



SAC Climate Resilient Agriculture Report

Windward Commodities
and Helen's Daughters
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Sustainable Agriculture in the Caribbean (SAC) Project



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Climate Resilient Agriculture for Women and Youth in the Caribbean; Executive Summary



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Climate Resilient Agriculture for Women and Youth in the Caribbean; overview



- **To build sustainable resilience for the livelihoods for women and youth** it is critical that sustainable agricultural practices pervade all elements of crop or animal selection, growing, harvesting and selling.
- **Solutions are dependent on a mix** of cultural, economic, geographic, historical, political, and social-structural factors
- **The Caribbean will be impacted by a progressively drier and warmer climate**
This will reduce crop productivity and increase instances of crop failure. Similarly, increased rainfall and storms and rising sea levels are affecting soil erosion and suitability, increasing susceptibility of crops to disease and pests. Climate variability is making it difficult for farmers to plan and discouraging participation in agriculture. See SAC Sustainable Agriculture Report for specific details per country.
- **Women and youth will be disproportionately affected**
This is due to their un-equal assets and informal roles and rules that favour men. These include small plots more vulnerable to flooding and limited information and finance for investment in resilient crops and practices
- **Sustainable agriculture practices have the potential to positively impact incomes**
But only with the right engagement with women and youth to address critical needs such as time saving, family health, food and personal security. Sustainable practices can also re-ignite interest in agriculture, particularly from youth.



Climate Resilient Agriculture for Women and Youth in the Caribbean; Risks and Opportunities



Risks for women and youth:

- **The main risk is decreased agency and control** of resources due cost and knowledge needed to adapt to new practices and technologies, exacerbating current inequalities

Opportunities for women and youth:

- **Income stability** from reduced crop losses, increased access to and control of resources and sustainable incomes from wild Non-Timber Forest Products (eg acai, Suriname)
- **Income diversification** with opportunity to become leaders in non-traditional/ new sectors such as nurseries and seed banks, and production of local materials for resilient practices such as goat fodder, shade houses, water management systems
- **Optimising value from land** through intensive farming practices and intercropping
- **Leadership and expertise** in crops that will benefit from climate change (eg cassava, sweet potato)
- **Time savings and security** with activities close to home (goat pens, hydroponics)
- **Health benefits** including reduced chemical usage (organic), resilient goat breeds
- **Increased self-sufficiency** in resilient inputs/ seed production and or fodder for livestock
- **Increased interest and participation** through exciting new practices and technologies



Climate Resilient Agriculture for Women and Youth in the Caribbean; overview of recommendations



Recommendations address the need for strategic engagement at a policy level, strong engagement and support to women and youth at a country and sub-sector level and the need to leverage organisations and funds for a meaningful, game-changing impact for women and youth on the ground

Recommendations (see details in slides 13-23)

1. Engagement, collaboration and inputs to governments on Climate Change Strategies and Projects
2. Engagement with women and youth to understand and mainstream suitable sustainable practices
3. Farmer Field School approach for women and youth for successful adoption and use
4. Use of climate resilient varieties/ breeds and expanding the role of women and youth in supply
5. Expanding local crop, water and land management practices that work for women and youth
6. Leveraging existing resources, organisations and funds
7. Data and Communications – weather, mobile comms, radio etc



Climate change will impact all SAC countries and all SAC sub-sectors with similar cause and effect



Country	Population (m/f)	Area of country	Cultivated Land	% farmers (total)	% female farmers	Climate Projections by 2050
St Lucia	F: 93,207 M: 90,422	616km ²	106 km ²	15.3% ¹	2.89%	<ul style="list-style-type: none"> • ↑ 1.7°C mean annual temperature • ↑ 1 hour sunshine hours per day • ↑/↓ -19 to 4 mm annual rainfall • ↑ sea level rise and storm surge
Dominica	F: 35,387 M: 36,738	751km ²	250km ²	12.4%	3.4%	<ul style="list-style-type: none"> • ↑ 1- 4°C mean temperature • ↑ 5-15% wind speed • Rainfall extremities (high intensity rainfall and droughts) • Increase in category 5 storms
Jamaica	F: 1,491,520 M: 1,469,641	10,991k m ²	4,440km ²	18.6%	8.22%	<ul style="list-style-type: none"> • ↑ 2-2.1°C mean temperature • ↑ 2.1 – 2.2°C minimum temperatures (warmest month) • ↑ 1.8-1.9°C mean temperatures (coldest month) • ↑/↓ -44% to +18% rainfall • ↓ 700mm - 800mm annual rainfall • Higher variability in frequency and magnitude of drought or heavy rains



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Country	Population (m/f)	Area of country	Cultivated Land	% farmers (total)	% female farmers	Climate Projections by 2050
Suriname	F: 291,812 M: 294,822	163,820km ²	840km ²	16%	24%	<ul style="list-style-type: none"> • ↑ rainfall variabilities with flooding, but decreased rainfall overall • ↑ sea level by 20-51cm
Guyana	F: 391,010 M: 395,549	214,969km ²	12,513km ²	13.4%	7.88%	<ul style="list-style-type: none"> • ↑ 2.5°C mean temperature • ↓ Annual precipitation by -31.94mm (-362.05mm to 330.11mm) in 2040-2059

Relevant Government Climate Change Strategies:

St Lucia: National Adaptation Plan with associated sector adaptation plans 2018 - 2028

Dominica: National Resiliency Development Strategy Dominica 2030

Jamaica: National Adaptation Plan being drafted, The State of the Jamaica Climate 2015

Suriname: National Adaptation Plan 2019 - 2029

Guyana: Draft National Adaptation Plan, Draft Climate Resilience Strategy and Action Plan for Guyana 2015



Addressing Climate Change on sub-sectors and countries varies and will require localized solutions on the ground



	↑ or ↓ rainfall	↑ temperatures	High humidity	↑ sea levels and salinity in soil
Lettuce (St Lucia)	<ul style="list-style-type: none"> ↑ destruction of crop in open fields soil erosion and landslides on elevated areas 	<ul style="list-style-type: none"> Wilting and heat stress Early maturation and ↓ crop duration Unusable crops: due to bolting, loss of colour Bitterness 	<ul style="list-style-type: none"> Rapid growth rates Tip burn Calcium deficiencies 	
Cabbage (St Lucia)	As above	<ul style="list-style-type: none"> Decline in seed production Lower dry matter content Lower yields 	Cabbage budworm, cabbage looper, cabbage white butterfly, diamond back moth, fall armyworm and leaf miners	
Bell Peppers (St Lucia)	As above	<ul style="list-style-type: none"> Vulnerable to pest infestations due to high transpiration rates in germination and transplanting 	Late Blight, Fusarium Wilt, Bacterial Wilt	Crop does not perform well in saline conditions
Tomato (St Lucia)	<ul style="list-style-type: none"> Impacted by drought conditions Risk of flooding 	<ul style="list-style-type: none"> Require high lands that are lower in temperature 		



Addressing Climate Change on sub-sectors and countries varies and will require localized solutions on the ground



	↑ or ↓ rainfall	↑ temperatures	↑ sea levels and salinity in soil
Sweet Potato (St Lucia)	<ul style="list-style-type: none"> • Less impacted by hurricanes (underground) • Can be grown on marginal ground • Increases potato weevil will impact yields particularly in droughts 	Positive change: <ul style="list-style-type: none"> • Increased biomass (32-37%) with 2.8% increase in temperature • Increased yields (2050 and 2070 St Lucia CARIBSAVE climate model) 	
Dasheen (St Lucia)	<ul style="list-style-type: none"> • High moisture plant will not tolerate drought well (high stress) 		Negatively impacted by salinity and rising sea levels
Onion (Dominica)	<ul style="list-style-type: none"> • Negatively impacted by drought 	<ul style="list-style-type: none"> • speeding up bulbing • bolting and lower yields 	
Irish Potato (Dominica)	<ul style="list-style-type: none"> • Crop decay: fluctuations in yield quality and quantity • Reduction in tubers per plant with low water in growing season 	<ul style="list-style-type: none"> • Increased pest and diseases • Foliar development and delayed tuberization • ↑ Nos of smaller tubers per plant 	



Addressing Climate Change on sub-sectors and countries varies and will require localized solutions on the ground



	↑ or ↓ rainfall	↑ temperatures	High humidity	↑ sea levels and salinity in soil
Celery, Chive and Parsley (Dominica)	<ul style="list-style-type: none"> Parsley thrives in rich, well watered soils, and yields will decrease even in elevated areas of Dominica Parsley should be shaded in tropical areas Celery and Chives will react as above, with chives being slightly more tolerant of high temperatures 			
Hot Pepper (Dominica)	<ul style="list-style-type: none"> Droughts reduce nutritional uptake, infertility and reduced productivity Dry periods cause fungi growth and stems to dry, wilt, and affect fruit production 	<ul style="list-style-type: none"> Increased susceptibility to diseases related to insects, fungi, bacteria and pest/nematodes 	<ul style="list-style-type: none"> Scotch bonnet susceptible to viruses, nematodes, fungi, bacterial wilt* 	
Ginger (Jamaica)	<ul style="list-style-type: none"> Soft rot/rhizome rot and collapsed stems caused by heavy rain after planting Other diseases are caused by and spread through flooded, poorly drained soil and high temperatures including bacterial wilt, leaf spot, storage rot 			
Tumeric (Jamaica)	<ul style="list-style-type: none"> As above including leaf blotch Drought will decrease chlorophyll content and reduce the size of leaves and roots. 			



Addressing Climate Change on sub-sectors and countries varies and will require localized solutions on the ground



	↑ or ↓ rainfall	↑ temperatures	High humidity
Goats (Jamaica)	<ul style="list-style-type: none"> Increased spread of disease and parasites ↑ mortality and ↓ productivity in lactating goats Confined goats at risk of drowning 	<ul style="list-style-type: none"> Impacting growth, milk and meat production Solar radiation impacts quality of milk 	
Mangoes (Guyana)	<ul style="list-style-type: none"> Negative impact on tree photosynthesis, vegetative and reproductive development impacting fruit quality and production 		
Guava (Guyana)	<ul style="list-style-type: none"> Drought conditions will cause flower drop and severe physiological disorders, such as spongy tissue. 	<ul style="list-style-type: none"> Deterioration in physiological processes Increased susceptibility to fruit flies 	
Carambola, Passion Fruit (Guyana)	<ul style="list-style-type: none"> Declining suitable agricultural lands and loss of biodiversity will affect availability of suitable pollinators for passion fruit and threaten reproduction 		
Pineapple	<ul style="list-style-type: none"> Drought results in early withering of the peduncle leading to corky micro-fissures Reduction in sugar content (dry conditions), reducing fruit marketability 		



Impact of Climate Change on sub-sectors and countries varies and will require localized solutions on the ground



	↑ or ↓ rainfall	↑ temperatures	High humidity
Brassicas (Guyana)	<ul style="list-style-type: none"> • Can be destroyed by flooding • High rainfall impacts sugar content 	<ul style="list-style-type: none"> • Early development of seed pods and crop wane through early expulsion of seeds 	
Sweetcorn (Guyana)	<ul style="list-style-type: none"> • Adversely impacted by flooding, high winds and storms • Rainfall can offset impact of higher temperatures 	<ul style="list-style-type: none"> • Scenarios show increase of 2°C would result in 40% ↓ yield 	
Cassava (Suriname)	<ul style="list-style-type: none"> • Crops will be affected by flooding 	<ul style="list-style-type: none"> • Crop will perform well in ↑ temperature, drought conditions and poor soil • Cassava mosaic disease, whitefly, cassava bacterial blight and mealy bug 	
Acai Berries (Suriname)	<ul style="list-style-type: none"> • Drought resistance, can go without water for 61 days in the Amazon • Negatively impacted by flooding • Clearing of surrounding vegetation and ecosystem impacts plant growth 	<ul style="list-style-type: none"> • Plant yields increase (hot years) • Damage to fruit in drought 	



Recommendations; overview



Recommendations address the need for strategic engagement at a policy level, strong engagement and support to women and youth at a country and sub-sector level and the need to leverage organisations and funds for a meaningful, game-changing impact for women and youth on the ground

Recommendations

1. Engagement, collaboration and inputs to governments on Climate Change Strategies and Projects
2. Engagement with women and youth to understand and mainstream suitable sustainable practices
3. Farmer Field School approach for women and youth for successful adoption and use
4. Use of climate resilient varieties/ breeds and expanding the role of women and youth in supply
5. Expanding local crop and land management practices that work for women and youth (examples)
6. Leveraging existing resources, organisations and funds
7. Data and Communications – weather, mobile comms, radio etc



Recommendations to realise opportunities for women and youth in sustainable agriculture



1. Leverage Climate Change Strategies for agriculture for women and youth through engagement with Government (0-5 years)

- Review relevant areas of National Climate Change Strategies that could benefit the sub-sectors (see slide 13 for details)
- Explore options to leverage resources and funds to support women and youth with SAC eg MoA Extension Officers, Information Services
- Find specific activities for meaningful and specific collaboration eg through alignment with National Climate Change Strategies eg below:

Eg. Relevant Projects:

- **Guyana:** Hinterland Environmentally Sustainable Agricultural Development Project
- **St Lucia:** Building resilience for adaptation to climate change and climate vulnerabilities in agriculture in Saint Lucia
- **Dominica:** Emergency Agriculture Livelihoods and Climate Resilience Project, Disaster Vulnerability Reduction Project
- **Jamaica:** Disaster Vulnerability Reduction Project, Southern Plains Agricultural Development Project (SPAD), Jamaican Sustainable Farm Enterprise (JSFE)
- **Suriname:** Sustainable Agriculture Productivity Program (SAMAP), Climate Smart Agriculture Project



Climate Change Strategies from Government Plans that could benefit SAC sectors



Actions to be implemented	Potential alignment/Benefits to Project
Guyana	
Crop risk mapping based on projected spatial and temporal changes	Sub-sectors risk information for adaptation
Irrigation Systems Assessment (decentralization and empowerment strategy).	Improved drainage and irrigation for sub-sectors
Species monitoring for climate change impacts	Nuanced and detailed sub-sectors climate change impacts information
St. Lucia	
“Enhanced-Value Chain Business Development Centre” for Climate Resilient Agriculture (CRA)	Sub-sector value chains benefit from promotion and enhancement
Awareness raising campaigns on agro-biodiversity	Communication sub-sector products developed
Research on integrated pest/disease management	Non-chemical pest management methods
Sustainably cultivate and conserve heirloom species	Climate Resilient seeds and plants
Suriname	
Strengthen participation in agriculture among women	Participation of project beneficiaries
Increased adoption of techniques such as appropriate greenhouses and hydroponic gardens	Uptake of greenhouse and hydroponic technologies
Dominica	
Attracting young professionals to actively participate in agricultural	Youth mainstreaming in sub-sectors
Mainstreaming the disaster risk reduction in agriculture	Disaster resilient sub-sectors information
Jamaica	
Develop modern and efficient farming systems	Climate resilient sub-sectors
Agricultural best practices development	Case studies on sub-sectors of best practice



Recommendations to realise opportunities for women and youth in sustainable agriculture



2. Engagement with women and youth on the ground to mainstream sustainable practices (6 months)

Explore use of CIAT Climate-Smart Agriculture Rapid Appraisal: (CSA-RA) – or similar approach - with women and youth fully engaged and represented in line with SAC's beneficiary ratios:
2:1:1 representation women: youth: men

Approach: participatory workshops, expert interviews, household/ farmer interviews and farmer transect walks to gather the realities and challenges facing diverse farming communities

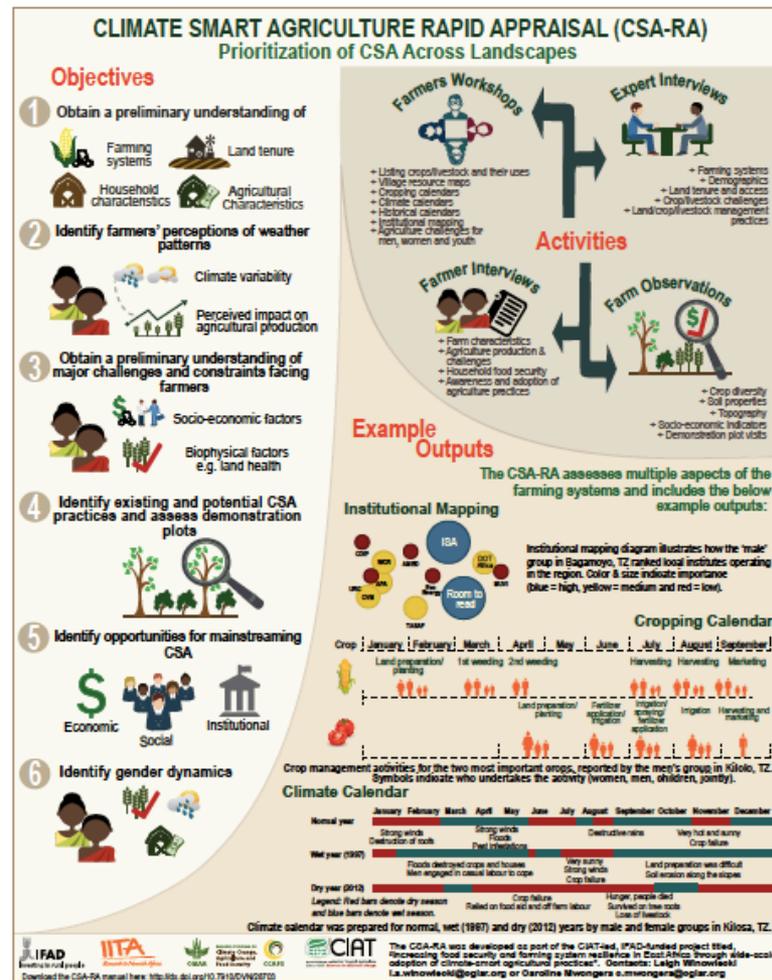
Eg Manual: with approach, questionnaires, considerations:

<https://dataverse.harvard.edu/file.xhtml?persistentId=doi:10.7910/DVN/28703/U4BQSE&version=9.0>

See next slide for infographic on approach

2. Early engagement with women and youth on the ground – continued (6 months)

- **Obtain preliminary understanding** of farming systems, household characteristics, infrastructure, land tenure, household expenditure, asset ownership, profitability of farming enterprises etc
- **Identify farmers' perceptions of weather patterns and perceived impact** on production
- **Obtain preliminary understanding of major challenges and constraints** faced by farmers (eg climate variability, land health, specific cropping or livestock issues, markets etc
- **Identify existing and potential CSA practices**, agronomic practices, land management practices and assess demonstration plots of those practices
- **Identify opportunities for mainstreaming CSA** and potential social, economic and/ or institutional barriers to adoption





Recommendations to realise opportunities for women and youth in sustainable agriculture



3. Farmer Field School approach for gender and youth sensitivity to adoption and use (12 -18 months)

- Engage with extension officers (Ministry of Agriculture), Farmer Facilitators (FFs) or NGOs **to set up Farmer Field Schools (FFS) for women and youth within the SAC sub-sectors** to focus on adaptation and mitigation to climate change that is **cultural, gender and youth responsive**
- **Collaborate with government, research organisations, universities, colleges** for use of land for demonstration plots
- FFS are used in all SAC countries except Suriname and utilizes people-centered and experiential learning focused on problem solving and discovery. They can:
 - **Build knowledge** to analyse production systems, identify problems, test possible solutions, and adopt the most suitable practices to farming systems (FAO, 2003)
 - **Encourage the practice and testing/evaluation** of sustainable land use technologies, and introduce new technologies in line with their own tradition and culture
- From a programme perspective the approach is highlight participatory and time bound
 - one agricultural production cycle or a year, involving a group (commonly 20-30) farmers
 - group observation, discussion, analysis, presentation, and collective decision making and action



Recommendations to realise opportunities for women and youth in sustainable agriculture



4. Climate resilient varieties/ breeds and expanding the role of women and youth in supply eg:

Establishing climate smart varietal of crop/ livestock

- knowledge
- Income & assets
- time savings
- health
- food security
- leadership

- Collaborate to expand existing resilient varieties in circulation eg Cox Farms St Lucia SSLYY Dasheen (resilient to fungal infections), Jamaica ginger
- Reduce time to crop maturity to reduce exposure and speed up recovery from shocks (eg CIAT's system for rapid multiplication of genetically superior cassava)
- Make endemic crops resilient if possible (eg Dominic ginger) and use of clean planting materials (eg FAO ginger value chain project in Jamaica)
- Work with CARDI and IICCA to secure breeding stocks of goats that are more resistant to increasing temperature eg Anglo-Nubians, Alpine, and Saanan
- Work with relevant Government and national research agencies and regional organisations such as CARDI (eg in conjunction with Centre of Pacific Crops and Trees), IICA,FAO on specific varieties for sub-sectors and countries, CELOS (Suriname) for cassava plant breeding, greenhouses, animal fodder

Nurseries and seed banks

- Engage women and youth to establish nurseries with disease free material working with key organisations and seed banks

Fodder production

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- Encourage forage production, and the promotion of silvopastoral systems combining forestry, forage plants and livestock
- Sun drying of high protein plants for use during the wet / hurricane season



Recommendations to realise opportunities for women and youth in sustainable agriculture



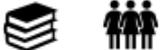
5. Expanding local crop and land management practices that work for women and youth eg.

<p>Soil Management (conserving and preventing erosion)</p> 	<ul style="list-style-type: none">• Explore techniques of tillage developed by Windward Islands Farmers Association (WINFA)• Use of vetiver grass to prevent landslides and natural erosion. This can be obtained from Dominica, St. Vincent and the Grenadines, Guyana, and Jamaica if not available locally• Windbreaks using vetiver grass and other economical crops such as mango, soursop, and cocoa (higher resilience to climate change)
<p>Water Management:</p> 	<p>Water harvesting and storage including:</p> <ul style="list-style-type: none">• Indigenous practices including digging of ponds to catch and hold water• Low-cost solar water pumps and drip irrigation systems• Drainage and irrigation to control water flow• Drain clearance to reduce flooding• Engage Water Users Associations (WUA) to manage local water sources• Low water use solutions such as sprinkler system and gravity water systems

5. Expanding local crop and land management practices that work for women and youth eg.

<p>Seedlings v seeds</p> 	<p>Produce/ secure seedlings rather than germinating plants from seeds:</p> <ul style="list-style-type: none"> • reduces time exposed to climate variabilities in the open • reduces the need for tillage of the soil which fractures the soil, disturbs soil composition, removes soil cover, causing ↑ run off and erosion
<p>Organic practices</p> 	<ul style="list-style-type: none"> • Avoid handling and digesting chemicals (eg Dominica)
<p>Integrated Pest Management</p> 	<ul style="list-style-type: none"> • Establishing environmentally sustainable, effective Integrated Pest Management approaches • Prevent overuse of pesticides eg in Guyana
<p>Intercropping</p> 	<ul style="list-style-type: none"> • Enable pollinators, natural predators to pests and other ecosystem services • Reduce issue of land availability eg acai and cassava, fruit and vegetables
<p>Cover Crops</p>	<p>Such as planting nitrogen-fixing legumes to benefit fruit, cassava etc</p>
<p>Agroforestry</p> 	<p>Collaborate with eg. WWF and IUCN on best practices for ecosystem management of Acai forests and the establishment of Acai plantations</p>

5. Expanding relevant local crop and land management practices that work for women and youth eg.

<p>Shade houses and Greenhouses</p> 	<p>Engage women and youth in development of prototypes of shade houses and greenhouses to mitigate exposure to climate change in open fields:</p> <ul style="list-style-type: none"> • Produce low cost shade houses using local materials eg <ul style="list-style-type: none"> • indigenous materials of bamboo and straw, or coconut leaves • hybrid houses using indigenous materials and imported plastic • Eg 70% bell pepper production in Brazil is in shade houses
<p>Pens and shelters</p> 	<ul style="list-style-type: none"> • Engage women and youth in using local materials to build pens and shelters to house goats
<p>Solar</p> 	<ul style="list-style-type: none"> • solar pumps, for using and obtaining water especially during drought periods
<p>Hydroponics</p> 	<ul style="list-style-type: none"> • Explore low-cost hydroponics options for women and youth for climate resilience, cultivation in yards close to home, maximise space through elevated production



Recommendations to realise opportunities for women and youth in sustainable agriculture



6. Collaborations with organisations and funds to support women and youth

Research and Tech Assistance	Regional: CARDI, IICA, FAO Ministry of Agriculture agencies and extension officers (see Stakeholder map per country)
Climate Smart Expertise	<ul style="list-style-type: none"> International Centre for Tropical Agriculture (CIAT) Agricultural Research Centre for International Cooperation (CIRAD): Elisabeth Claverie (CEO)
Potential Collaborations	World Wildlife Fund and International Union for Conservation of Nature (IUCN): agroforestry Partnerships for Forests (P4F): Acai development in Colombia (Luis Rios)
Farmer Groups	WINFA, farmer/ community groups for resilience and post shock 'bounce back' (eg Dominica)
University/ College	Eg. University of the West Indies, Eg. Sir Arthur Lewis Community College (St Lucia) Centre of Agriculture research of the Anton de Kom University of Suriname (CELOS) eg cassava
Private Sector	Explore potential investments in sustainable supply chains: TOPCO, De Molen, Grace Foods etc
Funds:	<ul style="list-style-type: none"> Local funds eg Environmental Foundation of Jamaica, Suriname SCSD (see stakeholder maps) UNDP GEF Small Grants Programme: climate change adaption grants Green Climate Fund (GCF), United Nations Convention on Climate Change (UNCC) REDD+ programme, Inter-American Development Bank and Caribbean Climate-Smart Accelerator
Insurance	<ul style="list-style-type: none"> Influence accessibility and gender responsiveness of insurance products eg Livelihoods Protection Policy (LPP), a parametric index-based micro insurance product available in St Lucia and Jamaica from Caribbean Policy Centre and Munich Climate Insurance Currently distributed through social aggregators like credit unions, farmers cooperatives etc

7. Data and Communications eg weather, mobile comms, radio etc

Information

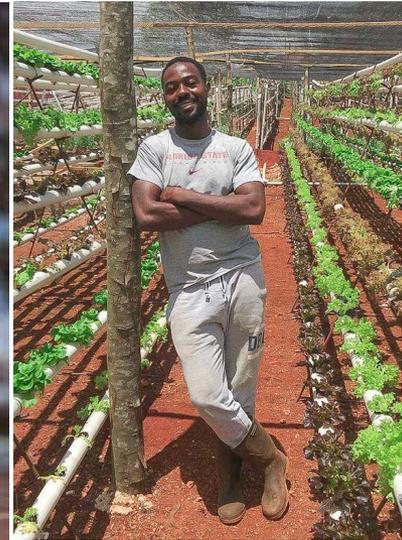
- Establish effective ways to disseminate knowledge on climate practices such as:
- Explore mobile communications and a collaboration with Digicel or Flow such as the Ecofarmer platform in Zimbabwe: <https://www.ecofarmer.co.zw>

Communications

- Work with local role models and social media agencies to attract women and youth to agriculture with climate smart technology and interest eg:

Inspiration:

Former Olympian Ricardo Chambers has established a vertical aquaponics farm in Spur Tree, Manchester, Jamaica, and has ambitions to revolutionise farming in Jamaica and across the Caribbean. He could be a strong role model for youth and for technology for the SAC programme.



End Notes/References

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