COAST INSURANCE

COAST Insurance:

An Assessment of Saint Lucia's Fisheries Sector

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1 Introduction: Why COAST?

Employing roughly 300,000 people directly and indirectly, the Caribbean Community's fisheries sector is a vital source of livelihood and development in the region. The sector makes major contributions to food security, poverty alleviation, employment, foreign exchange, culture, recreation, tourism, and the general quality of life in rural and coastal communities. Fisheries are an important contributor to Gross Domestic Product (GDP) in the region, accounting for up to 7 percent in some countries.

Direct employs consist of the people who go out on the boats and catch fish. A much larger group makes livings indirectly. These include people engaged in processing, preserving, storing, transporting, marketing, and selling fish and fish products. Others make nets, build and maintain vessels, or work in research, development, and administration linked with the fisheries sector. Many of the region's fisherfolk live in rural communities where their activities are a mainstay of the local economy.

Over the long term, Caribbean fisheries face many pressures. These include poor fishing practices and poaching; degradation of supporting habitats such as coral reefs, seagrasses, and mangroves; sargassum blooms, and invasive species such as lion fish. But in the long term, the list is topped by climate change. Already, studies show that it is modifying the distribution and productivity of fish stocks. Projections suggest that over time it will cause a series of profound biophysical and socio-economic impacts that could undermine the sustainability of fisheries and the livelihoods of the communities that depend on them.

Tropical storms and other major weather events, which are intensifying due to climate change, hit the islands' fishery communities disproportionately hard by preventing fishing before, during, and after the events. During the event itself, vessels and fishing gear are destroyed or damaged. Afterward, the harm is compounded by loss of public services such as electricity, fueling stations, piers, and roads. Fishery products stop flowing to market, causing special hardships in poor communities.

Yet at the same time, fisheries can play an important role in disaster recovery. While the sector is highly vulnerable to climate hazards, its people can get back out on the water as soon as they have good weather—and functioning boats and equipment. They can bring back fish to communities that would otherwise go hungry after a disaster. For this reason, a rapid bounce-back of the fishing industry after weather events can be critical for overall recovery and food security in the Caribbean.

Recent hurricanes and their devastating effects demonstrate the need for a climate risk insurance product to ensure that fishing communities can quickly rally after such events. To meet this need, the Caribbean Ocean and Aquaculture Sustainability faciliTy (COAST) initiative was developed. COAST is an innovative climate risk insurance mechanism to promote food security, livelihoods of fisherfolk, fisheries resilience, sustainable management of coastal infrastructure, and disaster risk reduction in the Caribbean.

1.1 Objectives of the Report

This study has three main objectives:

- To develop a methodology to gather fisheries and disaster risk management information at the country level and incorporate it into the development of the COAST product;
- To apply the assessment methodology in Saint Lucia; and
- To understand interest in COAST insurance in the fisheries sector and readiness to implement it.

2 COAST—The First-Ever Parametric Insurance for Fisheries

In traditional insurance, covered parties submit claims for specific losses that they have suffered. The insurer gathers information to confirm that the claims are justified, an often time-consuming process, then issues payment based on the size of the loss. Parametric insurance, in contrast, pays out automatically when a pre-agreed "trigger" event occurs—a Caribbean storm of such-and-such intensity over such-and-such geographical area, for example. Payments go to all covered parties within the affected zone, regardless of the details of their own losses. By its nature, parametric insurance gets money into the field much faster than the traditional variety with its delays and claims adjustment bureaucracy.

COAST insurance is parametric. As with all insurance of this type, COAST is based on a model of probability. CCRIF SPC, working with the World Bank, finalized a catastrophe model for COAST called SPHERA4COAST. It is based on regional databases as well as country-level data, including for Saint Lucia. The model includes the two categories of losses that COAST covers:

- Adverse Weather (AW) Component. This evaluates losses that the rough seas and heavy rainfall of adverse weather cause to fisherfolk by preventing them from carrying out their usual activities.
- Tropical Cyclone (TC) Component. This assesses direct damage by tropical cyclones—typically due to high winds and storm surge—to fishing assets such as vessels, equipment, and infrastructure.

COAST was developed through a partnership of the U.S. State Department, which donated funds; the World Bank, which supported the product design and government readiness to implement COAST; CCRIF SPC, which developed and issued the actual insurance policies; the Caribbean Regional Fisheries Mechanism (CRFM), which supported implementation of COAST; and the Caribbean governments.

COAST is now offered in two countries, Saint Lucia and Grenada, on a pilot basis. The first phase of coverage began on July 1, 2019 and will run until May 30, 2020.

The national government and the fisherfolk of Saint Lucia are both direct beneficiaries of the COAST product. The government benefits by transferring the huge liability of disaster recovery to CCRIF SPC and reducing volatility in its national budget. Fisherfolk—boat owners, captains, crew members, fish vendors, and fish groomers—gain from direct and quick pay-outs from the Ministry of Finance in the event of catastrophe.

2.1 COAST's Innovative Features

- First-ever climate risk parametric insurance developed for the fisheries sector—spearheaded by the Caribbean. Vulnerable fishing communities are getting access to insurance developed specifically for their needs.
- Promotion of resilience in the fisheries sector. COAST will foster a stronger blue economy in the region by reducing the harm of climate change to fisheries food security and by incentivizing policy reforms for climate-smart fisheries practices and coastal resilience.
- First-time insurance coverage for "bad weather" events, including tropical cyclones. COAST innovates in also covering potential losses that fisherfolk suffer due to high waves and heavy rainfall.
- Rapid pay-outs. CCRIF SPC will channel pay-out funds to the Ministry of Finance of participating countries within 14 days of the covered event, followed by a quick transfer to fisherfolk and other beneficiaries.
- First-time tracking of pay-outs down to the level of individual beneficiaries. A special financial management and auditing system will make this possible.
- Inclusiveness and participation of women. COAST is intended to cover all participants in the fisheries sector, including crew members, captains, and boat owners, but also fish vendors and processors, most of whom are women. The list of beneficiaries is predefined by the governments in a COAST Operational Manual.

In year one of the program, COAST is advancing the formalization of the fisheries sector by registering all stakeholders in the fisheries value chain, including the women who often go uncounted and unrecognized. The next step will be to promote better data management and reporting to improve ability to locate fisherfolk and fisheries assets. These measures will help strengthen nature-based resilience for coastlines and infrastructure.

3 Developing an Assessment Methodology for COAST

Development of the COAST assessment methodology was carried out in three phases, drawing on scoping visits, research, data-gathering visits to Saint Lucia, and stakeholder discussions and feedback.

- Phase 1 included reconnaissance visits to three case-study countries (Saint Lucia, Jamaica, and Belize) to consult government officials and key stakeholders. We introduced our team and project purpose to local officials. We explored the fisheries management systems of each country, including data collection and monitoring. We gathered information on how fisheries are organized, and what commitments the countries had made towards the Caribbean Community Common Fisheries Policy (CCCFP).
- Phase 2 involved reviews of published literature and stakeholder-team discussions to identify indicators for exposure, hazard, vulnerability, and adaptive capacity. We developed a data assessment checklist with key topics and variables to assess the need and readiness of the countries' fisheries sectors for COAST insurance.
- Phase 3 included a week-long visit to Saint Lucia to hold discussions with government authorities in finance, fisheries, natural resources, and disaster risk management and with key stakeholders such as fisher cooperatives, non-governmental organizations, and banks. The purpose was to:

    1. assess local interest in COAST and understand current insurance gaps;
    2. understand preparations to use COAST insurance to protect the fisheries sector; and
    3. identify and collate fishery, environmental, and disaster risk management data and information for use in constructing a risk transfer model for the fisheries sector.

Risk is a term in everyday use that is difficult to define in practice due to the complex relationships between its components (Baas et al. 2008 and Clement et al. 2018). Risk is the combination of the likelihood (probability of occurrence) and the consequences of an adverse event such as a hurricane. The three major elements of risk are exposure, hazard, and vulnerability (Baas et al. 2008). These elements can be applied in various ways depending on factors such as the level of uncertainty, the focus of an assessment (such as broad or specific), and the direction and emphasis of the approach used.

Briefly, hazard refers to the likelihood and intensity of a potentially destructive natural phenomenon, while exposure refers to the location, attributes, and value of assets that are important to the fisheries sector that the hazard threatens (Clement et al. 2018). Vulnerability, on the other hand, is the reaction of the assets when exposed to forces produced by a hazard event (Clement et al. 2018). A wide range of data are required to assess each of these components. At a national level, some of these data are held by government agencies while others are in the hands of non-governmental stakeholders.

During development of COAST, the World Bank and CEFAS created a checklist (Table 1) and used it to gather data and information for a range of variables grouped by key fisheries assessment and management topics. The variables were carefully selected to ensure that the data could address the three key components of risk. Other variables such as institutional capacity were included to gather information on how COAST could be implemented in the case-study countries.

Table 1: Data Assessment Checklist of Key Topics (numbered) and Variables to Assess Need and Readiness of Fisheries Sectors for COAST.

Topic	*Variables*
1. Information and data management concerning fisheries:	Boat and engine registration (including ownership) Fisherfolk registration/licensing process and systems Are data disaggregated by gender, age, other metrics such as demographics? Are data on license registration for individuals, boat owners, actual users aggregated or individualized? Are data disaggregated by part-time, full-time, and operational site? What is the process for registration? How and when are licenses renewed? What are the barriers/incentives to individuals becoming licensed? Why are more fishers not registering?? What proportion of total fishers is registered? Fishers' telephone numbers and addresses How can fishers be reached in the event of a storm? Is information on next of kin/alternative beneficiary collected? Number and types of boats and gear Landing site from which the boat operates Value of boats Value of gear Landings—weight and value Are data disaggregated between commercial vs. artisanal/subsistence fisherfolk? What criteria are used to distinguish commercial from artisanal fishers—catch yields, access to markets/export, sales values? Are data disaggregated by geographic areas such as parishes? Are data disaggregated temporarily (monthly, weekly etc) Catch size limits Foreign fishing agreements Fish stocks monitoring and assessments Information on maximum sustainable yield Fishing monitoring, control, and surveillance (MCS) systems Season and area closures How are these agreed upon—seasonal yields, breeding times, timing of policies? Is the fisher/data registry deposited with CRFM? Is access to fishery resources effectively managed?
2. Fisher organization and capacity:	Type and level of fisher organization How do cooperatives operate? Where do fisher cooperatives get their funding? Percentage of fisherfolk associated with a cooperative/organization Are fisheries organizations representative with regards to total number of fisherfolk (direct and indirectly employed)? Do individual fishers have access to financial services (credit, loans, insurance)? What type of services are these and where do they come from? Do associations and cooperatives have the capacity to manage financial resources? Are they involved in co-management of fisheries or marine protected/managed areas? What is the structure of the cooperative system? Do members (fishers) trust cooperative leaders to receive funds on their behalf? What do cooperatives offer to fisherfolk? Do individual fishers benefit from cooperatives?

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3. Supply chain information:	Landing sites number, capacity, location, and conditions (frequency of maintenance Fish markets number, capacity and location, and conditions (frequency of maintenance) List of assets and their value for each landing site and fish market Employees of fish markets, including their gender Fish processors number, capacity, location, and conditions (frequency of maintenance)
4. Environmental, climate, and socio-economic data sets:	Mangroves, coral reefs, and seagrass beds location and extent Mangroves, coral reefs, and seagrasses historical monitoring information (in order to evaluate health condition) Climate/weather monitoring systems—identification, number, location, and frequency of data collection/ reporting Climate/storm hazard assessments in coastal areas—availability, latest assessment, how often, what does it map (which hazards, infrastructure assets, ecological assets, population, and vulnerabilities?) Population dependent on fisheries for livelihoods and food Livelihoods diversification in the fisheries communities Monthly or seasonal fisherfolk income estimation
5. Damage to fisheries infrastructure:	Methodology followed to estimate damage Value of the assets The extent to which a built asset was damaged or lost during a hurricane/storm/inundation Historical data on post-disaster assessments of needs, damage, and losses in the fisheries sector Separate direct and indirect damage (e.g., separating damage to infrastructure and boats from loss of income to the fisheries sector, business interruption, etc Time of recovery or rebuilding after a hurricane/storm/inundation Use of disaster relief grants in the sector (if available)
6. Institutional capacity:	What is the status of implementation of fisheries policy, national plans, species-specific management plans? Management of fishing effort Disaster risk management and climate change planning tools for risk preparedness, reduction, response, and recovery (what and who's responsible) Human, technical, and financial capacity for monitoring and assessing fisheries management (how many people, technical background, frequency) Human, technical and financial capacity for disaster preparedness and response (how many people, technical background, frequency) Embracing adaptive management, decision-making under uncertainty, and the precautionary approach
7. Current disaster coping mechanisms of fisherfolk:	Which ones do they use? Do coping mechanisms vary according to age, gender, and others factors such as demographics? What is the existing insurance penetration in the country's fisheries sector? In past events, how did the cooperatives support people in need and what were the gaps? What were the other government interventions in the past or other systems of support used after natural events? How much of a fisherfolk recovery was individually driven vs. externally supported?

The data collected during this process enabled the team to understand the sector's readiness and baseline to implement COAST at the institutional, and fisher community level. This information was also used to identify existing challenges and gaps to be filled by COAST from the design to the implementation stage.

In addition, it provided valuable information to characterize the exposure of the fisheries sector, which is a critical piece for the development of the catastrophe model in each country. In particular, the data was employed as follows:

- Location of assets: Specific georeferenced information about landing sites, and other fisheries assets was used to evaluate potential impacts of climate events (tropical storms, excessive rainfall).
- Vessel inventory: Number and type of vessels (size, engines, etc), was used to estimate the potential impact to fishers and the whole sector at the time of a climate event.
- Fish catch landings data: Fisheries production (quantity and value) per month, landing site, and species was used to understand the potential loss of income during a climate event.
- Fisherfolk registration: demographic information about registered fisherfolk was used to estimate the number of full-time and part-time fisherfolk at each landing site, and to assess their unit revenue (i.e., the average income of one person in one day, variable in time and space).

4 Assessment of Saint Lucia's Data

4.1 Fisheries Sector Data

Saint Lucia has digitized information on boat, engine, fishers, and gear registration. This includes demographic data on fisherfolk in terms of age, where they live, gender, and contact information in case of emergency.

Table 2: Annual Quantity of Gear Used by Saint Lucia Fishers

Gear	*2017*	*2018*
Trolling lines	4,574	3,523
Handlines	1,602	1,436
Fish pots	1,006	858
Palangres	733	533
Longlines	379	232
Harpoons	252	199
Flying fish nets	219	221
Gill nets	166	146
Other	111	9
Scuba tanks	94	63
Fillet nets	66	74
Beach seines	5	9
Spear guns	3	2
Droplines		178
Total	9,210	7,483

Source: Government of Saint Lucia, 2018.

There is a clear process for registration and licensing. Boat registration is done just once until the vessel changes ownership. But if any information about the boat changes, the owner is required to inform the Department of Fisheries. Otherwise, the standard procedure is to update the information during licensing. Boat registration is free, but fishing licenses are bought annually for EC$5 and are heavily subsidized by the government. About 85 percent of fishers are registered. If fishers are not registered, when they purchase a vessel they need to pay for the full duties. Usually, most boat owners are registered, but not the crew. The Department of Fisheries has inspections in which they identify people who are not registered. Some women are both boat owners and fishers. Data on number of gear sets is collected annually (Table 2). Fisher registration is also updated annually (Table 3). There are some incentives for fishers to become registered, such as getting better fuel prices.

Table 3: Number of Saint Lucia Fishers Licensed per Year

	2017			2018		
District	*Captain*	*Crew*	*Spearman*	*Captain*	*Crew*	*Spearman*
Anse La Raye	2	9		5	6	1
Babonneau					2	
Bexon						
Canaries	1	11		6	20	
Castries	12	21	1	8	25	
Choiseul	5	19		2	9	
Dennery	12	37	1	19	45	
Gros Islet	3	7		14	16	2
Laborie	4	18		3	5	
Micoud	6	24		7	16	
Mon Repos	1			1		
Praslin	1	2			1	
Rivere		1				
Savannes	1			1		
Soufriere	6	8		10	21	
Vieux Fort	15	94		42	90	
Total	69	251	2	118	256	3

Source: Government of Saint Lucia, 2018

All commercial fishing in Saint Lucia is "artisanal," using small boats, traditional methods, and simple equipment. Landings are mostly pelagic species. To monitor the industry's operations, data collectors are stationed at all primary and some secondary landing sites. They record weight and value of landings. They use scales to measure weight, and are trained to make estimates if scales are not available. Usually they record whether the weight is based on whole or gutted fish. Length or age data about the fish is not collected, due to low staff capacity. Data on gear used in the catch is collected but not reported. There are no proper maps of fishing grounds, so data collectors take note of general zones that boats visited. Data are collected on 15 randomly selected days each month. From this, full-month totals are estimated. Collectors sample every other boat but count the total number of boats that went out—total trips functions as the measure of fishing effort.

Each month, the collectors send their compiled data sheets to the Department of Fisheries. Landings data are disaggregated by date, landing site, and species caught. Data entry is completed promptly and data are usually backed up (Table 4). Saint Lucia has its own back-up system for its fisheries data but works closely with CRFM through regional fisheries officers mainly from the International Commission for the Conservation of Atlantic Tunas (ICCAT)

Some vessels have global positioning system (GPS) equipment. Its presence on board is reported at the time a boat is licensed. Generally authorities do not use GPS to track fishing, but more to understand where a fisher was last working in the event of loss at sea.

Fish stock monitoring and assessments follow guidelines from CRFM for conch, large pelagics, and lobster. In order to calculate and implement catch limits to safeguard stocks, a high level of monitoring is required. Given the capacity constraints on data collection, the Department of Fisheries does not use catch limits. Instead it applies other measures such as size limits (for conch, sea urchins, and lobsters), fishing effort, and marine protected areas.

Table 4: Weight and Value of Landings at All Landing Sites in Saint Lucia

a) Weight of Landings per Year, Tons

Year	*Tuna*	*Dolphin*	*Wahoo*	*Snapper*	*Flying fish*	*Shark*	*Lobster*	*Conch*	*Lionfish*	*Blue marlin*	*White marlin*	*Other species*
2000	473	555	243	68	98	5	25	40				352
2001	404	427	214	82	323	5	36	41				435
2002	320	402	243	45	193	10	10	60				324
2003	456	287	169	57	75	6	23	48				325
2004	419	376	238	39	11	20	11	46				362
2005	466	198	169	33	71	12	15	42				380
2006	410	382	187	37	30	7	9	35				344
2007	328	512	211	51	46	5	13	41				302
2008	560	361	182	52	251	13	13	38				341
2009	486	465	195	64	220	9	10	34				375
2010	613	352	199	71	109	9	19	28				400
2011	541	473	197	29	22	3	24	39				365
2012	442	504	151	47	4	11	28	63				460
2013	492	387	148	39	107	7	31	82				346
2014	385	407	155	39	85	4	25	72	2			520
2015	374	505	87	34		4	16	97	4			494
2016	518	435	147	39	1	2	9	92	6	91		392
2017	538	403	110	35	1	5	19	99	7	134	1	318

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Table 4 continues

b) Value of Landings per Year, EC$ Thousands

Year	Tuna	Dolphin	Wahoo	Snapper	Flying fish	Shark	Lobster	Conch	Lionfish	Blue marlin	White marlin	Other species
2000	5,208	7,328	2,674	1,198	11	11	11	11				4,257
2001	4,448	6,103	1,883	1,439	9	9	9	9				4,784
2002	3,622	4,722	2,275	686	9	9	9	9				2,519
2003	4,860	3,439	1,645	867	9	9	9	9				2,731
2004	4,456	4,569	2,293	587	9	9	9	9				2,821
2005	5,376	2,796	1,927	515	10	10	10	10				3,347
2006	5,097	5,656	2,330	617	10	10	10	10				3,103
2007	4,267	6,697	2,452	855	10	10	10	10				3,410
2008	7,424	5,473	2,348	978	10	10	10	10				4,128
2009	6,398	6,748	2,489	1,266	11	11	11	11				4,424
2010	8,065	5,383	2,472	1,384	11	11	11	11				4,643
2011	7,015	7,137	2,497	575	9	9	9	9				5,116
2012	6,015	7,573	1,921	969	10	10	10	10				5,447
2013	7,028	6,704	2,050	824	10	10	10	10	6			4,497
2014	5,573	6,830	2,227	827	10	10	10	10	34			6,699
2015	5,452	7,988	1,270	733	10	10	10	10	62			5,594
2016	7,685	7,321	2,120	852	11	11	11	11	86	1,286	6	4,366
2017	8,386	7,138	1,656	779	11	11	11	11	99	1,730	12	4,022

Source: Government of Saint Lucia, 2018

Saint Lucia has seven primary landing sites (each used by more than 100 boats), five secondary (11-100 boats), and seven tertiary (3-10 boats). Primary sites have infrastructure including jetty, lockers, processing areas, fish vending areas, washrooms, vehicular access, administration buildings, and cold storage. Primary sites also have data collectors. Secondary sites have only minimal infrastructure, and only three of the five have data collectors. The tertiary landing sites are mainly beaches, lacking any real infrastructure. Landing site infrastructure is variously managed by fisher cooperatives, the Saint Lucia Fish Marketing Corporation, the Department of Fisheries, and town councils. Most infrastructure lacks insurance.

According to the Department of Fisheries, on average 48 trips are recorded at each landing site per day. This implies that the primary-secondary-tertiary categorization of sites is either inaccurate or there are many registered vessels that do not go out fishing or vessels registered at one port make use of multiple landing sites over the course of the year.
In addition to landing sites, fisheries infrastructure includes slipways to pull up boats, berthing areas, marinas, and fishing villages themselves.

Concerning the scale of the fisheries sector in Saint Lucia, a census conducted by the Department of Fisheries in 2012 (Government of Saint Lucia 2013) gives basic parameters. It found that the contribution of fisheries to GDP is less than 1 percent. However, the sector is nonetheless an important source of employment and income for rural fishing communities island-wide. For example, 30 percent of people employed in the fisheries sector earn one quarter to half of their household incomes from fishing (Government of Saint Lucia 2013). There are eight main occupations in the fisheries sector, the census concluded: fishing vessel owner, fishing boat captain, sport fisher, fishing boat crew, vendors of fish, builders and repairers of boats and fishing equipment, outboard engine mechanics, and fishing equipment suppliers (Government of Saint Lucia 2013). Males hold most of these jobs, with a median age of 42 in households comprised of one to three people. Most people in fishing households are young (in the age group 0 to 24) and most of their dwellings are not on individually owned land (Government of Saint Lucia 2013).

Membership in fishers' cooperatives is low—most members are boat owners and captains. Each vessel earns on average EC$200 to EC$400 per fishing trip per vessel in the high season and EC$200 in the low season. Most fishers supplement their income with work in the farming, construction, and tourism industries (Government of Saint Lucia 2013). Traditionally the government has looked at fishing as a primary activity, but now there is more consideration towards value added e.g. processed fish, salt fish etc.

Survey data show that recurrent and non-recurrent inputs into a fishing business can vary from EC$500 to EC$5,000 per year. Fishers have access to credit for their businesses from credit unions and banks. The main factors impeding fishing operations were reported as fuel cost, weather, landing site facilities, timely payment, cost of fishing equipment, and fish catch (Government of Saint Lucia 2013).

Weaknesses in Fisheries Data

- There is no registration of fish processors and vendors.
- Stock assessment is not conducted.
- The only measure of effort recorded in the data set is number of trips. Data on other measures of effort (hours fished, number of crew, gear used) are collected but not included on official data spreadsheet.
- The Department of Fisheries does not have adequate staff for monitoring, compliance, and surveillance. Hence enforcement of rules and regulations is low. Concerning fisheries management in general, the key challenges are surveillance, human resources, technical skills, and infrastructure capacity.
- Fish markets are not fully used in part because they do not fall under the Department of Fisheries. Therefore, fish processing activities and fisheries assets (ice machines etc) inventory and usage are not entirely recorded.

Table 5: Summary of Fisheries Sector Data in Saint Lucia

Key variable	
Boat and engine registration	There is a clear process for registration and licenses. Government has digitized information on boat, engine, fishers, and gear registration Has annual inspections to identify people who are not registered. Has a list of active vessels and fishers for each year.
Fisherfolk registration/licensing	Some incentives exist for fishers to become registered, such as access to better fuel prices. About 85 percent of fishers are registered. Fisher and gear registries are updated annually. No registration of fish processors and vendors
Fishers' telephone numbers and addresses	Agencies hold demographic data on fisherfolk concerning age, address, gender, and contact in case of emergency.
Data on fishing effort	Only number of trips undertaken is recorded as measure of effort.
Landings	Weight and value of landings are collected at seven primary and three secondary landing sites. Data are collected on 15 randomly selected days each month by sampling every other boat that lands. Data collectors use scales to take weight readings, and are trained to make estimates if no scales are available. Data collection focuses on all primary and some secondary sites, so data gaps result at some secondary and tertiary sites. Short time lag (weeks) between data collection and entry into computer.
Fisheries management practices	No catch limits. Size limits (for conch, sea urchins and lobsters) are in use, as well as marine protected areas.
Fish stocks monitoring and assessments	No stock assessments
Fishing monitoring, control, and surveillance (MCS) systems	Low monitoring, compliance, and surveillance of rules and regulations
Data storage and access	Data are electronically held and backed up internally within the Department of Fisheries. Data are shared with CRFM upon request. Users (e.g. students, project staff) need permission to access data.
Data quality	Data for many variables are collected, such as number of crew, fishing duration, gear used, fishing depth but only the weight and value of landings plus number of fishing trips are reported on official data. This due to the fact that Government hasn't updated yet data collection guidelines. Emphasis of data collection is to report total annual production. Other objectives, such as informing management decisions, are secondary Low data quality assessment—data are mainly cross-checked when being entered into computer. Quality training focuses on data collectors, but often overlooks other places where errors can occur.
Data quantity	Statistics on weight and value of landings beginning in 1981.

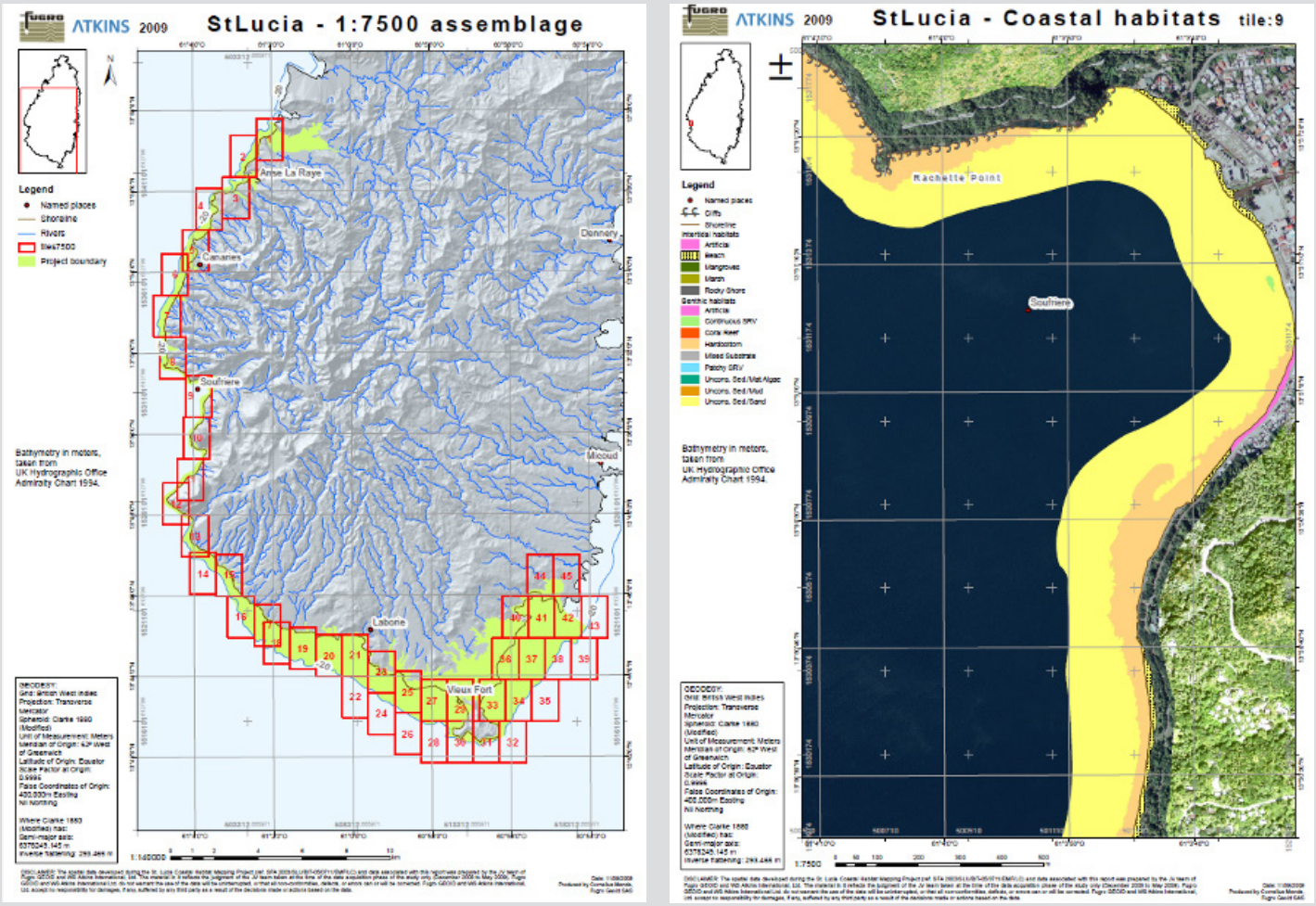
4.2 Environmental, Climate, and Socio-Economic Data

4.2.1 Mangrove, Coral Reef, and Seagrass Data

For the study's dataset, the Department of Fisheries provided coastal habitat maps by Fugro and Atkins from 2009 which cover the east and south of Saint Lucia (Figure 1).

Figure 1. Coastal Habitat Maps from 2009

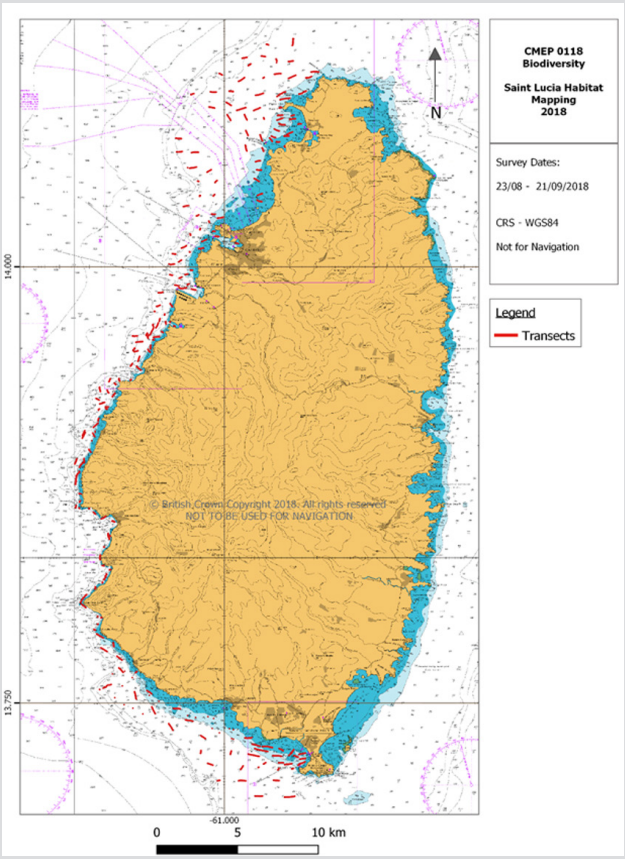
The left map shows the coverage of the survey, and the right is an example map of Soufriere Bay.



Source: Fugro and Atkins.

It is not clear whether these maps were produced by satellite imagery, aerial surveys, or "ground truthing," survey work at ground level. Bathymetry for the maps was taken from the UK Hydrographic Office (UKHO) Admiralty Chart of 1994. To improve map quality and enable better management of coastal regions and fisheries, a new set of high-resolution maps is in production, under the auspices of the Commonwealth Marine Economies (CME) Programme. To that end, CEFAS is undertaking a survey and will deliver a seabed habitat map for the west coast of Saint Lucia. Maps will be developed for all areas where new bathymetry data were recently collected by the UK Hydrographic Office (UKHO), focusing on places that have a maximum depth of 100 meters. The new maps will draw on this bathymetry work but also on exposure data (the location of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas) and video tows, a form of ground truthing (direct observation) using underwater

Figure 2: Locations of Ground Truth (Direct Observation) Video Transects Taken under the Commonwealth Marine Economies Programme.



Source: The Nature Conservancy.

The Department of Fisheries aims to undertake reef condition assessments twice a year in the Soufriere Marine Managed Area (MMA), if staffing is adequate. The department does not hold any data about seagrass. Other reports rating the ecological health of Saint Lucia include one for Soufriere (Beeden et al. 2013) and the State of the Environment Saint Lucia 2015 report (Government of Saint Lucia 2015).

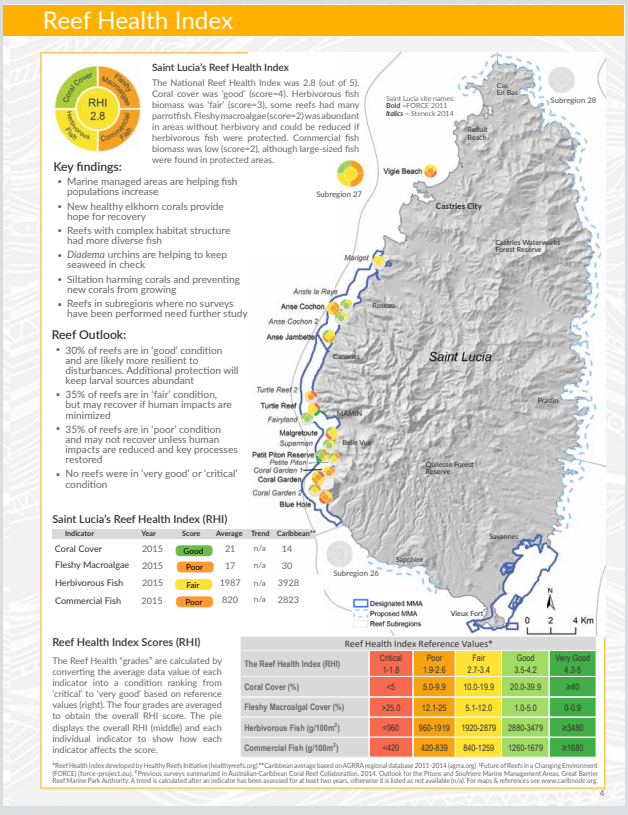
The World Bank Disaster Vulnerability Reduction Project (DVRP) is undertaking coral restoration work at Porte Sable in Saint Lucia, including training government officials on coral reef monitoring. Other projects are underway or have been completed with a focus on protecting or restoring marine ecosystems. Documents provided for this specific study included "A System of Protected Areas in Saint Lucia" (Haffey 2009) and a legal analysis of the Saint Lucia protected areas legislation (Isaac 2017).

video images on biophysical condutions, taken during 2018/2019. The location of the video tows is shown in Figure 2. Moreover, the mapping will contain confidence values, a measure of accuracy. The new maps are to be presented to the Government of Saint Lucia in 2020.

BSF Swissphoto of Switzerland is currently undertaking a full survey of Saint Lucia using LIDAR sensing technology. The work is funded by the World Bank. The integration of this data and those from other mapping technologies would enable the production of a high-resolution habitat map covering an area wider than the western coast, possibly the full country.

Coral reef health reports are available for Saint Lucia and certain other Caribbean countries at the CaribNode website.[1] Figure 3 shows the reef health index for Saint Lucia, with most corals in "good" or "fair" condition, but about a third rated as "poor." The authors state that managed marine areas are helping fish to recover, but that the "poor" areas will recover only if human impacts are reduced.

Figure 3: Page 4 of the Saint Lucia Coral Reef Report Card (TNC 2016b), Showing the Reef Health Index.



Source: The Nature Conservancy.

1 http://caribnode.org/documents/?category=health

4.2.2 Climate Data

In Soufriere MMA, a monitoring station is in operation to collect hydrographic data. Saint Lucia has two tide gauges, with a proposal to add three more. The stations are inspected and maintained regularly. Saint Lucia also has one wave buoy. For the current study, the authors requested the resulting data from the Saint Lucia meteorological service, Met Office. But since the damage of Tropical Storm Kirk in 2018, the authors were told, Met Office has had problems accessing the data. Timely and accurate data are needed to assess insurance triggers. Met Office stated that such data could be provided to CCRIF if necessary.

Figure 4: An Example Forecast from Météo-France for Saint Lucia (Ste-Luce).
Forecasts are shown for wind speeds and direction (vent), swell (houle), significant wave height (hauteur significative), sea state (état de la mer), and six-hour maximum waves (hauteur max. sur 6h).

	ven 23	sam 24				dim 25				lun 26	
	18h	0h	6h	12h	18h	0h	6h	12h	18h	0h	6h
Vent à 10m											
Direction	ENE	ENE	E	ESE	ESE	ESE	ESE	ESE	ESE	E	ESE
Vitesse (nœuds)	16	17	16	12	12	14	14	17	16	16	14
Echelle Beaufort	4	5	4	4	4	4	4	5	4	4	4
Mer totale											
Hauteur significative (m)	1.4	1.4	1.4	1.4	1.4	1.4	1.6	1.6	1.6	2.2	2.2
État de la mer	Agitée	Agitée	Agitée	Agitée	Agitée	Agitée	Agitée	Agitée	Agitée	Agitée	Agitée
Hauteur max. sur 6h (m)	2.5	2.5	2.5	2.5	2.5	2.5	2.9	2.9	2.9	4.0	4.0
Mer du vent											
Hauteur significative (m)	0.5	0.6	0.8	0.7	0.5	0.6	0.8	1.0	1.1	0.7	0.8
Houle											
Direction	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	E	E	E
Hauteur significative (m)	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.2	1.2	2.0	2.0
Période (s)	8	8	8	8	8	8	8	8	10	10	10

Source: Météo-France.

In the meantime, Météo-France, the French national weather forecasting agency which generates data for Martinique, has been issuing forecasts for Saint Lucia—an example is provided in Figure 4[2]. The World Bank's Disaster Vulnerability Resilience Project (DVRP) [3] is aiming to further strengthen Saint Lucia's own hydrological and meteorological service.

For climate data, Saint Lucia currently uses the scenarios and models provided by the Intergovernmental Panel on Climate Change (IPCC). Saint Lucia has sectoral adaptation strategies in place, including for fisheries (Fisheries SASAP 2018-2028 and GoSL 2018a), which support the National Adaptation Plan. The fisheries strategy outlines 31 key adaptation measures to be undertaken to build resilience for fisheries and dependent people. These measures cut across financial, technical, regulatory, and informational areas.

The overarching Climate Risk and Vulnerability Assessment (GoSL 2018b) recommends that Saint Lucia create a portal to centralize climate, environment, and socio-economic data, mapping, and relevant reports. Such a portal would be helpful for updating the COAST insurance models regularly, because data would be easier to obtain. The assessment also recommends updating marine resource and poverty assessments, which again would be useful for COAST. One way in which COAST could result in capacity building is through completion of some of the projects described in the fisheries SASAP, such as addressing financial, technical, and regulatory requirements. This would help bolster the fisheries sector against extreme weather events and climate change.

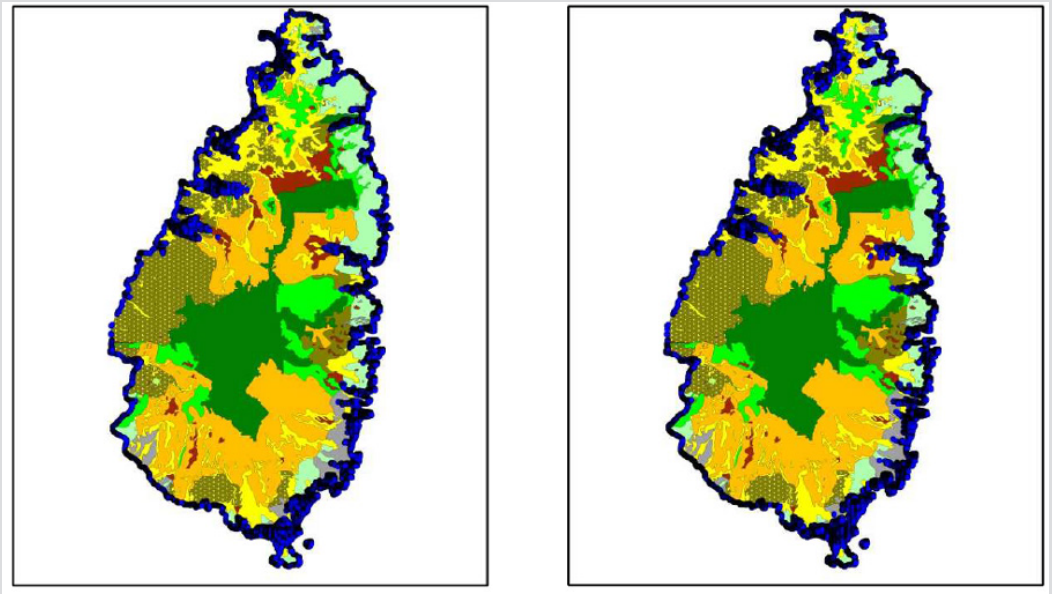
The National Communication on Climate Change for Saint Lucia (Government of Saint Lucia 2017) summarizes the findings of a vulnerability and adaptation assessment carried out by The Nature Conservancy for Saint Lucia. This document examined development of the coastal zone, including adaptation options such as increasing economic resources, technical knowledge, adaptive capacity, and land availability. Coastal areas that would be inundated by storm surge caused by a hurricane were mapped in different scenarios of future sea-level rise. Figure 5 presents an example.

2 http://projects.worldbank.org/P127226/second-phase-disaster-vulnerability-reduction-apl-st-lucia?lang=en

3 www.meteofrance.gp

Figure 5. Potential Flooding and Sea Rise

The areas colored in blue would be flooded after a Category 5 hurricane under a sea level rise of 5.87 meters in 2040-2069 (left) and 6.31 meters in 2081-2100 (right).



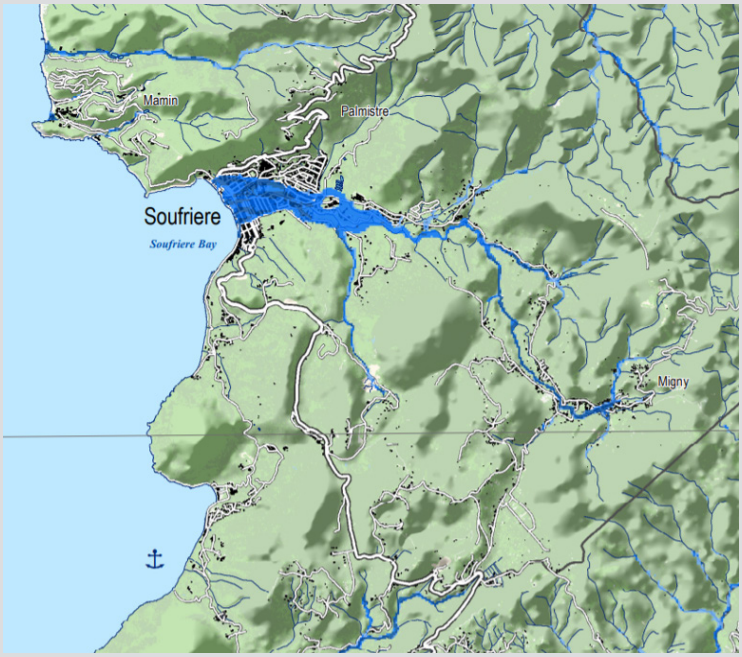
Source: The Nature Conservancy.

The modelling found that the towns and villages that would be hardest hit by sea-level rise and hurricanes are Micoud and Dennery in the east, Castries, Gros Islet, and Anse de La Raye in the west, and Vieux Fort in the south. Central Castries is already very close to or below sea level, and so would be inundated even by Category 2 hurricanes.

Another data source for hazard mapping is the Caribbean Handbook of Risk Information Management (CHARIM 2016b), which includes topographic, land cover, and flood risk maps for Saint Lucia. A section of the flood risk map is shown in Figure 6.

Figure 6. CHARIM Flash Flood Risk in the Soufriere Area of Saint Lucia.

The map is for four rainfall events, based on historical rainfall data for the past 5, 10, 20, and 50 years. The CHARIM website has full details.



Source: Caribbean Handbook of Risk Information Management.

4.2.3 Socio-Economic Data

Saint Lucia's National Emergency Management Organisation (NEMO) has started to conduct community –by-community assessments of disaster scenarios, including multi-hazard risks of flooding and storm surge. Officials are to begin work in the Dennery area in November and wrap up in December. The UN Development Programme (UNDP) and the Caribbean Disaster Emergency Management Agency (CDEMA) are providing technical support with funding from the European Commission.

The Department of Cooperatives has discussed trying to get more young people into the fisheries sector, in hopes they would use innovative fishing methods and diversify into the aquaculture sector (E. Stevens, Registrar of Cooperatives, personal communication).

Weaknesses in Preparation

- Saint Lucia has preliminary habitat maps for its marine environment, more detailed in some areas than others. There is, however, little ongoing monitoring of ecosystems or assessments of how fishing, climate change, or other disturbances affect these habitats, or how they can be better protected. This appears to be due mainly to lack of staff within government. Most mapping and habitat or biodiversity assessments are part of externally funded projects, in some cases without any capacity building within government or any means of repeating the studies.
- Saint Lucia has made much progress in developing National Adaptation Plans, but shortages of government resources mean implementation of the plans is haphazard.
- Saint Lucia has rainfall monitoring stations and some wave height and tide gauges, but too few. Through government and externally funded projects, their numbers are increasing.
- Some projects have begun to build resilience in coastal communities, but these appear to be piecemeal and dependent on external funding.

Table 6: Summary of Environmental, Climate, and Socio-Economic Data in Saint Lucia

Environmental	**Marine habitats**	Habitat and bathymetry maps are available (unclear whether from satellite or ground-truthed). New maps being prepared drawing on new bathymetric data and video tow data. Lidar survey underway. Coral reef health report in 2016 showed that a third are in "poor" condition. Small number of marine managed areas There is no ongoing habitat monitoring plan. Some coral monitoring exists in Soufriere MMA, and coral restoration work under DVRP.
Climate	**Policies and plans**	Has a National Adaptation Plan, and a fisheries sector adaptation strategy
	Monitoring systems	Tide gauges, monitoring station, and one wave buoy. Plans exist to strengthen this monitoring under DVRP.
	Hazard assessment	Has a Climate Risk and Vulnerability Assessment. Adaptation assessment includes flood hazard maps. CHARIM flood risk maps.
Social and economic		Vulnerability and adaptation assessment completed in 2017. NEMO beginning to carry out community assessments.
Data quality		Habitat maps and flood assessments appear robust. Socio-economic data beginning to be collected. Tide gauges and wave buoy provide detailed data, with plans for more gauges.
Data quantity		Apart from tide and wave data, studies are mainly one-off projects. Ongoing coral monitoring in one area, but not widespread.
Data storage and access		Data are stored by various government departments, NGOs, or international organizations. Difficult to access or to find out what information exists. Saint Lucia aims to collate and keep data in one place.
How data are updated		Projects mainly ad hoc and reliant on external funding.

4.3 Disaster Risk Management Data

Saint Lucia does not have a comprehensive fisheries policy (T. Nelson, Deputy Chief Fisheries Officer, personal communication). But the Government has just received a grant from the Food and Agriculture Organization to create one. It will include issues of disaster risk management and climate change.

The National Environment Management Organisation (NEMO), which coordinates environmental issues among ministries and the private sector, has devised a disaster risk reduction profile for the country. It has identified priority areas, which includes the integration of disaster risk management (DRM) across sectors, making sure that all relevant sectors consider disaster preparedness, mitigation, response and recovery. But NEMO is small. It has a budget of just EC$250,000 a year, a director, deputy director, an officer who evaluates whether work has been done, and seven other employees. Concerning marine issues, it tends to rely on extension officers from the Department of Fisheries to perform some of its functions.

Concerning emergency communications with fishers, Saint Lucia uses an app developed by the University of West Indies for the Easter Caribbean called FEWER (Fisheries Early Warning Emergency Response). It is designed to function in conjunction with CAP (common alerting protocol), another app created by NEMO. NEMO is working to integrate the FEWER app with VHF radio to reach fishers who work are out to sea beyond the range of mobile coverage. It is currently in advanced discussion about this with the International Telecommunication Union. The FEWER app is used mostly by young fishers, because some older ones do not have smart phones, or don't take them out to sea. The Department of Fisheries recently conducted an early warning systems audit to determine what types of early warning systems different people use. The department is trying to make sure that all fishers receive emergency messages.

Following an extreme weather event, NEMO usually coordinates the disaster assessment. Data on losses and damage are gathered through extension officers and key informants at various sites. The Department of Fisheries is on the NEMO committee, so information the department obtains from informants is usually passed to NEMO. The data collected includes damage to physical assets and fishing gear but not loss of earnings.

Saint Lucia has sheltered bays where fishers can pull their boats for protection during storms. Tourist boats are pulled to the marinas. But safe spaces are in short supply, meaning that many boats, particularly those operated by low-income fishers, have no real protection when the weather turns bad.

Saint Lucia stresses a science-based approach concerning fisheries management, but in times of emergency not all decisions are science-based. In post-disaster assessments in the Caribbean, adaptive management, decision-making under uncertainty, and the precautionary principle are often used, particularly concerning protection of key species such as conch. Officials recognize the need to act quickly, even if the science is not yet ready. For instance, Caribbean countries typically don't have a lot of science to inform decisions about lobster protection, but proceed using the precautionary approach.

Table 7: Summary of Disaster Risk Management in Saint Lucia

Main agency	NEMO Small budget and staff: has 10 technical and non-technical staff. Relies on extension officers from the Department of Fisheries to perform some of its functions
Early warning systems	Currently trialing FEWER app for fishers, mainly young people
Where boasts are stored	Difficult to find space to pull out boats Need more places to store boats to prevent damages and losses during weather events.
	Mobilization of FEWER app done by Department of Fisheries through extension officers
Coping mechanisms	Able to bounce back faster than other sectors Mixture of government and outside donors aid the recovery.

5 Using the Data Assessment Checklist

5.1 Evaluating Saint Lucia's Progress toward the CCCFP

Saint Lucia needs a framework to evaluate national progress toward meeting the commitments of the region's common fishing policy, CCCFP, and for specific climate-smart food security strategies that involve COAST and the Caribbean Regional Fisheries Mechanism (CRFM). A good evaluation framework would identify the intervention logic, key evaluation questions, and the means to answer these questions, and act as a guide for setting up processes for monitoring and evaluation. A draft evaluation framework for COAST was developed in an earlier part of this project. It was structured around core themes including the fundamental principles of CCCFP and country-led climate-smart food security strategies. Below, we briefly demonstrate how the data assessment checklist, applied in the later stages of this project, could quantify progress towards CCCFP. The illustration is based on a set of questions for each principle. The answers to each question lead to a 1-4 score, with 4 as the best. The score is assigned based on the available data and information and other evidence including expert opinion (Table 8).

Table 8: How the Data Assessment Checklist Can Create a Scorecard to Assess Progress towards the CCCFP.

This illustration uses a five-point index to measure how the CCCFP's fundamental principles are used in national fisheries action plans

CCCFP Principle		*1 Steps towards meeting the principle begin.*	*2 Implementation begins.*	*3 Implementation is at an advanced stage.*	*4 Benefits of implementation are being realized.*	*Saint Lucia's score*
1	**Countries must increase registration of fishers, gear, and vessels.**	A national program is being put in place and trailed in some areas.	Some registration of fishers but not consistent in time or space	Country has a national registry in which fishers, gear, and vessels are reported systematically.	All fishers, gear, and vessels are registered and there are effective ways to monitor and update the lists.	2
2	**Data must be collected to provide a full monitoring dataset for evaluating change in four areas of interest:** **a) Fisheries** **b) Mangroves** **c) Coral reefs** **d) Climate**	Very little data collection, many gaps exist, no continuous monitoring dataset	Some data collection at key landing sites that have a reasonably good monitoring dataset.	Comprehensive data collection focused on industrial fisheries. Good monitoring dataset and trialing a program of management-oriented survey and research	Comprehensive data collection across industrial and artisanal fisheries. Good monitoring dataset and ongoing program of management- oriented	
3	**Countries must strengthen cooperatives and associations of fisherfolk to promote co-management of fisheries resources.**	Low proportion of fishers belongs to cooperatives. Most are not involved in co-management of fisheries resources.	Government is making efforts to develop fisher cooperatives and to bring fishers into a role of co-management.	All fishers belong to a cooperative and there is an active framework of co-management by cooperatives and fisheries ministry.	All fishers belong to a cooperative and there is effective engagement and binding procedures for co-management by cooperatives and fisheries ministry.	2
4	**Fishing effort should be balanced to fishing opportunities, so as to assure sustainable levels of resources.**	Capacity balancing is being introduced but programs lack appropriate tools.	Capacity balancing tools are appropriately applied to some key stocks.	Capacity balancing tools are appropriately applied to most key stocks.	Capacity balancing tools are appropriately applied to all key stocks.	1
5	**Fisheries management decision-making should be based on scientific information.**	There is no evidence that decision-making processes are based on scientific understanding of resources and their habitats, or environmental, economic, and social factors.	Some decision-making processes are based on scientific understanding.	Most decision-making processes are based on scientific understanding.	All decision-making processes are based on scientific understanding.	2

5.2 Assessing Exposure, Hazard, and Vulnerability

5.2.1 Exposure

The tropical cyclone loss assessment using the SPHERA4COAST model consists of a geo-referenced exposure database that includes buildings and other types of major infrastructure. The buildings part of the database comprises residential, commercial, and industrial buildings; hotels; and public, educational, healthcare, and agricultural buildings. The infrastructure part covers airports, ports, power plants, and roads. Data about each asset includes location and characteristics of the asset relevant to assessment of cyclone-induced losses. For instance, for buildings, each entry includes asset type, material, height, age, and replacement cost. Depending on the level of disaggregation and timeframe required for the SPHERA model, information and data on the location and types of fishing infrastructure and their economic value is available in each of the case-study countries. Data points are available for location of emergency shelters, ports, boats, land use, areas of coral reef, mangrove, seagrass, and census data including occupation of households.

5.2.2 Hazard

The hazard module in SPHERA4COAST provides daily estimates of precipitation over a large area that includes the Caribbean and Central America. The daily estimates are derived in near-real time through a combination of climatic-meteorological models, which compute the amount of rainfall based on climate conditions, and a low-orbiter satellite-based precipitation model.

5.2.3 Vulnerability

Vulnerability analyses identify the likely consequences to the built environment when a storm dumps excess rain. The consequences are modelled by means of vulnerability functions, which are relationships that estimate losses that will result from different amounts of precipitation. The vulnerability module in SPHERA4COAST is based on an archive of historical losses induced by rainfall in the Caribbean. This includes detailed information both on the severity of losses and their distribution in time and geographical area. Information gathered during the field visits using the data assessment checklist includes reports on assessments conducted after past events. In addition, the team drew on a vulnerability study that Saint Lucia conducted specifically concerning its fishing communities and climate change.

6 Implementation of COAST

6.1 Interest in COAST

All government stakeholders in Saint Lucia express keenness on COAST. In meetings with study team members, some stated that the fisheries sector receives very little help after a severe weather event, and COAST would be very important in filling that gap. But to make COAST happen, the Government of Saint Lucia will need to commit to pay, year after year, substantial insurance premiums to CCRIF. There is therefore need to understand the country's fiscal situation.

Some local stakeholders raised concerns about the weather event "triggers" that would set payment in motion. These should be more than wind and storm surge, they said. Rainfall was equally important. Key equipment and facilities have been flooded and damaged by rainfall, even without high winds. Another issue in fishing communities was flooding from rivers, so-called fluvial flooding. Again, this type of damage can occur without high winds. These concerns were considered in the design of the Saint Lucia pilot program.

Some local stakeholders also questioned the heavily reliance on proxy or satellite data for modelling. And some noted a need to assure that COAST does not incentivize risk-averse behavior by fishers. More work is required towards understanding basis risk, the need to match pay-outs with actual losses.

6.2 Capacity of Institutions and Fisher Cooperatives to Channel Payments

6.2.1 Institutions

Ultimately a key question for the program is how COAST insurance payments will reach the people who need them most—small-scale, vulnerable fishers. In Saint Lucia, many stakeholders suggested that cash payments channeled by fisheries extension officers would be the best solution. However, the Department of Fisheries at present lacks sufficient staff to conduct direct pay-outs. The department consists of just 10 data collectors, six extension officers, two fisheries biologists, a chief and deputy chief, an aquaculture unit with three technical officers plus six-to-eight supporting staff and one driver. Some key vacancies exist (such as head of the Extension Unit) due to problems with funding for staff but also finding the right people. In part due to these staffing issues, the department currently channels distress funds, another form of aid, through fisher cooperatives. But the cooperatives do not include all members of the sector. This would have to change if these groups are to be the route by which insurance funds reach fishing communities. Credit unions could be another option for channeling the funds.

6.2.2 Fisher Cooperatives

Saint Lucia has nine registered fisher cooperatives and one umbrella group, the Caribbean Regional Network of Fisherfolk Organization. Some cooperatives are quite small--membership of just 10 people is needed to register as a cooperative with the Department of Cooperatives. Some cooperatives are better managed than others. Few succeed in generating much income because the costs of fishing are high, and the returns often low.

They are voluntary organizations, so fishers join if they see benefits. For the present, membership makes up only about half the total fishing community. Common incentives for drawing members are special prices on fuel and gear. Partly for that reason, members tend to be boat owners, not the hired hands on deck. In general, members are older people. This has led some of the groups to try to attract younger members through mentorship programs. These encourage younger people to come in and innovate, use sustainable methods, and hopefully make more money.

If cooperatives broadened their membership base, they would become more viable as distributors of insurance payments. They already have experience in channeling financial resources to the fisheries sector in the form of grant aid funds. Because they have to produce financial statements during registration, most cooperatives have up-to-date records, important in qualifying for grant aid. Still, only a few have professional skills to manage funds on a significant scale.

In general, fishers have little understanding about insurance and are not inclined to buy it as individuals. In any case, cost would often be prohibitive. There is similar low participation in lending. Loans are theoretically available, but fishers have little knowledge about borrowing, and when they do, they often can't get loans because they don't meet the requirements. One big barrier is that fishers can't meet collateral requirements because they cannot prove their income. The Department of Fisheries has begun pilot programs to encourage fishers to keep logbooks to create records of their catches and income. Some fishers have already used logbooks as evidence to acquire loans. In addition, the Department of Cooperatives is providing training and advice on financial management, loans, and insurance.

Table 9: Summary of Institutional and Fisher Cooperative Capacity in Saint Lucia

Implementation of fisheries policy	• Does not have a comprehensive fisheries policy but has a National Fisheries Plan (2013) • FAO recently provided a grant to update Saint Lucia's fisheries policy which will incorporate climate change, disaster risk management, and an ecosystem approach.
Management of fishing effort	• Although effort is recorded, it is not clear how it is being used or managed • Enforcement is not strong; a soft approach is preferred (incentive-based, training courses, etc).
Human, technical, and financial capacity for monitoring and assessment	• Although there's a relatively good human and technical capacity, staffing is limited to perform activities. • Poor environmental data monitoring
Link with fisher cooperatives	• Fisheries extension officers serve as key link with fisher cooperatives.
Percentage of fisherfolk associated with a cooperative	• Low membership of fishers in cooperatives, roughly 50%.
Capacity of cooperatives to manage financial resources	• Financial management is a key challenge for many cooperatives. However, there are some that have financial capacity.
Towards COAST	• Department of Fisheries may not have the capacity to deliver COAST directly to fishers but suggests to explore channeling funds to the cooperatives in the future

7 Recommendations for Future Work

In addition to this assessment, the Government of Saint Lucia would do well to complete additional sector-specific and general work to assure the successful roll-out of COAST insurance.

Future work should consider:

- Improving data gathering and analysis, and increasing data sharing among different organizations to help link day-to-day fisheries data sets with national plans and instruments such as COAST.
- Developing a systematic approach to understanding basis risk and especially how to closely relate pay-outs with actual losses experienced by the fisheries sectors. Local stakeholders questioned heavily use of proxy or satellite data for modelling. Applying participatory approaches that consult members of the fishing communities in the design of COAST would help ensure the mechanism has a low basis risk.
- Providing financial management training to some cooperatives, to qualify them to distribute pay-out funds. The feedback in Saint Lucia was that some cooperatives were currently up to this task, while others were not. The Department of Cooperatives could offer training on such issues as how to distribute funds, priorities pay-outs, and assess whether the money reached the intended parties.
- Setting up similar program assessment if funds are sent directly to the Ministry of Finance. During the country visits, team members heard concerns that the money must be spent on the fishing sector specifically and not on general recovery efforts.

- Preparing a country-led COAST Operational Manual to provide guidance and procedures to public servants for putting the insurance program in action in the event of a pay-out. The manual would specify the role of government agencies, with a goal of ensuring the quick and transparent delivery of pay outs to the beneficiaries.
- Helping assure that COAST capacity-building reinforce broader efforts to strengthen ecosystem resilience and adapt to climate change. Saint Lucia has National Adaptation Plans; other countries have laid out similar objectives. Ultimately, meeting their goals would reduce the vulnerability of the fisheries sector.

In sum, COAST will require in the short, medium and long-term thorough preparation at a national level, including a general improvement of fisheries data collection and registration, and the creation of quick and reliable channels for distributing pay-out funds after an emergency. But these efforts will pay dividends for years to come. Fisherfolk will get rapid help when disaster strikes their islands, allowing them to get quickly back to sea and assist in general recovery efforts. Governments will be shielded from debilitating one-time outlays for recovery aid. More than that, meeting COAST's standards will help Caribbean nations in long-term efforts to protect marine ecosystems that sustain fisheries and cope with climate events. COAST is a vital investment for the future.

Table 10: Ways that Saint Lucia Can Get Ready for COAST

Fisheries sector data	• Strengthen data collection and management system. • Develop a clear roadmap to monitor and manage fishing effort. • Tighten surveillance and enforcement of rules and regulations.
Fisher organization and capacity	• Strengthen financial management capacity of cooperatives • Increase the proportion of fishers in cooperatives, enhance outreach and education system (especially for youth). • Create benefits to fishers who are not boat owners.
Supply chain information	• Develop markets so that fishers can reliably sell their catch at a fair price on reaching shore.
Environmental data	• Implement regular monitoring of marine habitats, including reef and seagrass surveys, to keep track of ecosystem health and recovery.
Climate and weather monitoring data/information	• Continue to maintain weather stations and tide gauges and install more where possible. Establish a data repository for all environmental information, to make it easy to access and update, and prevent duplication of studies.
Social and economic data	• Conduct regular monitoring of fishing communities to keep up with changes. Continue projects which help diversification of livelihoods and climate adaptation. Improve gender assessments, and encourage women to get formally involved in the sector.
Data on damage to infrastructure	• Improve data collection (assessment), storage, and sharing from/to the ministry responsible for fisheries.
Coping mechanisms	• Increase the number of spaces where boats can be pulled out during weather emergencies. • Help older fishers use FEWER app. • Step up DRM protocol or action plan for the fisheries sector at the national and community level.
Institutional capacity	• Increasing budgets and find the right people to fill positions. • Enhance data sharing between sectors to allow better management plans for disaster risk and climate adaptation.

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Appendix 1: Metadata

Saint Lucia datasets and reports			
Folder	*File name*	*Report Reference or Dataset*	*Source*
Fisheries data	Government of Saint Lucia 2013	Government of Saint Lucia. 2013. Census of the Fisheries Sector in Saint Lucia 2012. Ministry of Agriculture, Food Production, Fisheries, and Rural Development. Government of Saint Lucia. 118 pp.	Department of Fisheries
	STL Fishers register	Dataset	Department of Fisheries
	STL Full Fishers list	Dataset	Department of Fisheries
	STL Landings data	Dataset	Department of Fisheries
	STL National Fisheries Plan 2013	Department of Fisheries (2013) Saint Lucia; National Fisheries Plan February 2013	Department of Fisheries
	STL number of gear	Dataset	Department of Fisheries
Envt and climate data_ Saint Lucia	Saint Lucia Coastal Habitat Maps_Fugro Atkins	Dataset	Department of Fisheries
	1_C156_CREOCEAN_Work_ plan_DVRP 18	CREOCEAN work plan 04/06/18 Preparation of guidelines and coral reef enhancement plan for Point Sable Environmental Protection Area. DVRP 2018.	World Bank DVRP project
	2_C156_CREOCEAN_ Inception_Meeting_Week_ Debrief_DVRP 18	CREOCEAN Inception Meeting Report and Week Debrief. Preparation of guidelines and coral reef enhancement plan for Point Sable Environmental Protection Area. DVRP 2018.	CEFAS
	3_C156_CREOCEAN_Draft_ TrainingPlan_DVRP 2018	CREOCEAN Training Plan - Inception Meeting Report and Week Debrief. Preparation of guidelines and coral reef enhancement plan for Point Sable Environmental Protection Area. DVRP 2018.	Online
	A Systems Plan for Protected Areas in Saint Lucia_Haffey 2009	D. Haffey. 2009. OECS Protected Areas and Associated Livelihoods Project. December 9, 2009.	Online
	Beach Profile Report 1990-2007_De Beauville Scott 2007	S. De Beauville-Scott. 2007. “Beach changes in Saint Lucia: 1990-2007.”	Grenada Red Cross
	Beach Profile Report 1990-2002_De Beauville Scott 2002	S. De Beauville-Scott. 2002. “Beach changes in Saint Lucia: 1990-2002.”	TNC, via CEFAS
	Draft Report Trough Weather System Damage_FAO 2013	FAO. 2013. Draft Report Saint Lucia. Agricultural sector assessment of the damage and losses caused by low-level trough weather system.	TNC
	Final Report of assessment of protected areas legislative framework IUCN_Isaac 2017	E.G. Isaac. 2017. “Legal analysis of the Saint Lucia legislative and governance framework for protected areas.” January 2013, 2017.	Online
	Fisheries SASAP_GoSL 2018a	Government of Saint Lucia. 2018a. Saint Lucia’s Sectoral Adaptation Strategy and Action Plan for the Fisheries Sector (Fisheries SASAP) 2018- 2028, under the National Adaptation Planning Process. Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations, and Sustainable Development, and Department of Agriculture, Fisheries, Natural Resources, and Cooperatives, Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources, and Cooperatives.	Online
	NAP Climate and Vulnerability Report_GoSL 2018b	Government of Saint Lucia. 2018b. Saint Lucia’s National Adaptation Plan Stocktaking, Climate Risk and Vulnerability Assessment Report. Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations, and Sustainable Development.	Online

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Folder	*File name*	*Report Reference or Dataset*	*Source*
FEnvt and climate data_ Saint Lucia	OPAAL_Environmental_ Awareness_KAP_Study_Final_ Report_OECS 2007	OECS. 2007. Environmental Awareness in the OECS: Report of a KAP (Knowledge, Attitude, and Practice). Survey conducted in six OECS member states. Final Report August 18, 2007.	Department of Fisheries
	Opportunities for Sustainable Livelihoods in Protected Areas in the OECS_OECS 2006	OECS. 2006. Opportunities for Sustainable Livelihoods in One Protected Area in Each of the Six Independent OECS Territories, for the OECS Protected Areas and Sustainable Livelihoods (OPAAL) Project. OECS CONTRACT Number OECS/121/05	Department of Fisheries
	Pointe Sable Environmental Protection Area Management Plan 2009-2014_Gardner 2009	L. Gardner. 2009. Management Plan for the Pointe Sable Environmental Protection Area, 2009-2014. Government of Saint Lucia.	Department of Fisheries
	Preliminary Assessment Report of Tropical Storm Matthew_ Jaria 2016	F. Jaria. 2016. Preliminary Assessment Report of Tropical Storm Matthew for the Non-Banana Sector. Department of Agriculture, Fisheries, Natural Resources, and Co-operatives.	Department of Fisheries
	Pointe Sable EPA Final Consultancy Report_OECS 2010	OECS. 2010. Environmental And Socioeconomic Studies for OPAAL Demonstration Site In Saint Lucia Pointe Sable Environmental Protection Area.	Department of Fisheries
	Rapid assessment of the status of coral reef in Saint Lucia following Hurricane Tomas_ Nelson 2010	T. Nelson. 2010. Report on coral reef assessment following Hurricane Tomas.	Department of Fisheries
	Reef check report 1999 - 2004_ De Beauville Scott 2004	S. De Beauville-Scott. 2004. Report on Coral reef assessment following Hurricane Tomas.	Department of Fisheries
	Reef Health Snapshot_ Soufriere_Beeden 2013	R. Beeden, E. Doyle, P. Kramer, M. McField, and H.A. Oxenford. 2013. "A snapshot of the health of Soufriere coral reefs: Results from a trial of a rapid assessment method." Soufriere, Saint Lucia, September 2013. Australia Caribbean Coral Reef Collaboration. www.climateandreefs.org.	Online
	Saint Lucia Climate Change Risk Profile_CARIBSAVE 2012	CARIBSAVE. 2012. The CARIBSAVE Climate Change Risk Atlas (CCCRA). Climate change risk profile for Saint Lucia. March 2012.	Online
	Saint Lucia Coral Reef Report Card TNC 2016b	The Nature Conservancy. 2016b. Saint Lucia Coral Reef Report Card. Online. Available at http://caribnode.org/documents/?category=health	Online
	Saint Lucia Flood Hazard Map_CHARIM 2016b	CHARIM. 2016b. Caribbean Handbook on Risk Information Management: Saint Lucia. Available at http://www.charim.net/stlucia/maps	Online
	Saint Lucia Topographic Map_CHARIM 2016b	CHARIM. 2016b. Caribbean Handbook on Risk Information Management: Saint Lucia. Available at http://www.charim.net/stlucia/maps	Online
	State of the Environment_ GoSL 2015	Government of Saint Lucia. 2015. State of the Environment Saint Lucia 2015.	Online

Appendix 2: Glossary of Abbreviations

CAP:	Common Alerting Protocol
CARICOM:	Caribbean Community
CCCFP:	Caribbean Community Common Fisheries Policy
CCCRA:	CARIBSAVE Climate Change Risk Atlas
CCRIF	SPC: Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company
CDEMA:	Caribbean Disaster Emergency Management Agency
CEFAS:	Centre for Environment, Fisheries, and Aquaculture Science
CHARIM:	Caribbean Handbook of Risk Information Management
CME:	Commonwealth Marine Economies program
COAST:	Caribbean Oceans and Aquaculture Sustainability Facility
CRFM:	Caribbean Regional Fisheries Mechanism
DRM:	Disaster Risk Management
DVRP:	Disaster Vulnerability Resilience Project
FEWER:	Fisheries Early Warning Emergency Response app
GoSL:	Government of Saint Lucia
ICCAT:	International Commission for the Conservation of Atlantic Tunas
IPCC:	Intergovernmental Panel on Climate Change
IUCN:	International Union for Conservation of Nature
KAP:	Knowledge, Attitude, and Practice
MCS:	Monitoring, Control, and Surveillance
NEMO:	National Emergency Management Organisation
OECS:	Organisation of Eastern Caribbean States
OPAAL:	Protected Areas and Associated Livelihoods project
SASAP:	Sectoral Adaption Strategy and Action Plan
SIDS:	Small Island Developing State
SPHERA4COAST:	System for Probabilistic Hazard Evaluation and Risk Assessment for the Caribbean Oceans and Aquaculture Sustainability faciliTy
UKHO:	United Kingdom Hydrographic Office
UNDP:	United Nations Development Program

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