



Addressing Disaster Risk Management in Caribbean Agriculture



Natural disasters such as drought, hurricanes, earthquakes and floods have had devastating impacts on Caribbean economies and livelihoods over the last decade.

On average, there have been six natural disasters in the region annually between 1970 and 2006, with higher incidences in Haiti and the Dominican Republic. The active hurricane season of 2004 resulted in damages in the Caribbean amounting to USD 3.1 billion¹, with catastrophic impacts on the gross domestic product (GDP) of member countries, particularly in Grenada (estimated at 200 percent of GDP²).

These shocks have serious macroeconomic effects which have increased the incidence of poverty and which could even lead to economic crises in the country. The Agriculture Sector in particular, has been severely affected, by these weather-related and seismic events. Consequently, the region's food and nutrition security has been impacted. These impacts include, inter alia, loss of crops and livestock, reduced agricultural productivity, malnutrition, forest fires, destruction of housing for livestock, increased migration of fish from the region, high food prices and loss of livelihoods of affected farmers and fisherfolk.

Table 1 over page summarises the impacts of the natural hazards in the region's agriculture sector over the past 15 years.

KEY FACTS

- The Agriculture Sector and food and nutrition levels in the Caribbean have been greatly affected by natural disasters.
- Climate models predict that the Caribbean will become up to 30% drier during the wet season and that droughts will become more frequent and severe.
- FAO works with Caribbean governments in the areas of Disaster Risk Reduction, in building resilience and also in recovery from disasters. Some of the achievements of FAO's work in DRM include the development of decision support tools such as Early Warning Systems and National Water Information Systems as well as improved capacities in Climate Smart Agriculture.

Table 1: Summary of Impacts of natural hazards on the Agriculture Sector of the CARICOM Countries during the period 1998 – 2013

Country	Year	Impact
DROUGHT		
Guyana	1998	35% of rice fields in Guyana left uncultivated because of insufficient water. Water rationing, cessation of logging and river transport in some places, loss of livestock, > 1500 Amerindian families who rely on agriculture affected.
Dominica	2010	43% reduction in banana exports in first 11 weeks of 2010
St Vincent and the Grenadines	2010	20 % reduction in agricultural production 155% increase in price of tomatoes (Feb – Mar)
Trinidad and Tobago	2010	20.1% increase in price of fruits compared to prior month (Feb) Bush fires destroyed large acreages of citrus farms Increase in cost of citrus importation from US\$ 6.3 to 8.3 million by the end of the year
Antigua and Barbuda	2010	Potworks Reservoir all but dry 25% decrease in onion production 30% decrease in tomato production
Grenada	2010	38 small farmers in northern and eastern districts affected USD 64,500 in losses 340,000 litres of water shipped from Grenada to Carriacou
HURRICANES		
Grenada (Ivan)	2004	USD 889 million in damages and losses to the economy (200% of GDP) USD 37 million in losses to the Agriculture sector 100% of banana industry destroyed 40% of mature cocoa trees destroyed 90% of nutmeg trees toppled Total average annual revenue available to farmers decreased by 90%
Bahamas (Francis and Jeanne)	2004	USD 550 million in damage and losses (10% of GDP)
Jamaica (Ivan)	2004	USD 75 million in damages (8% of GDP)
Belize (Dean)	2007	USD 89.1 million in losses to the economy USD 54 million in losses in the Agriculture sector 90.6% of cropping sector destroyed
Jamaica (Dean)	2007	USD 329.34 million in losses to the economy USD 43 million in losses in the Agriculture sector 56,537 crop farmers and 7 170 livestock farmers seriously affected
St. Lucia (Dean)	2007	14% of population affected including 47% of the vulnerable community USD 10 million in losses in the Agriculture sector 67% of banana industry destroyed USD 5.7 million in losses in banana exports
St Vincent and the Grenadines (Low level trough)	2013	Total impact on the agriculture sector - EC \$32,398,175 (USD 11,999,324), of which total damage is estimated at EC \$29.454 (USD 10.9) million and total loss at EC \$2.943 (USD 1.09) million Forestry sub-sector accounted for 74.1%, while total effect on the 'other crops', plantains and infrastructure were 6.9%, 5.8% and 5.3%, respectively.
EARTHQUAKE		
Haiti	2010	USD 7.8 billion in damages (104% of GDP) 200,000 deaths 9% reduction in cereal production compared to the previous years 20% reduction in pulses production 12% reduction in root crops production 14% reduction in plantain production



The Intergovernmental Panel on Climate Change, in its report for 2014 predicts that the climate variability in the Caribbean is likely to be exacerbated by Climate Change. Climate models predict that the Caribbean will become up to 30% drier mainly during May to November (which is usually the wettest period). Annual precipitation will reduce by 5 – 15% and temperatures will increase between 1 – 5 degrees C and consequently droughts will become more frequent and severe. Countries which rely mainly on surface water (Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines) may be more vulnerable. Salt water intrusion is also possible due to over-extraction of groundwater for irrigation. Countries such as Barbados, Antigua and Barbuda and St Kitts and Nevis (<1000 m3 fresh water/capita), which FAO classifies as ‘water-scarce’ are likely to be most severely affected by droughts. Even non-water scarce countries may also be affected during the dry season. Moreover, extreme events such as hurricanes and droughts are likely to be more frequent and severe.

Consequently, there is an urgent need for increased

integration of disaster risk management (DRM) in agriculture development analysis and planning in light of the projected impacts of climate change and variability on food and nutrition security of Caribbean countries.

Caribbean Response: Policies and Plans

To address this issue and reduce the risks and impacts, a number of initiatives have been undertaken at the regional and national levels through the implementation of policies, plans and mitigation and adaptation strategies. These include:

1. The **Comprehensive Disaster Management (CDM) Strategic Framework**, guided by the Hyogo Framework of Action, was spearheaded by the Caribbean Disaster Emergency Response Agency (CDERA) now the Caribbean Disaster Emergency Management Agency (CDEMA) in 2001. The strategic objective of the CDM framework is to integrate disaster management considerations into the development planning and decision-making process of participating states. In 2007 a revised and Enhanced Regional Strategy and Programming Framework to guide CDM programming in the Caribbean during the period 2007 – 2012 was developed. The enhanced CDM Strategy provided the baseline for developing the 2014-2024 CDM Strategy. The main priorities are: Hazard Mapping and Vulnerability Assessment, Flood Management, Community Disaster Planning, Early Warning Systems, Climate Change and Knowledge Enhancement. FAO is the lead agency with responsibility for the Agriculture Sector of the CDM Strategy.
2. The **CARICOM Regional Framework for Achieving Development Resilience to Climate Change: 2011 – 2021**. This Regional Framework was guided by the Liliendaal Declaration³ and provides a vision for transformational change in the Caribbean response to the challenges of a changing climate. The Implementation Plan was approved by the Heads of Government in 2012 and defines the Regional strategy for coping with Climate Change in key sectors, one of which is agriculture. Its objective is to build resilience to a changing climate and create low carbon economies. FAO has been playing a role in promoting Climate Smart Agriculture throughout the region.
3. The **Jagdeo Initiative** outlines the 9 key binding constraints to agricultural development in the region. Each binding constraint is guided by a Technical Management Advisory Committee (TMAC). Two of the TMACs of relevance to DRM are the ones which deal with (a) Disaster Risk Management and Praedial larceny and (b) Land and Water Management. These two TMACs were led by FAO. Recently, the Council for Trade and Economic Development (COTED) approved the merging of the two TMACs into a new Technical Working Group (TWG) for Natural Resources, Climate Change and DRM. FAO is the lead coordinating agency of this new TWG.
4. At the national level, FAO has assisted the Governments of Belize, Dominica, Jamaica and Guyana to develop and implement **Disaster Risk Management Plans for the Agriculture Sector**. FAO has also prepared a report on the Status of Implementation of DRM plans for the agriculture sector in the Caribbean⁴. This report includes information on best practices and lessons learnt in developing and implementing Agriculture DRM plans in the Caribbean.
5. In the area of **risk transfer**, the Livelihood Protection Policy has been developed under the auspices of the Caribbean Risk Adaptation and Insurance in the Caribbean Project. This project is led by the Munich Climate Insurance Initiative (MCII) – hosted by the UN University Institute for the Environment and Human Security (UNU-EHS). It is implemented by MCII with consortium partners from the Caribbean Catastrophe Risk Insurance Facility (CCRIF), MicroEnsure and Munich RE. Funding and support are provided by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) under the International Climate Initiative.



Caribbean Response: Tools and Information Systems

At the regional and national level, a number of tools and information systems and products have been developed, which are aimed at providing more reliable data, particularly for early warning systems to inform decision making on appropriate actions to be taken by policy makers, farmers, extension officers and other key stakeholders to mitigate and reduce the effects of natural hazards. These are summarised in Table 2 below:

Table 2: Tools and Information Systems currently used in the Caribbean to assist in decision making in DRM

Tool/Information System	Application	Responsible Agencies
National Water Information Systems	Repository for hydrologic, climate, land, watershed, infrastructure and water-related data. The systems are extremely powerful quantitative and qualitative tools which allow not only the archival of data, but also display information in a very comprehensive and visual manner to give a snapshot of the water resources at any time and geographical scale.	FAO (TCP), CIMH and Mc Gill University (under the CARIWIN Project funded by CIDA)
Early Warning Systems	<p>National Drought Monitoring Networks (in three pilot countries – Jamaica, Grenada and St Lucia) and National Drought Early Warning and Information Systems (DEWIS) Implementation Plans</p> <p>Food and Nutrition Security Information Early Warning System (FNSIEWS) prototype developed. The prototype is a functional software application that captures and presents data to support Food Security Analysts in assessing and forecasting national food security status.</p> <p>FAO's Global Information and Early Warning System on Food and Agriculture (GIEWS) reviews the world food supply/demand situation, issues reports on the world food situation, and provides early warnings of impending food crises in individual countries.</p>	<p>CIMH, FAO, Brazilian Cooperation</p> <p>FAO</p> <p>FAO</p>
Caribbean Basin Monitoring and Drought Forecasting Outlooks	Publishes drought and precipitation projections up to at least three months prior to the event	CIMH, CIDA (CARIWIN Project)
Climate Impacts Database (CID)	Reports extreme levels of rainfall, particularly drought	USAID funded "Building Capacity to Manage Water Resources and Climate Risk in the Caribbean" project
Caribbean Agrometeorological Initiative (CAMI)	Improved dissemination and application of weather and climate information using an integrated and coordinated approach	CARDI, World Meteorological Organization (WMO), National Meteorological and Hydrological Services (NMHSs) funded by EU-ACP
Livestock Emergency Guidelines and Standards (LEGS)	Develops and publishes studies and guidelines for appropriate and timely livestock-based livelihood responses in emergencies using a participatory and evidence based approach	FAO

FAO's work in DRM in the Caribbean

The FAO has been assisting Caribbean countries primarily in the areas of Disaster Risk Reduction and in building resilience, but also in recovery from disasters. Some of the achievements include:

- DRM plans for the agriculture sector developed for Belize, Dominica, Jamaica and Guyana. In the case of Jamaica, plans were also developed at the Community level.
- National Monitoring Networks established in three pilot countries – Jamaica, Grenada and St Lucia and National Drought Early Warning and Information Systems (DEWIS) Implementation Plans developed with funding from the Government of Brazil.
- National Water Information Systems established in St. Lucia and Grenada (the system is considered a best practice in the region and has since been adopted by Guyana and Jamaica)
- Formulation of National Water Policy and Integrated Water Resources Management Plan in Grenada
- Demonstrations of best practices in DRM established in Belize, Dominica and St Lucia
- Improved national capacities to assess damage and loss using the livelihoods approach in Guyana and Dominica
- Improved capacities in Climate Smart Agriculture as part of the Zero Hunger Challenge Initiative in Antigua and Barbuda. This included training in Rainwater Harvesting and Efficient Water Use Technologies.
- Climate Smart Technologies currently used by farmers in the OECS and Barbados have been identified under a study of Sustainable Crop Production Intensification (SCPI) Technologies. In this regard, cassava has been identified as a climate smart crop because of its drought resistant qualities.
- Prototype Food and Nutrition Early Warning System (FNSIEWS) developed. This prototype supports Food Security Analysts in assessing and forecasting national food security status.
- Eleven (11) Rainwater Harvesting Pilot demonstrations established in South Saint Elizabeth in Jamaica as well as training in Rainwater Harvesting Technologies
- A GIS system developed to map areas in Jamaica where Rainwater Harvesting is feasible and where there are likely to be water deficits. This is a powerful tool for Integrated Water Resources Management in the country.
- Improved capacities of twenty (20) agricultural managers across the region in the application of livestock emergency guidelines and standards, including how to design, plan and implement livestock-based interventions during and after disasters and emergencies.
- Emergency Assistance provided to affected farmers in St Vincent and the Grenadines and St Lucia in the wake of the low level trough in December 2013.
- Information products and training materials prepared on Rainwater Harvesting and Sustainable Land Management
- Land degradation and monitoring system developed and operating in Grenada using the Land Degradation in Dry Land Areas (LADA) methodology at national and local level.

The Way Forward

FAO will continue to work with its development partners, CARICOM, IICA, CARDI, CCCCC, CDEMA and CIMH and others, to provide technical assistance in order to improve governance, knowledge and information transfer and policy advice. This technical assistance will contribute to build resilience and improve decision making by policy makers, extension workers, farmers, foresters and fisherfolk, to reduce losses and improve their livelihoods in the wake of disasters. Specifically, it will continue to assist member countries to develop DRM Plans for the Agriculture Sector. In the Fisheries sub-sector, efforts will be aimed at implementing a recently approved GEF-funded project to increase resilience and reduce vulnerability to climate change impacts in the Eastern Caribbean Fisheries Subsector through the introduction of adaptation measures in fisheries management and capacity-building in fisherfolk and aquaculture. Assistance will continue to be provided to build capacity in Climate Smart Agriculture and to identify and promote best practices in DRM, through the establishment of demonstration pilots in Caribbean countries.

i. Figure does not include costs associated with loss of human life, disruption of public services and human wellbeing, or increased poverty levels linked to loss of livelihoods.

ii. Heger, M. Julca, A, and Paddison, O. 2008. Analyzing the impact of natural hazards in small economies - The Caribbean case. Research paper No. 2008/25. United Nations University and World Institute for Development

iii. The Liliendaal declaration by the Caribbean community asserts the objectives of the UNFCCC and the Kyoto protocol. It places the onus of mitigation efforts on the developed nations while underscoring the vulnerability of low-lying, small island developing states such as those found in the Caribbean. As well, it points to CARICOM's own efforts at education, outreach and adaptation in response to climate change.

iv. <http://www.fao.org/docrep/018/i3341e/i3341e.pdf>

Appendix 1

- Heger, M. Julca, A, and Paddison, O. 2008. Analyzing the impact of natural hazards in small economies - The Caribbean case. Research paper No. 2008/25. United Nations University and World Institute for Development
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- Grenada was the second largest nutmeg producer globally, second to Indonesia.
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