five sections. The first provides an overall portrait and context for this report. Section 2 offers key findings and insights compiled from field research in Antigua and Dominica. The gender responsiveness of National Adaptation Plans of Action (NAPA) and other policy documents are also assessed.² Section 3— Realising Innovation and Potential— presents a perspective on what is needed to underpin smart community responses to the compounded impacts of climate change and food insecurity. It pulls together some of the common elements and issues arising from the country studies and makes a strong case for capacity-building across the board.

Research methodology. Participatory research methods and systematic compilation of published and unpublished field data form the foundation of this study. Contributors, interviewed farmers and researchers are listed in the Annex. Also it provides data comparatives for the three islands selected for this study: Antigua/Barbuda and Dominica. The Annex provides a literature survey on climate change, food security and farming in the region.

The key premise of this study is that small-scale, ecologically sensitive farming and fishing in the Caribbean, which includes women in salient and vitally productive roles, present a critical way to deliver on three distinct but inter-related fronts:

- to anchor the local food security of rural populations— by integrating sound farming practices with the promotion of indigenous and hardy species, biological diversity and fresh foods of high nutritional value— while at the same time reducing dependence on imports;
- to secure and protect the interests of small Caribbean islands in international trading systems that are increasingly systematically unfavourable, by discovering and pursuing small-scale self-sufficiency and comparative advantages in areas of domestic know-how; and
- to protect and secure the full bio-diversity of Caribbean Small Island Developing States (SIDS) ecosystems and biomes³ — by using local farming practices that work to ‘optimise’ natural resources (instead of ‘maximising’ natural extraction) and by building reserves and contingencies. This in turn could lend itself to the integration of Payment for Ecosystem Services (PES) mechanisms with integration of the security of public environmental commons through land use and marine/coastal management with income benefits to farmers and rural entrepreneurs.

The report used the following sources to support its recommendations:

- literature review on climate change, agriculture and gender, and desk research on current data on climate and agricultural data for each island;
- light-touch baseline information-gathering about women in agriculture in each island, to strengthen the macro analysis and to reduce reliance on unreliable national data;
- one-to-one interviews and focus group discussions with women smallholders;
- key informant interviews with stakeholders in the food security and climate change sectors; and
- key informant interviews with key figures in national government ministries and in local government in the rural areas targeted by the research.

Hope for delivering on these three imperatives is supported by the following findings:

Small-scale farming proffers unique strengths. Small-scale farming systems tend to feature crop diversity, non-technological forms of cross-breeding species, ‘weather hedging’ in cultivation decisions, and the use of traditional knowledge as risk mitigation and adaptive responses to a range of environmental and economic risks. “Moreover small farms create more employment, reduce poverty and almost certainly contribute to more resilient food security. Food systems with a multiplicity of producers, processors, traders and vendors are also less likely to present opportunities for... speculators” (Fulbrook, 2010). Yet field research shows that smallholders in general—and women farmers in particular—are generally left out of emerging discussions and decisions around farming, food security and climate change. “That small farmers are unable to respond to prices as fast as we may wish or access credit or insurance is not through lack of desire, but as much as anything because of how governments, development partners and multi-lateral agencies have structured policies, information, markets, access and regulation to favour large farms and corporate investors” (Ibid.). Supporting this sector is a critical part of land use and agricultural planning. If smallholders can be supported to further develop mixed farming systems that combine crops, small livestock, poultry and local fishing, this would add to the resilience of the farming sector and protect local communities against the unpredictability of micro-climatic changes.

The multiple roles of women in agriculture make them strategically important to food security. Women have an integral role in agricultural production in the Caribbean and in all stages of the value chain, from harvesting through value-added processes. The Inter-American Institute on Agriculture reports that almost half of all food consumed at home in the Latin America and Caribbean region is produced by women (IICA, 2010). This is particularly true in the Caribbean, where there is a marked preponderance of female-headed households. Women play a key role not only through ‘back-yard’ or small-scale farming, producing staples, grains and vegetables and raising small livestock for home consumption, but they also sell surplus food in local markets, boosting family income, which can in turn be used to supplement the family’s diet and nutrition. “In households, improvements in the family’s nutrition are linked to decisions taken [by women] regarding the use and distribution of income” (Ibid.: 8). This implies multiplier effects on food security stemming from women’s

participation in agriculture. Further, where male farmers generally focus more on harvesting cash crops for the market, women are more likely to save, act as custodians and users of traditional knowledge and exchange seeds – roles which buttress food security and agricultural biodiversity (Narasimhan, 2011: 1). Their unique role in agriculture, though largely undervalued and inadequately covered by the statistics, makes women strategically important for development, and for food security in particular.

Organic farming systems have untapped potential. Flagship studies, such as the Food and Agriculture Organization's *Organic Agriculture and Food Security* (FAO, 2007a) show that, compared to non-organic farming systems, organic farming methods positively address a range of factors related to climate change. Organic farming, however, is not mentioned in the Intergovernmental Panel on Climate Change (IPCC) 2007 report and continues to be isolated from the mainstream agricultural discourse. Conversion to farming methods that integrate on-farm inputs is a necessary step to weaning off imported chemical inputs. Composting and manure self-sufficiency that would support these farming systems also needs strengthening.

Experiential and traditional knowledge and historical memory is worth leveraging. When it comes to the felt micro-impacts of climate change, small farmers, and particularly women farmers, are valuable record keepers, watchful data collectors, and on-the-ground pulse takers of the impact of climate change on the biosphere.⁴ "With the increasing need to include climate variability and change in micro-level planning and productive systems, the use of traditional and adapted knowledge and techniques is expected to become more important" (Narasimhan, 2011). Societal and cultural consciousness-raising (a cognitive framework) and holistic learning about climate change and its impacts also need to draw on the experiential knowledge of farmers and fishers.

Multilateral commitments to SIDS that support high-level collaboration on development, agriculture and climate change are being formulated. The SIDS 18th session of the Forum of Environment Ministers (FME 18) of Latin America and the Caribbean (LAC) met in Ecuador from 31 January to 3 February 2012. Ministers adopted the Quito Declaration and a decision specific to SIDS. The Decision draws attention to: the UN Environment Programme (UNEP) Medium-Term Strategy (MTS) 2010–2013, the theme of institutional frameworks for sustainable development (IFSD)⁵ to be considered at the UN Conference on Sustainable Development (UNCSD, or Rio+20), and a relevant decision of FME 17.⁶ The FME 18 Decision called for the establishment of a SIDS-specific sub-programme within the current MTS and future MTSs, and urged timely action for effective implementation of, and follow-up to, the Mauritius Strategy for the Further Implementation (MSI) of the Barbados Programme of Action (BPOA) for the sustainable development of SIDS. The Decision calls for any agreement on IFSD at Rio+20 to provide a clear institutional mechanism to address, in a concrete and focused manner, the sustainable development of SIDS and least developed countries (LDCs) at the global and regional levels.

There is no reference to food security in the MTS document, and only a few broad statements are made with respect to gender.⁷ A commitment to food security and *women's productive, regenerative, stewardship and conservation roles needs to be integrated into these multilateral treatments, with specific financial allocations in the specific SIDS sub-programme.*

2 PLANNING FOR A RESOURCE-CONSTRAINED FUTURE WITH A FOCUS ON WOMEN

2.1 WOMEN AS AN AFTER-THOUGHT

As the international development community's acknowledgement of women's farming roles grows, so does the set of policy solutions targeted at women as farmers, as heads of household and as those ultimately responsible for providing and caring for their communities. More often than not, these solutions are presented as an *extension of rural services* that have, for many structural reasons, not reached women yet; largely to make sure that they *do* in fact reach women as effectively as they might reach men. The underlying assumption behind the design of policy solutions is that farmers are treated as 'clients of a service delivery system' rather than vested players in 'designing and delivering the system'.

Most policy, trade and aid decisions that impact rural women are made in a non-participatory, top-down, one-directional way (Williams, 2005). In an effort to redress this, supplemental policies are often established— to compensate for structural gaps, almost as an afterthought— to make sure that women 'benefit' from these policies and are accounted for. Some of the policies, instruments and tools targeting women include legal provisions; financial services including micro-credit and rural cash infrastructure; and practical training such as marketing, processing and small business training. These are important and valuable services if they in fact help to empower women.

The evidence on the ground suggests that quite often these '*solutions*' *do not value or take into account women's socio-economic productive roles nor their cultural knowledge, intelligence or legacies*.⁸ This raises important questions. Do these '*solutions*' enable women to be actors in their own decisions, or do they further compromise women, placing them in greater debt, at deeper risk and in positions of further weakness and silence? Who presents the economic arguments for bringing more farmers — women and men — into the global market as mass producers of commodities for export and consumers of (imported) food? How are women empowered to protect their rights to take farming decisions that prioritise and first satisfy local food needs before cash crop production?

In anticipation of an intensification of women's, and communal, struggles over natural resources, and the continued 'invisibility' of their societal and productive roles, how can they plan for the future of their rights, their security and their sustenance? When the stresses of climate change are then added to this struggle, how should women plan for the future?

2.2 WOMEN IN FOOD SYSTEMS

While the circumstances and contexts of each case study are quite distinct, there are elements and issues that are common to most farming women. Since colonial times, commercial crops and farming methods have fallen within the ambit of male roles and responsibilities. Women played secondary and supporting roles, assisting in planting seeds for the crop, weeding, harvesting and other menial tasks.⁹

Growing local food crops or landrace species for local diets, however, has been left almost entirely to women, with minimal investment or infrastructure to strengthen either the sector or women's roles in that sector. Where they are still intact, home farm own-production plots

continue to supplement year-round food needs for the community, are an important risk mitigation approach at the household level and continue to remain the remit of women farmers.

BOX 1

Levels of women's roles in food systems

Farm production level:

- Women and men work together on the farm as family members
- Increase in number of female-headed households; higher dependency ratio and need for adapted policies
- Women grow a wide range of produce to supplement purchases, in addition to raising livestock and poultry
- Closer examination of gender in fisheries reveals a more complex inter-related situation than the common portrayal of men as catching fish and women as sellers.

Household consumption/allocation level:

- Women, more so than men, have an immediate role in allocating resources within the household
- Providing and planning household meals falls to women generally more than men
- Women have a direct vested interest in ensuring clean and safe water use.

Societal/environmental level:

- Women have long-term viewpoints on what food security entails
- Women have much to say about sustainable practices in nutrition, health provision and production
- Women and men have different resources/experiences at their disposal to deal with climate change and climate variability
- Therefore, climate change responses/policies should be gender-sensitive and respond to women's capacities and vested interests.

Appreciating and supporting these roles can be the deciding factor as to whether rural adaptation/mitigation is an efficient use or a waste of resources, and whether community responses are reactive or proactive, spontaneous or planned, sustainable or unsustainable.

These farms, unlike commercial crop plantations, are likely to contain a wide range of traditional varieties, planted in a diverse ecological farming system, which together are often less susceptible to changing climate conditions. In addition to their hardiness, many of the traditional varieties meet the nutrition needs of local populations better than many imported foods.¹⁰

TABLE 1

Nutritional Values of Local Foods Compared to Imported Substitutes

	Local Food	Exotic (imported) Food Comparable
Vitamin C Content	Guava fruit four times the fibre, 19 times the vitamin C	1 American apple
	One West Indian cherry vitamin C content	15 American apples
Cholesterol	Coconut water has no cholesterol compared to butter or other animal fats; 1 tbsp of coconut milk has 4g fat compared to 11.5g fat for same amount of margarine	Olive oil
Mono-unsaturated fat	Jamaican ackee and avocado pear	Same type of fat as olive oil
	Callaloo (amaranth) 4x more calcium, 2x more iron, more than 2x vitamin A	Broccoli, cauliflower, Brussels sprouts
Fibre	Green banana, sweet potato and local breadfruit provide 1.5g per serving of about 70 calories	Irish potato, brown rice, whole kernel corn

Caribbean women hold a vested interest and stake in food systems —as producers, consumers and managers. These are distinct roles but also roles which are intertwined and inter-dependent (Box 1). In the context of changing climates and increased stresses on the natural environment, women farmers need consistent, relevant and intelligent support, in a timely manner, to enable them to ‘scale up’ their critically important roles in food security, health and biodiversity conservation. They need to be central in the solution by managing a peer-to-peer network of training, sharing of technical knowledge and distribution of information, to ensure their sustainable livelihoods and the long-term sustainability of their communities.

2.3 PRIVILEGE, POWER AND POLITICS

Like many of their sister states in the Caribbean, Antigua and Barbuda’s national machinery for women was re-named the Directorate for Gender Affairs in 1998, and in 2000 Dominica’s became the Bureau of Gender Affairs. This move, said the then Minister, was because men in Dominican society are the ones that are marginalised, and the name would thus reflect the change in emphasis. Eudine Bariteau (2003: 37) has noted that “women as ‘subject’ are being effaced”. In an interview with Roberta Williams,¹¹ she surmises “We have made some important progress re women, e.g. women in the civil services, or their access to loans, but women’s economic empowerment does not always translate into social equity.” Jeremiah Maxime (Ministry of Agriculture, Antigua and Barbuda) describes this as “Women compete with men for the same (extension) services. When a woman expects a deliverable, and it is not delivered, she will assume it is because she is a woman, and a lot of the time, she is right! She will call and be told ‘I’ll check it tomorrow’—and tomorrow never comes! I know because I have six sisters!”

This state of affairs ensures that men remain the privileged and dominant subjects at all levels of social and economic development. It is, in part, through this optic that the discussion of inclusive, green growth, women’s role in agriculture and the policy environment for agriculture, disaster management and environment needs to be viewed.

3 FOOD SECURITY AND CLIMATE CHANGE IN THE CARIBBEAN – MACRO ISSUES

In the Caribbean, the number of hot days in the year has been rising and the number of cool days declining. Climate models suggest that there will be drier wet seasons and longer dry seasons in future.¹² According to the IPCC 2007 Synthesis Report for the Latin America/ Caribbean region: “By 2050, desertification and salinization will affect 50 percent of agricultural lands in Latin American and the Caribbean zone. If deforestation continues at today’s rate, approximately 40 percent of the existing 540 million hectares of Amazonian rainforest will have disappeared by 2050.” Rising sea levels are expected to increase the saltwater intrusion of coastal freshwater aquifers while rising temperatures have already led to coral bleaching and declines in marine biodiversity in many parts of the tropics. Climate change will have a significant impact on fisheries and aquaculture, which currently provide a living for around 500 million people and are the main source of animal protein for many of the world’s poorest countries.¹³ Climate change is expected to result, among other things, in an increase in sea-surface temperature, decreases in sea-ice cover and changes in salinity and acidity, all of which could affect productivity (Pye-Smith, 2011).

3.1 CLIMATE CHANGE IMPLICATIONS FOR FOOD SECURITY

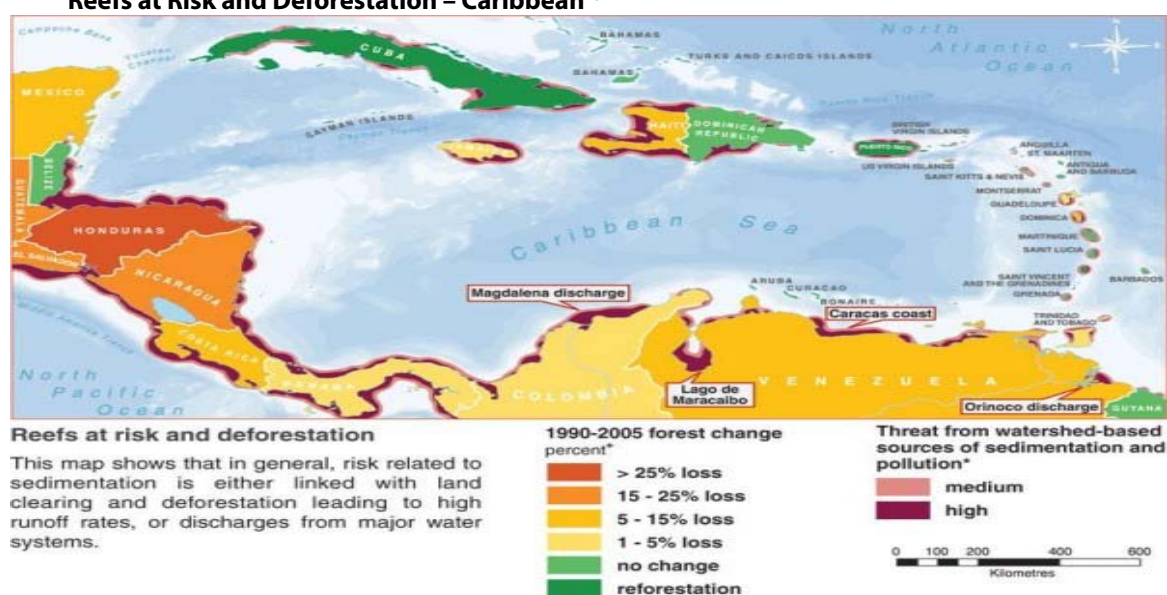
Many of today's global environmental issues are directly related to Earth's natural resource base. All of these challenges and losses are inter-linked and inter-dependent, resulting from modern methods of land use and the relentless exploitation of resources for consumption and profit. A report by the World Bank (2009) stresses that "addressing the irreversible loss of ecosystem services and biodiversity impacts is probably the single largest item in adaptation costs in Latin America and the Caribbean".

Poverty aggravates the issue; the chopping away of coastal sea grape or mangrove swamps for coal for personal use damages the coastline's natural defence systems against the ravages of hurricane-related erosion. The long-standardised and established principles of land-use methods need to be 'unlearned' and reversed, the vested interests of an entrenched agro-industrial system¹⁴ and its system of subsidies dismantled, and, by the same token, those people who would be the natural stewards of natural resources need to be recognised, valued and empowered to take bold new strides in the context of climate change.

Farmers across the Caribbean are facing the direct and indirect effects of climate variability and change, although they may only recognise it as seasonal unpredictability and variability. Evidence gathered from the field indicates that smallholder farmers are the most vulnerable of the agricultural community precisely because they have had little help to secure their farms, natural resources and assets in the face of increasingly unpredictable weather and rising sea levels. The same farmers and fishers, however, have critical and yet unacknowledged roles to play in addressing climate change by changing their practices to use less energy and fewer inputs that produce intensive greenhouse gas emissions, and to care for and nurture biological diversity and the health of the soils. Because the science behind the interaction of climate change with ecosystems is only at a developmental stage, it is especially critical that human interactions with ecosystems are enabled to be organic and integral to adaptation. In other words, because there is no 'one size fits all' solution, it is especially important to ensure that the experiment of adapting to climate change is allowed to roll out.

FIGURE 1

Reefs at Risk and Deforestation – Caribbean¹⁵



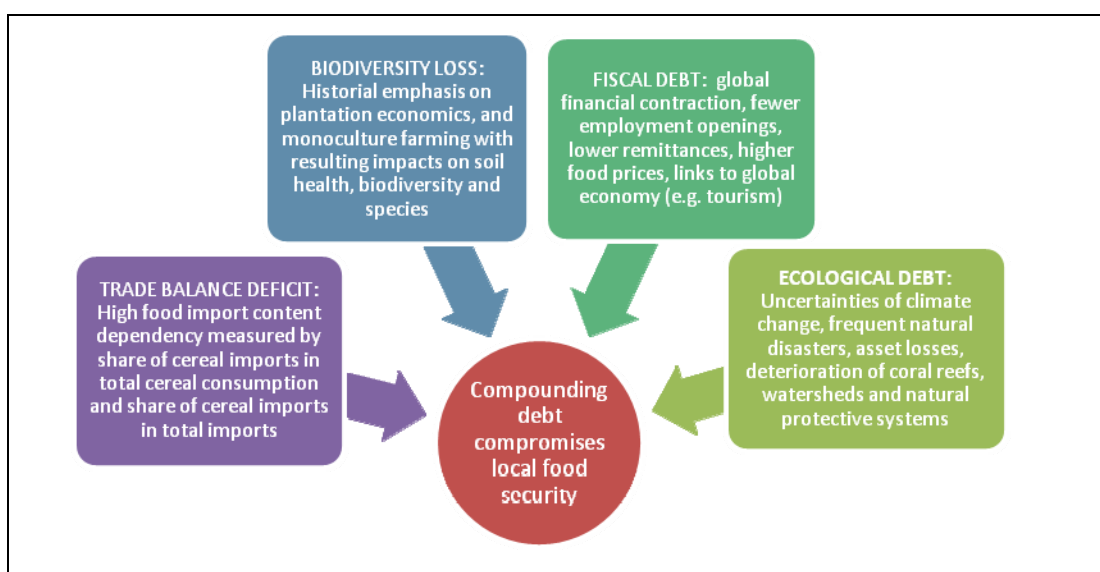
While the region is still at a fact-finding stage on how climate change will manifest itself in the longer term, what can be measured to some extent now is the *variability and frequency of weather-related events*. These events exceed the gross domestic product (GDP) capacity of the islands; the turnaround time for recovery is very short and is made even more challenging when natural ecosystems are already compromised or denuded. Land clearing and deforestation, for instance, (Figure 1) is prevalent on many Caribbean SIDS, which in turn exposes them to the worst damage from nature's storms.

3.2 DISASTERS, DAMAGE AND DEBTS

One of the immediate and serious impacts of climate change on small economies is the *compounding of debt*. Hurricanes, storms, heavy rains, tsunamis and earthquakes can potentially erase years of progress and investment, with patterns of climate variability and change potentially putting Caribbean SIDS on a continuous 'build, repair and recover' cycle.¹⁶ Hurricane Ivan's impact on Grenada in 2004 was estimated to be over 200 per cent of GDP, and recent analyses estimate that Caribbean governments could end up spending as much as 20 per cent of their GDP on coping with climate change (Reid, 2010). Natural ecosystem resilience in the Caribbean SIDS is being further weakened by the increasing frequency and intensity of disasters: a significant challenge to SIDS worldwide. This in turn compromises food security.

FIGURE 2

Compounding Debt adds to Food Insecurity



Against this backdrop, nine Caribbean SIDS carry a hefty fiscal debt, which—when compounded by ecological debt¹⁷— means that recovery in the immediate term will *require a combination of austerity measures and investment measures in the restoration of nature* and acknowledgement that food security is dependent to a large extent on whether these SIDS can and should continue to import food for local consumption. Figure 2 suggests that the Caribbean SIDS are facing four kinds of debt, fiscal and trade-related net losses as well as loss of plant and animal biodiversity and ecological losses (deterioration of natural resources and assets). From this initial illustration, it would stand to follow that one of the first remedial

actions that needs to be taken is to recover from systemic debt and to restore the natural collateral and vibrancy of the island economies at systemic levels. While this is not the focus of this paper, it is highlighted here to stress that NAPAs, regional and international trade policies, employment and education policies, and investment in viable ecologically sound farming and fishing systems must all be components of a holistic 'debt recovery' intervention.

In the Caribbean context especially, where a good majority of women are the de facto book-keepers and accountants of their households, and increasingly also the investors and equity holders in the primary economy (farming and fisheries)—they are a king pin (or queen pin) in recovering from systemic debt.¹⁸ Despite the fact that women are generally the last to receive financial support—or perhaps because of this very fact— women are more likely to save for times of stress or economic constraints.¹⁹ Studies on investment behaviour also show that women are more likely than men to take a long-term view on their financial risks and savings, more risk averse and less inclined to be swayed by short-term profit motives (World Bank, 2002). In other words, *there could be an opportunity here to better leverage the savings and investment behaviour of both women and men to recover from systemic debt.*

While overall aid figures are declining and earmarked funds on the rise,²⁰ there is an urgent imperative to leverage whatever funds available to recover from systemic debts in order to address food security.

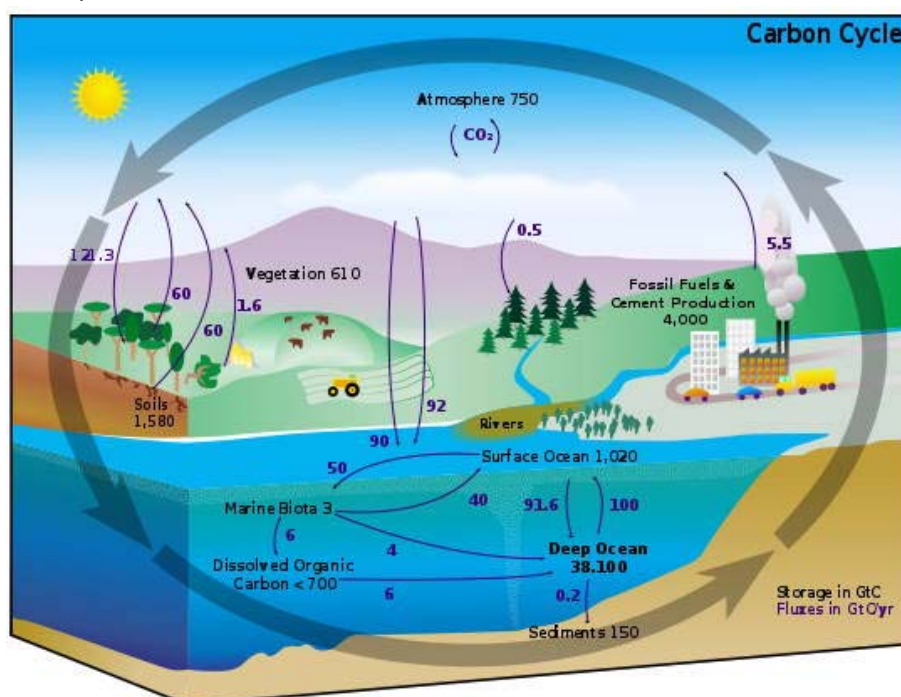
3.3 HEALTHY OCEANS AND FOOD SECURITY IN SID ECONOMIES – THE BLUE CARBON LINK

Small island states have an existential stake in the health of the ocean. Currently, the annual rate of loss of coastal marine vegetal ecosystems (2–7 per cent) is up to four times that of rainforests and is caused *inter alia* by unsustainable natural resource use, poor coastal development practices and poor watershed and waste management (FAO, 2010). Yet coastal vegetation— mangroves, sea grasses and salt marsh grasses—sequesters carbon far more effectively (up to 100 times faster) and more permanently than terrestrial forests, and hence has been dubbed blue carbon. Blue carbon features prominently among ideas to reduce atmospheric carbon dioxide (CO₂) and limit global climate change.²¹

As surface water temperatures increase, the amount of CO₂ that can be dissolved in water is reduced. Combined with changes in acidification, water circulation and mixing and loss of blue carbon habitats, this means that the oceans' ability to absorb and store CO₂ is decreasing (Figure 3).²²

Coastal populations are at the front line of climate change and often the most vulnerable to its effects. Fish and other sea products are an important protein and vegetable source for local diets— their dependence on healthy seagrass meadows, salt marshes and mangrove forests makes integrated coastal management a key aspect of SIDS food security strategies. This is why the diverse roles of women in fisheries and in conservation of coastal ecosystems need to be evaluated and invested in.

FIGURE 3

Blue Carbon Cycle (FAO, 2004)

3.4 CARIBBEAN FOOD SECURITY IN THE GLOBAL CONTEXT

The scenarios from the Millennium Ecosystem Assessment (2005) assume a global rise in demand for food by 60–85 per cent by 2050, based on predicted population growth and assumptions about consumption trends. Similarly, FAO (2012) projections indicate that by 2050 a 70 per cent increase in current food production will be necessary to meet demand for food, primarily through yield increases.

The recent food crisis, combined with a global economic contraction, growing national debt and the threats posed by climate change, has brought higher political visibility to both food issues and to climate change. In Venezuela and Ecuador, new political concepts have been introduced into new legal frameworks with a clear focus on improving access to food—through important legislation on the structure of agricultural production and food supplies. In Brazil and Mexico, food security has become a major long-term policy objective rolled out in the implementation of mega government programmes.²³

A recent typology study of food security (Table 2) ranks most of the Caribbean SIDS in the ‘high soil fertility’ and ‘favourable climate’ categories, but none as a ‘high food security’ category—because, by definition, their trade regimes are insecure (Yu, 2010). This means that some of the most food-secure countries are those that can afford to buy food at all times, no matter that they might not have favourable climates or sufficient arable land on which to grow it or waters in which to fish. In other words, trade security is a key variable in measuring food security. The fact is, however, that certain food imports actually undermine local food production and are a market disincentive to local producers—thereby also leading to food insecurity and import dependency.

TABLE 2

Typology of Food Security

Typology of Food Security (Yu, 2010)			Low Soil Fertility		High Soil Fertility	
Food Security	Trade	Food Production	Unfavourable Climate	Favourable Climate	Unfavourable Climate	Favourable Climate
Lowest Food Security	Insecure	Low food production				Haiti
	Secure	Low food production				
Low Food Security	Insecure	Low food production				Dominican Republic, Honduras
	Secure	Low food production				
Middle Food Security	Insecure	High food production		Belize, Guyana		Dominica
		Low food production				Antigua and Barbuda, Jamaica
	Secure	High food production				
		Low food production		Netherlands Antilles		St. Vincent and Grenadine
Upper Middle Food Security	Insecure	High food production				
		Low food production				Bahamas, Barbados, Cuba, Grenada, St. Kitts & Nevis, St. Lucia
	Secure	High food production				
		Low food production		Trinidad and Tobago		
High Food Security	Insecure	High food production				
		Low food production				
	Secure	High food production			Lithuania, USA	Belgium, Czech Republic, Denmark, France, Romania
		Low food production				Malta

As will become clearer in the following section, trade security is not such a key variable in the definition of food security as seen by local producers —on the contrary, some farmers were quite vocal against international trade. To begin with, taking farmland away from cultivation for local consumption and converting that land use to farming ‘ingredients’ (such as sugar, vanilla or chocolate) or inedible crops (such as tobacco, flowers, jatropha or cotton) or beverages (tea or coffee)— and the list goes on— for export immediately puts local people in a situation of dependence on a market over which they have absolutely no control. With this dependence comes economic vulnerability. Regardless of the negative impacts of plantations on biodiversity and soil health, the international economic model does not work for small farmers. The October Trade and Hunger (Madeley 2000) series show how market liberalisation benefits the rich, while poor people either do not benefit or are made more vulnerable to food security. In other words, the international trade system and food security are not easy bedfellows.

FIGURE 4

Grocery Store Shelves in St. John’s, Antigua: Imported Fish



The tensions between small and large scale, between foreign and domestic investment, and between food and other crops are subject to intense power politics. While the region as a whole is a net food exporter, food price inflation has a detrimental impact on the nutrition, health and income of low-income populations. Rising food prices and differences in trade patterns create negative consequences even for those countries that are net food exporters. Between 2006 and 2008 the price of wheat increased by 152 per cent, and that of maize by 122 per cent, whereas the price of bananas rose by just 24 percent (Piñeiro et al., 2010). At the time of writing, Dominica had just reconfirmed its commitment to increasing banana exports.²⁴

At the same time, imports of cheap meats and processed foods (e.g. canned fish) not only undercut local markets of locally grown foods but also diminish the importance of eating local produce (Figure 4). Women interviewed in Dominica, for instance, reported that the local fish catch would be promptly sold on the market because “it was cheaper than to buy a lot more (frozen imported) chicken for the price of fresh fish”. Imported white potatoes in the grocery stores are cheaper than locally grown dasheen (taro) or cassava, and imported canned fish cheaper than local fish, the respondents also reported.

3.5 CARICOM REGIONAL FOOD AND NUTRITIONAL SECURITY POLICY (RFNSP)

The RFNSP provides a policy framework (for the period 2011–2025) taking existing regional development agreements forward into policy priorities to guide the design and implementation of action programmes on major food and nutrition security challenges in CARICOM.²⁵ On paper it outlines a vision for collaboration in areas until now not perceived as appropriate for collective regional action. It draws up concrete actions to achieve the four objectives of food availability; food access; proper food utilisation for good health, nutrition and well-being; and stable and sustainable food supplies at all times. The policy aims to support initiatives to provide stability in food availability and access for the population in the short, medium and long term. These measures include the:

- creation of a Venture Capital Fund, with a particular focus on women and youth, to support innovative and creative value addition activities for traditional and non-traditional commodities along the supply value chain;
- establishment of a functional market information system to reduce price volatility, taking into account global prices;
- establishment of a nation/region-wide inventory of vulnerable groups (farmers, producer groups, communities) and levels of vulnerability (vulnerability analysis and mapping);
- expansion (where needed) and linking of relief interventions with longer-term structural improvement measures;
- evaluation of the feasibility of bulk buying and hedging in the purchase of production inputs and basic commodities/products;
- promotion of non-distorting intra-regional trade policies and programmes to be applied in times of food crises to reduce the risk to the most vulnerable groups and reduce market uncertainty;
- establishment of a food crisis fund that will cater to the needs of the most vulnerable groups;
- establishment of a mechanism that is triggered when there is a food crisis, and consensual agreement on procedures to be followed at country level after a disaster (preparedness strategy);
- identification of social welfare programmes, productive safety nets and other policy prescriptions that can be applied in times of crisis;
- advocacy with Member States for the establishment of additional safety nets for extremely vulnerable groups;
- development of a food aid policy consistent with regional and national food security and agricultural policies; and
- development of principles and criteria to assess the environmental impact of agriculture and the value chain system — for example, sustainable use of water resources, use and disposal of packaging materials, energy, fertiliser, pesticides, outputs (waste from agricultural processes), and the introduction and enforcement of systems and mechanisms to minimise any negative effects and impact.

The policy commits to the principles of:

- equity and participation of the beneficiaries in the decision-making processes;
- targeting the most vulnerable groups, in particular small producers, women, children, elderly people, those who are mentally or physically challenged, and indigenous groups; and
- linking its food security vision to the development of the Caribbean food system as it addresses challenges of mitigation of, and adaptation to, climate change.

The policy also encourages CARICOM Member States to ratify the Right to Food Convention and to implement its guidelines. In recognition of the region's food distribution inefficiencies and high income inequality, taking into account the disparities between the rural and urban areas, CARICOM Member States shall ensure that the population has economic and physical access to food at all times by improving access to livelihood assets by widening and deepening vocational training programmes for artisans, farmers, fisherfolk and vulnerable groups (especially women) etc., to improve their skills and employability.

Of interest to food producers, CARICOM Member States also commit to promoting increased availability of regionally produced nutritious food at competitive market prices through a territorial approach to production planning in the region in which:

- priority commodities will be selected on the basis of the promotion of a nutritionally balanced diet comprised of Caribbean food products;
- criteria for selection of the commodities/products will be based on market demand, competitiveness, nutritional composition/elements and natural endowments of Member States. The Dietary Guidelines for the Region will also guide the selection of these food commodities/products; and
- small producers (farmers, fisherfolk, cottage food processors etc.) in the Member States (with a focus on gender) shall be critical in the production of the identified food commodities/products.

3.6 TURNING VULNERABILITY ON ITS HEAD

Economic analysis and literature on the inherent vulnerability²⁶ of SIDS economies abound – by virtue of their “small size, small populations, thin domestic markets, openness or exposure to international trade, high dependence on strategic imports and hence high exposure to price shocks of products such as energy, and the absence of economies-of-scale” (Springer, 2010). The significance of these threats has been emphasised by key decision-makers in government through regional statements such as the CARICOM Liliendaal Declaration on ‘Agriculture and Food Security’ and on ‘Climate Change and Development’ in 2009 (CARICOM, 2010b). Arguably, the core of resilience for SIDS might lie in addressing each of these vulnerabilities by:

- recovering from the destabilised ecological dynamic of the landscape, protecting their natural assets²⁷ —this includes their farming social capital²⁸ and capitalising from both over the long term;
- protecting as much of the domestic economy as possible from the speculative (and unpredictable) nature of the international economy;

- ‘thickening’ the domestic markets to regional markets²⁹ —and in so doing, shifting away from the logic of global trade in which economies of scale (scales of extraction, production and consumption) have increased to unsustainable sizes;
- pursuing policies and committing funding towards small-scale self-sufficiency in domestic know how —such as energy-efficient architecture, alternative energy systems (wind/solar) in which the Caribbean SIDS can claim comparative advantage;
- turning the absence of economies of scale into an advantage through a deliberate move away from mono-cropping towards mixed farming and niche cultivation of its tremendously rich gene pool;³⁰ and
- working closely with farming and fishing communities to pursue these policies for their mutual benefit— creating a culture of ownership and responsibility among men and women.

If Caribbean food supply continues along today’s trends (high imports, shifting consumption patterns, low investment in the local farm sector), we can anticipate that the food dependence of many islands will become more acute.³¹ If, on the other hand, farming methods and local food systems are rehabilitated to take into account growing domestic needs and interests as well as ecological impacts, then Caribbean islands could turn these vulnerabilities into sources of strength. This rehabilitation requires political will and support for an intensification of rural production.

Some policymakers are unconvinced that local rural capacity to intensify production exists. When asked about the potential for women farmers to develop a local poultry market to substitute for the enormous importation of frozen chicken, some civil servants did not think this would be feasible because of snakes and the likelihood that “city dwellers would complain about crowing roosters early in the morning”.³² Conversations with village women showed that, contrary to expectations, some women do already maintain a small flock for their immediate consumption, and there is growing interest in developing small battery or free-range poultry operations, and there would be a parallel interest by women to buy local eggs. At present, imported mass-produced and cheaper cuts of chicken flood the local market, are relatively cheap and convenient to buy and undercut local chicken production.

The other ‘vulnerability’ factor concerns the status of women in the Caribbean. Women throughout the Caribbean are resourceful, innovative, the bedrock of the economy, the ‘social glue’ of their communities and “the keepers of the family —they decide how income is allocated”.³³ They are also the household accountants, the producers and marketers of food for the local market, and their relatively high literacy levels means that their social awareness and ‘politicisation’ around ‘grow local/eat local’ campaigns or the sharing of information on preparing for climate change would ‘germinate’ very quickly. However, as this report will illustrate, these roles and responsibilities are not supported —either through policy or through financial protection or incentives. It is equally important to invest in the learning and engagement of men so that they are equal participants in a local food economy and in the restoration of ecological resilience. If this does not take place, the responsibilities that women already carry are likely to get heavier.

3.7 WHOSE FOOD SECURITY IS COMPROMISED?

Climate change is capable of changing environmental conditions to the point where it could significantly reduce agricultural production. The fourth assessment of the IPCC states that the most vulnerable societies are those in high-risk areas (coastal and river flood plains, extreme environments) and whose economies are closely linked to climate-sensitive resources (IPCC, 2007: 7). Arguably, indigenous subsistence-based communities are among the acutely vulnerable. When food systems are added to the equation, in some circumstances climate change can cause local or regional food production to decline, resulting in food crises which in turn can destabilise local economies and even trigger conflicts. In April 2008, for instance, Haiti saw days of rioting that left five people dead and forced the resignation of its Prime Minister. Food prices in the country had increased by between 50 and 100 per cent in the last year (Schneider, 2008).

Food security is a complex concept – and means different things to different people (Box 2). A widely used definition of food security is the 2001 refinement by the FAO of its earlier 1996 World Food Summit definition: “Food security is a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2002). The key variables that characterise food security concepts and approaches have, therefore, come to be: accessibility, availability, stability and utilisation. In this context, those who are most vulnerable to food crises could also include:

- those communities that are completely dependent on food and water supplies from outside the community —in other words, those countries most dependent on external trade for food and water intake (this includes industrialised countries where farmland supply is already exhausted to urban populations that rely entirely on external sources for food);
- those sections of poor populations who are unable to defend their access to natural resources or who could find their farming activities, factors of production and produce taken away from them by more powerful commercial interests (such as turning Haiti into a hub of sweatshop labour for the US market);
- those sections of poor populations who are already in a fragile position — who suffer from malnutrition, and whose incomes are so low that a disproportionately large proportion of their income is spent on water, food and fuel — those most exposed to price rises and least protected by policy interventions and social provisions; and
- those populations who are already farming on degraded land or who are suffering from the consequences of deforestation, over-chemicalised soils, denuded coastal landscapes or mono-cultured fields or who are living in flood-prone low-lying areas, water-stressed areas, on hillsides and in precarious housing.

Climatic upheavals and natural disasters further accentuate the vulnerabilities of those rural populations who are not empowered or enabled to act on preparing for, managing, preventing and insuring against the most dramatic effects of climate-induced natural disasters. As climate change and its weather-related events such as extensive flooding, intense drought or storms take hold with increasing frequency, ferocity and in different forms, we are witnessing patterns and evidence that show time and time again that:

- those whose livelihoods are directly dependent on natural resources, land and ocean are often the most immediately exposed to the adverse impacts of climate change;
- those with the means and the capacity can make arrangements to shelter through an emergency or to insure against hard times; those without these means will be left stranded or in positions of even greater precariousness than before; and
- those who are least educated, the last informed and who are consistently left out of any kind of decision-making are also the least able to understand, prepare for or take actions to tackle either the immediate or the long-term impacts of climate change.

BOX 2

Food Security Means Different Things to Different People

Food security is a concept well defined by previous studies, but it is hard to know what it means to any particular person, family or community. Even though much is known about the lives of the people in Buen Hombre, Dominica, it is hard to represent in words what it means to be insecure regarding food. An incident that stands out in the mind of this researcher is a visit one evening to a fairly large family in the community. During the visit the wife explained that she could not offer food because her husband had been sick and had not been able to fish that day, so he had no fish to sell. Without cash, they could not purchase their daily supply of water. Even though the family had a substantial supply of beans and rice, they lacked the water to cook dinner. Because he was unable to fish, his family went without food in a house having dried beans and rice.

One year the farmers of Buen Hombre were encouraged by Dominican Republic agricultural extension agents to plant more tobacco. In fact, whole fields were devoted to tobacco, which normally was only one of many cash and subsistence crops grown. After a wet season, and consequently a wonderful harvest, farmers were told by the Dominican government that so much tobacco had been grown it now had no immediate value. Even this price-supporting government could not purchase all of the tobacco that had been grown at its urgings. Almost a year later, the front room of most Buen Hombre farmers was filled to the ceiling with bales of tobacco. Subsistence crops that were normally grown had not been planted, and people were short of cash for purchasing staples. Credit, which normally was in short supply, had been extended by the government to encourage the planting of tobacco, but now such credit had transmuted into ever-mounting family and community debts. The entire village was facing months, and for some families years, of food insecurity because of this episode.

Another type of food insecurity arises when people believe they are destroying their livelihoods. This can happen to farmers when they watch their fields erode and the only soil they will ever have race toward the sea. They watch as formerly fertile fields begin to 'grow rocks' — a local expression that describes the effects of erosion. When people who know about long-term ecosystem change see it happening, they then worry about what will become of themselves, their families and their village. They worry not about tonight, or even this season, but about forever; because the damage to the fishery and fish habitat, like the erosion of fertile agricultural soils into rocky fields, is irreversible.

SECTION II: HIGHLIGHTS AND KEY FINDINGS FROM FIELD RESEARCH

This section pulls together key findings common to the focus countries, followed by country-specific details. The field research in Antigua involved making connections with individual farmers and farmer associations through institutions such as the Gender Bureau and the beekeepers' association. Focus group discussions for farmers were organised by the Gender Bureau. Interviews were conducted with a range of government ministries involved in food security. In Dominica, connections were made through women farmers who had participated in training workshops for organic farming, and visits were made to farmer clusters throughout the island and to vegetable and fish markets. As in Antigua, there were meetings with ministries involved in food security. A complete list of interviewees is in the Annex .

Economic production snapshot: Tourism continues to dominate Antigua and Barbuda's economy, accounting for nearly 60 per cent of GDP and 40 per cent of investment. The dual-island nation's agricultural production is focused on the domestic market and constrained by a limited water supply and a labour shortage stemming from the lure of higher wages in tourism and construction. Manufacturing comprises enclave-type assembly for export, with major products being bedding, handicrafts and electronic components. Prospects for economic growth in the medium term will continue to be influenced by tourist arrivals from the USA, Canada and Europe and potential damage from natural disasters. The 2008 global financial crisis has led to a significant increase in the national debt, which topped 130 per cent of GDP at the end of 2010.³⁴

The Dominican economy has been dependent on agriculture —primarily bananas — in years past but increasingly has been driven by tourism as the government seeks to promote Dominica as an 'ecotourism' destination. To diversify the island's production base, the government is also attempting to develop an offshore financial sector and has signed an agreement with the European Union (EU) to develop geothermal energy resources. In 2003, the government began a comprehensive restructuring of the economy —including elimination of price controls, privatisation of the state banana company, and tax increases — to address an economic and financial crisis and to meet International Monetary Fund requirements. This restructuring helped to reduce the debt burden, which remains at about 85 per cent of GDP. Hurricane Dean struck the island in August 2007 and caused damage equivalent to 20 per cent of GDP. In 2009, growth slowed as a result of the global recession; it picked up only slightly in 2010 (CIA, 2012).

1 INTERESTS IN FARMING APPEAR TO BE TAKING ON A NEW HOLD

The compounding effects of a contracting global economy and rising food prices have served to refocus people's attention and sights on the everyday realities of their own food security. Over the course of meeting with farming women some trends in local food interest and awareness among women and a growing constituency of producers were discernible. This constituency is made up as follows:

Health consciousness: there is a solid— and growing— core of consumers, both urban and rural, who are 'highly sensitive' to the nutritional value of what they are eating. The core stems from *Ita*³⁵ foods which adhere to the general principle that food should be natural or pure and from the earth and extends to fresh, local and organic foods. A marked presence of

Ital kiosks in both Antigua and Dominica that run viable businesses— (frequented even by some of the civil servants also interviewed) suggests that there is a healthy demand for (and local supply of) vegetarian and fresh foods. This is despite the growing popularity of international franchises such as KFC, Burger King and Subway.

Educated farmer entrepreneurs: there is an emerging constituency of professional women (in teaching, nursing, banking etc.) deliberately looking to convert family plots to improve farming systems to supplement both income and diets. A Scotiabank professional, for instance, had just returned inspired from a permaculture course in Trinidad. A village nurse (La Plaine, Dominica) is making a first attempt to farm organically. A retired school principal is keeping bees and attempting to farm organic chicken and sell organic eggs. These women appear to be concerned with supplementing the food system with locally grown and healthy alternatives for the family home and discerning consumers.

Diversifying livelihoods: there is also a growing constituency of professional women who are investing in the farming and fishing sectors because they see these as potentially lucrative sectors, to supplement their incomes in sectors that are negatively impacted by the ongoing economic contraction. In other words, their concern for their own job security is driving them back to investing in the sectors that are the foundation of social security nets in SIDS – and in so doing comprise an important investor constituency. This relatively younger generation of women may have no farming experience at all, but they are participating in training courses, forming loose cooperatives and leasing land under various farming promotion schemes.³⁶

Environmental consciousness: There is more recognition of environmental issues. For instance, there is growing public awareness of the destructive effects of certain ‘weedicides’³⁷ that are a mainstreamed input into the farming systems on the islands— such as ‘Gramazone’ —although direct links with the demise of marine species have not been confirmed as yet. This growing awareness manifests itself in public opinion about the inherent dangers of ‘chemicalised’³⁸ food.

Young farmers and entrepreneurs: there is a small number of young people who are showing an interest in primary production, farming and fishing. This may be for income reasons or for health-related and lifestyle decisions – or a combination of both.

Each of these constituencies represents an important component of the consumer/producer interests in food security. While their motivations and drivers might be diverse, their collective interests are common. Personal commitment from ‘farm champions’ either in setting up productive farms or in initiating national organic movements often make up the initial step towards a wider conversion of farmers. Personal commitment and ‘passion to farm’ may arise from environmental, social or ethical concerns. Each constituency is open to more incentives, more training and awareness-raising about not just farming methods but also about climate change and local food systems. They note the need for more institutional strengthening around these groups, to bring their concerns and hopes to fruition around common goals and objectives and, as importantly, to hold the government accountable for its policies, its agreements and its actions.

BOX 3

Women Investing in Fisheries – Antigua

Women are investing in the fisheries sector in a multitude of ways:

- Many entrepreneurial women are putting up the collateral for local investment, especially for the purchase of fishing vessels.
- Mothers are buying fishing boats to underpin the livelihoods of their sons.
- Most women in the fishing industry are engaged in the post-harvesting sector (processing and marketing).
- There is a growing number of women who actually go out to sea, as crew.
- Wives and mothers are concerned about the health hazards of deep sea diving for conch and prevent their husbands from taking unnecessary risks just for income.

Training workshops target fisherfolk as a whole. If more women were to show up, they could monitor the daily fish catch more astutely. [Some women do turn up, but very few.]

Cheryl Appleton, Chief Fisheries Officer, Antigua (interview with author January 2012)

BOX 4

An Onion from Antigua

“... right now if I buy an onion in the market, it is usually not an Antiguan onion; it comes from another country. It might be cheap in the market, but when you cut it open, there is a good chance it would be spoiled inside, so I end up throwing some of it away. I would rather buy the smaller onion grown on the island if I can find it. It might be more expensive, but actually I need less of it because it is much more pungent and tasty than anything imported. Our climate here is well suited to growing onions, or anything for that matter!”

Woman farmer’s interpretation of food security, Antigua

BOX 5

Food Security in Fish

“... some models seem to suggest that if you cannot produce but you can purchase, then you have food security, I beg to differ. Our biggest concern is preservation of Dominica’s food security, the way we manage our fisheries determines how we promote preservation of national food and nutritional security. Currently we are looking at an outreach program to get fish from 28 landing sites around the island into the villages (rather than through a centralised market based out of Roseau). We need the gender bureau to work with the fisheries division to decentralise fish sales outlets and to support women in fisheries.”

Norman Norris, Fisheries, Dominica

2 WOMEN’S STAKE IN THE FISHING SECTOR

A weaker, although growing, constituency of food security stakeholders are the women involved in the fishing sector. Women’s activities range from shallow-water fishing in artisanal fisheries to waged labour in the commercial fishery sector. They are important contributors to both national and household food security— though unrecognised, unvalued and undervalued in a sector that in many developing countries is recognised as one of the most depressed sectors in society. A draft study on poverty levels in CARICOM fishing communities (VincyView, 2012) states that women, except in special cases, are barely actively engaged in fishing; most of them perform their work within the processing industry. That might be the

case, but this does not do justice to the fact that more and more women have a direct stake in the sector that goes beyond visible labour. They underpin the sector with their collateral investment, and they are also participating in offshore and inland fishing. Conversations with fisherwomen conducted as part of this field research draw tenuous links between the urgency of managing declining and threatened fisheries and farming methods, integrated forestry/watershed management, integrated coastal zone management and local knowledge about biodiversity.³⁹

3 LOCAL PERSPECTIVES ON FOOD SECURITY

Section I outlined how food security means different things to different people. The definitions or understanding of food security forthcoming from representatives of this constituency are quite consistent. Their concerns are determined by both their consumption as well as their production interests. A sample of perspectives, culled from key informant interviews and focus group discussions, is captured in the following quotes from farming women:

- Valerie R: "I want to know what is on my plate, and the only way to be sure is to have direct links to the farmer —that way I know where my food is coming from."
- Evangeline: "Food security is in what we produce locally and healthily; when some farmers clear land using weedicides and herbicides, that damages our soil and our food security."
- Dana P: "People tend to eat what they see others eat. There needs to be more education in the value of eating organically and in raising people's consciousness about why they need to be aware of what they are eating."
- Rita E: "We import white flour which we do not need in our diets — we should eat what we grow and grow what we eat, including local chicken."
- Margaret L: "Our vegetables are seasonal; we need to ensure year-round harvests so that we become more self-sufficient in fresh greens so we do not have to import cabbage and tomatoes."
- Yvonne V: "I feel more secure when I get local produce. I eat what I grow and supplement it with some things that I have to buy."
- Jocelyn B (village nurse at local health centre): "Food security to me is growing what you eat, eating what I grow, and deciding how I grow it, when and where. As a nurse I see nutrition-related diseases at the health centre —including obesity, diabetes and high blood pressure —which in turn require a wide range of pharmaceuticals."

From the above, a number of discernible shifts in consumption and nutrition patterns emerge, particularly towards more carbonated drinks, white bread, fast snacks and over-processed foods. The daily diet is 'provision' and meat (usually chicken), while greens are only a Sunday diet, some noted. More education and motivation were identified as necessary for a return to a more balanced and local diet.⁴⁰ In an effort to survive, farmers have tried to

secure household food security using food reserves kept in granaries for those who have them or kept in baskets and sacks in the house for those who do not. Other adaptation mechanisms include growing food crops that can stay in their gardens for long periods, especially tubers such as cassava and yams, and/or planting kitchen gardens with vegetables and fruits grown to improve family nutrition.⁴¹ Farmers have found these strategies to be more effective at ensuring food security than market-based strategies, which they regard as too risky. Experience has taught them that when they sell their food crops at harvest time, the prices are usually low, and, by the time there are food shortages, market prices are usually too high for them to afford them. In one discussion with women farmers in Dominica, a three-pronged approach was considered for improving food security in this context: looking at past practices, making changes in the immediate period, and planning for the future (see more details in Table 3).

TABLE 3

Concurrent Action on Three Fronts

Restoration and Regeneration Plans	Sustainability and Viability Plans	Contingency and Strategic Plans
Halting degradation by unlearning destructive processes and relearning restorative processes. “We have to stop raping the soil” by over-exploiting it, over-fertilising it and using bad rotation practices (Vargas-Lundius, 2010: 21)	Adapting cultivation and harvesting methods to local contexts in ways that enhance diversity of local gene pool and local food and water sources	Protection for the future and for future generations includes: <ul style="list-style-type: none"> ▪ conservation of forests and watersheds; ▪ preservation of seed varieties; ▪ fishing methods that promote long-term fish stocks; and ▪ sequestering soil carbon to enhance future productivity. It combines risk reduction with the creation of safety nets and contingency plans for smallholder farmers.

4 HOW WOMEN FARMERS FRAME CONCERNS OF CLIMATE CHANGE

The international development community uses specific terminology to refer to how human and biological systems respond to the local effects of climate change. Adaptive capacity is the potential or ability of a system, region or community to adapt by adjusting to, moderating potential damages of, taking advantage of the opportunities created by, or coping with the effects and impacts of global climate change.⁴² Human interactions with the environment are highly complex, involving multiple feedbacks that generate new effects and outcomes. Communities’ ability to adapt to climate change has more to do with the issue of autonomy — their capacity to make decisions on their own and to continue to exercise their ways of ‘becoming’ with the environment around them — to adapt and be flexible in coping with climate vulnerability and change. In other words, a community’s capacity to adapt to change is highly dependent on the strength of their sense of community, kinship and close social associations (Crate and Nuttal, 2009).

Social culture also frames the ways in which people perceive, understand, experience and respond to weather and related risks.⁴³ Just as food security means different things to different people, climate variability and change also mean different things to different people. When asked about change in the context of their local environments, women in Antigua and Dominica who participated in the focus group discussions for this study shared their

personal experiences and perspectives based on daily and seasonal activities, framed around timescales of immediate needs and seasonal harvest cycles. It is apparent that their understanding and articulation of the phenomenon of climate change is inexact, with their comments ranging from:

“When I hear ‘climate change’, I think of the erosion of the ozone layer, deforestation and pollution effects on the environment.”

“The changes—for example, drought, which affected an area years ago. It [climate change] affects us now and how it will affect the area in years to come.”

to:

“You cannot predict weather patterns anymore.”

“The strength of the sun has changed; it is scorching now.”

“Climate change is changing weather patterns.”

“Climate change is hot extremes, wet extremes, unexpected weather changes.”

One common observation from these farmers was the unprecedented seasonal changes and the difficulty of relying on or counting on weather patterns. However, none of the farmers interviewed drew a link between climate change, rises in sea level, increases in sea surface temperatures, coral bleaching or coastal erosion. Unlike the Pacific islands, where the rise in sea levels is visible and immediate, in the Caribbean islands this change is not yet visible—what is visible is the recurrence of climate-induced storms.

5 ANTIGUA AND BARBUDA – SEEKING SECURITY

“Much has been lost, and we are in a situation of ecological debt like most of the region.”⁴⁴ From the field research in Antigua and Barbuda, a number of findings, similar, complementary and different from those in Dominica emerged. Key field observations are summarised below:

- A ‘buy local, grow local’ campaign would be timely and should be given more importance. There appears to be more public recognition of the faulty state of the food system, and quite a few groups are beginning to ask questions of the government. Ministry of Agriculture officials indicate that the time is right to pay this more attention.
- Women are innovative, hardworking and developing some superb processed food products. Coordinating supplies of raw materials, however, continues to be a challenge.
- The lack of a functional Planning Unit in the Ministry of Agriculture means that the Ministry itself is shackled by a systemic lack of trust and institutional memory, fighting over turf and an inability to share information. Deep-rooted issues often get in the way of progress. The government needs to ramp up service in the face of climate change—for instance, an unusual sequence of two wet years means that there are areas that need drainage facilities, as well as water harvesting and storage.

- Antigua's main crops include eggplant (aubergine), carrot, cabbage, onion, sweet pepper, pumpkin, yams, sweet potato, tomato and squash. Most of the produce is consumed locally. Some of the vegetables and tree crops are sold to hotels, and limited amounts to export markets.
- The traditional challenges facing agriculture remain: finance, drought, availability of land, marketing and the price of labour. The 2007 Administration vowed to "rescue agriculture, marine resources and food production". A January 2012 report in the *Antigua Observer* (Gordon, 2012) indicates that the new agricultural policy is now complete and cites new access to financial supports which will make farming 'less of a risk', highlights public-private partnerships and notes that funds have been sourced from IICA, FAO and the Caribbean Agricultural Research & Development Institute (CARDI). The Director of Agriculture emphasised six major pillars of the new policy to address food security, invasive species, food safety, and climate change and disaster mitigation.
- Most buildings —public and private —have rain-harvesting (roof run-off) facilities integrated into the design; this is a definite plus for Antigua and a good example of how simple conservation steps can be integrated into architectural design. Rainwater harvesting at the household level is an important source of drinking water for the majority of the population and can also support own-consumption agriculture.⁴⁵
- While there is no current database on local farmers or farming entrepreneurs, there is a feeling that some recovery in the farming sector is taking place. For example, a few groups are starting farming cooperatives, the government is being pressured to deliver basic agricultural services, and the Ministry of Agriculture is establishing a Planning Unit.
- According to some comments received during key informant interviews and focus groups, Antigua has "... gone backwards, where before we could count on self-sufficiency in certain food products, the last two decades have seen a withdrawal of funds for and investments in the sector. There is also a growing recognition that systems have been mismanaged." The current crisis, it is noted by some, also forces governments to be more efficient, more creative and less wasteful: "We cannot afford to make mistakes, because we don't have the money to carry those mistakes."⁴⁶ The impacts of withdrawal of research funds from the farming sector over the last two decades are evident now. CARDI, for instance, is left with minimal experimentation capacity on sweet potato varieties (having once been a key developer of local Guinea grass seed and hardier species such as pigeon pea) and with very minimal interaction with or training services for farmers.
- From interviews and conversations, there appears to be an attitudinal shift: the societal stigma attached to farming in Antigua is beginning to shift. Where farming was considered primarily the livelihood of those who 'failed to do better', there is now a generation of young professionals (women too) who are looking at farming and fisheries as the new income security. Antiguans participating in the field research also noted that a growing number of Jamaicans and Guyanese are leasing land to farm. Bradbury Brown (CARDI) commented that it might take a few more disasters or crises before Antiguans change their mentality towards farming.

For now most Antiguan feel that if they earn enough money, they will be able to buy their food. He also noted that Antigua used to be self-sufficient in a few crops — i.e. onions in the 1990s— and that the island was able to supply the region with onions. Now it imports onions and produces hardly any of its own. The island was also for the most part self-sufficient in many fruits and vegetables, supported by comprehensive research on grains and legumes, pigeon peas, soya beans and peanuts. As families have moved out of farming and tourism has become a more 'valuable' income source, there is heavy reliance on the importation of many staples.

5.1 POLICY ASSESSMENT

The Millennium Development Goal (MDG) monitor (2007) noted "missing data to assess progress remains a challenge, especially the lack of information concerning indicators 1, 2, 3 and 5". In response, the Ministry of Housing, Culture & Social Transformation conducted a National Poverty Assessment/Survey of Living Conditions in Antigua and Barbuda to assess the socio-economic situation of the population and to measure accurately progress reached in terms of achieving the MDGs, especially with regard to MDG 1. One key finding of the 2007 Poverty Assessment report related to critical gaps in the state machinery. Namely, the Gender Affairs Division is severely strapped for resources — personnel and other — and has had to limit its role to advocacy in respect of the abuse of women and girls — in some ways operating more like a crisis centre. The report continues, "however, in the continuing work of the organisation, there is need for the cover of an act of Parliament and this has not been forthcoming. Nor has there been any Cabinet decision on the role and function of the Division in the emerging dispensation. Thus, it has had to limit its work to contributing by way of advocacy and advice to other organisations willing to collaborate, given that it is not provided with the resources to undertake the types of interventions that are needed". As a result, the current capacity of the Gender Bureau to monitor, report on and implement strategies for MDGs and/or NAPAs is non-existent.

The Poverty Assessment report also provides insightful comments on the nature of power, gender relations and the macro economy, and Chapter 5 focuses on Special Needs. As an indicator of where women are in the society it is important to note that, unlike many other Caribbean countries, Antigua elected its first female Minister only in 2004, and she was appointed Minister of Labour, Administration and Empowerment.

National policy on agriculture: Such developments will be guided by a renewed vision that promotes agriculture as "a vibrant and dynamic sector, driven by small and medium-scaled commercially oriented competitive agribusiness enterprises, guaranteeing food security nationally, while capitalizing on niche markets externally, with high quality products, produced by environmentally conscious farmers and agroprocessors".⁴⁷ The renewed vision of agriculture addressed the need for increased food security; diversified agriculture markets; enhanced producer competitiveness; increased purchase and consumption of local produce and products; sustainable natural resource utilisation; environmentally sound production practices; the multi-sectoral integration of agricultural policy; increased rural economic growth and development; increased value-added transformation of produce; and an increased contribution by the agricultural sector to foreign exchange earnings.⁴⁸ Although agriculture presently contributes a small percentage (4 per cent) to GDP, the government is seeking to

increase this percentage in the future. As a net importer of food, Antigua and Barbuda's food supply patterns may be affected both in terms of price and availability if climate change affects global food production.

The fishery sector of Antigua and Barbuda is artisanal or small-scale commercial in nature. Capture production involves mainly small fishing units targeting demersal or reef-based resources. Demersals or reef species account for at least 85 per cent of capture production (FAO, 2007b). All fishery products landed in Antigua and Barbuda are marketed fresh for direct human consumption. There are currently only two major facilities that allow processing of fisheries products for retail (the Market Wharf and Point Wharf fisheries complexes), and both only at a very limited level. Traditional salting and drying (corning) of some species still occurs at a subsistence level. Antigua and Barbuda supplied the French overseas territories of Guadeloupe and Martinique with seafood for several decades. However, with the new EU health regulations, exports to these territories plummeted (Lovatelli and Sarkis, 2011).

Land and water resources issues: In a number of agricultural areas farmers do not own the land but rent it from government or private landowners on an annual basis. Where leases are granted they are usually for a period of five years. Long-term leases of 25 years are available, with an option to renew, subject to Cabinet approval.⁴⁹ However, the process of land acquisition for agriculture is time-consuming and costly, and inadequate land use policy creates conflicts among land users. Watersheds are not well maintained, nor are the waterways leading from these watersheds. Years of indiscriminate cutting, clearing for agriculture, uncontrolled grazing and fires have resulted in serious degradation, accelerated erosion, reduced productivity of the land, increased siltation of reservoirs, loss of biodiversity, including wildlife habitat, and loss of aesthetics. The watersheds are no longer efficient in trapping the rainfall, and flooding is common in low-lying fields and in settlements where the water channels are not well maintained. Soil loss from the Body Ponds and Potworks watersheds has caused excessive sedimentation of downstream dams and streams as well as coastal habitats such as mangroves, beaches, seagrass beds and coral reefs. There has also been mangrove destruction at a number of coastal areas such as Jolly Beach, Fort James and Cades Bay. The application of pesticides, herbicides, fungicides and other chemicals in agricultural production has polluted the Potworks Reservoir and its accompanying watershed area.⁵⁰

6 COMMONWEALTH OF DOMINICA – UNTAPPED POTENTIAL

"Dominicans' tie to the land is captured in the national motto, expressed in French Creole as 'Après Bondie, C'est La Ter' or 'After God is the Earth'."

The following observations have been captured through conversations and deeper questions posed to the farmers that the author met. Field observations indicate that the village women will grow most 'provision' (sweet potato, yam, cassava, dasheen) and some vegetables, herbs and spices, but they rely on the import markets for rice, sugar, flour, lentils, milk, oil, meat, onion and garlic. Village women who spend a lot of time processing their own food will choose to grow and eat their own cassava and taloma and have the capacity to be self-sufficient. Grinding of cassava or taloma into flour means that the staple diet can be stored over time. Families will plant and harvest provisions three to four times a year; usually the planting, harvesting and processing is a joint activity between wife and husband (as it is laborious work). Most will only buy rice and flour on occasion, and when prices became

especially high they would substitute these staples by growing more provision. At the moment, they grow enough for their own consumption and small sales, but they could grow more surplus for sale to local markets or beyond if there is a guaranteed market.

The women speak of the weather in terms of 'unpredictability', extreme seasonal variations (heavy rains, strong winds or very dry spells). The way they deal with this on a day-to-day basis is to grow a range of crops with different needs (dasheen needs water; yam prefers dry weather). They notice, for instance, that the sun bakes the soil and dries it out more rapidly.⁵¹

Poultry, eggs and small ruminants: a good number of the women interviewed said that they did keep free-range (bantam) hens on their farms. A few would collect eggs. As a farming activity, however, it is not as common as it could be. Cheap daily food for most low-income people comprises chicken and provision (rural people are more likely to consume fresh fruit and some vegetables— such as pumpkin, spinach, eggplant (aubergine), pigeon peas and beans— than the poor people in urban areas). The larger family farm units (4 to 6 acres) also had goats, pigs and perhaps a cow or horse. A few farms visited during the field exercise had goats, but these are not milk goats. Vegetables and fruit: fruit is seasonal, and the island will experience 'gluts' of avocado and mango. Currently, there are no established practices or markets for conserving these gluts.

Taloma Women Action Group Delices acquired in excess of 15,000 square feet for the erection of a new taloma processing plant. While the group has about 28 members, only eight or nine of the 'executive' are 'motivated' to work in the group. The packaging (imported from Trinidad), labelling and bar codes are costly. For taloma flour the laborious process is as follows: the family grow the root, harvest it, cut out the roots and clear the harvested bulbs. They pay for it to be ground, take it home and strain the pulp in large bins of water, essentially 'washing' the pulp in a thin cloth to absorb the starch element of the roots.⁵²

6.1 POLICY ASSESSMENT

The **2003 Country Poverty Assessment** commissioned by the Caribbean Development Bank estimated that 37 per cent of households were headed by women.⁵³ The average size of these female-headed households was between five and six persons— a number larger than most male-headed households. The level of poverty in the rural areas, and especially among the indigenous Kalinago, is reported to be relatively high. Most men and women in the Kalinago community are involved in subsistence farming and fishing as their primary occupation. At the same time, however, Kalinago women interviewed as part of this field research were farming between 3 and 6 acres each and expressed confidence in their capacities to grow food for their immediate families and communities.

Dominica's level of food imports is not in keeping with the food and nutrition security policy that it is developing. The country imports about US\$24 million worth of food annually. According to Dr. Ballayram, Food Economist at the Caribbean Food and Nutrition Institute (CFNI), Dominica is importing food that is leading to chronic non-communicable diseases. "We still import about US\$24 million of food every year— lot of that food is calorie-dense, high in fat, high in sodium, high in sweeteners, and they lead to obesity and chronic diseases" (Dominica News Online, 2011).

Like Antigua, Dominica has a **Bureau of Gender Affairs** and a Gender Policy. During 2009 several public meetings were held to acquaint the population with its gender policy. The policy now has an action plan attached to it, and the Institutional Framework of Gender Mainstreaming consists of a Gender Management System (GMS) comprising a Gender Management Team and Gender Focal Points.

The Dominica National Council of Women also appears to be very active and could play a role in supporting women in agriculture but seems to have prioritised violence against women as a natural response to an unmet and growing societal need.

A **National MDG Monitoring Committee** has been set up, and much has been accomplished in terms of identifying and collecting indicators aimed at informing the process. As it relates to MDG 3 — promoting gender equality and the empowerment of women — the National Gender Bureau, acting as the Gender Machinery, is charged with monitoring and evaluating the plan of action. Goals seem primarily focused on education/training on health, although employment and poverty reduction are also mentioned.

The status of women in Dominica: Women and men do not enjoy equal social, economic, legal and political rights. Despite recent increases in women's educational attainment/achievement, women continue to earn less than men in the labour market even when they have education and years of work experience. Statistics from 2009 show that 55 per cent of Permanent Secretaries in Dominica are women. This is a marked difference from previous years, when 100 per cent of Permanent Secretaries were male.⁵⁴

In terms of women in politics, women form only 11 per cent of the government. There are currently four women in government (three of whom hold ministerial positions, and one is a Senator). The **2006 Growth and Social Protection Strategy (GSPS)** (Government of Dominica, 2006), a five-year medium-term poverty reduction strategy, was the defining economic and social policy document, focusing on:

- reducing unemployment and underemployment;
- attaining sustainable growth and development;
- reducing vulnerability to shocks —economic and natural disasters;
- improving international competitiveness and export performance. and
- improving the effectiveness of social protection programmes.

BOX 6

Fish is Integral to Food Security

For Dominicans, fish protein represents 13% of diet, a far greater share than both the Caribbean and world averages of 7 and 6 per cent, respectively. While fishing generally uses little in the way of technological advancements, it remains central to Dominican culture, employing thousands of fisherfolk and supplying successive generations with sustained economic possibilities (World Resources Institute, 2007). Imports account for about one third of fish consumed in the Commonwealth of Dominica. The imports include canned mackerel, tuna and sardines, and some salted cod.

BOX 7

Dominica Organic Agriculture Movement (DOAM)

Initiated in 2006 in response to local interest and need, DOAM now has a small office and staff in the town of Roseau, with 56 member farmers, including 15 women farmers. Because organic agriculture is a fast growing niche market, DOAM regards organic certification, including Participatory Guarantee Systems – which build on Dominican traditions of cooperative working - as a great way to capitalise on that growth potential. A growing number of producers are interested in production practices that are more in harmony with the ways Dominicans used to traditionally work their land. Organic farming also maintains the resilience of the land to hurricanes, torrential rain, and other natural disasters common to the Caribbean. As its influence grows, DOAM is collaborating with the Government of Dominica meet its commitment to having a national agriculture industry free of chemical inputs by 2015.

A Trade Policy Review by the OECS concludes “The OECS Economic Union and the CSME [Caribbean Single Market and Economy] offers the opportunity for Dominica and the rest of the OECS and CARICOM to consolidate their strengths and resources and to chart a common development path. Concluding an EPA [Economic Partnership Agreement] with the EU that is development centred and provides adequate development support to address trade capacity needs will enable Dominica to expand trade to the EU and attract investment from the EU.”⁵⁵

In 2011 a report on the Pilot Program for Climate Resilience (PPCR) initiative in Dominica identifies a number of government implementing agencies for NAPAs and the PPCR. The Environmental Coordinating Unit (ECU) in the Ministry of Environment, Natural Resources, Physical Planning and Fisheries is the focal point for the PPCR. There are five Thematic Working Groups (water resources, agriculture, energy/disaster management/met services, private sector, civil society), which are made up of representatives of relevant line ministries/government agencies and civil society. The Thematic Working Groups will convene at regular intervals to: undertake a climate change risks assessment; undertake an adaptive capacity assessment; help identify priority investments; provide guidance on the development of the Strategic Program for Climate Resilience (SPCR); and provide inputs and receive updates on the PPCR process (Box 8).

BOX 8

Pilot Program for Climate Resilience, Dominica

The Pilot Program for Climate Resilience (PPCR), initiated in 2008, aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation. In this way, the PPCR provides incentives for scaled-up action and initiates transformational change. The pilot programmes and projects implemented under the PPCR are country-led and build on NAPAs and other relevant country studies and strategies. They are strategically aligned with other donor-funded activities to provide financing for projects that will produce experience and knowledge useful to designing scaled-up adaptation measures.

In summary, PPCR Dominica supports a programmatic approach:

Phase 1 – Preparation of the Strategic Program on Climate Resilience (SPCR) for Dominica (\$307,000 grant);

Phase 2 – Implementation of the Strategic Program on Climate Resilience (SPCR) in Dominica, namely US\$5–7million in grant funding and US\$4–9 million in other concessional resources to pilot and demonstrate projects to integrate climate risk and resilience into core development planning as developed under Phase 1. It is essential that the pilot programmes be country-led, build on NAMAs (or equivalent national climate change adaptation strategies) and other relevant country studies and strategies, and be strategically aligned with the Adaptation Fund and other donor-funded activities to provide pilot finance in the short term so as to learn lessons that will be useful in designing scaled-up adaptation financing.

7 OBSERVATIONS AND CONCLUSIONS FROM FIELD RESEARCH

- Economic crisis is forcing the hands of local people to search for alternative and multiple sources of incomes. Farming and fishing still offer a 'way in' and a social security net. As an extension to this, there appears to be general disillusionment with what the tourist industry can truly offer in terms of secure incomes or dependable livelihoods.
- This could be an opportunity for financial reinvestment and positive attitudes towards farming and fishing.
- There is very little articulation about or understanding of climate change, making it difficult to underscore the importance of adaptation among farmers and fishers. Naturally, they are more concerned by seasonal variability.
- This is an opportunity for training and education.
- The farmer movement among women is weak to non-existent. The few rural membership organisations that exist remain dispersed and fragmented. Social capital needs priming and strengthening. The Gender Bureau needs comprehensive capacity-building. Gender issues for the most part are not considered a significant issue or important or valuable in the scheme of things. There is a general misconception that gender refers only to issues relating to maternity or violence against women.
- The messages around food security are clear, defined primarily as the ability to grow and consume locally.
- There is a need for political will and commitment to ensure that the country's development proceeds in a sustainable manner, with an understanding that economic development must be interlocked with environment issues. Given budgetary constraints, it should be ensured that all programmes and projects have a sustainability and a gender component built in. In addition, to effectively utilise scarce resources, there must be a community-oriented approach to sustainable land use and natural resource management. Therefore, it is really important that training opportunities that arise around agricultural production, from business management to composting, should also include consciousness-raising components such as the politics of food systems, food security, climate change, inclusion of women and the absolute importance of building natural, economic and social 'resilience'.

SECTION III: REALISING INNOVATION AND POTENTIAL – OVERALL RECOMMENDATIONS AND CONCLUSIONS

In 2008, 60 countries called for radical changes in world farming when they signed the report of the UN's International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)⁵⁶. The IAASTD is the biggest study of its kind ever conducted, and is intended to guide world agricultural development and food production in the coming decades. It reflects a growing consensus among the global scientific community that the old paradigm of industrial, energy-intensive and toxic agriculture is a concept of the past. The key message of the report is that *small-scale farmers and organic, agro-ecological methods are the way forward to solve the current food crisis and meet the needs of local communities*.⁵⁷

The final report from the Commission on Sustainable Agriculture and Climate Change reviews this and other reports to make a number of important recommendations regarding food security and climate change (Beddington, et al., 2012). Caribbean SIDS are well advised to take these findings seriously as they consider their next steps in agri-food policy development.

1 REFRAMING THE APPROACH TO COMMUNITY STAKEHOLDER DEVELOPMENT

The successful roll-out of a food security policy in the Caribbean SIDS rests on one singular factor: the meaningful and comprehensive engagement of the farming and fishing communities —both women and men — in working together to determine solutions.

While climate change affects the entire planet, and while food security is a global issue, the most effective ways of addressing both of these issues occurs when communities are directly engaged at the local level. Food security in the context of climate change and micro-climate impacts is *an intensely local concern — which needs to be supported and managed at an overarching regional and national level*. By extension, those civil society and farming organisations that are successfully addressing these dual challenges have also built on local environmental knowledge, experience and interests at local levels, while drawing on scientific knowledge and the know-how to adapt to and mitigate the effects of climate change. People-centred early warning systems are effective protection and prevention systems.

Community-based climate change adaptation measures require, in turn, careful holistic and systemic planning such that the entire community is involved in a participatory manner, and in particular that sufficient time is allocated for awareness-raising, information-sharing and discussion (Cambers, 2009). In the Caribbean, too often the term 'participation' is mistaken to mean 'inclusion'. Truly engaging participation involves listening to challenges and solutions at the local level and having mechanisms and feedback links in place to take these solutions to policy levels⁵⁸ and to integrate them into the food security system. Supporting smallholder farmers' organisations is key to enabling them to identify research needs and priorities, and empowering them to implement research results and solutions.

Re-investment in the farming sector in SIDS economies needs to go hand in hand with regular sensitisation workshops on climate change and food security to build public awareness and understanding of the links between adaptation strategies and women's responsibilities in agriculture, fishing, water, sanitation and capacity to recover from natural disasters.⁵⁹ With this

kind of initial sensitisation, women can identify technical training needs to enhance their abilities to mitigate and manage risks associated with climate change such as construction, farm practices, homestead protection and access to meteorological information.

Community food security and relatively self-reliant production, when linked to other communities, can contribute to overall food sovereignty and help to build a more inclusive, ecologically sustainable food system. When efforts to attain food security are linked throughout the community(ies), the likelihood of achieving food security is higher.

BOX 9

Women at the Community Level

Women should be at the centre of community-level responses, as they are already very effective in some communities at mobilising local involvement and implementation. Without question, communities must be at the heart of efforts to build resilience, whether by diversifying livelihoods or strengthening food and water security. Women must also be at the core of adaptation strategies, and for this, gender-disaggregated data and research are necessary. Strengthening local institutions is critically important, as it is these institutions which have shaped how rural residents respond to environmental challenges in the past. (Oxfam, 2009)

2 REFRAMING THE POLICY APPROACH TO AGRICULTURE

There is a ‘mind set’ among policymakers and financiers that casts the ‘low-productivity subsistence farming’ as a burden on the economy. In fact, these family plots are far from ‘low-productivity’; their productivity range and level is incredibly high, and they form the bedrock of the nation’s food security. Because they are decentralised, policymakers might consider it more challenging to manage marketing infrastructure or might not want to divest power directly to community-based structures. But strengthening decentralised marketing structures actually promotes a resilient food economy.

One silver lining is that because chemical fertilisers and pesticides are often beyond the affordability of small-scale farmers, they are de facto prime candidates for more bio-friendly and ‘climate-smart’ forms of farming. Key points from a CGIAR report on climate-smart farming — placing agriculture at the centre of climate change policy in the Caribbean SIDS (Pye-Smith, 2011)— are as follows:

At the policy level: No government – democratic or otherwise – is likely to adopt measures to reduce greenhouse gas emissions if such measures threaten a nation’s ability to feed its population. However, a failure to reduce agricultural greenhouse gas emissions and make the shift to climate-smart agriculture would put future food security at risk. This is one of the compelling reasons why *agriculture should be at the heart of the international climate-change negotiations*.

- *Climate-smart agriculture helps farmers to increase food production, become more resilient to climate change and reduce greenhouse gas emissions.*
- At national levels, greater attention is being paid to climate issues and agriculture, but even here there is significant room for further elaboration and action. For example, a recent analysis of country readiness proposals for the extended Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative revealed that although many countries acknowledge the importance of agriculture as a cause of deforestation, the strategies they propose are not robust enough to

meet the challenges we face (Pye-Smith, 2011). There is an urgent need for more detailed and tangible measures. *There is an urgent need for pilot projects which illustrate the virtues of climate-smart agriculture and a new future for farming.*

At the investment level:

- *If agriculture is to be part of the solution to climate change, and at the same time continue to contribute to food security and poverty alleviation, there will need to be a significant increase in investment in the sector.*
- Adaptation to short-term climatic variability and long-term climate change also involves better risk management – for example, through micro-insurance schemes and by providing farmers with access to better weather forecasts.
- Farmers could be (financially) rewarded or compensated for adopting practices that generate multiple benefits in climate-smart agricultural policies and practices.
- Agriculture should be eligible for support from existing and future climate-change financing mechanisms. Measures should be taken to ensure that smallholders benefit from carbon markets.

3 ORGANIC FARMING AS A MEASURE TO ADDRESS FOOD SECURITY AND ECOSYSTEM RESILIENCE

As far as a technical solution goes, this report concludes that ‘climate-smart’ farming can and should include organic farming systems. Features common to organic farming which are of significance to small-scale farmers in developing countries include:

- mixed farming and the use of crop rotations;
- more resilient production systems based on a more diverse cultural system;
- minimal use of external agrochemical inputs;
- emphasis on use of local resources;
- recycling of organic wastes;
- reduced environmental impact;
- low degree of mechanisation; and
- suitability for cultivation of small areas.

The FAO recommends organic farming⁶⁰ because it “... performs better than conventional agriculture on a per hectare scale, both with respect to direct energy consumption (fuel and oil) and indirect consumption (synthetic fertilizers and pesticides)”. Its 2002 report states that *organic agriculture*⁶¹ *enables ecosystems to better adjust to the effects of climate change* and has major potential for reducing greenhouse gases. Other positive factors include:

- organic soils have better water-retaining capacity, which explains why organic production is usually more resistant to climatic extremes such as floods or droughts;
- carbon sequestration in soils is promoted by organic methods due to the addition of compost, mulches, manures and cover crops;
- where they are certified, organic farming systems require regular and methodical recording of farming data such as compost production and harvest records for organic farm inspectors to monitor. This systematised data collection method lends itself to systematic recording of weather-related data for use by local and national meteorological stations;
- as organic farming comprises highly diverse farming systems, the diversity of income sources also increases, potentially buffering farmers against adverse effects of climate change and variability such as changed rainfall patterns;
- organic approaches may make it easier to link economic value, cost and payments to future carbon sequestration programmes that seek to offer farmers environmental fees for stewardship of soil, land and biodiversity;
- organic farming offers a low-risk farming strategy with reduced input costs and lower dependence on external inputs such as fertilisers. By extension, this often means reduced financial risk and reduced indebtedness, alongside increased diversity; and
- other related benefits include healthy eating, local foods and a lower overall carbon footprint for food production.

Shifting to organic farming is an attractive alternative for smallholder farmers in the Caribbean. Organic farmers are able to apply local resources and knowledge as well as non-chemical inputs to their farming systems, conserve their soil and land quality and revive indigenous agricultural practices. This in turn can have a positive long-term impact on local food security and promote a return to cultures and systems of holistic environmental management.

The principles of organic farming can be extended to the fishing sector. With careful monitoring and suitable strategies in place, climate change could offer opportunities for sustainable aquaculture and mariculture. With climate change, some inland waters could experience an increase in the availability of phytoplankton and zooplankton, which would boost aquaculture production. While increased salinity in deltas will push some aquatic farming upstream, it could also provide additional areas for shrimp farming. Unlike land-based animal husbandry, which accounts for 37 per cent of all human-induced methane emissions, farmed aquatic species emit no methane (FAO, 2010: 120). Aquaculture of molluscs and the expanding seaweed culture make a minimum contribution, if any at all, to CO₂ emissions, while they could contribute to carbon sequestration. Aquaculture could be an important source of animal protein with a smaller carbon footprint and relevant potential for additional mitigation of carbon release into the atmosphere (FAO, 2010).

4 EMERGING LIVELIHOOD OPPORTUNITIES IN GREEN ECONOMIES

Greening agriculture in developing countries, concentrating on smallholders, can reduce poverty while investing in the natural capital on which poor people depend. Greening the small farm sector by promoting and disseminating sustainable practices could be the most effective way to make more food available to those who are poor and hungry, reduce poverty, increase carbon sequestration and improve access to growing international markets for green products (UNEP, 2011). Payments for Ecosystem Services (PES) are a potential formalised income stream for poor people in rural areas, although it remains to be seen how much these payment schemes might benefit women. Table 4 outlines categories of ecosystem services for which women could be paid.

TABLE 4

Examples of Ecosystem Services by Ecosystem Type

Ecosystem type	Four functions of ecosystem services: provisioning (e.g. food and water), regulating (e.g. climate regulation), supporting (e.g. waste processing), and cultural	Example of potential PES supplied by poor women
Croplands	Food production, carbon storage and sequestration, habitat, scenic	Adoption of farming practices that enhance ecosystems from agriculture and environmental stewardship, natural processes of rebuilding soil health and biodiversity of species
Grasslands, rangelands	Food production, pollination, waste treatment, soil formation, water regulation, carbon storage and sequestration, biological control	Pastoralists are the custodians of dry land environments, providing services through good rangeland management including biodiversity conservation and wildlife tourism
Forests	Soil formation, waste treatment, air quality, biological control, storm water control, genetic resources, raw material (timber, fuelwood, non-wood forest products), carbon storage and sequestration, insurance against extreme events, recreation	Reforestation initiatives, replanting and management of new forest growth, restoration of forest species including medicinal plants, fungi and grasses
Lakes, rivers, riparian zones	Water supply, waste treatment, food production, habitat biodiversity, recreation, total and aquatic ecosystems	Activities to protect, restore and enhance near-stream and in-stream habitats and processes by restoring and managing grassy buffers, wetlands, riparian forests and flood plains. Indigenous grasses can be planted adjacent to waterways to intercept pollutants and soil erosion
Marine	Coastline stabilisation, fish nurseries, carbon sequestration, water regulation, biodiversity	By conserving mangroves to protect biodiversity, fish nursery habitats remain intact, leading to increased fisheries production; the natural waste processing function of mangroves remains, leading to better water quality; coastal zones are also better buffered from the potential damaging impacts of storms; and the carbon remains stored in mangrove soils and trees
Wetlands	Water supply and treatment, food and fish production, disturbance regulation, habitat, total ecosystem, climate regulation	Rehabilitation of wetlands through flood protection, sediment trapping, erosion control, maintenance of biodiversity

TABLE 5

Examples of Market-Based Instruments for Rural Women
(compensation, current capital and contingencies)

Alternative Income Streams	Justification and Interest for Women	Examples of Market-Based Instruments
Compensation payments (foregone, past and legacy) CAPITAL PAYMENTS	Redresses historical power imbalances, rights and responsibilities of resource-dependent people vis-à-vis environmental service beneficiaries who wield greater political might and economic influence; tackles questions of ownership, entitlements, knowledge and capital assets	<ul style="list-style-type: none"> ▪ Strengthen women's farming groups to secure and manage financing through collaboration with community-based organisations and micro-banks ▪ Enable women to conduct their own detailed needs assessments and budget estimations ▪ Compensation payments for lands taken away from indigenous peoples during colonial era, or return of land autonomy to local peoples (e.g. as in First Nations bands in Canada) ▪ Public relief, reconstruction and rehabilitation paid from public (global and national) funds ▪ Transfer payments
Current income (fees and rewards) SERVICE PAYMENTS	Formalises recognition of women's rights to reside in, use and modify a protected ecosystem; and to engage in legitimate natural resource development aspirations; government programmes that provide public services in exchange for green economy contracts; a new source of revenue for performing a defined service (e.g. social forestry)	<ul style="list-style-type: none"> ▪ Cost and benefit sharing ▪ Environmental protection fees for organic practices, biodiversity conservation, sequestration and conservation of carbon stocks, watershed management and rehabilitation, supervision of drinking water, flood and landslide protection, coastal protection ▪ Procurement for green services ▪ Feed-in tariffs from small-scale energy utilities ▪ Employment in green-sector businesses (e.g. retrofitting and other energy conservation measures, renewable energy, ecological agriculture, or eco-tourism) ▪ Investments in restoration and enhancement of natural capital could generate additional income-generating opportunities (e.g. reforestation) ▪ How can women earn against tradable permit systems?
Contingencies and security (future and anticipated) FUTURE FUNDS	Addresses conserving stocks for saving income and securing against adverse shocks and risks by integrating payments and compensation into traded products	<ul style="list-style-type: none"> ▪ Risk insurance for farmers, fishers and foresters ▪ Green bonds ▪ Communal trust funds ▪ Cooperative credit schemes

While PES incomes could become viable options for women who collectively bargain for payment for these services, these need to be supplemented with systemic income streams that are not limited to just 'servicing' or 'caring' for the green economy but that position and reward women very centrally in their community-level management of resources. This in turn assumes that women are able to access existing rural finance infrastructures, and that there are systemic and 'built-in' streams of income that target women that could be legislated, regulated and integrated into the roll-out of the green economy.

Farming practices are often the best indicator and determinant of environmental quality (e.g. soil, water, biodiversity).⁶² Farmers who maintain vegetative cover, soil health and

moisture content are essentially building the long-term wealth of their natural systems. Since modification of agricultural production choices can provide positive environmental externalities, PES has become a topic of interest and experimentation.

5 CONCLUSION

In 2009 the Shridath Ramphal Centre (Jessop, 2009) drew the following conclusion about food security in the region: “The Caribbean is still struggling to develop a new agricultural model. While small-scale agriculture and land ownership continues to have a deep rooted and emotional appeal, large scale farming with its echo of servitude — in the Anglophone Caribbean at least — remains far from attractive.” It went on to say that for the most part agricultural thinking in the region continues to be dominated by saving a commodity-based agriculture that largely only flourished because of trade preferences —and that while there are various attempts to produce more for domestic consumption, or to turn crops or agricultural waste into bio-ethanol, as yet “none of this is about creating regional food security”.

Investing in a food-secure model using small-scale fiscal stimuli that mobilises the untapped potential of local producers is imperative. Small-scale processes can provide a mechanism to foster sustainable solutions to the problems of food and water security and spread benefits more evenly across communities of farmers and consumers alike.

Economists and policymakers need to make allowances for how social memory works because it is relevant to small-scale subsistence producers who are most often left out of macro-policy decisions and their effects — indigenous social memory is a great repository of human experience and a vital resource for resilience and adaptation in the changing contemporary global context. The ineffectiveness of communication has prevented the general public from understanding and taking action against climate change.

The farming sector in many Caribbean islands sits at a decisive juncture. The islands can decide to follow ‘business-as-usual’ practices which will take their ecology, economy and food security down one (disastrous) trajectory, or they can adopt a more long-term vision, which invests in the country’s food economy while shifting the structural foundations of both economy and ecology to better adapt to climate change. The business-as-usual practice will continue to favour capital- and input-intensive technological solutions above all else, and will disregard units of production that are considered economically ‘unviable’ or of no importance because they do not contribute to conventional measurements of GDP. In other words, women smallholder farmers and their productive, regenerative, stewardship and conservation roles will continue to be ignored. On the other hand, if allowed to pursue the full extent of their innovation and investment, ecologically sound farming methods and nurturing of local biodiversity on both commercial and family plots could lead a new way to farm in the era of climate change.

ANNEXES

LIST OF PEOPLE INTERVIEWED

The people listed below were either interviewed or consulted or participated in a focus group discussion.

DOMINICA

Name	Position/Interest	
Jocelyn Green	Nurse	
Rita Edprith	Farmer	
Margaret Lawrence	Farmer	
Danna Philbert	Farmer	
Zahur Peter Pamdu Athamaze	Farmer	
Ellen Haas	Farmer	
Yvonne Vigilant	Honey farmer	
Evangeline Vellege Nidette	Farmer	
Valerie Roghi	Farmer	
Rosa Martin	Farmer	
Virginia Duraud	Farmer	
Florence Tyson	Farmer	
Vanya Fredericke	Farmer	
Adrianna Fredericke	Farmer	
Veronika Privost	Farmer	
Phyllis Alfred	Farmer	
Juliette Graham	Farmer	
Adriana	Farmer	
Violet Daroux	Farmer	
	Farmer	
Brian R. Cooper	Unit Co-ordinator	National Parks
Olu Obonyo	President	DOAM (Dominica Organic Agriculture Movement)
Karen Sutherland	Roots Farm Organic Farmer	
Roy Xavier	Roots Farm Organic Farmer	
Norman J. Norris	Senior Fisheries Officer	Ministry of Environment, Natural Resources, Physical Planning and Fisheries

BARBADOS

Name	Position	Organisation
Sandra Edwards		UN Women
Vincent A. Little	Regional Policy Advisor, Food and Nutrition Security	FAO

ANTIGUA & BARBUDA

Name	Position	Organisation
Roberta Williams	Director	GARDC (Gilbert Rural and Development Center)
Sereno Benjamin		IICA
Denise Martin	Farmer (Knowing and Growing Network)	
Alistair Jacobs	Field Member	Antigua-Barbuda Beekeepers cooperative Society
Bradbury Browne	Technician	CARDI (Caribbean Agricultural Research and Development Institute)
Brian Cooper	Unit coordinator	National Parks
Ruleta Camacho	Senior Environmental Officer	Environment Division, Government of Antigua and Barbuda
Novella Payne	Food producer	Granma Aki – dried fruits & preserves, juices, soaps and herbal solutions from locally grown sources. www.granmaaki.com

WASHINGTON, DC

Name	Position	Organisation
Fionna Douglas	Program Manager –Agriculture and Rural Development Department	The World Bank
Laura Gleisser		AED
Tiguist Fisseha	Dominica PPCR	The World Bank
Roland Sundstrom	Junior Professional Officer	The Global Environment Facility
Mohammed Bakarr		The Global Environment Facility
Barbara Coello		World Bank, Gender & Agriculture, Haiti
Laura M. Glaeser	Early Warning and Response Specialist	Fhi 360
Cletus Springer	Director	OAS- Dominica
Beatriz Ferro-Santos	Administrative Officer	OAS
Eija Pehu	Science Adviser – Agriculture and Rural Development Department	The World Bank
Pirkko Poutianinen	Senior Gender Specialist – Agriculture and Rural Development Department	The World Bank
Mohamed I Bakarr	Senior Environment Specialist	GEF
George De Romilly	International Consultant for PPCR	ECU
Collin Guiste	PPCR National Coordinator	ECU
Lloyd Pascal	Director	ECU

FURTHER NOTE ON RESEARCH METHODOLOGY

Geographical scope: The Caribbean region is characterised by many small island states with diverse cultures, environments and food systems. They import about three quarters of their food from outside the region and largely rely on tourism, the service industry and export crops for revenue. The region is susceptible to weather extremes and changes in preferential export markets. Regional institutions are only weakly connected. Countries within the Caribbean region are members of the English-speaking Commonwealth, the Spanish-speaking Organization of Ibero-American States, or the French-speaking La Francophonie Group.

In an attempt to capture as diverse a sample as possible, the original study focused on three islands; from the Leeward Islands — Antigua and Barbuda, from the Windward and Lesser Antilles Islands — Dominica (both islands with the smallest numbers of population), and from the Greater Antilles — Haiti (an island with one of the highest population numbers). All three are CARICOM members — which allowed for easier comparative data analysis. Comparative data for the three island states are presented in the table below, although a separate country report will be prepared for Haiti given some of its unique characteristics in the context of the research focus.

	Antigua & Barbuda	Dominica
Area	442.6 sq km (water=0)	751 sq km (water=0)
Climate	Tropical maritime; little seasonal temperature variation	Tropical; moderated by northeast trade winds; heavy rainfall
Terrain	mostly low-lying limestone and coral islands, with some higher volcanic areas	rugged mountains of volcanic origin
Natural Resources	NEGL; pleasant climate fosters tourism	timber, hydropower, arable land
Land Use	arable land: 18.8%	arable land: 6.67%
	permanent crops: 4.55%	permanent crops: 21.33%
	other: 77.27% (2005)	other: 72% (2005)
Irrigated land	1.3 sq km (2008)	NA
renewable water resources	0.1 cu km (2000)	NA
Natural hazards	Antigua and Barbuda are exposed to tropical storms every year from July to October and also suffer from periodic droughts. The islands are vulnerable to the effects of climate change due to higher temperatures, sea level rise and increased hurricane activity.	flash floods are a constant threat; destructive hurricanes can be expected during the late summer months
recent events	water management – a major concern because of limited natural freshwater resources – is further hampered by the clearing of trees to increase crop production, causing rainfall to run off quickly	Hurricane Dean 2007 caused damage equivalent to 20% of GDP
Population	87,884 (July 2011) est)	72,969 (July 2011 est.)
Median age	30.3yrs, male 28.7, female 31.7 (2011 est.)	30.8yrs, male 30.4, female 31.3
GDP - by sector	Agriculture: 3.9%	Agriculture: 20.7%
	industry: 33.2%	industry: 23.2%
	services: 62.9% (2010 est.)	services: 56.1% (2010est.)
Labour force	Agriculture: 7%	Agriculture: 40%
	industry: 11%	industry: 32%
	services: 82% (1983)	services: 28% (2000est) →

Agricultural products	cotton, fruits, vegetables, bananas, coconuts, cucumbers, mangoes, sugarcane; livestock	bananas, citrus, mangos, root crops, coconuts, cocoa
Industries	tourism, construction, light manufacturing (clothing, alcohol, household appliances)	soap, coconut oil, tourism, copra, furniture, cement blocks, shoes
Exports	\$69.1 million (2010 est.) petroleum products, bedding, handicrafts, electronic components, transport equipment, food and live animals	\$42.8 million (2010est) bananas, soap, bay oil, vegetables, grapefruit, oranges
Imports	\$633.7 million (2010 est.) food and live animals, machinery and transport equipment, manufactures, chemicals, oil	\$225.3 million (2010 est.) manufactured goods, machinery and equipment, food chemicals
Environmental international agreements	party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Wetlands, Whaling signed, but not ratified: none of the selected agreements	party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, Ship Pollution, Whaling. signed, but not ratified: none of the selected agreements
Other	Antigua has a deeply indented shoreline with many natural harbours and beaches; Barbuda has a large western harbour	known as 'The Nature Island of the Caribbean' due to its spectacular, lush, and varied flora and fauna, which are protected by an extensive natural park system; the most mountainous of the Lesser Antilles, its volcanic peaks are cones of lava craters and include Boiling Lake, the second-largest thermally active lake in the world. Dominica is using the concept of transformation into an Environmentally Sound Organic Island

NUTRITIONAL VALUES OF LOCAL FOODS COMPARED TO IMPORTED SUBSTITUTES

Nutritional values of local foods		
	Local food	Exotic (imported) food comparable
Vitamin C content	Guava fruit four times the fibre, 19 times the vitamin C	1 American apple
	One West Indian Cherry vitamin C content	15 American apples
Cholesterol	Coconut water has no cholesterol compared to butter or other animal fats, 1 tbsp of coconut milk has 4g fat compared to 11.5g fat for same amount of margarine	Olive oil
Mono-unsaturated fat	Jamaican ackee and avocado	Same type of fat as olive oil
	Callaloo (amaranth) 4x more calcium, 2x more iron, more than 2x vitamin A	Broccoli, cauliflower, Brussels sprouts
Fibre	Green banana, sweet potato and local breadfruit provide 1.5g per serving of about 70 calories	Irish potato, brown rice, whole kernel corn

See: <<http://vegetarianindominica.wordpress.com/category/local-foods/>> for further details.

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NOTES

1. The World Economic Forum in Davos, Switzerland, in 2010 presented a 'New Vision for Agriculture' – led by 17 global companies that championed the initiative – these included Archer Daniels Midland, BASF, Bunge, Cargill, The Coca-Cola Company, DuPont, General Mills, Kraft Foods, Metro, Monsanto Company, Nestlé, PepsiCo, SABMiller, Syngenta, Unilever, Wal-Mart Stores and Yara International.
2. See Perch (2010), where a review of existing NAPAs showed that 67.5 per cent did not prioritise gender, and 18 per cent did not prioritise poverty in their adaptation response. This is at odds with thinking that there is a two-way relationship between poverty and inequality (UNRISD, 2010; UNDP, 1990) and with LDC status, wherein poverty and inequality are central to limited progress on human development. Just three of the 12 NAPAs that demonstrated a multidimensional analytical framework for their projects, linking climate change concerns with the environment, gender and poverty, are from SIDS.
3. A biome is a large area with similar flora, fauna and microorganisms, such as a tropical rainforest or a coastal biome. Each of these large communities contains species that are adapted to its varying conditions of water, heat and soil. An ecosystem is much smaller than a biome. A biome can be thought of as many similar ecosystems grouped together.
4. See also Narasimhan (2011).
5. A few references on Institutional Framework for Sustainable Development (IFSD) that might be useful: <http://www.ieg.earthssystemgovernance.org/publications/special-issue-%E2%80%9Cmaking-it-happen%E2%80%9D-spotlights-ifsd> and <http://www.unep.org/environmentalgovernance/Portals/8/InstitutionalFrameworkforSustainabledevPAPER1.pdf>.
6. Ministers' Decision on SIDS calls for the urgent and full implementation of FME 17 Decision 9. The latter had called for UNEP support for, *inter alia*, green economy efforts in Caribbean SIDS; the environmental component of the Caribbean Community's (CARICOM) Single Market and Economy (CSME); and the CARICOM Climate Change Centre (CCCCC), while allocating dedicated technical and financial resources to its technical programme for SIDS in the LAC region.
7. These include: ensuring that the medium-term strategy will be implemented in a gender-responsive manner requires the full implementation of the UNEP Governing Council decision on gender equality and the environment and the draft UNEP gender policy and gender plan of action. Consequently, UNEP will strengthen the capacities of its staff and its partners with regards to gender issues and analysis to ensure that UNEP supports gender-responsive environmental management. This will entail continuous support to strengthen capacity internally and to build strategic alliances with external partners. At the administrative level, UNEP will continue to ensure that it abides by the United Nations Secretariat's recommended guidelines on gender-sensitive human resource management practices and implements policies that ensure that the work environment is safe and free from discriminatory practices. To implement the medium-term strategy and create a productive, flexible and results-oriented UNEP, the organisation needs to attract, foster and retain human talent that is aligned to programmatic needs. The overall aim of UNEP is to build a high-quality, multi-skilled and mobile workforce that is efficient, competent and possesses the highest degree of integrity. In doing so, UNEP will pay due regard to geographical representation and gender balance.
8. See, for example, documentation at Sustainable Economy and Green Growth – Who Cares? GenaNet: Gender, Environment and Sustainability, April 2013, and Friederike Knabe and Jacqueline Knoyok (2006). 'Overcoming barriers: promoting women's local knowledge', KM4D 2(1): 8–23.
9. See, for example, Silvia Federici (2009) on capitalism, colonialism, women and food politics.
10. See: <http://vegetarianindominica.wordpress.com/category/local-foods/> for more examples.
11. Roberta Williams runs The Gilbert Agricultural & Rural Development Center (GARDC) in Antigua, a training facility targeting youth and women providing positive entrepreneurial and employment alternatives. GARDC is an ecumenical programme of The Methodist Church in the Caribbean and the Americas (MCCA) <http://www.gardc.org/>.
12. See World Bank (2009).
13. See, for instance, FAO (2010).
14. What makes our food system really unsustainable is the predominance of the globalised commodity trade that has resulted in the integration of the food supply chain and its concentration in the hands of a few transnational corporations. This in turn has greatly increased the carbon footprint and energy intensity of food production and consumption.
15. UNEP figures accessed at http://www.grid.unep.ch/products/4_Maps/EU_carib_deforest20080222b.jpg.
16. Conversation with D. Rowan-Campbell, organic coffee farmer, Jamaica. See also Perch (2011) <http://cdkn.org/2011/07/green-economies-with-social-futures-a-focus-on-the-caribbean/>.
17. The Living Planet Report (2008) http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/ reports that in 2005, humanity's ecological footprint was 31 per cent larger than the planet's capacity to produce these resources. This ecological 'overshoot' means that it now takes about one year and three months for the Earth to regenerate what we use in a single year. Overshoot has increased by 5 per cent since the last Living Planet Report,

which was based on 2001 data. The CO2 footprint, which accounts for the use of fossil fuels, is almost half the total global footprint, and is its fastest growing component, increasing more than eleven fold from 1961 to 2005.

18. Author's observation and opinion.

19. Author's field observations.

20. The proportion of aid from bilateral donors to multilateral development institutions through core contributions is declining (OECD-DAC, 2011). According to the draft 2011 DAC Report on Multilateral Aid, core multilateral contributions as a share of Official Development Assistance (ODA) fell from 33 per cent in 2001 to 28 per cent in 2009. Meanwhile, earmarked funding to multilateral organisations is the fastest growing component of ODA, leading to what some are calling the bilateralisation of multilateral aid (OECD-DAC, 2011: 4). Earmarked funding increased from US\$13.4 billion in 2008 to US\$15 billion in 2009, representing 12 per cent of total ODA (OECD-DAC, 2011: 28). In total, roughly 40 per cent, or US\$52 billion, of gross ODA was channelled to and through the multilaterals in 2009 (OECD-DAC, 2011: 4).

21. See the Blue Carbon project: <<http://www.thebluecarbonproject.com/the-problem-2/>>.

22. Black and brown carbon emissions from fossil fuels, biofuels and wood burning are major contributors to global warming. Green carbon, the carbon stored in plants and soils, is a vital part of the global carbon cycle. Blue carbon is the carbon captured by the world's oceans and represents more than 55 per cent of the green carbon. The carbon captured in living organisms in oceans is stored in the form of sediments from mangroves, salt marshes and sea grasses. In addition to absorbing heat and regulating the Earth's climate, oceans are the largest long-term sink for carbon. Oceans store about 93 per cent of the earth's CO2 and capture more than 30 per cent of the CO2 released annually. Most of the carbon captured is stored not for decades or centuries but rather for millennia. Importantly, restoration of green and blue carbon habitats alone could mitigate emissions by up to 25 per cent. Blue carbon sinks are also central to the productivity of coastal zones, which provide a wide range of benefits to humans (e.g. as buffers against pollution and extreme weather events, as sources of food and livelihood security and social well-being) and services estimated at more than US\$25 trillion per year.

23. In July 2008, Venezuela enacts legislation to further support food sovereignty: the Law of Food Security and Food Sovereignty; the Law for Integrated Agricultural Health; the Law for the Development of the Popular Economy; the Law for the Promotion and Development of Small and Medium Industry and Units of Social Production. On 28 September 2008, Ecuador approves a new constitution recognizing food sovereignty. On 17 February 2009 Ecuador's Food Sovereignty Regime approves the Organic Law on Food Sovereignty. Adapted from Beauregard and Gottlieb (2009).

24. Roseau, Dominica, 8 February 2012 (Prensa Latina) Dominica's agricultural sector focused efforts on the cultivation and production of bananas to increase their exports to European countries, said authorities. This Caribbean nation is one of 10 receiving funding from the European Commission through the programmes BAM (Banana Accompanying Measures) related to the development of that crop. Some €190 million were allocated to provide additional support to the countries involved in the initiative so that they can adapt to new market conditions. From that number, Dominica expects to receive next year around €14–15 million, and it will try to make its banana production more competitive.

25. Final Draft Regional Food and Nutrition Security Policy, 14 October 2010.

26. For example at <www.climate.org>. SIDS are characterised as economically vulnerable, with small human populations, dependence on only one or a few sectors of the economy, and vulnerability to internal and global economic developments. Future changes in weather patterns and sea level predicted by climate change models will further affect virtually all areas of their economies and societies.

27. Small island states contain a highly unique range of biological diversity, with over 4000 species of endemic plants and animals, including some of the largest and most diverse coral reefs. Niche habitats and small populations often result in species with unique traits and adaptations to environmental and climatic conditions <www.climate.org>.

28. One of the central elements in maintaining the complexity of these agricultural systems is the social capital established by the local populations. Social capital is based on systems of trust; networks of exchange and reciprocity; shared rules, norms and sanctions; and organisation into groups and associations. In agricultural work, social capital can be discerned through social relations within and among domestic units, where it ensures the productivity of the traditional agricultural systems and plays an important role in the *in situ* management and conservation of local varieties

29. The Caribbean Community (CARICOM) has been analysing the implications that the new international context will have for the Caribbean Regional Program for Food Security. During the 11th meeting of the CARICOM in April 2008, it was agreed that climate change and food security, as well as the relationship between CARICOM and third countries, would be a high-priority issue at the 2008 ministerial meetings.

30. Conservation International (2009) identifies the Caribbean region as a biodiversity hotspot and an international conservation priority. Its many varied physical and marine environments support high levels of flora and fauna diversity and endemism. The Caribbean has about 13,000 species of plants, as compared to around 14,000 in all of North America. That makes the Caribbean five times more bio-diverse than the equivalent area of North America. Among Caribbean plant species, about 6550 are single-island endemics. Dominica is home to approximately 1250 species of plants, some of which are Caribbean endemics. There are 11 plants endemic only to Dominica. Currently, about 13 per cent of Caribbean land is protected, compared to 20 per cent for Dominica.

31. According to the US foodexport.org: "The Caribbean Basin remains a large and stable market for U.S. suppliers. With limited land, water and labor resources and no economies of scale for significant agricultural production, the region is and will remain highly dependent on food imports. The regulatory environment is also quite receptive to U.S.

products. The United States is the largest supplier of food products to the Caribbean Basin. Consumer oriented products accounted for over 50% of U.S. agricultural, fish and forestry exports to the Caribbean Basin, with poultry, red meats, snacks, dairy products, and processed fruit & vegetables rounding out the top five export categories. In 2009, the United States also exported \$36.5 million worth of seafood products to the region, an increase of over 22% from the prior year." At last report the USA reportedly supplies Antigua with 55–65 per cent of total food purchases. The food retail sector accounts for approximately 65 per cent of imports, and the remaining 25 per cent is used by the hotel, restaurant and institutional sector. The largest percentage of US exports are from staples, such as frozen chicken, beef, juices, canned goods, fruits and vegetables and dairy. Euromonitor has indicated that the market size of the packaged food retail business was US\$31.6 million in 2009, an increase of 25.8 per cent from 2004, or about US\$6.5 million. It also forecast growth of nearly 13 per cent to 2014, or US\$4 million during the period, for a total of US\$35.7million. See <<http://www.foodexport.org/Resources/CountryProfileDetail.cfm?ItemNumber=1005>>.

32. This emerged from key informant interviews for this paper.

33. Interview with Norman Norris, Fisheries, Dominica, 30 January 2012.

34. See UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States <<http://www.unohrrls.org/en/orphan/57/>>, updated July 2012.

35. *Ital* cooking excludes food that is chemically modified or contains artificial additives, including preservatives or colouring. Some people also avoid added salt in foods, especially salt with the artificial addition of iodine, while some people eat pure sea or kosher salt.

36. Author's observations from interviews with young men and women in Antigua.

37. The herbicide Paraquat, produced by Swiss agrochemicals giant Syngenta, has been banned by a European Union court for not meeting health standards. Swiss pressure group the Berne Declaration, which has fought for several years to have the product outlawed, hailed the decision as "a milestone". Paraquat has not been approved for use in Switzerland since 31 December 1989. The substance, which has been in use for more than 40 years, is the main ingredient in Basel-based Syngenta's Gramoxone. The weedkiller is used by millions of farmers worldwide in over 120 countries. Paraquat is the trade name for *N,N'*-dimethyl-4,4'-bipyridinium dichloride, one of the most widely used herbicides in the world. Paraquat, a viologen, is quick-acting and non-selective, killing green plant tissue on contact. It is also toxic to human beings and animals. Research has shown that it is linked to development of Parkinson's disease.

See: <<http://www.pan-uk.org/pestnews/Actives/paraquat.htm>> for toxicity and implication for marine life.

38. While it is common to hear mothers wanting to feed their children healthy and chemical free food, this was the first time the author had the occasion to speak with a gentleman who expressed his desire to ensure that his ageing mother would have only healthy food and nothing "chemicalised".

39. There are numerous shared migratory fish stocks in the region, and the fishing industry is highly important, including the industrial, artisanal and recreational sectors. Rather than a decline in overall landings, indications of overfishing can be observed through changes in species composition of landings, where species higher in the food chain decline over time. The unsustainable exploitation of fish stocks and other marine resources is a primary transboundary issue in the region.

40. See Annex for summary nutritional values of local foods.

41. Summary findings from focus group discussions and interviews.

42. See IPCC Working Group II: Impacts, Adaptation and Vulnerability <<http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=643>>.

43. See Lopes and Begossi (2007).

44. Historically, most of the natural vegetation of Antigua and Barbuda was cleared for the cultivation of sugar cane and cotton, while the economy is currently dominated by tourism, a sector that is also dependent on the quality of the environment. Inventories of the vegetation of Antigua and Barbuda suggest that a large percentage of plant species is classified as rare and endangered. Many terrestrial animals have become rare, endangered or extinct due to the loss and/or fragmentation of natural habitats such as mangroves, seagrass beds and coral reefs. Some water-birds and several species of reptiles have become extinct; sea turtles that are endangered worldwide are declining in numbers; while overfishing has resulted in a decline in the variety and number of reef species of fish. In addition, exotic species such as the mongoose have been introduced (UNDP, 2001).

45. The six major watersheds cover 43 per cent of the island's area and contain approximately 70 per cent of Antigua's population, 80 per cent of the groundwater supplies and 90 per cent of the surface water supplies.

46. Interview with Ruletta Camacho.

47. Source: Agriculture Development Profiles extracted from the CARICOM Secretariat's website (www.caricom.org).

48. Source: Agriculture Development Profiles extracted from the CARICOM Secretariat's website (www.caricom.org).

49. Notes and observations from interviewees.

50. Notes from interviews.

51. Notes from interviews with women farmers.

52. Notes from interviews with women farmers.

53. Also see *Country Poverty Assessment Report – Dominica 2010* <<http://www.caribank.org/uploads/publications-reports/economics-statistics/country-poverty-assessment-reports/Dominica+CPA++Main+Report+Final+%28Submitted%29.pdf>>.

54. Source: <www.eclac.cl/mujer/noticias/paginas/8/36338/Dominica.pdf>.

55. See World Trade Organization (2007) and also ECLAC (2010).

56. The work of more than 400 scientists over four years, the 2500-page report is a sobering account of the failure of industrial farming.

57. See IAASTD (2008).

58. A paradigm shift includes increasing investment in knowledge and information about natural processes, about the redistribution of access to and use of resources, about strengthening citizen involvement in decision-making processes and associating improved quality of life with equity.

59. Conversations with a range of women pointed to the lack of available training sessions and a growing interest in and demand for accessing these.

60. While some people argue that organic farming cannot feed the world, there is evidence that organic agriculture can have large-scale impacts: for example, farmers who practise sustainable organic rice farming in Asia proved that their production is higher and more stable than when they used chemical-intensive farming. Conversion of large-scale production to organic farming could also be relevant, for example, to enhance soil fertility and reduce water pollution. However, organic farming is not always synonymous with sustainability. For example, there are very large farms that are labelled organic but are not sustainable. Broader conservation technologies are needed in which all components of the ecosystem are taken into account. Ecologically intensive agriculture can go beyond organic farming and develop integrated solutions based on organic approaches, while also requiring, in certain conditions, external inputs or even biotechnologies.

61. Organic agriculture has developed, and guidelines have been detailed in writing over the last 50 years. Since the early 1990s the term 'organic agriculture' has become legally defined in a number of countries. It has its roots in the variously named biodynamic, regenerative agriculture, nature farming and permaculture movements which have developed in different countries. Numerous adaptations of the guidelines have taken place, but the common understanding is that: "practicing organic agriculture involves managing the agro-ecosystem as an autonomous system, based on the primary production capacity of the soil under local climatic conditions. Agro-ecosystem management implies treating the system, on any scale, as a living organism supporting its own vital potential for biomass and animal production, along with biological mechanisms for mineral balancing, soil improvement and pest control. Farmers, their families and rural communities, are an integral part of this agro-ecosystem. Both sexes are involved on equal terms" (UNDP, 1992).

62. See Parr et al. (1992) and also IFOAM EU Group (2010).



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