ONE BAY FOR ALL

SUSTAINABLE MONTEGO BAY

ACTION PLAN

ONE BAY FOR ALL

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ACTION PLAN

IDB

St. James Parish Council

O, JAMAICA, THE MUSE WILL NOT GRANT ME
THE POWER TO PRAISE THEE IN SONG,
FOR WHERE IN GOD'S EARTH IS SUCH BEAUTY
OR WHERE DOTH SUCH SPLENDOUR BELONG?
—UNA MARSON

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

CISOCA	CENTRE FOR THE INVESTIGATION OF SEXUAL OFFENCES AND CARNAL ABUSE
CXC	CARIBBEAN EXAMINATIONS COUNCIL
CPSD	CRIME PREVENTION THROUGH SOCIAL DEVELOPMENT
CRP	COMMUNITY RENEWAL PROGRAMME
CSEC	CARIBBEAN SECONDARY EDUCATION CERTIFICATE
CSJP	CITIZEN SECURITY AND JUSTICE PROGRAMME
ESCI	EMERGING AND SUSTAINABLE CITIES INITIATIVE
FY	FISCAL YEAR
GHG	GREENHOUSE GASES
GDP	GROSS DOMESTIC PRODUCT
GOJ	GOVERNMENT OF JAMAICA
HEART TRUST (NTA)	HUMAN EMPLOYMENT AND RESOURCE TRAINING TRUST, NATIONAL TRAINING AGENCY
IDB	INTER-AMERICAN DEVELOPMENT BANK
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
J$	JAMAICAN DOLLARS
JNHT	JAMAICAN NATIONAL HERITAGE TRUST
LAC	LATIN AMERICAN AND CARIBBEAN
LEED	LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
MBCCI	MONTEGO BAY CHAMBER OF COMMERCE AND INDUSTRY
MOE	MINISTRY OF EDUCATION
MLGCD	MINISTRY OF LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT
MLSS	MINISTRY OF LABOUR AND SOCIAL SECURITY
MYC	MINISTRY OF YOUTH AND CULTURE
NCVS	NATIONAL CRIME VICTIMISATION SURVEY
NEPA	NATIONAL ENVIRONMENT AND PLANNING AGENCY
NHT	NATIONAL HOUSING TRUST
NSWMA	NATIONAL SOLID WASTE MANAGEMENT AUTHORITY
NWC	NATIONAL WATER COMMISSION
NWA	NATIONAL WORKS AGENCY
NYS	NATIONAL YOUTH SERVICE
NGO	NONGOVERNMENTAL ORGANIZATION
ODPEM	OFFICE OF DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT
PDC	PARISH DEVELOPMENT COMMITTEE
PIOJ	PLANNING INSTITUTE OF JAMAICA
PRF	PAROCHIAL REVENUE FUND
PMAS	PERFORMANCE MANAGEMENT AND APPRAISAL SYSTEM
PDRMU	PLANNING AND DISASTER RISK MANAGEMENT UNIT
PET	POLYETHYLENE TEREPHTHALATE
PPP	PUBLIC-PRIVATE PARTNERSHIP
RMI	RISK MANAGEMENT INDEX
SJPC	ST. JAMES PARISH COUNCIL
SJPD	ST. JAMES POLICING DIVISION
STATIN	STATISTICAL INSTITUTE OF JAMAICA
TBD	TO BE DETERMINED
TVET	TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING
UDC	URBAN DEVELOPMENT CORPORATION
UFC	UNITE FOR CHANGE INITIATIVE
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE
US$	UNITED STATES DOLLARS
VSU	VICTIM SUPPORT UNIT
WPM	WPM WASTE MANAGEMENT LTD.


GLASS BOTTOM

ABOUT THE PLAN

This book, entitled "One Bay for All: Sustainable Montego Bay", represents the culmination of an intense research and assessment process carried out in collaboration between Jamaica and the Inter-American Development Bank (IDB). Through the IDB's Emerging and Sustainable Cities Initiative, this endeavour comes to a turning point with the development of this Action Plan for achieving a more sustainable way of life in Montego Bay. This plan considers Montego Bay for its problems and its promise: while offering concrete proposals for improvements in quality of life across social, economic, and environmental dimensions, it also takes into account the local and global challenges faced by a Caribbean island in the 21st century. These challenges range from economic, cultural, and political, to more globalized problems such as natural hazards and climate change.

The purpose of disseminating this Action Plan is two-fold: one, to serve as a detailed guide and model for decision-makers to take future actions which will lead to a revitalized, resilient, and reconnected city and citizenry; and two, to engender more public participation in the process towards sustainability through transparency and thereby promote good governance and accountability. With the Action Plan made publicly available, and its promise of a brighter future, citizens can be engaged in a democratic and open process in which people help guide their city on a path toward a better, safe, and prosperous future for themselves, their children, and their community.

As can be seen in the following pages, the road that must be taken may not be an easy one. The challenges for Montego Bay are real, yet not insurmountable. This Action Plan offers an inspirational journey across these hurdles, and shows how Montego Bay can grow and flourish on a more sustainable path. The IDB is confident that with enough public and private support and collaboration, and a shared vision, Montego Bay can be transformed and arrive at its destination as a Caribbean model city of sustainability.

A WORD FROM THE MAYOR

Dear Citizens of St James:

It is a pleasure to greet you all through this medium. The St. James Parish Council continues to carry out works that support the growth and development of the parish, in a manner that reflects smart planning and effective, sustainable resource management while creating opportunities for wealth creation and economic sustainability.

The City of Montego Bay, St James was selected as one of the pilot cities of the Inter-American Development Bank's Emerging and Sustainable Cities Initiative. Since that time in September 2012, we have been working with the Bank on planning the sustainability of the city in terms of its environment and adaptation to climate change, its urban quality, and its fiscal strength and governance. Indeed, our participation in the series of Inter-American Development Bank (IDB) meetings and workshops have given us a renewed perspective and we are confident that we will reposition Montego Bay as the City of choice to live, work, raise families and do business.

One of the most important steps taken by the St. James Parish Council with regards to our partnering for improved networking and operations has been our involvement in the Emerging and Sustainable Cities Initiative (ESCI). This experience has exposed my team and I to critical information, and our vision for success has been improved upon, as we now put things in place to unleash the numerous possibilities and potential of Montego Bay and St. James by extension.

In today's economy, it is a well known fact that – like business corporations – cities must change to stay successfully operational. Cities cannot remain sustainable and prosperous if the businesses and organizations that exist in its geographical area of influence are producing what is no longer in demand, or not providing the goods or services, or culturally religious customs that are needed for socio-economic growth.

I must thank the Hon. Minister Noel Arscott and his team of Ministry of Local Government and our numerous stakeholders who have worked tirelessly with us over the past two years to come up with this plan. Special thanks must also be extended to the South Korean Government who has been unhesitant in their assistance with the preparation of the design of the Montego Bay-Smart City plan by way of Integrated Operation Control Centre (IOCC).

I have given and will continue to give my full support to the IDB and the team to see to the successful implementation of this action plan and I invite you to join us on this journey as we move Montego Bay towards becoming a "Smart and Safe City".

Regards,

GLENDON HARRIS
Mayor of Montego Bay

PLAN COLLABORATORS

This action plan and its contents were developed between October 2012 and February 2015 by the Emerging and Sustainable Cities Initiative (ESCI) of the IDB. The IDB Team worked in close collaboration with the St. James Parish Council, the Ministry of Local Government and Community Development, the Planning Institute of Jamaica, and benefited from widespread participation from several other organizations, without all of whose generous help and contributions this action plan would not have been possible. The ESCI Team would particularly like to acknowledge the contributions of the Korean Research Institute for Human Settlements (KRIHS) supported by the Ministry of Strategy and Finance of Korea (MoSF), and of the Korea EXIMBank (KEXIM) through Korea's Knowledge Sharing Program (KSP). Special thanks are also offered to the many people who either directly or indirectly assisted in this process, whose names remain unknown, though their help is neither forgotten nor unappreciated. This action plan was the result of the diligent efforts of a multitude of people and organizations, and any omission of acknowledgement of any person or entity is not deliberate. All participants and collaborators are appreciated and acknowledged to have made an important and positive contribution to the future sustainability of Montego Bay. The principal contributors are listed here.

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EXECUTIVE SUMMARY

Xamayca. The native Arawaks called it "The Land of Wood and Water" or "The Land of Springs". Jamaica has been flaunting its natural beauty and abundant resources for centuries. Even today visitors flock from around the globe to see this gem of the Caribbean. Montego Bay, a city on Jamaica's northwest coast, sees millions of tourists each year, and they come for the pristine blue waters, the fiery sunsets, the verdant mountains and undulating palm trees. Montego Bay, often referred to as Mo'Bay by the locals, welcomes visitors with its lush landscape and the warmth of the sun and its people. But, the future of this blessed place is threatened by the ills of unchecked and rapid urban development and growth that continue to put a strain on resources.

The city's economic dependence on tourism also brings with it challenges, such as the vulnerability of its main economic product to extreme climate events; inaccessibility of many of its beautiful beaches to residents; and a social, economic, and physical divide between locals and tourists. At the same time, the tourism sector brings opportunities, such as attracting capital for investment.

If approached correctly, Montego Bay can take these opportunities to find a new identity and emerge renewed. It can become a better planned city that is more compact and consumes less space and resources. It can be a city where places aren't just spaces, where nature is valorised, where there is one unified community and not two separate worlds. Mo'Bay can make better use of its existing infrastructure, guarantee safety for all, and have the fiscal and administrative capacity to provide quality public services. It can be a more resilient Montego Bay, one that is revitalized and made of sustainable connections between people, places, and the environment. By building adaptive capacity and harnessing the strength of various sectors and agencies, the city will stand firm yet flexible to both the unknown challenges of tomorrow and the expected hazards that plague every Caribbean city.

To aid in these efforts and mobilize the various actors necessary to make Montego Bay a sustainable city that offers a high quality of life to all its residents, present and future, in 2012 Montego Bay joined the Inter-American Development Bank's Emerging and Sustainable Cities Initiative (ESCI).

EMERGING AND SUSTAINABLE CITIES INITIATVE (ESCI)

A sustainable Montego Bay for 2030 means a resilient, reconnected, and revitalized city. A resilient city is a strong and healthy city that is ready and capable of adapting or bouncing back from hardship. A revitalized city is one that is active, full of life, renewed, and fortified. A reconnected city is one that is brought into contact or joined together again. Montego Bay will be a place where all, including both the most vulnerable and future populations, have equal access to opportunities for a decent, safe, and prosperous livelihood. With this vision fulfilled, Jamaica's own "Vision 2030" will also be satisfied, whose motto is to make the island a "place of choice to live, work, raise families and do business".

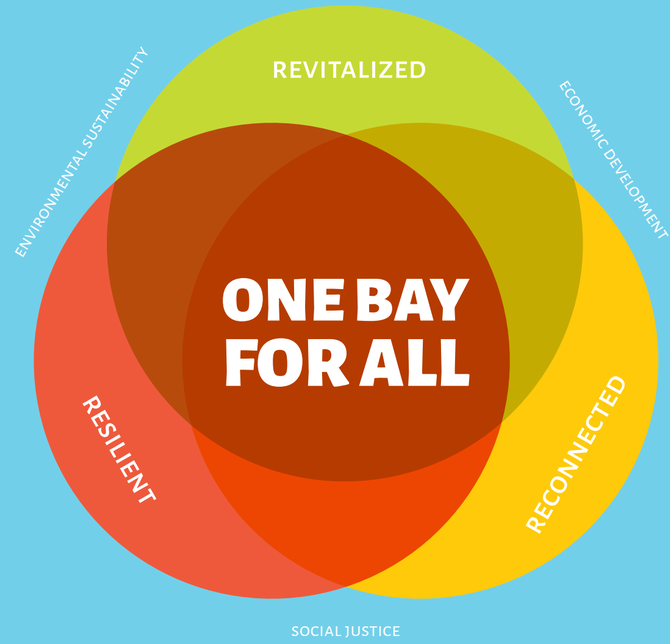
But, how do we achieve this vision? The ESCI offers a solution through a comprehensive plan of action. This long-term vision guides the ESCI's Action Plan for Montego Bay and its interventions in priority areas. Organised around this vision, the Plan emphasises the synergies needed across sectors and issues for sustainability to be achieved. Through actions that ensure environmental sustainability, economic development, and social justice, this city can become One Bay for All.

The ESCI is an initiative of the Inter-American Development Bank which takes a multi-disciplinary approach to creating synergistic solutions to urgent sustainability challenges faced by emerging mid-sized cities in Latin American and the Caribbean (LAC) today. A key to the success of the Initiative is facing problems while they still present opportunities, which is why the ESCI focuses on cities of this kind. With increasing urbanization and growing urban populations in the LAC, the ESCI provides technical assistance in refining and implementing urban development plans while addressing these inter-related issues of sustainability and urban growth in a structured and integrated manner. The ESC Initiative works hand-in-hand with local and national stakeholders to identify problems, form a diagnosis, and craft potential actions for response. Their goal is to provide several high-impact and highly-visible results which may act as a catalyst for continued smart growth and sustainable development in the target city, as well as provide models to other LAC cities challenged with similar problems.

EMERGING and
SUSTAINABLE
CITIES
Initiative

VISION:

THROUGH REVITALIZATION, RESILIENCY AND RECONNECTION, WE CAN ACHIEVE ***ONE BAY FOR ALL***



So, how does the ESCI go about making a sustainable city? It uses a novel approach that is continuously tested and revised. The methodology involves five phases (see Figure 1), and begins with a rapid diagnostic assessment and analysis of the city using a set of indicators. During this phase, interviews, research, meetings, and base studies are carried out to complete data collection and inform the assessment. Utilizing a traffic light rating system, the most pressing areas for action are identified. The results of this phase for Montego Bay are shown in Figure 2. Areas in red are critical and require immediate action, and areas in yellow are unsustainable but not critical.

PRELIMINARY PHASE	PHASE 0	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
	5%	5%	30%		50%	10%
	PREPARATION	DIAGNOSTIC ANALYSIS	PRIORITIZATION	ACTION PLAN	PREINVESTMENT	MONITORING
EXPR. OF INTEREST LIST OF CITIES VALIDATION NEGOTIATION -COUNTRY AUTHORITIES LETTER OF EXPR. OF INTEREST	START COLLECTING INFORMATION WORK - TEAMS FORMATION ACTORS IDENTIFICATION HIRING TECHNICAL INPUTS	FIRST MISSION CITY OVERVIEW COMPLETE INDICATORS TRAFFIC LIGHT EXERCISE	APPLYING FILTERS: - PUBLIC OPINION - ECONOMIC COST - CLIMATE CHANGE - SPECIALISTS CRITICAL AREAS FOR THE CITY'S SUSTAINABILITY	FORMULATION OF THE ACTION PLAN FOR THE CITY'S SUSTAINABILITY Initial Studies - DEEPENING ACTION PLAN ACTION PLAN VALIDATION MISSION	FINANCING PREINVESTMENT STUDIES IN PRIORITY SECTORS: - FEASIBILITY - ECONOMIC - ENGINEERING DESIGN - ENVIRONMENTAL IMPACT - OTHER CITY-FOCUSED TC AGREEMENT DEVELOPMENT	DESIGN AND IMPLEMENTATION OF INDEPENDENT MONITORING SYSTEM COMPONENTS: - INDICATORS FOR PRIORITIZED AREAS - ADDITIONAL TOPICS OF INTEREST IN THE CITY CITIZEN PERCEPTION

Figure 1

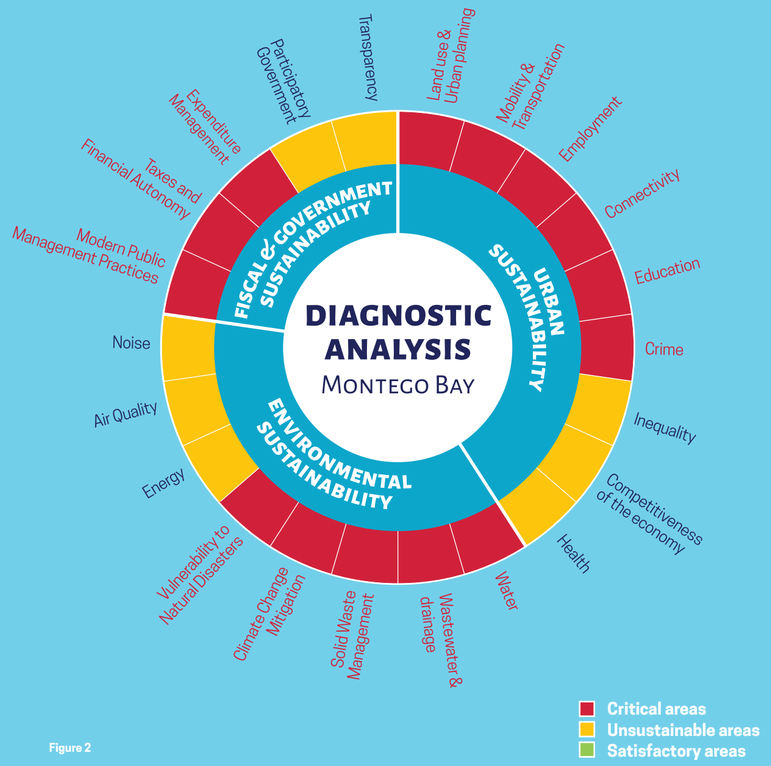


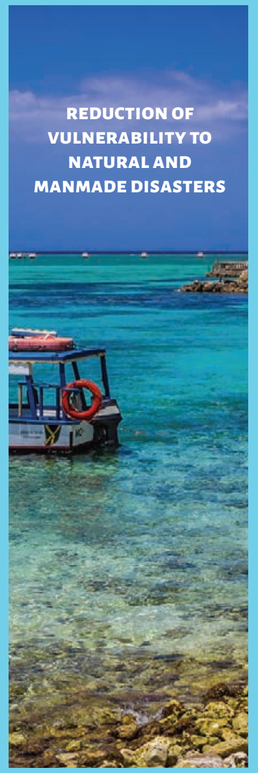
Figure 2

The next phase of the methodology prioritizes these areas through the application of filters (public opinion, economic impact, and environmental sustainability), allowing for a determination of priority action areas through informed discussions with key stakeholders. Taking all of these factors into account, the final priority action areas were determined to be the following:

- Sanitation, to include solid waste management and wastewater
- Urban development and planning, including trans portation
- Reduction of vulnerability to natural and manmade disasters
- Public safety and crime
- Employment and training, to include education

The third phase of the ESCI methodology is the formulation of an Action Plan. The next steps of the process involve the final two phases, including pre-investment and monitoring.

The Action Plan is an integrated strategy designed to address and overcome the barriers to the sustainability of the city. Emphasis is placed on specific strategies in the five priority action areas, and their definition and programming have been guided by the long-term vision for Montego Bay. The Plan itself is organised by the themes of the Vision, each theme including short- and long-term actions corresponding to implementation in 0 to 3 years and 3 to 15 years, respectively. The following paragraphs will highlight some key, short-term interventions that exemplify how these actions should be carried out in an integrated manner, while also summarizing the other proposals of the Plan. It is important to recognize that one project can simultaneously address multiple problems and provide a variety of solutions. These types of projects are what inspire future actions and build community support for sustainability efforts.



An integrated urban strategy for sustainable development in downtown Montego Bay

A WATERFRONT OASIS

On its face this project may seem like just a new park, but in its essence it is a cross-sectoral solution to multiple urban problems faced by a coastal city. Montego Bay is vulnerable to several natural disasters like hurricanes and storm surge, as well as sea level rise as a result of climate change. Further, there is both a lack of beaches that are free to access and use by the public, as well as a lack of open recreational green space for residents. In order to connect the city with the sea while at the same time building resiliency and helping protect it from coastal hazards, an approximately 2-kilometre stretch of "forgotten" and underutilized coast from the Old Hospital Park to the River Bay Fishing Village will be revitalized and transformed into a public access beach and park.

This integrated waterfront park will include a boardwalk park, an upgraded seawall pier, public beaches, and a variety of seaside recreational facilities. These facilities may include cafes, shared jogging/bike paths, sand beach volleyball courts, playgrounds, public toilets and showers, a space for cultural events, lifeguard stands, garbage bins and collection service, and bike racks and rental stands. This important coastal transformation will provide a destination for locals and tourists alike, offering amenities and activities where both can mingle, relax, and enjoy the outdoor natural splendour of Montego Bay.

While adults and children are enjoying safe access to the new park and swimming in the crystal blue waters, little will they realize they are in the midst of a shoreline stabilization and erosion control project. This coastal zone management project will be part of a greater program, and will work to protect the city against storm surge and reduce coastal erosion. Some of the tools to be used include open space preservation, establishment of groynes and breakwater structures, and use of low seat walls in the park that act as additional protection from storm surge while also providing seating areas for relaxation.

Many of the design principles for the new park complement other priority actions. The park design incorporates eco-corridors or green links, new pedestrian areas and connections with downtown, and integration with the proposed new mobility plan. These designs anticipate the needs of locals and tourists, while also considering the long-term sustainability goals, plans, and vision for the city. The total cost for this featured project is US$8,000,000, or J$917,600,000 [1].

Other priority actions that this project already supports or should be integrated with include the following:

- Downtown Walkability Project
- Sustainable Mobility Master Plan and Program to reduce traffic and provide better connectivity throughout the city, to include a new North transit centre
- Creation of more parks, green spaces, and recreation areas
- Revitalization of downtown and key landmarks
- City and coastal resilience to natural and manmade disasters and climate change, including establishment of a Planning and Disaster Risk Management Unit (PDRMU)
- Clean and Green Initiative: clean up city with strategically placed waste receptacles and the beautification of illegal dumpsites
- Promote safety in public spaces by strengthening and supporting operational priorities of law enforcement, while also building community resilience to criminal victimisation; citizen watch groups and tourism police.

1. Conversion from US$ to J$ uses average mid-market rate from January 2015 (US$1 = J$114.7)

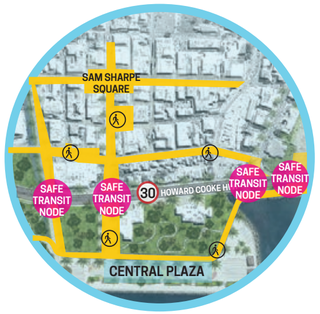
Integrated waterfront park and coastal zone management project

An urban oasis on the waterfront

Design Principles For Waterfront Park

ECO CORRIDORS

In the central area of the urban intervention a system of three ecologic corridors connects the historical downtown area with the newly created multifunctional plaza at the Waterfront Park. The three corridors are designed as green boulevards connecting the existing structures from Barnett Street, the Market Street and the a newly created Eco corridor utilizing the North Gully as an accessible walkable strip.



NEW PEDESTRIAN AREAS

The new Waterfront Park is integrated into a holistic program of making the city more pedestrian friendly. The Downtown area in the mid term is a pedestrian area and connects with the central plaza of the new Park. Safe Transit Nodes are special transition areas for pedestrians at the Howard Cooke Highway. These nodes need a special design with speed bumps or other speed reducing measures. The Highway shall be 30 km/h at the main Downtown area.

A NEW MOBILITY BEHAVIOUR

The area is pedestrian friendly for all people. The locals can walk from Downtown Montego Bay to the new Plaza facilities, the bars, the beach Volleyball courts, etc. The tourists have different origin-destination patterns: they might come from the Hip-Strip or stop their cabs at the Taxi stands at the transportation center. Close to Pier 1, a bike-rental will be installed and visitors can take a bike-ride from the central plaza and explore Downtown and its new Waterfront park.

419 housing units

0.4 plot occupation

FAR 1,0 floor area ratio

9173 M² total public space

12.297 M² built area

US$ building costs
- basic 10M
- extended 16,7 M

MY NEW HOME AND NEIGHBOURHOOD

Uncontrolled, low-density urban growth is a major problem in Montego Bay. Informal settlements across the city present safety and sanitation issues and limit the government's financial capacity to make investments to benefit residents by reducing the property tax base. Residents of informal settlements also face high risk in the face of potential natural disasters, as the structural character of these communities is often weak or unregulated, and their location is often precarious, on steep hills or along water bodies prone to flooding.

The goal of the Integral Neighbourhood Upgrading Program and Pilot Downtown Housing Project is to implement a comprehensive neighbourhood upgrading strategy for the city and improve the quality of life of residents in these vulnerable communities. This can be done not just through physical improvements, like new or updated homes and improved or added infrastructure (paved streets, sidewalks, sewage connections, stormwater drainage, street lamps, etc.), but also through social improvements, for example, by connecting people with safety and sanitation programs or training and education programs for employment. Neighbourhood upgrades may also include added outdoor recreation facilities like basketball courts and playgrounds, and open and green spaces. The program's strategy will be to implement smart growth policies for sustainable growth and development of Montego Bay, which includes promoting mixed-use and high-density development in and near the urban core. During neighbourhood upgrading, additional housing may be added in strategic locations to fulfil this goal.

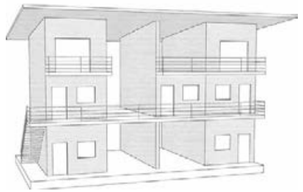
An example of this program is the pilot project in downtown's Railway Lane Community. This project will develop 7 blocks of this informal settlement for a total of 419 new housing units, plus upgrade the adjacent Charles Gordon Market. With a built area on each lot covering only 40%, this allows for the creation of a total of 9,173 square meters of new public space.

A key aspect of this project is the incremental housing. Though the term may be unfamiliar to many, the concept is not. Incremental housing is something Montegonians have been doing for years – as families grow physically and economically, so does the home. These proposed incremental housing units start out basic, but can be expanded as needed. These units range in size from 28 square meters to a potential 90 square meters. The cost of the basic incremental housing (419 units) for this community is approximately US$10 million; plus infrastructure upgrading costs, the total cost for the short-term pilot project is estimated to be approximately US$23.2 million, or J$2.6 billion.

Community improvements also include landscaping, recreation and sports areas, bike lanes, eco-friendly design and design elements that may reduce the opportunity for crime. The process for developing and upgrading this community will involve the residents from the start, and this participatory process will result in a sense of ownership for the project by the residents.

The adjacent market, an integral part of this community, will gain structural improvements, like a new roof and façade, and a new plaza with green spaces and areas for shade and sitting. New spaces should be designated for wholesale and retail vendors as well as food establishments.

My Growing Home: The Extension Process

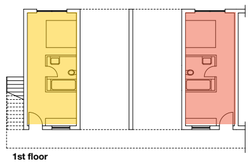


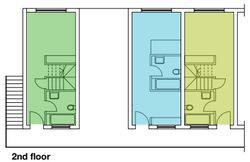
BASIC

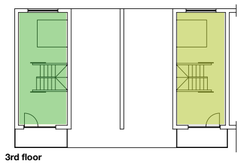
BASIC HOUSING
UNITS VARY FROM
28M² UP TO 56M²

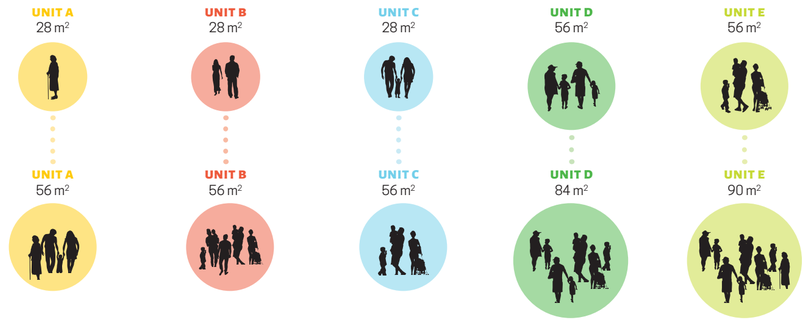
EXTENDED

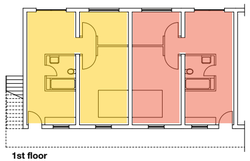
EXTENDED HOUSING
UNITS VARY FROM
56M² UP TO 90M²

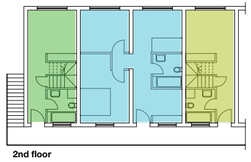


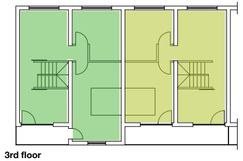












This project supports, complements, and should be integrated with other proposals of the action plan, to include the following:

- Downtown revitalization
- Update of the urban development and planning instruments, including training of planners
- Clean and Green Initiative – trash containers and collection
- Create new public/green spaces
- Integration with mobility projects, like the downtown walkability project and mobility plan, to ensure community access to transit and connectivity with city
- Rehabilitation of important and historic landmarks for the city (markets as part of cultural heritage)
- Integration of community with updates to basic services and improvements in solid waste management
- Support community involvement in proposed composting program
- Enhance community resilience to criminal victimisation with programming and support; collective efficacy
- Promote community safety by supporting local law enforcement operations
- Development plans should consider stormwater runoff mitigation strategies
- Inclusion of a contingency plan for emergency hazard events, and build resilience to hazards through modern, resilient, sustainable building techniques and designs
- Promote sustainability of community through youth development programs, and targeted job training and internships

All of these initiatives and actions are enhanced through improved intersectoral and interagency collaboration; consultations between key groups and stakeholders; citizen engagement in the process and promotion of public participation; and public awareness and education campaigns.

VISION	ACTION	TERM	ESTIMATED COST US$	ESTIMATED COST J$*	PRIORITY AREA
RESILIENT	Integrated Waterfront Park (including Coastal zone management project)	●	$8,000,000.00	$917,600,000.00	
	Vulnerability audits of critical facilities	●	$30,000.00	$3,441,000.00	
	Create Hazard Risk Reduction strategy	●●●	$80,000.00	$9,176,000.00	
	Contingency Plan for city and coastal zone	●	$50,000.00	$5,735,000.00	
	Proposal/Plan for long-term monitoring program of contingency plan	●●●	$15,000.00	$1,720,500.00	
	Plan for Airport Response to CC		$40,000.00	$4,588,000.00	
	Build capacity for response of PDRMU / training in risk assessment and management	●	$20,000.00	$2,294,000.00	
	Risk-resilient coastal zone management program	●●●	$20,000,000.00	$2,294,000,000.00	
	Coastal risk assessment	●	$400,000.00	$45,880,000.00	
	Coastal and disaster risk information and planning system (GIS-based), to include training		$25,000.00	$2,867,500.00	
	Stormwater Drainage Plan Implementation	●●●	$4,243,934.00	$486,779,229.80	
	Private waste collection study	●	$25,000.00	$2,867,500.00	
	Additional waste collection vehicles	●●●	$7,000,000.00	$802,900,000.00	
	Vehicle maintenance facility	●●●	$160,000.00	$18,352,000.00	
	New sanitary landfill	●●●	$8,000,000.00	$917,600,000.00	
	Closure of Disposal site in Retirement		$800,000.00	$91,760,000.00	
	Study to identify site for sanitary landfill and Plan for closing of Disposal site in Retirement	●	$30,000.00	$3,441,000.00	
	Materials recovery facility	●●●	$160,000.00	$18,352,000.00	
	Composting facility	●●●	$1,773,000.00	$203,363,100.00	
	Prefeasibility study for composting plant/facility	●	$30,000.00	$3,441,000.00	
	Strengthen community policing program	●●●	$60,000.00	$6,882,000.00	
	Foster economic engagement of vulnerable communities	●	$70,000.00	$8,029,000.00	
	Design case management system/database for comprehensive community interventions		$8,000.00	$917,600.00	
	Eliminate deficiencies in electronic crime-fighting technology	●	$55,000.00	$6,308,500.00	
			$25,000.00	$2,867,500.00	
	Consolidate local law enforcement fleet		$15,000.00	$1,720,500.00	
	Recruitment and retention plan to improve police-citizen ration w/ related activities		$50,000.00	$5,735,000.00	
	Increase police-citizen ratio (Additional officer salaries) - (over 15 years)	●●●	$30,000,000.00	$3,441,000,000.00	
REVITALIZED	Update and complete development plan	●	$200,000.00	$22,940,000.00	
	Capacity building and training for urban planners	●	$50,000.00	$5,735,000.00	
	Pilot Downtown Housing Project	●	$23,205,512.00	$2,661,672,226.40	
	Integral Neighbourhood Upgrading	●●●	$247,682,736.00	$28,409,209,819.20	
	Design for Revitalization of Charles Gordon Market	●	$80,000.00	$9,176,000.00	
	Revitalization of Charles Gordon Market	●●●	$1,000,000.00	$114,700,000.00	
	Downtown Walkability Project (pilot + phase 1 + 2)	●●●	$5,150,000.00	$590,705,000.00	
	Rehabilitation of Historic Landmarks	●●●	$2,200,000.00	$252,340,000.00	
	Provide more receptacles for litter throughout city	●	$30,000.00	$3,441,000.00	
	Transformation of illegal dumpsites	●	$20,000.00	$2,294,000.00	
		●●●	$500,000.00	$57,350,000.00	

In combination, and in addressing the five priority action areas, the actions proposed in this plan will make Montego Bay more resilient, more connected, and more liveable. They will make Mo'Bay not just a destination for tourists, but a home for the locals. The city can grow in a managed and sustainable way, and promote access and mobility for all. Quality of life will be improved with housing and neighbourhood upgrading, support for education and training and the matching of jobs with a focus on vulnerable populations, improvements in public sanitation, more efficient law enforcement to serve and protect the people, building capacity for response to hazard events and planning for climate change, more integrated operations for city management, and reduction of vulnerability to hazards through projects like the implementation of a stormwater drainage plan for the city. A consolidated list of actions is shown in the adjacent summary tables. They are categorized by vision theme and labelled with their corresponding priority action area.

*Conversion from US$ to J$ uses average mid-market rate from January 2015 (US$1 = J$114.7)

- Urban Development and Planning
- Reduction of Vulnerability to Disasters
- Sanitation
- Public Safety and Crime
- Employment and Training
- Transversal
- ● Short
- ●● Medium
- ●●● Long

VISION	ACTION	TERM	ESTIMATED COST US$	ESTIMATED COST J$*	PRIORITY AREA
RECONNECTED	Sustainable Mobility Master Plan (including subsidies)	●●●	$1,500,000.00	$172,050,000.00	
	Development and construction of intermodal north transportation hub	●●●	$4,000,000.00	$458,800,000.00	
	Interagency coordination / consultations between key groups	●	$5,000.00	$573,500.00	
	Public awareness campaign	●	$40,000.00	$4,588,000.00	
	Implement Building Resilient Communities Program	●●●	$50,000.00	$5,735,000.00	
	Consultations between SJPC and service delivery entities	●	$5,000.00	$573,500.00	
	Public education campaign (initial phase)	●	$50,000.00	$5,735,000.00	
	Continued public education campaign (over 15 years)	●●●	$1,500,000.00	$172,050,000.00	
	Help desk for on-site sewage treatment and disposal options	●	$10,000.00	$1,147,000.00	
	Training for enforcement of sanitation laws	●	$5,000.00	$573,500.00	
	Additional health department vehicle	●●●	$50,000.00	$5,735,000.00	
	Create Sewage connection program plan/strategy	●	$15,000.00	$1,720,500.00	
	Increase residential sewage interconnections	●●●	$37,000,000.00	$4,243,900,000.00	
	Develop local government capacity to lead multi-stakeholder crime prevention group	●	$30,000.00	$3,441,000.00	
	Cultivate stakeholder participation in multi-stakeholder crime prevention group		$65,000.00	$7,455,500.00	
	Develop local anti-corruption initiative	●	$20,000.00	$2,294,000.00	
	Public awareness campaign / promote collective efficacy in crime prevention	●●●	$200,000.00	$22,940,000.00	
	Facilitate dialogue among youth diversion service providers	●	$1,000.00	$114,700.00	
	Expand general support services for victimized youth		$60,000.00	$6,882,000.00	
	Create entrepreneurial opportunities for youth in conflict with the law	●●●	$300,000.00	$34,410,000.00	
	Strengthen state response to gender-based violence and exploitation	●	$40,000.00	$4,588,000.00	
	Conduct survey on commercial sex workers		$15,000.00	$1,720,500.00	
	Consultancy to collect information on current training programs and target population		$7,000.00	$802,900.00	
	Development of central database of information for job-seekers and employers		$40,000.00	$4,588,000.00	
	Matching of training programs with labor market needs, to include local labor market assessment	●	$25,000.00	$2,867,500.00	
	Communication strategies and establishment of regular meetings to improve coordination between key stakeholders		$3,000.00	$344,100.00	
	Tracer study		$40,000.00	$4,588,000.00	
	Create mentorship programs / development of career guidance opportunities	●●●	$15,000.00	$1,720,500.00	
	Establish demand-based training and internship programs		$50,000.00	$5,735,000.00	
	IOCC: cost-benefit analysis		$100,000.00	$11,470,000.00	
	IOCC: Executive Project	●●●	$400,000.00	$45,880,000.00	
	Integrated Operations Control Centre: Pilot		$4,000,000.00	$458,800,000.00	
	IOCC: Implementation for Greater MoBay		$14,000,000.00	$1,605,800,000.00	

Achieving the vision for Montego Bay means taking collective action in a step-wise and strategic manner. Together we can build towards a better city where all can share the experience of an improved quality of life through economic development, environmental sustainability, and social justice.

The total estimated cost for this Action Plan, including 70 short- and long-term actions or interventions across 3 themes and 5 priority action areas, is nearly US$ 425,000,000, or over J$ 48 billion. Spread across 15 years, to reach the goal of a sustainable Montego Bay for 2030, that amounts to approximately US$ 28.3 million, or J$ 3.2+ billion, per year. It is important to remember that progress has already been made towards these actions. The ESCI has accomplished the preparation of the following, which will support implementation of several actions in the plan:

- 3 base studies which provide information and data for (i) the development of planning and geographic information systems, and (ii) public officials and private entities for better decision-making
- Action Plan to inform the updating of the new development plan for Montego Bay
- Conceptual design for waterfront park
- Conceptual design and strategy for neighbourhood upgrading and pilot downtown housing project

These initial studies should be followed by further research and analyses for feasibility and impact during the pre-investment phase. The estimated cost of pre-investment is US$760,500, or J$87+ million. Furthermore, the burden of these costs for implementation can be eased by spreading the financing across any combination of local and national government, multilateral agencies like IDB, public-private partnerships, development organizations, and other private (financial) sector investments. Various financing models should be explored to strengthen the feasibility of implementation of the plan.

Active and constant citizen participation over time is essential for overcoming sustainability challenges. For this reason, an independent monitoring system to track the progress of key sustainability problems and goals will be formed in the final phase of the ESCI, and led by civil society in coordination with the municipality. This impartial and objective group will follow-up on the results of development plans in the city, to include the actions identified as priorities in this ESCI action plan. By strengthening a culture of citizen participation, transparency and accountability, the public administration shall become more efficient and more incentivized to direct public resources toward the sustainable development of the city and the improvement of quality of life for its people.

The first step of anything is often the most difficult, but at the same time it is the most important as it helps build momentum towards the goal. As such, the priority actions in this action plan are just the first steps on the road toward sustainability and the journey towards the vision of One Bay for All. Once the priority interventions are implemented, Montego Bay can re-evaluate and refocus, shifting its efforts to keep up with other critical issues and long-term problems. The action plan, like the city, is clearly alive and dynamic. And as Montego Bay evolves, so the plan evolves too. Though the city and the plan may change, the five pillars of the successful implementation and sustainability of the actions remain: (i) the expansion of the information available for decision-making, (ii) capacity-building, (iii) inter-agency coordination, (iv) public participation, and (v) a citizen monitoring system. With these five pillars, the path towards a sustainable Montego Bay becomes clearer and each step becomes stronger.

The following document presents the final Action Plan for Montego Bay, Jamaica, and includes related background information and research. The first chapter of this document provides an explanation of the ESCI, while the second provides context for Montego Bay and the reasons behind the selection of the city for participation in the Initiative. The third chapter provides a description of the methodology used by the ESCI, and the fourth presents a diagnostic overview of the topics analysed for Montego Bay. The fifth chapter summarizes the greenhouse gas mitigation analysis, disaster risk and climate change vulnerability assessment, and the urban growth study. In the sixth chapter, an explanation of how the priority areas of action were determined can be found. The specific plan of action is laid out in the seventh chapter, including a description of the plan's guiding vision, a more detailed diagnosis of the priority action areas, and strategies for each priority action area. As part of the Plan's follow-up, the Parish Development Committee, with the support of the ESCI, will establish a citizen monitoring system, described in the eighth chapter. The eighth chapter also contains plan implementation details, including estimated costs and next steps. The ninth and final chapter closes with final thoughts on the successful implementation of the Plan, emphasising the importance of synergies in the implementation process.

1

1. WHAT IS THE EMERGING AND SUSTAINABLE CITIES INITIATIVE (ESCI)?

At the time this document was written, 54% of the world's population was living in urban areas, and the Latin America and Caribbean (LAC) region composed the second-most urbanized region in the world, with 80% of its residents living in cities[2]. In the latter half of the last century the percentage of its population living in urban areas nearly doubled, growing from nearly 41% in 1950 to 75% in 2000. If this growth trend continues, by 2035 almost 86% of the region's population will be living in cities[3]. The situation in the Caribbean is similar, yet not as extreme, with 70% of the population living in urban areas, while in Jamaica the urban population makes up 55%[4]. No matter the level of urbanization, this process of urbanization offers great opportunities for city improvement, in that these growing cities represent the centres of economic activity. These cities have become the nuclei of development and innovation; the hubs of cultural activity; and the centres of exchange and diffusion of goods, ideas, and services. Taking advantage of and harnessing these strengths not only will improve life for the residents of these cities, but will also reap benefits for the economic activities themselves and the surrounding areas.

This rapid pace of urbanization, however, also creates daunting challenges for local governments and strains their ability to effectively facilitate a high quality of life for their citizens. Unfortunately, these same challenges are not new or foreign to Montego Bay, Jamaica. As people move to cities, often from poorer rural areas, many occupy land that is unsuitable for human habitation due to safety or environmental reasons. Conversely, they may occupy lands along the city's periphery, leading to inefficient low-density housing patterns that make it difficult and expensive to fulfil the demand for infrastructure and utilities. Notwithstanding the precarious development of these informal settlements, they may also be illegal in nature and impede law enforcement, often creating pockets of the city that are largely out of government control. An estimated 23.5% of the LAC region's urban population lives in slums[5], while in Jamaica this statistic is slightly lower at around 20%[6].

Accelerated population growth in urban areas can result in problems related to unemployment, security, inequality, environment, and government finances and operational efficiency. Further complicating things is climate change, which adds new threats to the LAC region's cities, many of which already suffer from natural disasters. The more these urban populations grow, especially in coastal cities, the more people and infrastructure are exposed to sea-level rise, hurricanes, flooding, earthquakes, and landslides. For many, such disastrous events can mean enormous losses and present obstacles that are difficult to overcome. In addition, as income rises in these growing cities, individuals' consumption will increase, putting a greater strain on natural resources and worsening problems of pollution and traffic congestion.

These challenges associated with rapid urbanization are not only faced by mega and large cities, but also by medium and small cities. In fact, 20% of the global population lives in a medium-sized city, and nearly 50% of the global urban population lives in small cities of less than 500,000 inhabitants[7]. And although the LAC region's largest cities continue to grow, it is its interme-

2. UN, World Urbanization Prospects: The 2014 Revision, Highlights (New York: Department of Economic and Social Affairs, Population Division, UN, 2014), http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf. 1.
3. UN, World Urbanization Prospects: The 2007 Revision, Highlights (New York: Population Division, Department of Economic and Social Affairs, United Nations, 2008), 78-79.
4. UN, World Urbanization Prospects: The 2014 Revision, 23-24.
5. UN, World Urbanization Prospects: The 2007 Revision, 151.
6. USAID, USAID Country Profile: Property Rights and Resource Governance Jamaica (Washington, DC: USAID, 2010), http://usaidandtenure.net/sites/default/files/country-profiles/full-reports/USAID_Land_Tenure_Jamaica_Profile.pdf.
7. UN, World Urbanization Prospects: The 2014 Revision, 15.

diate cities that now show higher growth rates[8]. These mid-sized cities of 100,000 to 2 million people are called "emerging cities." These emerging cities may be less prepared for growth than their larger cousins, but they also present opportunities to intervene in a city's trajectory at a critical point in its development.

Despite its challenges, Montego Bay, Jamaica, offers an abundance of natural resources and local spirit, as well as economic strength in its tourism sector. Furthermore, the moment is ripe for Jamaica, when the urban-rural population is at a healthy balance, and specifically, the population of Montego Bay is small enough that the possibility for the effective administration of change is great. Cities like this make for notable cases to demonstrate how a city can improve and become more sustainable and resilient. By taking action at an earlier stage of growth, a city can be set on a sustainable path that avoids undesirable situations, which at a more advanced level of growth would be much more difficult and expensive to correct.

To respond to these challenges and take advantage of these opportunities, in 2011 the Inter-American Development Bank (IDB) created the Emerging and Sustainable Cities Initiative (ESCI), a technical assistance program that helps intermediate cities in Latin America and the Caribbean identify and prioritize actions to maximally improve their sustainability and residents' quality of life. The ESCI defines a sustainable city as one that offers its current residents a high quality of life without compromising that of future generations.

Cities are complex, interdependent systems, and resolving any one of its problems requires a comprehensive view of its parts, their dynamics, and interactions. For this reason, the ESCI of the IDB draws on more than 50 years of international development knowledge and experience to address the sustainable urban development challenges facing emerging cities today. Using a multi-disciplinary approach, the ESCI promotes environmental, urban, and fiscal sustainability through a more participative, representative, and transparent government.

The ESCI uses an action-oriented methodology in which key problems are quickly and systematically identified and prioritized so that an appropriate solution can be implemented. The first phase of implementing the ESCI consists of a rapid assessment of twenty-three topics within the three dimensions of sustainability to identify which thematic areas of the city are performing well, which show signs of problems but are currently satisfactory, and which are performing poorly and require urgent attention. This assessment uses a stoplight system to classify the topics as green, yellow, or red based on a set of 130 indicators and qualitative information gathered through interviews and document reviews. This process is used to quickly assess a wide range of topics that are important to a city's functioning and identify priority issues. These issues are further prioritized and assigned scores based on public opinion, climate change and disaster risk, and economic criteria. Two to five topics with high scores on this prioritization assessment are selected for focus in the action plan in consultation with the government and local civil society. Once the priority action areas have been identified, a more detailed analysis is conducted to identify the specific problems within the topic that need to be addressed.

The next phase is the development of the solutions to the issues identified. An interdisciplinary team of specialists from the Inter-American Development Bank works closely with the local authorities to develop a set of actions that will be both feasible and have a high impact on the issues identified. These strategies are articulated in an action plan. The final phases of ESCI are the implementation of the action plan, as well as the establishment of a citizen-led system to monitor the results of the action plan and the progress of the city.

The contributions of the ESCI aid local decision-makers in intermediate cities across Latin America and the Caribbean in prioritizing the most critical challenges and obstacles to sustainable development, while also providing them with the tools, resources, and mechanisms to realize more coordinated and efficient planning. ESCI promotes inter-agency coordination across local and national governments and civil society, in hopes to create consensus in planning priorities. It simultaneously supplies the tools and instruments needed, like this action plan, to orient city planning and decision-making in the direction of sustainable development with people and the improvement in their quality of life as the focus. ESCI's methodology is based on the premise that urban development strategies that are well planned, integrated, and cross-sectoral can ensure improvements in the quality of life for citizens and help materialize a more sustainable, resilient, and inclusive future for emerging cities in Latin America and the Caribbean.

8. UN-Habitat, State of the World's Cities 2012/2013 - Prosperity of Cities (New York: Routledge, 2013), 31.

AN URBANIZED WORLD

Urban population as percentage of total population by 2014.

MILLIONS OF INHABITANTS & PERCENTAGE OF URBAN POPULATION

BIG URBAN ZONES

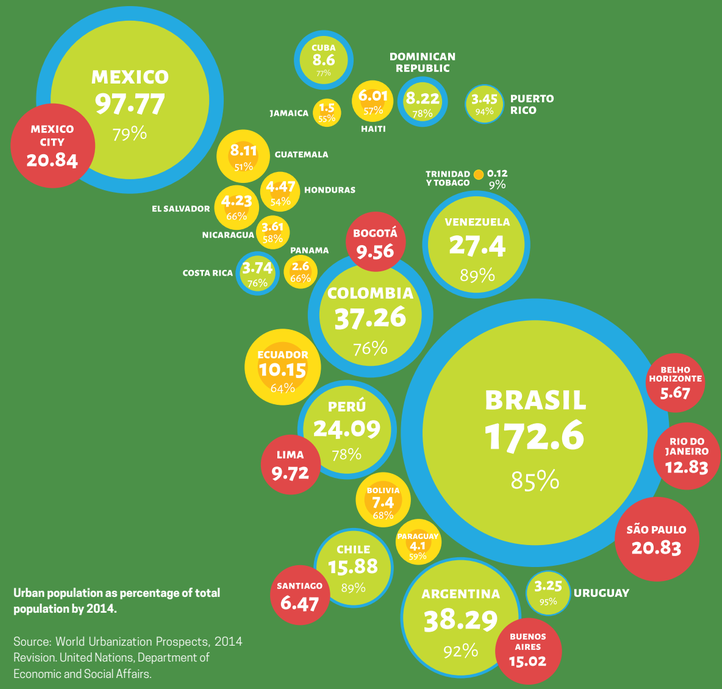
COUNTRIES AND REGIONS

< 50%

< 50% - 75% >

> 75%

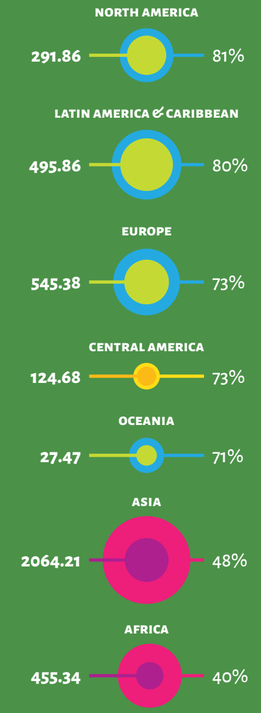
LATIN AMERICA & CARIBBEAN



Urban population as percentage of total population by 2014.

Source: World Urbanization Prospects, 2014 Revision. United Nations, Department of Economic and Social Affairs.

THE WORLD



WHAT IS A SUSTAINABLE CITY?

A sustainable city offers a high quality of life for its inhabitants; minimizes its impact on the environment and its natural resources; is adaptable to the effects of climate change; and has a local, fiscal, and administrative government capacity to maintain its economic growth and perform its duties with urban citizen participation. Above all, it does not compromise the well-being, resources, or opportunities of future generations.

With this definition in mind, ESCI focuses on the 3 pillars of sustainability (shown in the figure to the left) when responding to the challenges of sustainable urban development.

The challenge facing many emerging and sustainable cities is balancing economic growth with the protection of the earth's vital resources. This is especially difficult in today's unsustainable global economy where more than 1 billion people are excluded from economic progress and the environment is suffering unrelenting damages from human activity. Protecting and enhancing ecological assets—the natural capital—is a priority when managing 'sustainable' urban growth.

ESCI recognizes the 'bottom up' approach to sustainable development as a successful method for helping cities achieve more sustainable, efficient, and effective institutional frameworks, urban planning, and socio-economic development. Better technology, more data, more knowledge and experience, and greater awareness allow for better decision-making while opening the path towards change at the local level. Starting down the sustainable path at the local level is where it matters most, and where a significant difference can be made.

1 ENVIRONMENTAL, SUSTAINABILITY AND CLIMATE CHANGE

Environmental management and local pollution control (including air and water contamination, solid waste management and disaster prevention)

Climate change mitigation

- Climate vulnerability reduction and adaptation measures

2 COMPREHENSIVE URBAN DEVELOPMENT

City design and footprint impact or growth control through effective planning and land use

Social inequality and uneven distribution of urban services

Urban transportation network efficiency

Economic competitiveness

Public safety

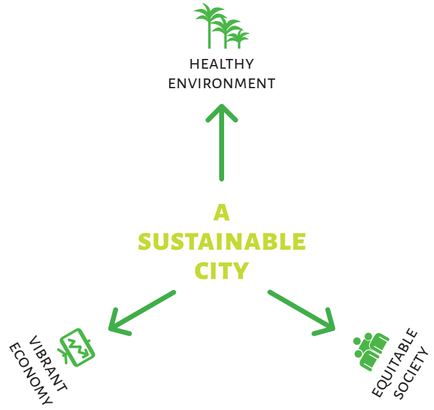
3 FISCAL SUSTAINABILITY AND GOOD GOVERNANCE

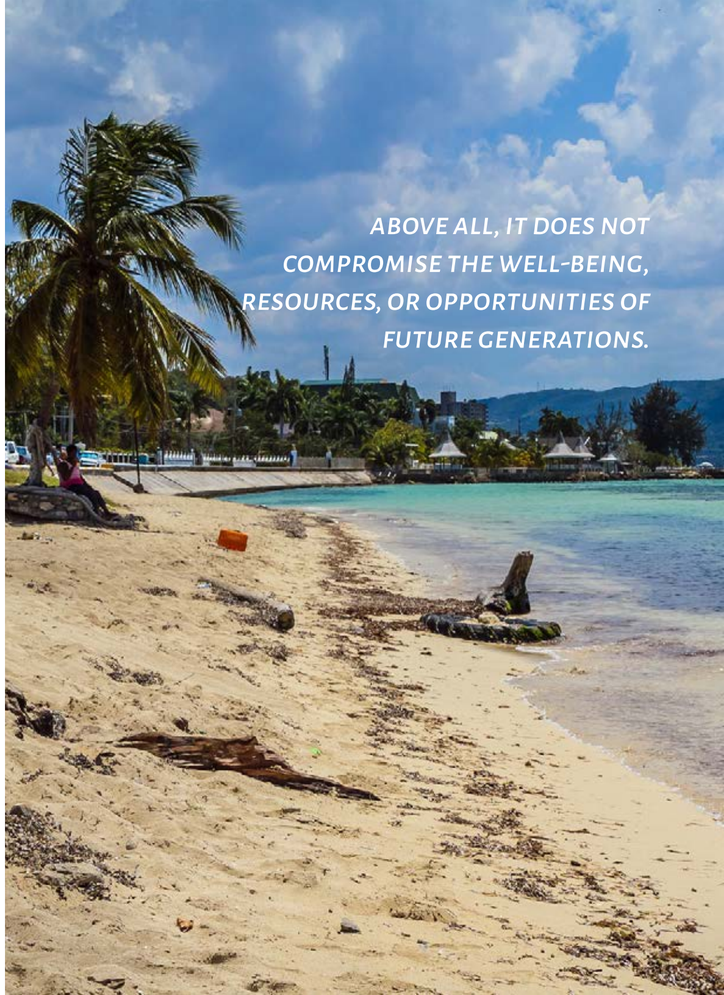
Prioritization and financing of needed investments

Urban and social services maintenance and funding

Expenditures and debt control

Transparency of decision making






2

2. WHY MONTEGO BAY?

AREA CONTEXT

After positive results in five pilot cities during 2011 (Santa Ana, El Salvador; Trujillo, Peru; Goiania, Brazil; Port of Spain, Trinidad and Tobago; and Montevideo, Uruguay), the IDB decided to advance the Initiative to the other countries in the region in 2012. In Jamaica, the Bank, through the ESCI, selected the city of Montego Bay to participate in the program. In order to understand the justification for this selection, a review of the city's context and its growth follows.

After Kingston and its neighbouring towns of Portmore and Spanish Town, Montego Bay is Jamaica's second largest city in terms of population with 110, 115 residents[9]. During the 18th and 19th centuries, it grew as an important port city through the export of sugar and bananas from area plantations. In the 20th century, especially with the development of the Montego Freeport and its cruise ship terminal, Montego Bay became the tourism capital of Jamaica. The city's economic development has relied heavily upon the role of the tourism industry, along with its relationship to the city's natural capital, until this day.

Montego Bay is located on the northwestern coast of the island and is the capital of the parish of Saint James. The city is situated on a coastal plain, and is geographically bounded on the West by the ocean and the harbour; and to the North, South, and East by steep hills. Several rivers and gullies run through the city, and the area serves as the drainage basin for the Montego River. The coastal area, while being known for its beautiful white sand beaches, is also home to the Bogue Lagoon, which is fringed by a coral reef and mangrove forest.

The city's urban core is composed of 38 neighbourhoods, and most planned urban development has centred on downtown and coastal areas. Residential development, both formal and informal, has been low-density and concentrated in the hills surrounding the city since the 1980s. Hospitality sector development, to include resorts and hotels, has shifted from the commercial axis of Gloucester Avenue (also known as the "Hip Strip") to coastal areas, especially East of the airport. With the lack of a comprehensive plan (however, a zoning plan from 1983 does exist), much of Montego Bay's growth has lacked planning and management.

The city's location on the country's northwestern coast and its hilly terrain provide inherent advantages as well as risks, making Montego Bay simultaneously the tourism capital of Jamaica and a city whose population and main economic product are ecologically sensitive and extremely vulnerable to natural disasters. The next section will present some of the city's key development challenges and opportunities, which made it an important choice for the ESCI.

9. Statistical Institute of Jamaica (STATIN), 2012. "Population and Housing Census 2011 Findings." http://statinja.gov.jm/pressreleases/pressreleasecensus.aspx.


THE CARIBBEAN SEA
MONTEGO BAY
Sangster International Airport
Flankers
Coral Gardens
Ironshore
Rose Hall
Barrett Town
Lilliput
to Fallmouth
Greenwood
Paradise
Norwood
Salt Spring
Albion
Glendevon
Cornwall
Flower Hill
Spot Valley
Brandon Hill
Montego Hill
Downtown MoBay
Rosemount
Rose Heights
Goodwill
Mount Salem
Farm Heights
Rose Mount Garden
West Green
Catherine Mount
Orange
Adelphi
Fairfield
Tucker
Irwin
Friendship
Woodlands
Tower Hill/Moy Hall
Granville
Bogue
Retirement
Reading
Pitfour
Unity Hall
John's Hall
Dumfries
HANOVER PARISH
Lottery
Anchovy
Comfort Hall
ST. JAMES PARISH
Roehampton
Hopeton
Sunderland
Cacoon Castle
Copse
Mount Carey
Montpelier
Ramble
Chester Castle
2.5km
5km
Scale 1 : 120,000
Location
LEGEND
Parish Boundaries
Urban Boundaries
Neighbourhoods
Airport
Regional Road Network

CHALLENGES AND OPPORTUNITIES

Montego Bay's beautiful coastline and waters draw millions of tourists to the city each year and drive the economy, where they relax and play, but also shop, dine, rest, and tour. Taking advantage of this natural landscape, most of the city's hotels are situated along the coast. However, this also makes much of the city's commercial infrastructure highly vulnerability to natural hazards, especially storm surge, which will constitute an increased risk particularly due to rising sea levels. Furthermore, the quality of the tourism product is related to the quality of the environment, particularly that of the ocean and coastal zone. This close relationship also works conversely, with the practices of hotels having a potentially large impact on the coastline, the health of marine habitats, and the city's environmental sustainability. The environmental sustainability of the city is, therefore, an essential element of any long-term plan for Montego Bay.

The growing tourism industry has helped feed the rapid population growth and urbanization in Montego Bay. Many Jamaicans are pulled to the city each year by the prospect of jobs, both formal and informal, in tourism or hospitality-related sectors. While some of the labour force commutes from Trelawny and Hanover (immediate neighbours to the east and west, respectively) to work, others have formed informal settlements along the periphery of the city. This sprawling, low-density growth pattern is not conducive to the achievement of a sustainable city.

Sprawling growth patterns have also been influenced by the lack of a comprehensive development plan and fragmented development. With the historic downtown serving as the functional and commercial centre of the city, most residential development has moved away from the city centre. This urban fragmentation is also evidenced by the lack of vitality in the city centre and its effective abandonment outside of normal business hours. This, coupled with a rate of urbanization that has outpaced absorptive capacities of public services sectors, have led to inefficiencies in urban development, public transportation, delivery of services, and use of resources.

National statistics indicate that one of every five resident lives in informal settlements[10]. Many of these settlements become hot spots for crime, contributing to making St. James Parish the third-most crime-prone parish in Jamaica. The difficulty of accessing these settlements, their often precarious location on steep hills, and a lack of enforcement of building codes within them result in sub-standard solid waste and sewage management. These various challenges could affect public health and safety in the event of a natural hazard, in addition to the quality of the tourism product that is offered as well as the perception of it in other countries.

Though it has presented many challenges, it is not implied that Montego Bay has not benefitted from tourism. Under the North Coast Improvement Project, roads have been upgraded, more water treatment facilities have been constructed, and sewerage and drainage improvement works have been constructed. Nonetheless, the problem remains with the unequal distribution of said benefits across income sectors. With over 50% of Montego Bay's economic activities located in a narrow coastal zone, including the Central Business District, this urban fragmentation is not just divided between commercial and residential, but is also manifested in a spatial and economic divide between tourists and locals.

In addition to the environmental and urban challenges, Montego Bay has important fiscal challenges. As the local government, the Parish Council is dependent on transfers from the central government; these transfers were almost twice its own income revenue in fiscal year 2012. Some of the transformation that Montego Bay needs in order to become a smart and sustainable city requires significant financial resources in addition to sound fiscal management. Although the local government will take a leadership role in fostering this transformation, if the effort is to succeed, other public bodies and private entities will need to invest in the city's improvement.

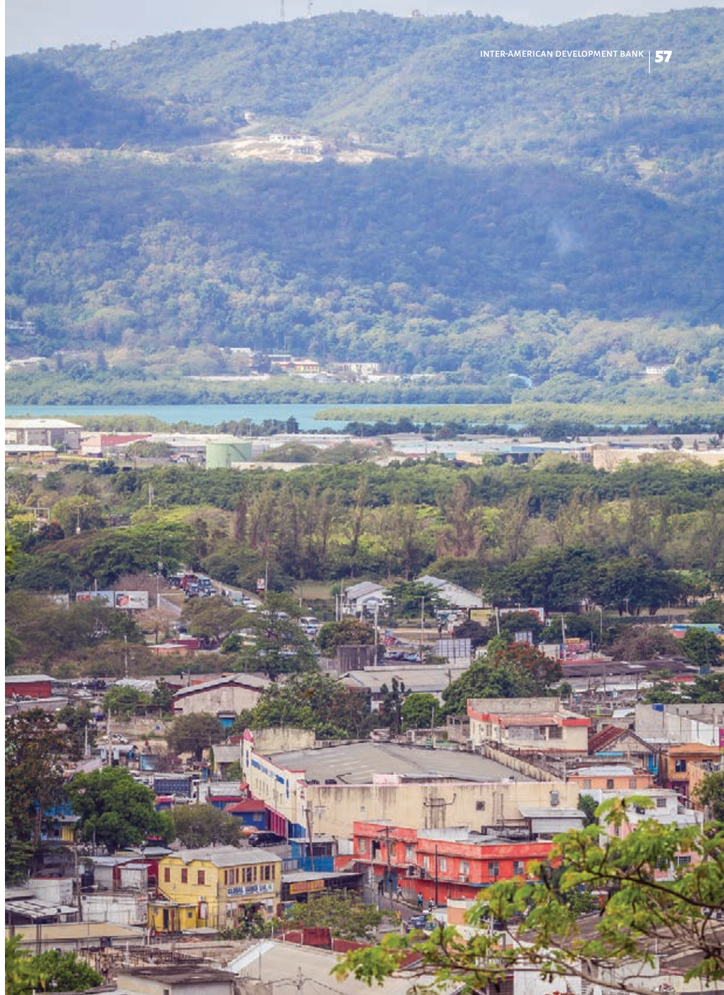
10. USAID Country Profile: Property Rights and Resource Governance Jamaica, http://usaidlandtenure.net/sites/default/files/country-profiles/full-reports/USAID_Land_Tenure_Jamaica_Profile.pdf.

THE IMPACT OF ESCI AND MONTEGO BAY

Montego Bay is an ideal candidate for interventions and investments to improve its environmental, urban and fiscal resilience and corresponding long term sustainability. Success of the Initiative in Montego Bay will provide an important demonstration effect for the capital city of Kingston and other urban centres with similar challenges such as Spanish Town and May Pen. It will also benefit the national economy, whose average annual growth rate over the last decade was only 0.52%[11]. Growth in the national economy would contribute to a much-needed reduction in the public debt to gross domestic product (GDP) ratio. Improvements in employment and training opportunities, especially for youth, can reduce unemployment and further assist in that growth. Montego Bay's growth could be a pivotal element in engendering the needed and desired growth at the national level while benefitting local development.

Why Montego Bay? Montego Bay has all the inhibitors to sustainable growth but also the greatest potential to impact national growth, if the various challenges are addressed in an integrated and synergistic way. Its urban growth patterns and exposure to natural hazards create challenges for public management, but its demographic and economic importance to Jamaica make it an important and strategic city for investment in a sustainable future.

11. Average annual growth rate of the gross domestic product (GDP) of Jamaica from 2003 until 2013. Trading Economics, 2014. http://www.tradingeconomics.com/jamaica/gdp-growth-annual.



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3. HOW DO YOU MAKE A CITY SUSTAINABLE: METHODOLOGY

The ESCI methodology takes an integrated and interdisciplinary approach to identifying a path for long-term sustainability in intermediate cities throughout Latin America and the Caribbean. Sustainability is viewed through 3 dimensions: environmental sustainability and climate change, urban sustainability, and fiscal sustainability and good governance. The most urgent and pressing sustainability challenges and needs of each city of the Initiative are identified through a rapid evaluation. This rapid assessment or evaluation is based on:

1. a quantitative analysis using a set of approximately 130 indicators, mostly derived from secondary data
2. a technical qualitative analysis, based on deep knowledge and experience of specialists.

This evaluation provides for a diagnosis and prioritization of sector-areas that require further attention. By combining the data with prioritization criteria, strategies and solutions are identified and presented in an action plan. A critical part of this approach is the rich knowledge transfer that occurs during dialogues between the IDB technical team and the local counterpart team, as well as the incorporation of the concerns and ambitions of a significant group of citizens and organizations at the local, national, and international levels.

This process is spread out over 2 stages and a total of 6 phases. The ESCI methodology and its various phases can be seen in the graphic to the right, and described in more detail below.

PHASE 0 – PREPARATION

The Preparation phase involves the formation of work teams, the collection of information on the indicators from secondary research sources, and the identification of key players in the city involved in the process. With these key actors, the overall vision of the city is defined. Additionally, the contracting process begins to generate the main technical inputs of the process: basic studies on climate change, the study of impact of urban growth, and the public opinion survey.

PHASE 1 – ANALYSIS AND DIAGNOSIS

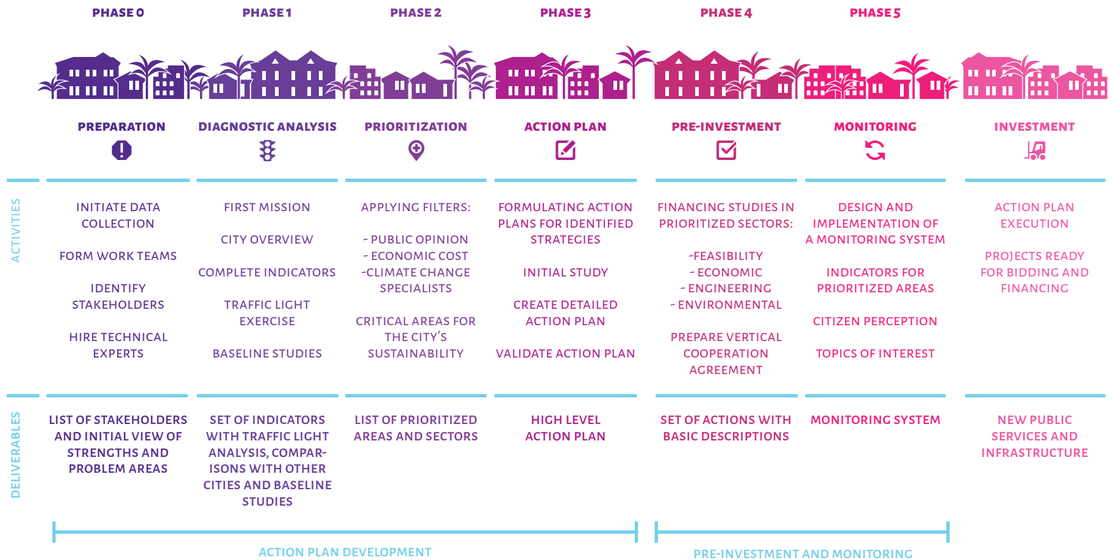
This phase begins with meetings between the city and the IDB, including the launch mission and inception workshop. These meetings serve to identify the general problems of the city; and include the participation of local and national officials involved in the development of the city, as well as other local agents representing various sectors (local authorities, NGOs, universities, etc.).

At this stage the data obtained in phase 0 is supplemented with data obtained in the field during the meetings and interviews, and as a result of requests for specific data made to the appropriate authorities. At the end of Phase 1, the set of indicators is completed and compared to the standards set by the IDB for the region and/or country (benchmarks and traffic light exercise), classifying each item as green, red or yellow. This traffic light system will help identify critical areas in which the city is in need of action.

PHASE 2 – PRIORITIZATION

In this phase, the priority of critical areas identified in the previous phase for the sustainability of the city is established. Each area or sector characterized by red or yellow (in the traffic light exercise) is prioritized through the application of the following filters:

1. perception or public opinion (what do the people think about each topic),
2. economic cost (what is the cost for society; or, what would it actually cost if we do nothing),
3. environmental cost/climate change (vulnerability to climate change and levels of



greenhouse gas [GHG] emissions),
4. valuation of specialists.

According to these filters, individual scores are assigned for each area identified, obtaining the list of priority intervention areas in the city. The ones with the highest scores are selected (ideally, three to five priorities per city are selected). Finally, the list is confirmed and the prioritization exercise is validated with the city.

Importantly, in this phase the technical inputs contracted and obtained in phases 0 and 1 (basic studies of climate change, impact of urban growth, and the public opinion survey) are used to prioritize the topics identified as critical.

PHASE 3 – ACTION PLAN

This phase includes identification, development and selection of strategies and/or actions for each prioritized area. The IDB technical team works closely with the city counterpart team to analyse these prioritized areas in more detail and to identify the opportunities and risks for improving the current situation of each. They also identify key actors and organizations that might make possible implementation of the process and the possible actions.

These strategies are then developed into a plan for implementation. The actions, timelines, costs of their development, and responsible parties for each activity are defined. The plan considers a short-term stage of implementation; however, these actions are intended to achieve long-term goals to be met by future administrations of the city. This plan becomes the roadmap for the city along its path to sustainability. At the end of this phase, the action plan is validated in a meeting between the IDB and the city.

PHASE 4 – PRE-INVESTMENT

This phase begins the initial stage of implementation of the action plan. Implementation of the Action Plan begins with pre-investment studies in prioritized sectors, for example, an environmental impact study or an engineering design. The IDB will assist the city government with raising financial resources and preparing projects for some of the prioritized solutions identified in the plan.

PHASE 5 - MONITORING

A mechanism will be started to monitor the city's progress in terms of sustainability. The monitoring system will be administered by an external, independent, and impartial civil society organization. The monitoring system will be designed in accordance with the critical areas or sectors identified during the diagnostic phase. The monitoring will follow the group of indicators in the areas prioritized with the city and included in the action plan, along with any additional areas of particular interest to the city or in tune with public opinion results.

These are the phases of achieving a sustainable and developed city in the ESCI. As more cities in LAC apply the ESCI methodology, they will become part of a network of sustainable cities. By participating in the network, cities will be able to share experiences, benchmarks, best practices and lessons learned.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3. WHAT DID THE NUMBERS TELL US?

As described in Chapter 3, the ESCI takes an integrated approach to city planning by assessing many topics related to a city's functioning, in three general dimensions of sustainability: environmental, urban, and fiscal/governance. Part of this process is the identification of priority action areas. While cities are complex and often have many issues, it is important to focus on key areas that can generate the most change or are currently acting as bottlenecks to sustainable development and a high quality of life for residents. The first step to identifying Montego Bay's priority action areas was to conduct a rapid diagnostic assessment of 22 topics related to the three dimensions of sustainability.

DIAGNOSTIC OVERVIEW

The rapid diagnostic assessment included the analysis of 130 indicators over 22 topics, and interviews with a wide range of stakeholders. To gather input for the assessment, meetings were held with the SJPC; Members of Parliament for St. James Northwestern, St. James West Central, St. James East Central and St. James Central; the MLGCD; the PIOJ; the Ministry of Finance; the Ministry of National Security; the Jamaica Public Service; the Ministry of Science, Technology, Energy and Mining; the Office of Disaster Preparedness and Emergency Management; the Urban Development Corporation; the Social Development Commission; National Environment and Planning Agency; the National Solid Waste Management Authority; the Water Resources Authority; National Water Commission; the Meteorological Service Jamaica; the Ministry of Water, Land, Environment and Climate Change; and the Ministry of Energy; Microsoft Corporation; University of Technology, Jamaica; the Montego Bay Chamber of Commerce; the Jamaica Hotel and Tourist Association; the Jamaican Tourist Board; the Small Business Association of Jamaica; the Tourism Product Development Company; the Parish Development Committee; and the Community Development Committees.

Based on the indicators and the interviews, each topic was assigned a colour using a stoplight classification system of red, yellow, and green. ESCI maintains reference values based on international standards and regional averages which assist in classifying local data for intermediate cities in Latin America and the Caribbean into these three categories – critical (red), likely problematic (yellow), and satisfactory (green). The indicators for Montego Bay (or the next largest political-administrative or geographic coverage level for which data was available) were analysed by comparing them with the aforementioned reference values. In the case of Montego Bay, most topics were classified as red or yellow. Red signalled an urgent or critical issue for the city, while yellow indicated an issue that was not yet critical but was likely to become a problem in the future (unsustainable) if adjustments were not made (or, in other cases, an issue that had been a problem in the past and was improving but had not yet reached an acceptable level). The following table (Table 4.1.1) presents the resulting classification of topics analysed.

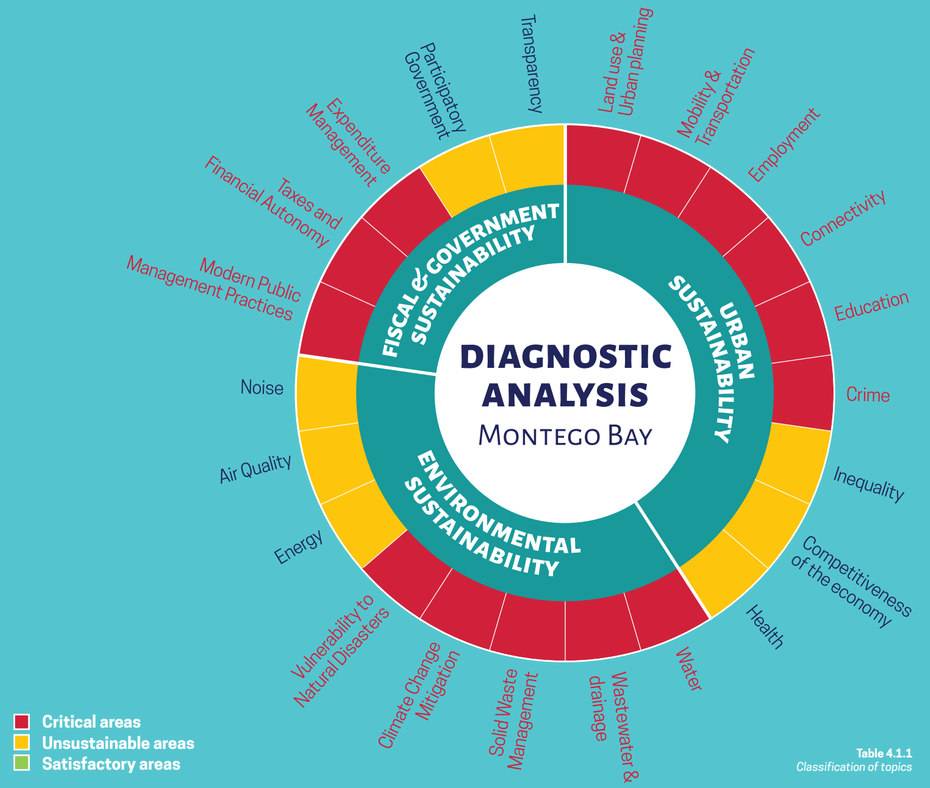


Table 4.1.1
Classification of topics

RESULTS BY TOPIC

This section provides a brief overview of the issues found in the topics covered by the rapid assessment. A more detailed description of the issues affecting the priority action areas can be found in Chapter 7.

Urban Sustainability Dimension

Land Use and Urban Planning

Compared to the ESCI's benchmarks (in which a growth rate of less than 3% per year is considered sustainable), Montego Bay's urban footprint has not grown excessively over the last decade (the average annual growth rate of the urban footprint between 2001 and 2011 was .07%)[12]. However, Montego Bay has a low population density (estimated to be 1,740 residents/km2; the ESCI considers an urban population density of fewer than 4,000 residents/km2 to be unsustainable), and suffers from other urban planning and land use issues that affect the quality of life of its residents. Despite being the tourism capital of Jamaica because of its picturesque coastline and agreeable climate, Montego Bay offers few open, public and green spaces for its residents to enjoy. There are approximately 2.7 m2 of open space per resident in Montego Bay, far below the World Health Organization's recommendation of 10 to 15 m2, proportionally distributed according to population density, per inhabitant[13]. In addition to the quality of life implications of this deficiency, it represents a lost economic opportunity for the city. Pleasant public spaces could draw tourists out of the all-inclusive hotels where they spend much of their time and into the city, where they would be able to patronize local businesses; these spaces would also make Montego Bay a more attractive destination in general.

Informal settlements are common in Montego Bay, limiting the government's ability to provide adequate services. This is both due to the direct logistical challenges of access and the indirect fiscal challenges presented by not being able to collect revenues from a large portion of its potential base. These settlements also frequently pose safety hazards to residents because of the inadequacy of the sites for human habitation or construction materials. A 1993 study found that 69.5% of Montego Bay's population lived in informal settlements. Although no more recent data is available, interviews with senior government officials indicated that the proportion of the city's residents living in informal settlements is still very high[14].

Mobility and Transportation

Few indicators of mobility and transportation are available for Montego Bay specifically. According to the 2007 Residential Consumer End Use Survey, "bicycle," "walking," and "other," account for 10% of trips to work and 25.6% of trips to school in urban Jamaica. The good news is that public transportation in turn, accounts for another 40.5% and 57.7% of trips to work and school, respectively. No use of motorcycles was reported for either of those purposes. These numbers put urban Jamaica in an interesting situation, in which more than 50% of trips to work and more than 83% of trips to school do not use any form of private transportation[15]. It is likely that those figures would be even higher for Montego Bay alone. The infrastructure is generally in good condition and the port and airport do not require any major intervention at this time.

Despite decent infrastructure, the topic of mobility and transportation received a "red" classification because, although a relatively high percentage of trips are taken using public transportation, these are mostly taken in route taxis. This form of transportation contributes greatly to congestion and pollution. Additionally, only 7.6% of people travel by foot (ESCI's "red" classification for this indicator is <10%). Furthermore, none of the fleet uses non-fossil fuels.

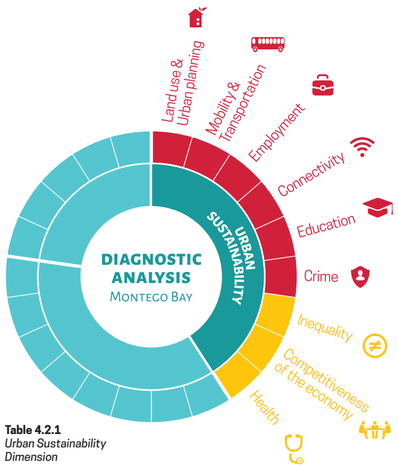
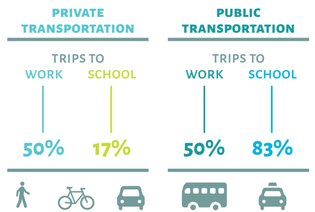


Table 4.2.1
Urban Sustainability Dimension



Employment

The national average unemployment rate in 2013 was 15.2%. This is high and likely contributes to the security issues in Montego Bay. Labour and training mismatches prevail, with 68% of the labour force reported having no training[16]. Although tourism creates employment opportunities, many of those looking for work in Montego Bay lack the skills sought by employers.

Connectivity

Information technology indicators show low Internet connectivity. On average there are only 3 fixed broadband Internet subscriptions per 100 residents and 4 mobile broadband Internet subscriptions per 100 residents, although there are 112 mobile phone subscriptions per 100 residents. The Micro, Small, and Medium Sized Enterprises (MSME) Alliance report indicates that, in Jamaica, more than half of the micro-enterprises and almost 40% and 30% of small and medium-sized enterprises, respectively, surveyed in 2008 did not use any form of information and communications technology. Of those MSME surveyed, only 14.4% used a computer in their business, 13.8% used email, and 8.6% had a website. Although these figures are constantly changing, they indicate the important technology gap that currently characterizes the local economy.

Education

Data from the Economic and Social Survey Jamaica indicate that the adult literacy rate in Jamaica was 91.7% in 2011[17]. However, the low accessibility of informal settlements to surveyors may mean that the residents of these areas were underrepresented in the data and the actual literacy rate may therefore be significantly lower. Similarly, data from the Jamaica Survey of Living Conditions (JSLC) 2010 indicated that a high number (98.2%) of children in the 3-5 age cohort in urban areas (Other Towns) received comprehensive Early Childhood Development Services[18]. Data from the JSLC 2010 also indicated that 100.0% of 6-15 year olds were registered in school compared to only 90.1% in the 15-16 age group. The national average student-teacher ratio was 26:1[19].

Approximately 84% of the Grade 11 cohort sat the Caribbean Secondary Education Certificate (CSEC) Examination administered by Caribbean Examination Council (CXC) in 2013[20]. Approximately 93.7% of female students in Grade 11 sat the exam, compared to 73.2% of male students. Some 74.9% passed one or more subjects in 2013[21]. However, the performance of Jamaican (including public and private) candidates in mathematics was well below the Ministry of Education's performance target, with only 34.1% passing the subject in 2013[22]. Only 27.7% of the cohort from Montego Bay passed English A and/or Mathematics (compared to 47.8% from Kingston)[23]. The low academic qualifications of young people in Montego Bay contribute to their difficulty in finding work.

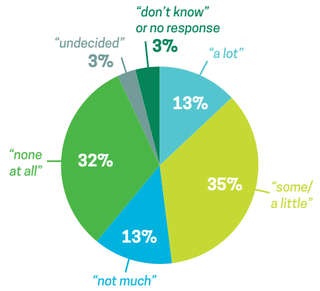
12. Inter-American Development Bank, UD&CC Montego Bay, Jamaica Historical and Current Urban Footprint and Future Urban Scenarios, (April 2014), 34.
13. Ibid.
14. PADCO/USAID, Housing in Montego Bay: A Case Study Using GIS Aerial Photographs, 1993.
15. The Planning Institute of Jamaica & the Statistical Institute of Jamaica for the Petroleum Corporation of Jamaica and the United Nations Development Program, Residential Consumer End Use Survey / Volume 1- Household Energy & Transport, 2007.
16. Planning Institute of Jamaica, Economic and Social Survey Jamaica 2013, 2014.
17. Economic and Social Survey Jamaica 2011.
18. JSLC disaggregates data according to three regions: KMA, Other Towns and Rural Areas.
19. Economic and Social Survey Jamaica 2011.
20. Ministry of Education, Caribbean Secondary Education Certificate (CSEC) Examination 2013 Analysis of the Public Schools' Performance, 5.
21. Ibid, 2.
22. Ibid, 3.
23. Ibid, 23.

Crime

Although there were only 143 robberies per 100,000 residents in St. James Parish in 2011, the homicide rate is quite high, with 150 homicides per 100,000 residents in 2013[24]. The relatively low robbery rate compared to the homicide rate is most likely because illicit money-making activities in Montego Bay centre on scamming.

In a 2013 survey of residents of the Montego Bay area, only 37% reported feeling safe walking alone at night in Montego Bay and its environs. When asked, "How much confidence do you have in the police?" responses were as follows: 13% "a lot"; 35% "some / a little"; 13% "not much"; 32% "none at all"; 3% "undecided"; and 3% "don't know" or no response. Results showed older residents generally had more confidence in the police than younger ones[25]. Interviews indicated a general feeling of insecurity and fear in Montego Bay, in large part resulting from scamming activities.

How much confidence do you have in the police?



24. Statistics provided by the Jamaican Constabulary Force.

Inequality

The Gini coefficient is a common indicator of income inequality, in which a value of "0" corresponds to perfect equality and "1" to perfect inequality. In 2009, the Gini coefficient for urban areas of Jamaica excluding Kingston was .37, indicating a moderate level of income inequality. It was estimated that 1 in 10 residents of urban areas, excluding Kingston, was living below the poverty line[26]. In general, poverty and inequality have been declining, and the World Bank attributes part of the decrease in poverty to a decrease in inequality in recent years. In 2003, Jamaica had the lowest inequality of any country in Latin America and the Caribbean, and inequality has continued to decrease since that time[27].

Competitiveness of the Economy

Common economic indicators are not available at the local level in Jamaica, making a specific analysis of Montego Bay difficult. However, an analysis of national indicators may provide a glimpse into the local situation. Doing Business 2014 ranks Jamaica 94 out of 189 countries, putting Jamaica at the world median in terms of the ease of doing business. However, Jamaica stands out in terms of the ease of opening a business, with only six days required to obtain an initial business license[28]. In the last year the government further increased this ease by simplified preregistration and registration requirements[29]. GDP per capita in Jamaica was estimated to be US$ 9,000 in 2013[30], which puts it at the beginning of what the Global Competitiveness Report considers the transition from an efficiency-driven stage of development to an innovation-driven one[31]. Also contributing to the competitiveness of Montego Bay is good infrastructure, which includes an international airport and port.

Health

In a 2013 survey of residents of the Montego Bay area, the majority (69%) reported their health as being good or very good; 21% considered their health to be average; 8% rated their health as poor; and only 1% rated their health as very poor[32]. As for the quality of health service in Montego Bay and its environs, 56% were satisfied or very satisfied, and 27% were dissatisfied or very dissatisfied[33]. The national life expectancy is 73.48 years (71.87 for men, 75.17 for women), which is considered slightly low for an emerging city in the Latin American and Caribbean (LAC) region[34].

25. Marketing Strategy Limited, A Final Report on Montego Bay Public Opinion Survey, 2013; 112, 114-115. Attached.
26. Jamaica Survey of Living Conditions (JSLC) 2009. The findings of the JSLC are disaggregated by region - the KMA, Other Towns and Rural Areas.
27. World Bank, 2011 Unlocking Growth: Jamaica Country Economic Memorandum – Report No. 60374-JM, World Bank, Washington D.C.
28. International Bank for Reconstruction and Development/The World Bank, Doing Business 2014, 2013, 200.
29. Ibid, 74.
30. CIA World Factbook, 2014., https://www.cia.gov/library/publications/the-world-factbook/geos/jm.html.
31. World Economic Forum, Global Competitiveness Report.
32. Ibid, 120.
33. Ibid, 124.
34. CIA World Factbook, 2014. https://www.cia.gov/library/publications/the-world-factbook/geos/jm.html.

ISSUES IN YELLOW

URBAN SUSTAINABILITY

INEQUALITY

Gini coefficient of 0.37 (2007)

COMPETITIVENESS OF THE ECONOMY

Jamaica ranks 94 out of 189 countries for ease of doing business

HEALTH

National life expectancy is 73.48 years

ENVIRONMENTAL SUSTAINABILITY

ENERGY

10% of electrical energy generation in Jamaica was from renewable energy sources (2011); no energy efficiency regulations in place

AIR QUALITY

22,438 - average number of respiratory infections per year for children <5 years old in Jamaica (2007-2008)

FISCAL AND GOVERNMENTAL SUSTAINABILITY

PARTICIPATORY GOVERNMENT

Lack of funding for civil society to influence budget and planning process

TRANSPARENCY

There is no local level indicator of transparency

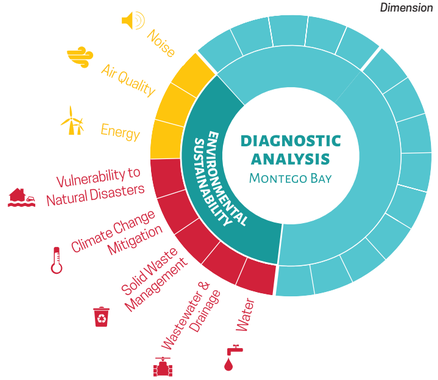
Environmental Sustainability Dimension

Water

The National Water Commission (NWC) is the main distributor of water (and collector of sewage) in Montego Bay. The Parish Council distributes some water, and a very small number of enterprises use private water distribution services (Rose Hall Developments Limited). The NWC supplies water from the Great River Water System, which is the major water system supplying Montego Bay. 75% of households in St. James Parish have home connections to the water network. On average, households have 19 hours per day of continuous water supply[35]. Approximately 1,000 – 2,000 households are supplied by a minor water supply, namely entombed springs (supplied from underground springs). Unmetered standpipes are paid for by the SJPC and available for communities to use. Those using the Parish Council system do not pay. Since water volume is inconsistent, very expensive trucking replaces the piped water supply in dry times. Water loss is extremely high, principally due to broken pipelines and poor maintenance (in some places, whole pipelines need to be replaced). Illegal connections and flat rates also incentivize waste. In general, metering is poor. Sometimes meters are unable to be read because of political reasons or violence. Although the annual consumption of water per capita in St. James Parish, 152/L/person/day[36], is considered appropriate and sustainable based on international standards, the high proportion of treated water that is distributed but not accounted for due to actual losses (e.g., leaking pipes), illegal connections, and lack of metering, is a critical issue that undermines the efficiency and sustainability of water provision, both from a material and fiscal standpoint. An estimated 68% of water distributed is non-revenue water[37].

The NWC St. James Draft Plan indicates that in 2010 there was an estimated overall supply shortfall of 4.4 mgd in the parish. It is estimated that if supply deficiencies are not addressed, the shortfall will reach 6.4 mgd as the water demand increases. The NWC proposals include reduction of non-revenue water from 75% to 30% and major rehabilitation of the Great River Treatment Plan and other treatment facilities[38].

Table 4.2.2
Environmental Sustainability Dimension



Wastewater and Drainage

There are serious concerns regarding wastewater treatment and drainage, as raised by the various stakeholders consulted during the diagnostic assessment. Of particular concern is the topic of wastewater treatment, which has the potential to affect the tourism product, one of the city's key economic sectors. In 2004, only 25% of households in St. James were connected to the wastewater treatment plant[39]. By contrast, a 2013 survey of residents of Montego Bay and its surroundings found 77% of respondents reported that their homes were connected to the main public sewer network[40]. The low sanitation coverage and substandard practices in informal communities have a negative impact on water sources in the Montego Bay area, and ultimately affect the water quality of the coastal zone. The National and Environment and Planning Agency (NEPA) undertook 88 water quality sampling exercises in 2011 and tested samples for nitrates, phosphates, BOD and faecal coliform. Excessive levels of nitrogen and phosphorous were found in many of the rivers analysed, particularly along the north coast, including the Montego River. This was attributed to inadequately treated sewage and trade effluent[41].

Solid Waste Management

Montego Bay's solid waste sector is facing great challenges. The current disposal site does not meet the international standards for a sanitary landfill and is expected to have only about five usable years left. There is no systematic separation of waste for composting or recycling, however, informal pickers recycle approximately 1-2% of waste generated. Illegal waste dumping and burning are also widespread and have a negative impact on the environment in addition to the immediate

35. Parish of St. James. Source: National Water Commission, St. James Parish Plan Draft Document. October 12, 2011.
36. Ibid.
37. Ibid.
38. Ibid.
39. North Coast Development Project (NCDP) External Evaluation December 2005: www.jica.go/jp.
40. Marketing Strategy Limited, A Final Report on Montego Bay Public Opinion Survey, August 2013.
41. Economic and Social Survey Jamaica 2011.

ISSUES IN RED

URBAN SUSTAINABILITY

LAND USE & URBAN PLANNING

6.9 ha per 100,000 residents of publicly accessible, open air recreational space; 1.97 ha per 100,000 residents of green areas

MOBILITY & TRANSPORTATION

0% of vehicles using non-fossil fuels as energy source

CONNECTIVITY

3 fixed broadband internet subscriptions per 100 residents

EDUCATION

31.7% of students in Grade 11 passed the CSEC mathematics examination in 2012

CRIME

85 homicides per 100,000 residents

ENVIRONMENTAL SUSTAINABILITY

WATER

75% of water distributed is unaccounted for and produces no revenue

WASTEWATER & DRAINAGE

25% of population had access to sewerage in 2002

SOLID WASTE MANAGEMENT

100% of city's solid waste is disposed of in open dumps, controlled landfills and dumps, bodies of water and/or burned

MITIGATION OF CLIMATE CHANGE

No climate change adaptation plan

VULNERABILITY TO NATURAL DISASTERS

No disaster risk management plan or contingency plan for natural disasters; 80-90% of public critical infrastructure vulnerable to natural disasters

FISCAL AND GOVERNMENTAL SUSTAINABILITY

MODERN PUBLIC MANAGEMENT PRACTICES

No electronic procurement system

TAXES AND FINANCIAL AUTONOMY

29.6% (average) of total municipal income comes from property taxes

EXPENDITURE MANAGEMENT

59.1% decline in gross capital budget (FY 2009/10 to FY 2011/12)

damage done by fires. Further complicating the waste management issue is the insufficient frequency of waste collection coupled with a small operational waste collection fleet (28 trucks, with approximately 50% non-operational due to financial limitations). Difficulty of access in areas with narrow or eroded roads further exacerbates the issue. Additionally, in some areas, night collection is not possible for security reasons. As for commercial waste collection, most hotels have contracted private services that pay a small fee to the National Solid Waste Management Authority (NSWMA) for using their disposal site. Notwithstanding, the cost of dealing with the waste greatly exceeds the flat fee paid by the hotels. This signifies an unrepresentative sharing of the cost of waste management.

Energy

Jamaica is highly dependent on fossil fuels, with only 5.88% of electricity generated from renewable sources. The current per capita annual electrical energy consumption is 1,134.0 kilowatt-hours and the energy intensity of the economy is 2.43-kiloton oil equivalent per dollar of GDP (purchasing power parity), both of which are considered good by international standards. However, there are no energy efficiency regulations that are monitored and enforced, meaning that a policy framework supporting sustainable energy use is not in place. This is expected to become more of an issue in the future because income in low- and middle-income countries tends to rise in direct proportion to energy consumption[42].

Air Quality

One of the major sources of air quality problems in Jamaica is fire from illegal trash burning, as previously mentioned. This problem is common in rural areas where there are no waste collection services. Fires at solid waste disposal sites, generally the result of arson, are another major source of air quality problems. In 2012 a massive fire at the Riverton disposal site resulted in increased complaints of respiratory illnesses among adults and children. A major outcome of the fire was improved data collection by the National Environment and Planning Agency (NEPA). Although most data collected by NEPA is for stations in Kingston and St. Andrew, data is collected for sulphur dioxide and nitrogen dioxide in St. James due to the Bogue Power Plant. The NEPA air quality report for 2011 indicated that the sulphur dioxide and nitrogen dioxide concentrations in the Montego Bay area were at acceptable levels, at 47.40 µg/m3 and 3.59 µg/m3 respectively. These are below the limit set by NEPA[43], however, unfortunately, NEPA indicates that air quality is generally deteriorating.

Mitigation of Climate Change

Jamaica submitted a greenhouse gas emissions inventory for the 2000 to 2005 period as a component of its Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC). However, no specific data for Montego Bay were made available and there are currently no mitigation plans with reduction targets by sector. In 2013, as part of the ESCI in Montego Bay, a study on greenhouse gas emissions was carried out which included an inventory, projections based on current trends, and an alternative scenario in which mitigation measures are implemented (For more detail on this study, please see Chapter 5. The complete final report from this study is available at www.iadb.org/cities). The study found that total (direct and indirect) per capita greenhouse gas emissions in Montego Bay in 2010 were 7.88 tonnes carbon dioxide equivalent (CO_2e)/person[44], a level considered "yellow," or unsustainable but not critical, by the ESCI indicator stoplight classification system. The topic of climate change mitigation as a whole was classified as "red" because of the lack of mitigation plans and the lack of emissions data prior to the ESCI study.

Noise

Jamaica's Noise Abatement Act (1997) states: "No person shall on any private premises or in any public place at any time of day or night, sing, or sound or play upon any musical or noisy instrument; or operate or permit or cause to be operated, any loudspeaker, microphone or any other device for the amplification of sound, in such a manner that the sound is audible beyond a distance of one hundred meters from the source of such sound.[45]" This is an important regulation but it is not generally enforced.

Vulnerability to Natural Disasters

Montego Bay is exposed to various natural hazards, including hurricanes, tropical storms, earthquakes, floods, and landslides, that have routinely caused significant economic and environmental damage and disrupted lives. The city's coastal zone, its main economic asset (the tourism product is dependent on sun, sea and sand) is highly susceptible to beach erosion and storm surge. Over the last few decades, rapid and extensive tourism investments along the coast have resulted in the loss of natural beaches and mangroves, increased coastal erosion, and a reduction in water quality. In addition, climate change, including sea level rise, may affect the stability of the shoreline and the health of coastal and marine ecosystems, increasing the vulnerability of the tourism-related physical plant (hotels, etc.) and other critical infrastructure. This has important implications for future development and the physical viability of the coastal zone. As tourism is the city's main economic earner and employer, and more than 90% of the tourism related infrastructure is concentrated along the coast, the economic and environmental sustainability of the city is also at risk.

At the time the diagnostic assessment was conducted, no exposure, vulnerability, or risk maps existed for Montego Bay. Storm surge hazard maps from 1994 were available for Montego Bay with predictions for 10, 25, 50, and 100 year return periods. There is no response (contingency) plan for Montego Bay in particular, though the St. James Parish has a preparedness plan, which requires updating. The city does not have early warning systems and, other than the services of a Parish disaster coordinator, the city has no dedicated resources for emergency response, vulnerability reduction, and risk transfer schemes. It relies on the central government for support, which is very limited.

In 2013 the ESCI conducted a probabilistic hazard and risk assessment study, which includes risk maps and the exposure of various types of infrastructure given particular return periods and types of hazards. For more detail on this study, please see Chapter 5. The complete final report from this study is available at www.iadb.org/cities.

42. International Monetary Fund, World Economic Outlook, (April 2011), 94.

43. National Environment and Planning Agency. (2012). Ambient Air Quality Report 2011: http://www.nepa.gov.jm/air-quality/2011%20Ambient%20Air%20Quality%20Report%20(final).pdf

44. Inter-American Development Bank, UD&CC Montego Bay, Jamaica Greenhouse Gas Emissions Inventory, (April 2014), 53.

45. Jamaica Noise Abatement Act (1997) : http://www.elaw.org/node/2512

Fiscal Sustainability Dimension

Participatory Government

Citizens participate in government through the Parish Development Committee (PDC), which is made up of representatives of civil society organizations. The PDC serves as a voice for medium- to long-term community development needs. Until 2005, the public was able to observe the Parish Council meetings but not actively participate. In 2005, the meetings began taking place in different council districts on a rotating basis and took on a more dialogue-based model. Over the last few years, this process and the PDC have declined somewhat and become less participatory, but the government is currently taking steps to reinstitute the process and expand participation. A local governance act that would give legal status to PDCs is currently in the parliamentary stage.

St. James was one of the first parishes to involve civil society in the progressive prioritization of the municipal budget's programming. This is done through a process of consensus-building and negotiation. All general council meetings are open to the public and the media, and information is made available. On the other hand, government officials interviewed considered that public reporting needs improvement, including at the national level, pointing to a gap between what the public wants to know and the information the government currently provides.

Officials interviewed hypothesized that the combination of citizens' fear of reprisals for whistleblowing and expression of opinions in public fora, with a lack of confidence in the ability of public institutions to effectively channel and promote citizens' concerns, undermines participatory processes. Montego Bay's anti-informant culture translates into a lack of participation and a mutual lack of trust between the government and the general public. More protection is desired for those who speak out.

Modern Public Management Practices

The local authority's budget is highly dependent on the level of subventions from the central government and, correspondingly, it does not have a multi-annual budget. There is a Performance Management and Appraisal System (PMAS) for the national government but remuneration of personnel is not based on a system of performance indicators at the local level. The Epicor Accounting System for receipts and payments used by the Parish Council in conjunction with Microsoft Office is sufficient for the scale of operations, but there is no electronic system to carry out procurement and con-

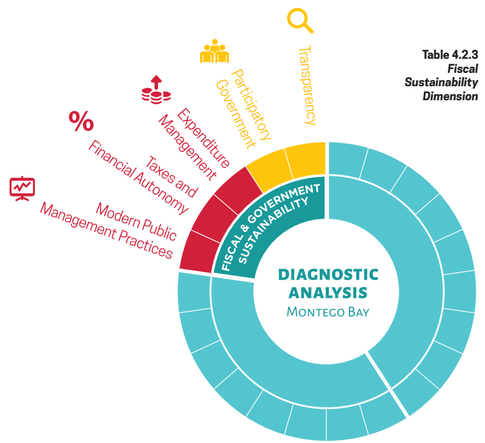


Table 4.2.3
Fiscal Sustainability Dimension

tracting. The lack of a multi-annual budget, electronic procurement system, and performance indicator-based remuneration of personnel at the local level led this topic to be classified as "red."

Transparency

One of the SJPC's strengths is its transparency, especially with its consistent auditing. Parish Councils are audited twice, by the Ministry and by the Auditor General. There has been post-auditing since Epicor was implemented in 2007. Budget drafts are made available online.

Taxes and Financial Autonomy

The revenue of the SJPC is lower than its expenditure. On average during 2010-2013, including property tax (the Parochial Revenue Fund), own revenue comprised 47.6% of St. James Parish's total revenue; excluding property tax own revenue was 17.0%. Over the three-year period, the average recovery of the municipal agencies' cost of providing services (i.e., markets, cemeteries and transportation centres/car parks, the Cultural Centre and the Catherine Hall Sports Complex) was 103.4%. The transportation centre and car parks are the only entities that recover expenditure (at least "break even") with a recovery rate of 325% compared to between 44% (cemeteries) and 82% (Cultural Centre) for other services. The high percentage of homes, many of high quality, in informal settlements means that there is a great opportunity to increase tax revenue by widening the property tax base.

Management of the Expenditure

The SJPC's expenditure, particularly its operating budget, exceeds its revenue, leaving no fiscal surplus to undertake projects that could improve the quality of life of the residents of St. James. The average growth rate of recurrent expenditure for the period FYs 2010/11 – 2012/13 was 2.0%, on par with LAC comparators. This three-year average was 3.4 percentage points below the three year average for FYs 2009/10 – 2011/12, which reflects the fiscal consolidation that the government is presently undertaking. The previous average was high relative to LAC comparators. Parish Councils do not have a capital budget. What serves as the capital budget is the Equalization Fund, funded from the PRF. This suggests that the much of the Council's budget is spent on recurrent expenditure. For the types of services that the Council wishes to offer and quality of life it wishes to afford its citizens, there is need to reduce recurrent expenditure and increase capital expenditure. The cited data indicate a shift in this direction. Nonetheless, management of expenditure is not as critical as adequacy of revenues from a fiscal standpoint except for the high costs for street lighting and solid waste management. Some 90% of property taxes pay for street lighting and solid waste management. Of the total PRF amount, street lighting has utilized approximately 4.8% between fiscal years 2009/10 and 2011/12. This suggests that the bulk of the PRF goes to public cleansing, as an inter-governmental transfer from the central government, on behalf of the local government, to the NSWMA.

5

5. RESULTS OF BASE STUDIES

To provide the city of Montego Bay with the information needed to adapt to and reduce its contribution to climate change, reduce its vulnerability to natural hazards, and grow in a sustainable way, the ESCI commissioned a set of three interrelated studies for Montego Bay as part of the project entitled "Urban Development and Climate Change: Current and Historical Urban Footprint, Urban Growth Scenarios and Basic Studies on Climate Change Mitigation and Adaptation". The results of these studies will support the ESC Initiative in providing technical assistance to aid decision-making and integrated municipal planning in Montego Bay.

The studies were conducted between August and November 2013 by GeoAdaptive, LLC, a consulting firm focused on urban, environmental, and information systems research and analysis. GeoAdaptive developed these three studies, namely the "Greenhouse Gas Emissions Inventory and Mitigation Analysis", the "Disaster Risk and Climate Change Vulnerability Assessment", and the "Historical and Current Urban Footprint and Future Urban Scenarios", in close consultation with local and national stakeholders, as well as with IDB specialists.

Through these studies, and by developing a series of diagnostic and prospective analyses of the city's urban and natural systems, IDB can contribute to developing the potentialities of Montego Bay in a sustainable way and provide a robust scientific and quantitative base for decision-making. All of the studies establish baseline measurements and use these data to project to 2030 scenarios, effectively providing a more detailed level of data for Montego Bay than was previously available to the government. In addition to informing the prioritization of action areas and the action plan itself, these studies avail themselves as important planning tools that can facilitate decision-making by both local and national authorities, including the SJPC, MLGCD, PIOJ, and NEPA, among others.

The following sections present summaries of the three aforementioned studies commissioned by the ESCI. They include a review of each study's objectives, methodology, and research findings. More detailed reports for each study may be obtained by visiting www.urbandashboard.org.

HISTORICAL AND CURRENT URBAN FOOTPRINT AND FUTURE URBAN SCENARIOS

This study aims to provide key information to public authorities which will aid in the integrated municipal planning processes, taking into consideration the potential costs and ramifications of two different urban growth development scenarios. The results are reflected in the Action Plan, particularly in the revitalization efforts through urban development and planning, which promote higher density development in the urban core, low-income housing, pedestrian-friendly urban design, as well as an integrated network of green spaces.

This study encompasses three primary modules. The first module consists of a survey of the historic and current urban footprint of the city of Montego Bay through the identification and analysis of the land cover of the region for the years 1985, 2001 and 2011. The land cover and changes between each period of time are detected through the interpretation of satellite imagery and remote sensing analysis. The second module focuses on the development of the future urban growth model, simulated for the 2030 time horizon under two distinct development scenarios. The first scenario is based on current planning decisions and trend conditions, while the second focuses on a more sustainable vision for the city guided by smart growth planning principles. The third and final module compares both simulated growth scenarios and provides the cost of infrastructure extensions to accommodate the growth of the future urban footprint for each scenario.

The urban growth analysis simulates two future patterns of growth for the city of Montego Bay through the year 2030. The baseline or trend scenario reflects the current urban and environmental policies that are in place and reveal diffuse (sprawl) patterns of urban growth towards the north near Ironshore and towards the south near Bogue Village. Both of these areas are identified as susceptible to hazards of storm surge, landslides, and pluvial inundation, as reported later in this chapter. This growth pattern is not efficient, can be dangerous due to the natural hazards, and can be costly in terms of infrastructure extension and addition of social services towards these new developments.

Many of the current policies outlined in the St. James Draft Development Order are modelled under the trend growth scenario, however there are adjustments that should be considered to drive the city towards a more sustainable and equitable future. These adjustments include the increase of institutional capacity to enforce the existing development orders and the restriction of development in areas prone to natural hazards. The consequences of developing in these areas will have direct impacts on the local economy and current population. Modifications to the current development order concerning development patterns, land use, and restrictions, as well as urban and environmental policies, such as the incorporation of new multifunctional spaces (for example, a green infrastructure network) will be crucial to the overall success of the city.

OBJECTIVES

This report will provide the following contributions that will inform the Action Plan and also generate a set of planning tools to assist in future decision-making for a more sustainable city:

- Development of a GIS database and framework to contain all data collected and created for this analysis
- Identification of land cover, through the analysis of satellite imagery of Montego Bay for the years 1985, 2001 and 2011.
- Analysis of the changes in land cover patterns between the periods of analysis (1985- 2001, 2001-2011 and 1985-2011).
- A rapid evaluation of the open space, natural, and urban areas of Montego Bay to determine potential new urban and natural linkages throughout the city.
- Analysis, simulation, quantification, and visualization of future changes to the urban growth for the city of Montego Bay through two simulated growth scenarios: trend and smart growth.

AREA OF CONTEXT

The urban core of the city is composed of 38 neighbourhoods, which together have a population of 110,115[46]. Most of the planned development has occurred within the centre of the city and along the coastline. In the hills on the outskirts of the city, a range of development types are present (from informal settlements to high-end housing), while hotels and resort complexes dominate the coast.

Within the last several years, Montego Bay has continued to grow on the periphery of the city, associated in part with the spread of informal settlements and a steady population increase since 1991. Although the city has a Development Order in place, enforcement of regulations is lax, resulting in large unplanned communities and new developments in precarious areas unfit for urbanization, such as areas exposed to natural hazards (i.e. flooding and landslides).

METHODS

The main portion of the study focuses on the use of spatial analysis developed by integrating geographically referenced data with geospatial simulation and analysis methods. The first component of the methodological approach uses standardized multi-spectral Landsat satellite images (30 meter resolution) and remote sensing analysis to identify the historic and current land cover and land cover change patterns for the urban footprint of the city and the surrounding region. The satellite images were used to create a series of multi-temporal images for the years 1985, 2001 and 2011. The multi-temporal analysis allowed for the identification of 12 land cover categories and the detection of the changes during the periods of analysis. These results provide an understanding of what, where, and when these changes occurred in relationship to the expansion of the urban footprint.

A key phase of the analysis involves a demand analysis to project the amount of future residential land demand for 2030. Existing density patterns were analysed to determine the average density for each development intensity category (high, medium, and low). The amount of future residential land required to accommodate the projected residential demand for each scenario was calculated by dividing the percentage of population growth projected for each development category by the corresponding level of density.

Both growth scenarios used the same future population growth projections, provided by the Planning Institute of Jamaica (PIOJ), of 133,477 residents by the year 2030. Spatial projections for each housing density level identified by the team of analysts, along with the PIOJ population projections, were critical inputs used for the Rapid Urban Growth Assessment Model (RGAM), developed by GeoAdaptive (2013). The Model simulates possible future changes to the urban footprint as a means to evaluate the transformations incurred under different types of public policies (trend vs. smart growth). Once the urban footprint for each scenario was identified, the model used the Spatial Analysis tool from ArcMap and a proprietary analysis model created by GeoAdaptive to examine the relationship between urban expansion and the infrastructure needed to support this growth. This information allows for the comparison of the projected capital investment costs to expand the current infrastructure network under each growth scenario.

DATA USED

The analysis developed in this study is based on a set of publicly available and globally, regionally, and locally available data sources. Three main sets of data were used in the analysis:

1. results of the land cover and historic urban footprint change detection
2. existing data on current infrastructure, such as the road network, water network, open and green spaces and other social services
3. geostatistical and census data for the city.

The data collected and the methods and standards used to document, process and visualize the data have been organized through a Geographic Information System (GIS), whose function is the management, distribution and display of critical information for the study area. The GIS developed for the analysis of the historical and future urban footprint for Montego Bay will allow the Parish and other stakeholders to use the data as a planning tool.

For more detailed information on the methods and data used, a complete report can be obtained at www.urbandashboard.org.

46. Statistical Institute of Jamaica (STATIN), 2012. "Population and Housing Census 2011 Findings." http://statinja.gov.jm/pressreleases/pressreleasecensus.aspx.

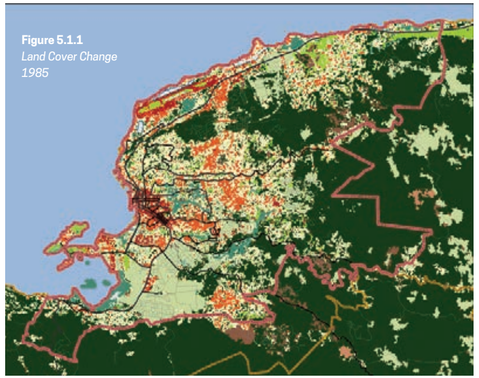


Figure 5.1.1
Land Cover Change 1985

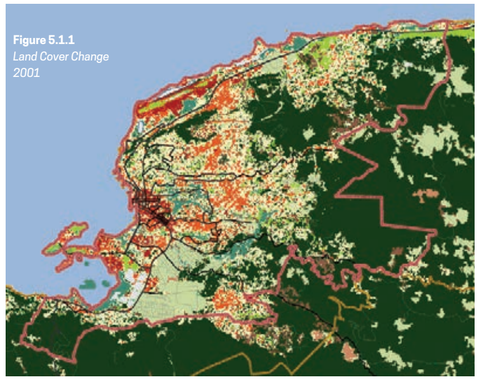


Figure 5.1.1
Land Cover Change 2001

RESULTS:

Evolution of the urban footprint: changes 1985 – 2011

As demonstrated in the analysis of the urban footprint for the years 1985, 2001 and 2011, the city of Montego Bay has been experiencing urbanization on the periphery of the city, with growth concentrated towards the north and south of the urban core. The analysis of land cover change (shown in Figure 5.1.1) reflects significant expansion of areas of low-density development with an increase of 438 hectares during the period of analysis (1985-2011). Consequently, forested and agricultural lands have been subject to the highest rates of conversion to development. The results of these analyses present the following conclusions:

- The growth observed between 2001 and 2011 shows patterns of infill development and peripheral growth, particularly towards the north near Ironshore and towards the south near Bogue Village. Growth expansion of this nature will place more demand on existing infrastructure, stress existing transportation networks, and increase demand for natural resources.

- As low-density development patterns continue within the urban boundary of the city, the demand for suitable land will also increase. These diffuse growth patterns consume land at a higher rate, specifically in areas that are the most suitable and easy to develop. If these patterns of development continue unabated, the rate of consumption of the surrounding forests and agricultural land will increase, urbanizing all available area within the urban boundary, as shown in the zoomed out map in Figure 5.1.2 and the graph in Figure 5.1.3.

- Informal settlements have also appeared in inappropriate areas for development, environmentally precarious in nature and susceptible to natural hazards. These types of residential areas place their residents in danger. Examples of developments in areas of high exposure are: along St. James Street along the North Gully, Creek Street, Princess Street, along the South Gully, areas around the Barnett Street bridge, Upper King Street, and parts of John's Hall. Some of these areas have the most vulnerable populations, which can lead to catastrophic consequences when developments of this nature are not curbed or controlled by local authorities.

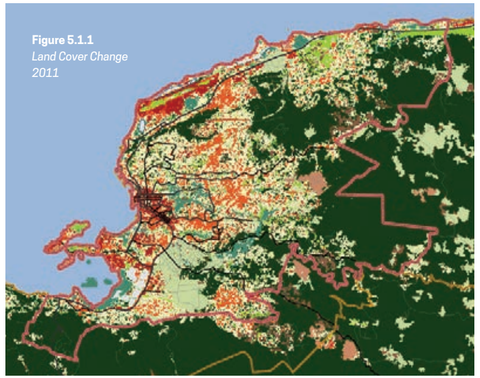


Figure 5.1.1
Land Cover Change 2011

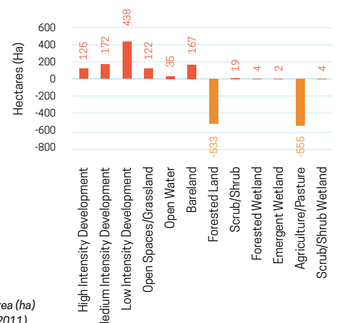


Figure 5.1.3
Land cover difference by area (ha) per land cover type (1985-2011)

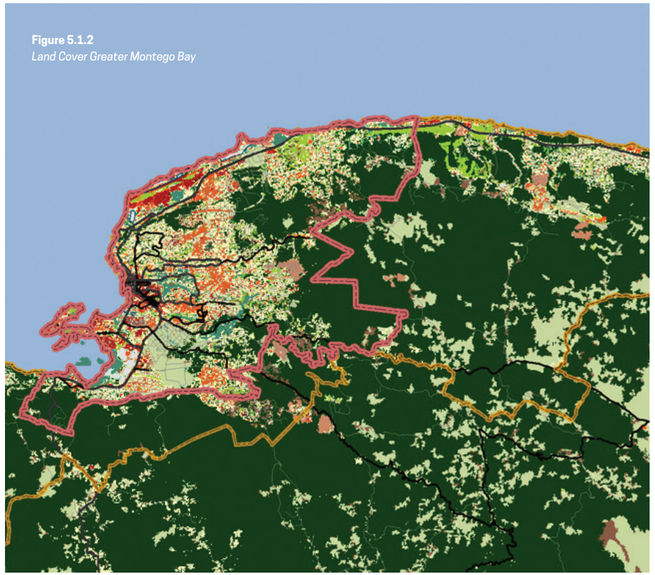


Figure 5.1.2
Land Cover Greater Montego Bay

Urban growth scenarios

Two growth scenarios were developed to explore the projections of future urban growth for Montego Bay to the year 2030: trend and smart growth. The scenarios were developed to compare the impacts of different urban development policies in light of population and demand projections to 2030. These policies are summarized in Table 5.1.1.

GeoAdaptive developed the Rapid Urban Growth Assessment Model (RGAM) to simulate land use changes by replicating real estate market conditions and the relationship between supply (developable land) and demand (projected growth within specified housing density categories) under different policy assumptions. The population projections for 2030 and residential land demand for three levels of development density were used as primary inputs for the model. Additional factors include the areas most attractive to residential land development (based on attractiveness factors) and areas with physical or regulatory development restrictions (based on urban policies, urban and green linkages and other factors that restrict development).

The Model imitates real estate dynamics within a Geographic Information System (GIS) (30m x 30m cell resolution) including elements related to zoning, urban policies guiding development density, urban and green linkages, improvement and implementation of new infrastructure, and urbanization restrictions. The results of both scenarios were validated and adjusted based on the recommendations made by representatives from local and national government and local stakeholder groups.

Trend scenario - 2030

Under the trend scenario, shown in Figure 5.1.4, the tendency towards patterns of low-density development is most evident. Current development policies favour low-density developments, as observed in the historic urban footprint analysis. As these developments become more prominent throughout the city, more land is consumed per resident and this is manifested as a diffuse growth pattern across the landscape by 2030. Consequently, medium and high-density developments are projected on the periphery of the downtown area (east, northeast and south) and near areas of similar densities. Medium density development is primarily projected along the main periphery road A1 (north and south of downtown), near existing medium density developments and south of Bogue Road on the western coast, near the western limit of the urban boundary[47]. High-density development is focused near major roads towards the north, northeast and southeast of the downtown area.

The areas of projected growth for high density development in 2030 include: areas between the Barnett Estate and Fairfield (Fairfield Road), north of downtown near Brandon Hill Road, and north of Salt Spring Road (northeast of downtown). Projected medium density development for 2030 includes: areas of infill throughout the city, Barnett Estate, along the southwestern coast and along A1, north of the downtown area. Low-density residential growth is the most prolific, and projected to occur in the following areas: towards the north near Ironshore and Norwood, and within Barnett Estate.

These areas of projected growth do not take into consideration the current extent of water and sewer networks or environmental or natural hazard restrictions. As a result, 492 hectares of new growth are added to the urban footprint by 2030, which is greater than the 312-hectare increase during the period 2001-2011. If the city continues to grow at this rate, the urban footprint will begin to reach the outskirts of the urban boundary, the availability of suitable land will decrease, and the urbanization of unsuitable locations will be more prevalent. For example, the city is surrounded by low-lying forested hills; development along these hillsides (formal or informal) can result in complications from the high risk of landslides and erosion. Currently there are no specific restrictions in place to prohibit development on steep slopes.

The primary land cover type consumed by the projected future development is on forest or agricultural/ pasture land. These results emulate historic development patterns, however the conversion of these land cover types can lead to the following implications: loss of biodiversity, increased greenhouse gas emissions (GHG), decline in air quality, erosion, increased flooding and loss of productive land.

A summary of the factors and projections used for the trend scenario are highlighted in Table 5.1.2.

47. The urban boundary is defined by the extent of the enumeration districts designated as part of Montego Bay by the Statistical Institute of Jamaica (STATIN).

PARAMETERS AND CONSIDERATIONS	TREND SCENARIO	SMART GROWTH SCENARIO
Population for 2030	The same population is used in both scenarios (133,477 inhabitants) (Source: PIOJ)	The same population is used in both scenarios (133,477 inhabitants) (Source: PIOJ)
Land Use and Regional Planning Policies	No change in current public policy	Considers strategies for sustainable urban development; smart growth policies such as increased housing density, open space conservation, and growth near existing services
Urban and Natural Systems Coordination	No	Yes (considering three main strategies at multiple scales: ecological connectivity, social- improvement of quality of life & environmental quality)
Availability of Economic Resources	Without restriction	Without restriction
Zoning	Current zoning	Zoning of alternative land uses.
Consideration of Natural Hazard Exposure	No restrictions on areas of exposure	Considers areas of inundation (pluvial flooding and storm surge)
Urban Growth Patterns	Scattered and dispersed development	Compact development based on densification and process of urban renewal
Urban Footprint (based on assumed density levels)	10% increase (relative to existing)	6% increase (relative to existing)

Table 5.1.1
Growth policies

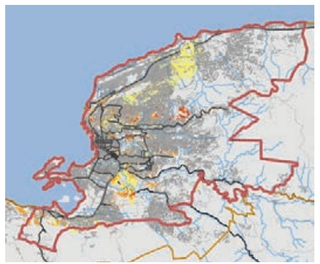


Figure 5.1.4
Trend scenario

FACTORS	TREND
Policies	• Project current conditions • No changes in public policy • No restrictions on areas of risk
Population	133,477 inhabitants
Demand (per density category)	• High: 28 ha (6%) • Medium: 139 ha (28%) • Low: 325 ha (66%)
Demand (Total)	492 ha
Total Road Network (km)	1,336 km
Land cover consumption	• Open Space: 29 ha • Bareland: 3 ha • Forested Land: 136 ha • Scrub Shrub: 20 ha • Agriculture/Pasture: 69 ha

Table 5.1.2
Trend scenario

Figure 5.1.5
Smart growth scenario

FACTORS	SMART GROWTH
Policies	• Considers strategies for urban sustainability • Protects network of urban and green linkages • Areas exposed to natural hazards restricted from development
Population	133,477 inhabitants
Demand (per density category)	• High: 40 ha (15%) • Medium: 62 ha (23%) • Low: 172 ha (63%)
Demand (Total)	275 ha
Total Road Network (km)	1,334 km
Land cover consumption	• Open Spaces 99 ha • Bareland: 40 ha • Forested Land: 284 ha • Scrub/Shrub: 67 ha • Agriculture/Pasture: 69 ha

Table 5.1.3
Smart growth scenario

Smart growth scenario - 2030

The smart growth scenario, shown in Figure 5.1.5, illustrates a more consolidated and compact pattern of development, as a result of the sustainable policies followed under this scenario. Many of these policies were derived from the 2010 St. James Draft Development Order.

The development under this scenario reflects the implementation of a set of smart growth policies, which support more controlled and regimented growth. Certain types of land cover and land use are protected from growth, and higher density development is given priority over lower density urbanization. High and medium density developments are closer to Downtown, while most low-density growth is projected towards the southern outskirts of the city and in a few northern locations. The patterns and distribution are scattered and there were many instances of infill development.

Low-density development is much less prevalent in this scenario. This outcome reflects urban policies that encourage more efficient and denser growth. In addition, the location of the growth was controlled through the implementation of more restrictions on land available for residential development. For example, in the smart growth scenario, development was restricted on hillsides with slopes greater than 25% or in areas prone to natural hazards (storm surge, landslides or flooding). In addition, proposed areas for open spaces and other green space interventions were safeguarded and therefore restricted from future urbanization.

The projected areas of high-density growth under the 2030 smart growth scenario include: infill areas surrounding the north and east portions of the downtown area (Albion, Glendevon, Mount Salem), and areas of Barnett Estate and Fairfield. Areas of projected me-

dium density development for 2030 include: areas of infill throughout the city, Barnett Estate, Ironshore, and the area west of the intersection of Long Hill Road and Bogue Road. The third group, low density, has projected growth for 2030 in the following areas: north near Ironshore, east of the downtown area near Irwin, south of Bogue Village, and within Barnett Estate.

As with the prior scenario, the primary land cover types consumed by the new projected development are forest and agricultural/pasture land.

A summary of the factors and projections used for the smart growth scenario are highlighted in Table 5.1.3.

Growth scenario comparison

The results of the trend and smart growth projections reflect changes in the future development pattern of Montego Bay. Although both scenarios project relatively low growth of the urban footprint - a 10% increase for the trend scenario and a 6% increase for the smart growth scenario - the trend projections of land demand are almost double that of the smart growth scenario (see Table 5.1.4). The primary difference between the scenarios is the density and distribution of development. The trend scenario favours low-density development along the periphery of the city. This type of growth presents higher costs to the city in the provision of services and roads. Peripheral growth increases demands on transportation systems, distance to employment centres, and other amenities the city has to offer. As a consequence, urbanization begins to encroach on the surrounding natural environment, which is detrimental to the function of ecosystems, and in some cases can also occur in areas that experience high levels of erosion (landslides) or are prone to inundation. This change in land cover can also increase the severity of any hazard already present within the site.

In comparison, the smart growth scenario increases the amount of high-density development, while decreasing the amount of low-density development projected in the scenario. Urbanization is focused in areas near existing development and less on the periphery, as well as filling in pockets of vacant land throughout the city. Developing within the city's existing footprint reduces the effort required by the municipality to accommodate new construction in terms of utility provision, road construction, and other amenities.

An important distinction to make between both scenarios is the amount and type of land restricted for future development. The trend scenario takes into consideration the existing policy restrictions such as currently built land, infrastructure, and bodies of water. Under the smart growth scenario, more restrictions on residential growth are taken into consideration, such as areas which are prone to natural hazards, hillsides with slopes steeper than 25%, proposed urban and natural linkages, open space, and agricultural lands. These restrictions allow for a more compact and efficient urban growth pattern, where development policies are enforced, residential areas are protected from natural threats, and there is an overall improvement in the quality of life, giving the city a more sustainable outlook.

The policies represented by the smart growth scenario would lead toward more compact and efficient development patterns. As shown in the graph in Figure 5.1.6, the increase in the size of the urban footprint projected under the smart growth scenario is lower than the increase observed between 2001 and 2011 (275 ha vs. 312 ha), and even less than the projected growth in the trend scenario (492 ha). A visual comparison of the two projected urban footprints with the 2011 situation can be seen in Figures 5.1.7-5.1.9. The change in the distribution of density, with an increase in high-density development and a decrease in the proportion of low and medium density, is also a significant factor that contributes to the more compact vision for the future of Montego Bay.

PROJECTIONS	TREND	SMART GROWTH
Total Land Demand	492 ha of land consumed	275 ha of land consumed
Growth of Urban Footprint	10% increase (relative to current urban footprint)	6% increase (relative to current urban footprint)
Density Distribution	High density= 6% low density= 66%	High density= 15% low density= 63%
Areas of Main Growth	Around Barnett Estate, Bogue Village, and near Ironshore	Around Barnett Estate, new development area, and near Ironshore

Table 5.1.4
Growth projections

Figure 5.1.6
Historic and projected urban footprint growth

Figure 5.1.7
Urban footprint 2011

Figure 5.1.8
Trend scenario

Figure 5.1.9
Smart growth scenario

Infrastructure extension costs

The analysis of infrastructure extension costs focuses on the demand of resources needed to support new development. The majority of the new growth will expand towards areas that are currently undeveloped, and it will be necessary to extend services, roads, and potable water to support this new growth. The costs associated with road extensions and the expansion of the potable water network (see Table 5.1.5) is important to consider when comparing the urban growth scenarios.

Road Network

The cost of the extension of the road network is based on the final results of the population growth under both scenarios of development. To obtain the estimated cost associated with the service roads extension, the road construction unit costs were calculated using values from recent National Works Agency projects. The estimated unit cost to support the development of the bypass road (identified as highway construction) is $58,658,375 JMD/km and the cost to support local service roads is $10,527,108 JMD/km. The total cost of extending the roads is approximately $1 billion JMD for the trend scenario and $318 million JMD for the smart growth scenario (approximately 1/3 cost of the trend scenario).

Potable Water

Expansion of the potable water network was calculated by comparing the existing service area (land 30 meters away from potable water network) with future service areas (delineated based on areas of new development) for four regions of the city (North, Central, South and Southwest). The average slope for each new service area was calculated to adjust the final cost calculation. Results, shown in Figure 5.1.10, show that the trend scenario has 663 hectares of new service area and the smart growth scenario has 527 hectares of new service area. The projected total length of new pipes was based on the assumption that the density of lateral pipe is 0.04 km/ha. The average cost of new pipes (for pipeline replacement) is $18,550,000 JMD/km (derived from National Water Commission's 2011 St. James Parish Plan). The total extension cost for the trend scenario is about $570 million JMD, while the projected cost of the smart growth scenario extension is about $455 million JMD.

The following are implications based on the results of the analysis of extension of infrastructure cost:

- Potable water services: sustainable policies implemented would result in more compact growth, resulting in significant savings compared to the trend scenario
- Service road: the additional bypass road (defined as highway cost) in the trend scenario resulted in a higher total cost compared to the smart growth scenario.
- Analysis on the extension of wastewater infrastructure was not conducted because the information was not available. This information would be useful to better understand the cost of extending other important resources to support new development.

CRITICAL INFRASTRUCTURE	TREND SCENARIO	SMART GROWTH SCENARIO
Road Network	JMD $1,078,644,859	JMD $317,803,634
Potable Water Network	JMD $570,844,610	JMD $455,652,293
Total	**JMD $ 1,649,489,469**	**JMD $ 773,455,927**

Table 5.1.5
Critical infrastructure costs

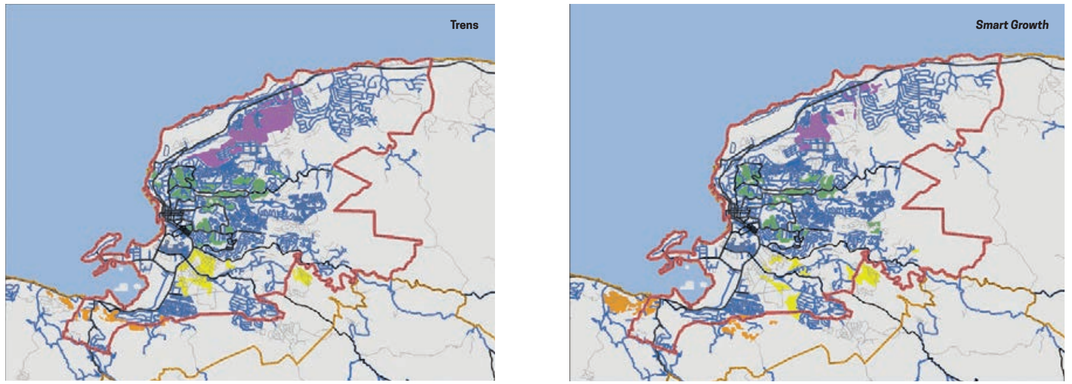


Figure 5.1.10
Water Service Area Montego Bay, Trend and Smart Growth

Sources:
Government of Jamaica, Mona GeoInformatics Institute, Urban Development Corporation

Conclusions

Through the development of future urban growth models for Montego Bay for the year 2030, it became apparent that the policies and enforcement of development regulations could result in significantly different outcomes. Two alternative growth scenarios were developed based on the analysis of historic growth trends (demonstrated in Figure 5.1.11), existing density patterns, and future growth projections. By comparing the results of the trend and smart growth scenarios, the impact of future growth patterns can be evaluated in terms of additional land needed for development, the required extension of infrastructure, and increased susceptibility to natural hazards.

Overall, the trend scenario reflects less compact, more land intensive residential development. The majority of growth in this scenario falls into the low-density category, which includes both high-end single-family housing, as well as informal squatter settlements. The most disconcerting aspect of the development pattern in this scenario is the expansion of new neighbourhoods into areas susceptible to pluvial flooding and landslides. Based on historic housing development patterns, a large proportion of this development will be informal, suggesting lower construction standards and higher vulnerability to hazards for buildings and residents alike. Growth is also projected to require the conversion of forest and agricultural land, which have already been drastically reduced in the Montego Bay area. Another challenge presented by this scenario is the cost of infrastructure extensions to support new developments. The estimated combined cost of extending roads and the potable water network is over JMD $1.6 billion. Although sewer extension costs could not be calculated, they represent a major additional expense that should be considered. The continued growth of the urban footprint will also contribute to on-going issues such as traffic, air and water quality, solid waste disposal, and crime.

On the other hand, the smart growth scenario represents a more sustainable future for the city, which reflects development patterns guided by the enactment and stricter enforcement of urban growth policies. These policies include land use and zoning regulations that encourage higher density development, discourage development in hazard-prone areas, and promote the protection and expansion of natural areas that provide essential functions such as protection from hazards, climate regulation, and recreation. The projected expansion of residential development in this scenario is almost half that of the trend scenario, and estimated infrastructure costs are under JMD $850 million. Restrictions on the development of floodplains and steep slopes also ensure lower hazard vulnerability than the trend scenario. Table 5.1.6 above summarizes the key differences between the development patterns and the resulting impacts between the two urban growth scenarios.

FACTOR	TREND SCENARIO	SMART GROWTH SCENARIO
Urban Footprint	Diffuse urban pattern (sprawl) (492 hectares)	More compact urban pattern: higher density, more infill development (275 hectares)
Residential Density	Existing development patterns, majority of growth is low density, lower overall density	Higher minimum density, lower proportion of total growth in low density developments
Infrastructure Costs	JMD $1.64 billion	JMD $842 million
Hazard Vulnerability	No restrictions	Excludes 50 year storm surge area, 100 year pluvial flood zones, and steep slopes (>25%)
Urban & Natural Linkages	None	Parks, forest reserves, river setbacks, wetlands, caves, ecological connections, green corridors, and open spaces

Table 5.1.6
Impacts of growth scenario

RECOMMENDATIONS

Through the process of developing the base studies presented herein, including field validation and consultations with local and national authorities, several recurring issues were identified relating to the city's urban growth. Several recommendations were made across five main categories: growth dynamics of the city, development and hazard vulnerability, supporting the tourism industry, urban and natural linkages, and greenhouse gases and traffic reduction. The majority of these recommendations is incorporated into the Action Plan, and can be reviewed in that chapter or by accessing the full report.

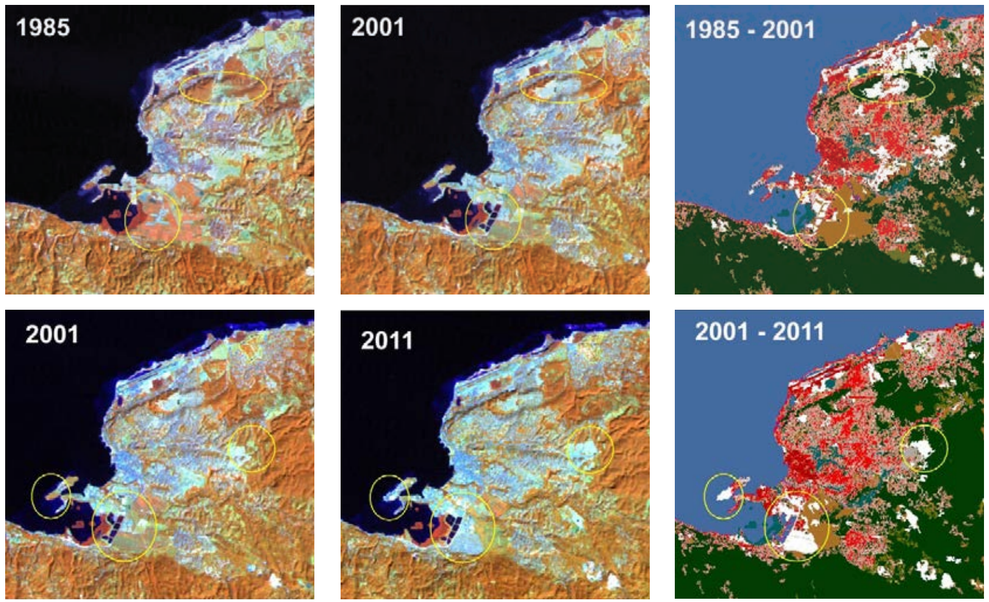


Figure 5.1.11
Analysis of land cover change and growth of urban footprint using satellite imagery

WHAT IS CLIMATE CHANGE?

Climate change is occurring for two reasons. On one hand, climate changes are associated with the natural variability of the Earth: the interactions between land, atmosphere, ocean and solar radiation received throughout the system, and their evolution over time. On the other hand, it has been established beyond doubt that climate change is partly a consequence of an anthropogenic increase of greenhouse gases (GHG) in the atmosphere. These gases, which occur naturally in the atmosphere, include among others carbon dioxide (CO2), methane (CH4) and water vapor (H2O). When accumulated in the atmosphere, these gases trap the heat from the sun, regulating the atmospheric temperature of the earth as a greenhouse. Through the burning and processing of fossil fuels (oil, coal and natural gas) the amount of GHG in the atmosphere has increased at an insurmountable rate.

THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2007) DEFINES CLIMATE CHANGE AS:

"...[A] CHANGE IN THE STATE OF THE CLIMATE THAT CAN BE IDENTIFIED (E.G., BY USING STATISTICAL TESTS) BY CHANGES IN THE MEAN AND/OR THE VARIABILITY OF ITS PROPERTIES, AND THAT PERSISTS FOR AN EXTENDED PERIOD, TYPICALLY DECADES OR LONGER. CLIMATE CHANGE MAY BE DUE TO NATURAL INTERNAL PROCESSES OR EXTERNAL FORCES, OR TO PERSISTENT ANTHROPOGENIC CHANGES IN THE COMPOSITION OF THE ATMOSPHERE OR IN LAND USE."

GREENHOUSE GAS EMISSIONS INVENTORY AND MITIGATION ANALYSIS

Carbon-intensive development has negative impacts on the environment while also presenting economic and social costs to a city. A smart, sustainable city aims to reduce its carbon footprint so as to help ensure a better future for its city, its people, and its environment. Through strategic planning, and the implementation of smart growth development coupled with targeted mitigation actions, the 2010 carbon footprint for Montego Bay can be maintained and possibly even reduced for 2030.

This study compiles an inventory of Montego Bay's current emissions (2010), projects emissions for 2030 based on different growth scenarios, and suggests actions that can be undertaken to achieve this goal of reducing the city's carbon emissions. Most of the recommended measures are cost-effective, in that they would fully recover their investment costs or even generate revenues during the project's lifetime. The results of this analysis and its recommendations are complementary to the Action Plan, particularly as it pertains to actions related to the Sanitation sector.

OBJECTIVES

1. Determine direct and indirect greenhouse gas emissions that are generated within the study area based on the GPC Basic+ methodology.
a. Identify the emission sources located within the study area.
b. Develop a manual to apply emission estimation calculations based on the GPC Basic+ methodology.

2. Project the baseline scenario with mitigation measures incorporated into the sustainable urban development scenario.
a. Develop a baseline (2010) for the GHG emissions inventory for Montego Bay, Jamaica, as well as future baseline scenarios for 2020 and 2030 (trend and smart growth scenarios).
b. Establish GHG emissions inventory projections for trend and smart growth development scenarios, for 2030.
c. Prioritize and identify the mitigation measures for Montego Bay.

METHODS

The GHG Emissions Inventory for Montego Bay, Jamaica was produced using the Global Protocol for Community - Scale GHG Emissions (GPC) Methodology, which was developed by the ICLEI and allows the standard calculation and reporting of greenhouse gas emissions. This GHG emissions inventory was made considering the year 2010 as the baseline scenario. The emissions were quantified and divided in three different categories: Direct emissions (from fuel use within the study area), Indirect emissions (from energy consumption through the national distribution grid), and Transboundary or other indirect emissions (from the use of fossil fuels, etc.).

In addition, projected emissions were calculated considering expected conditions for 2020 and 2030 (as the baseline scenario), as well as scenarios with interventions in three sectors: Waste (solid waste), Stationary Units (services sector) and Transport (on-road). Emissions in these sectors can be decreased by the introduction of mitigation measures in the future.

The baseline scenario results also consider the change in the urban footprint for two different scenarios: the trend scenario (where development follows current patterns of growth), and the smart growth scenario (which considers more sustainable patterns of development); both scenarios are projected through 2030.

The baseline scenario was defined considering the national GDP and available data on the average annual growth rate (APR) for the Energy sector (electricity & water supply). An APR of 0.0012 was used to evaluate this sector through 2030, in addition to the projected 2030 growth in The National Energy Policy; for the commercial sector and Institutional facilities (Indirect emissions – Services), the GDP of Hotels & Restaurants was used. For the Transport sector, Jamaica's vehicle fleet growth was used for on-road transport and the projected growth for aviation and water-borne navigation. For Waste, the First Order Decay method was employed; it considers population growth, as well as APR and other land use (AFOLU) were not calculated in this GHG emissions inventory. The projections were made considering the same GDP growth and the same population growth as the baseline scenario, as well as growth rates for the smart growth development scenario.

After calculating the reference scenario by using the GDP and the population growth rate, two parameters were assessed:

1. Change in density
2. Kilometres of new roads

These parameters influenced the specific urban footprint scenarios, and helped obtain their respective growth rates. Finally a cost-effectiveness analysis was conducted using a discount rate of 10% to calculate the annual investment. The mitigation costs were derived for each evaluated scenario. The costs include the emission reductions and the annual cost of each mitigation measure. For the sectors with higher emissions, appropriate mitigation measures were proposed according to the following criteria.

- The measures should be feasible in the short or medium term
- The C02e reductions from the mitigation measure should be over 1000 tonnes/year to be considered.

RESULTS

According to the results of the GHG emissions inventory, a total of 851,277 tonnes/year of carbon dioxide equivalent (CO2e) are emitted to the atmosphere, of which 651,852 tonnes/year are CO2; 192,144 tonnes/year are CH4 and 7,280 tonnes/year are N20 (see Table 5.2.1). The most important results from the GHG emission inventory are highlighted below:

- The main emission sources are Stationary and Mobile units, which support the core activities in the study area (268,466 ton CO2e direct emissions and 390,981 tonnes of indirect emissions, representing approximately 77% of total emissions (see Figure 5.2.1)).
- Direct emissions represent 38% of total CO2e emissions, and the indirect emissions make up 62% of the total.
- Direct emissions (38% of total), represent the energy consumed for activities in the city such as the transportation sector, accounting for 59% of emissions, power generation, which produces 24%, and the remaining 17% from waste management[48]. Figure 5.2.2 shows the total emissions by sector.
- The subcategories of priority sectors (stationary, mobile, waste) with predominant total emissions include commercial buildings (27%), on-road transportation (25%), and disposal of solid waste (22%).

48. Data on the industrial sector was not available, so its contribution was not determined.

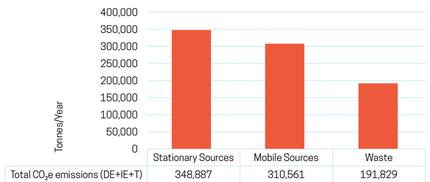
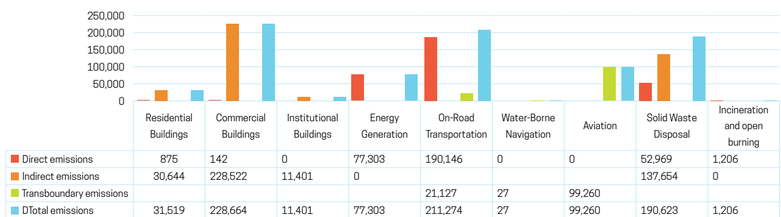


Figure 5.2.1
Quantity of CO2e by source for Montego Bay, Jamaica in tonnes/yr

EMISSION SOURCE		TONNES/YEAR			
		CO_2	CH_4	N_2O	CO_2e
Stationary units	Direct emissions	78,320			78,320
	Indirect emissions	270,567			270,567
Mobile units	Direct emissions	182,527	62	20	190,146
	Indirect emissions	119,232	10	3	120,414
Waste	Direct emissions	1,206	2,522		54,174
	Indirect emissions		6,555		137,654
Direct emissions		**262,053**	**2,585**	**20**	**322,641**
Indirect emissions		**389,800**	**6,565**	**3**	**528,636**
TOTAL					**851,277**

Table 5.2.1
Results by sector



	Residential Buildings	Commercial Buildings	Institutional Buildings	Energy Generation	On-Road Transportation	Water-Borne Navigation	Aviation	Solid Waste Disposal	Incineration and open burning
Direct emissions	875	142	0	77,303	190,146	0	0	52,969	1,206
Indirect emissions	30,644	228,522	11,401	0				137,654	0
Transboundary emissions					21,127	27	99,260		
DTotal emissions	31,519	228,664	11,401	77,303	211,274	27	99,260	190,623	1,206

Figure 5.2.2
CO2e Emissions by subcategory in tonnes/yr

Municipal solid waste, specifically the generation of methane in the city's landfill, represents the most important source of this pollutant (22.39% of the total emissions of CO2e). This source has direct and indirect emissions; the former associated with the city's waste disposal, and the latter with the disposal of waste from other urban areas in a 3:1 proportion, indirect emissions being greater than direct ones (see Figure 5.2.2).

Regarding stationary units, electric energy consumption in commercial buildings produces the greatest amount of emissions (26.86% of total emissions), mainly associated with the touristic and commercial nature of the city (Figure 5.2.3). Aviation represents another source with significant contributions (11.66%) because of fuel consumption during activities such as take-off, landing and taxi in and out; this is a characteristic feature of cities with high touristic activity.

Considering the results of the GHG emissions inventory as a starting point, the baseline scenario through 2030 was developed for the sectors with predominant emissions (stationary units, mobile units and waste). Figure 5.2.4 shows the CO2e emissions by sector for the baseline scenario. It also emphasizes the importance of applying the measures oriented to decrease emissions in these sectors by showing that emissions of mobile units would increase approximately 100%, compared to the base year of the inventory, if changes were not implemented.

The results obtained from the baseline scenario and the two human development scenarios are presented in Figure 5.2.5. The projected CO2 equivalent emissions through 2030 are shown for the trend and smart growth scenarios, with the trend growth scenario leading to higher emissions in the future.

For the sectors with higher emissions, some mitigation measures are proposed. Table 5.2.2 lists these mitigation measures, along with the corresponding average reduction of CO2e in tonnes/yr. Figure 5.2.6 presents the results of the projection through 2030 for the smart growth scenario with and without the implementation of the suggested measures, and compares them to the baseline scenario for each sector. If the city were not to apply the mitigation measures in the three sectors identified as priority, an increase of 400,000 tonnes of emissions, representing a 30% increase compared to the baseline scenario, would be expected.

The results of the cost-effectiveness analysis indicate that, with exception of measure number 3 (replacement of electrical appliances with energy saving products), the costs of each measure are recoverable. The difference between annualized costs with and without mitigation measures represents the net cost associated with each mitigation measure. These net costs are displayed in Figure 5.2.7.

When selecting which measure, or set of measures, will be implemented in the city, decision makers must consider not only the number of tonnes of CO2e that can be reduced, but also the net cost, whether the investment is recovered, and if the measure or proposed action is effective in the specified time frame. Table 5.2.3 shows the cost-effectiveness analysis summary of reduced CO2e emissions using each mitigation measure. Measure 1 (methane recovery) has a net cost of $206/tonnes of CO2e and reduces emissions by 32,996 tonnes CO2e/year, which indicates that the investment will be recovered in the short term.

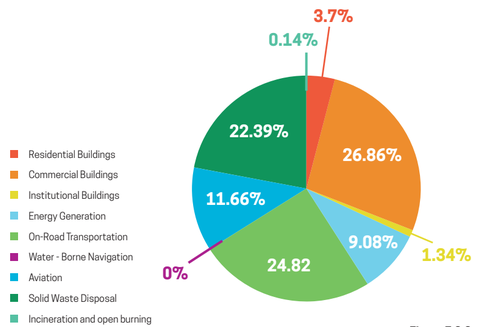


Figure 5.2.3
Percent of total CO2e emissions by subcategory

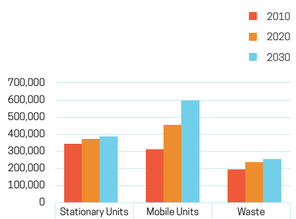


Figure 5.2.4
Baseline scenario (2010-2030) emissions by sector for Montego Bay, tonnes of CO2e

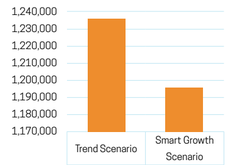


Figure 5.2.5
Trend and smart growth scenario (2030) CO2e emissions for Montego Bay, Jamaica, in tonnes/yr

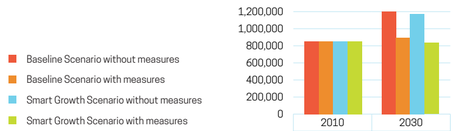


Figure 5.2.6
CO2e emissions (tonnes/yr) for the baseline scenario and smart growth scenario, with and without mitigation measures, for 2010 and 2030

MEASURE NUMBER	TARGET SECTOR	MITIGATION MEASURE	YEARLY AVERAGE EMISSIONS AVOIDED, COMPARED TO BASELINE SCENARIO (TONNES CO_2E/YEAR)
1	Waste - Municipal Solid Waste	Recovery and destruction of methane generated in the landfill	32,996
2		Compost generation from organic waste	160,607
3	Stationary Units - residential sector	Replacement of household appliances with energy-saving units	17,116
4	Stationary Units - industry trade	Energy savings in the hotel sector	59,561
5	Mobile units - on-road transportation	The change of taxis, cars, and vehicles under three tons from gasoline to natural gas	108,137

Table 5.2.2
Measures to reduce GHG emissions

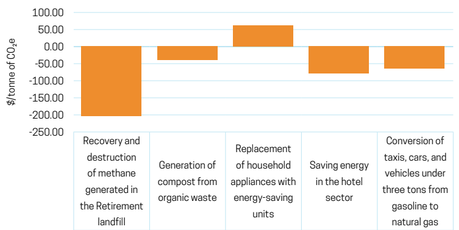


Figure 5.2.7
Net cost of GHG emissions mitigation measures for Montego Bay

- **Negative values represent net income or negative net cost to implement the measure. These benefits are realized through saving money or rapid recovery of the initial investment.**
- **Positive values imply a positive net cost, indicating the overall expenditure associated with the implementation of the measure. This means that the investment will not be recovered, and must be paid for by the city government.**

CONCLUSIONS

The results that should be highlighted from this analysis are:

1. The reuse and destruction of methane from the landfill represents reductions of emissions and of cost per reduced tonnes, and a recovery of the costs.

2. Taking into account that hotels are one of the main consumers of electric energy in the city, the second alternative for mitigation is to replace old, inefficient technology with new, energy-saving appliances and devices.

The maximum cumulative emissions reduction that can be achieved in the city through 2030 is 339,109 tonnes of C02e per year with respect to the total emissions up to 2010. This suggests that, if the proposed mitigation measures were applied, by the year 2030 the emissions of the city would remain close to the levels registered in the base year 2010.

This study allowed the development of a GHG emissions inventory for Montego Bay (2010) in which sectors such as on-road transportation, waste and stationary units were identified as areas in need of improvement.

For further emissions inventories, it would be important to generate and organize information that can support the decision-making process. Regarding air quality, it would also be important to generate information about the monitoring of pollutants and meteorological parameters in the city. Furthermore, an emissions inventory of pollutants should be conducted. Both tools would help improve air quality and strengthen the efforts to mitigate climate change.

The variables of the baseline scenarios through 2030 consider not only economic and population growth, but also incorporate growth due to urban footprint expansion. If this were to happen in a planned and organized manner (i.e. smart growth), a decrease of 59,956 tonnes/year of C02e would be achieved. This emphasizes the importance of an urban development plan for 2030.

MEASURE NUMBER	MITIGATION MEASURE	CO_2E REDUCTION IN TONNES	DIFFERENCE BETWEEN ANNUALIZED COSTS WITH AND WITHOUT MITIGATION MEASURES (MILLIONS OF DOLLARS)	NET COST $/TONNES OF CO_2E
1	Recovery and destruction of methane generated in the Retirement landfill	32,996	-6.79	-206.04
2	Generation of compost from organic waste	160,607	-6.19	-38.59
3	Replacement of household appliances with energy-saving units	17,116	1.09	62.32
4	Energy savings in the hotel sector	59,561	-4.70	-78.96
5	Conversion of taxis, cars, and vehicles under threetons from gasoline to natural gas	108,137	-7.23	-66.84

Table 5.2.3
Cost-effectiveness analysis summary

THE CHALLENGE OF CLIMATE CHANGE IN LATIN AMERICA AND THE CARIBBEAN

IN LATIN AMERICA AND THE CARIBBEAN, EXTREME CLIMATE EVENTS ARE BECOMING INCREASINGLY COMMON. THEY RAISE THE LEVEL OF RISK TO WHICH MANY INHABITANTS ARE ALREADY EXPOSED, ESPECIALLY FOR THE POOREST POPULATION. THEY ADD DIFFICULTY TO THE TASK OF MITIGATING THESE RISKS, AND INCREASE THE NEED FOR FINDING MORE AND BETTER FORMS OF COEXISTING WITH THEM WITHOUT CAUSING MORE DAMAGE, OR IN OTHER WORDS, IDENTIFYING ADAPTATION STRATEGIES.

CITIES ARE A MAJOR AND SIGNIFICANT CONTRIBUTOR TO THIS PHENOMENON.

CITIES CONSUME MORE THAN 75% OF DISTRIBUTED ENERGY WHILE ALSO GENERATING BETWEEN 75% AND 80% OF GREENHOUSE GASES ON THE PLANET.

DISASTER RISK AND CLIMATE CHANGE VULNERABILITY ASSESSMENT

There are many natural hazards that affect Montego Bay, including landslides, earthquakes, heavy precipitation and pluvial flooding, and hurricanes (which cause intense storm surges, high winds, and heavy precipitation). In addition, sea level rise over time will contribute to higher storm surges, coastal flooding, and coastal erosion. Landslides can also be triggered by both seismic activity and heavy precipitation. The natural hazards in Montego Bay often occur concomitantly and are very much interrelated – ergo the disaster risks are interrelated and require cross-sectorial coordination and planning for hazard mitigation, adaptation, and emergency response.

These hazards present potential threats to not only the people of Montego Bay, but also to the natural, cultural, infrastructural, and economic assets of the city. What's more, development patterns in the city may contribute to and possibly exacerbate vulnerability and risk, the degree to which depends on actions that are taken in the future to manage risk to natural hazards. However, prudent land-use planning can reduce the share of people and assets exposed to hazards by restricting growth in areas at risk.

This study evaluates priority hazards and certain effects of climate change for Montego Bay. It presents current and future projections of levels of exposure, vulnerability, and risk of the city, while considering how urban growth and climate change will influence the city's susceptibility in the future. The results of this assessment are reflected in the Action Plan, specifically in those sections covering disaster risk management and urban planning, although its impacts are evident across other sectors.

To facilitate disaster risk management and urban planning, a set of maps and a geographic information systems database were developed as a part of this assessment to identify and visualize the study results. These maps and database serve as a planning tool for public authorities and may also raise awareness of disaster risk among private investors. A more detailed description of this study follows.

OBJECTIVES

By obtaining the following objectives, this study highlights the potential effects of natural hazards and climate change on Montego Bay's population, infrastructure, assets, and future development, while providing tools and recommendations for decision-makers with respect to disaster risk management.

- Development of a GIS database and framework to contain all data collected and created for this analysis, to be used for future studies or as a tool to inform future planning decisions.
- Identification of current hazards, including intensity, frequency, and projected effects of climate change on these hazards.
- Analysis of exposure, vulnerability and risk to priority hazards and the implications these will have on future growth.
- Visualization of hazard impacts to guide risk management and planning.
- Estimate of annual and maximum losses to help guide investment decisions for the future development of the city.

METHODS

The study analyses risk in Montego Bay by consecutively assessing three risk components: hazard, vulnerability, and exposure. As shown in Figure 5.3.1, the risk analysis uses the following conceptual equation:

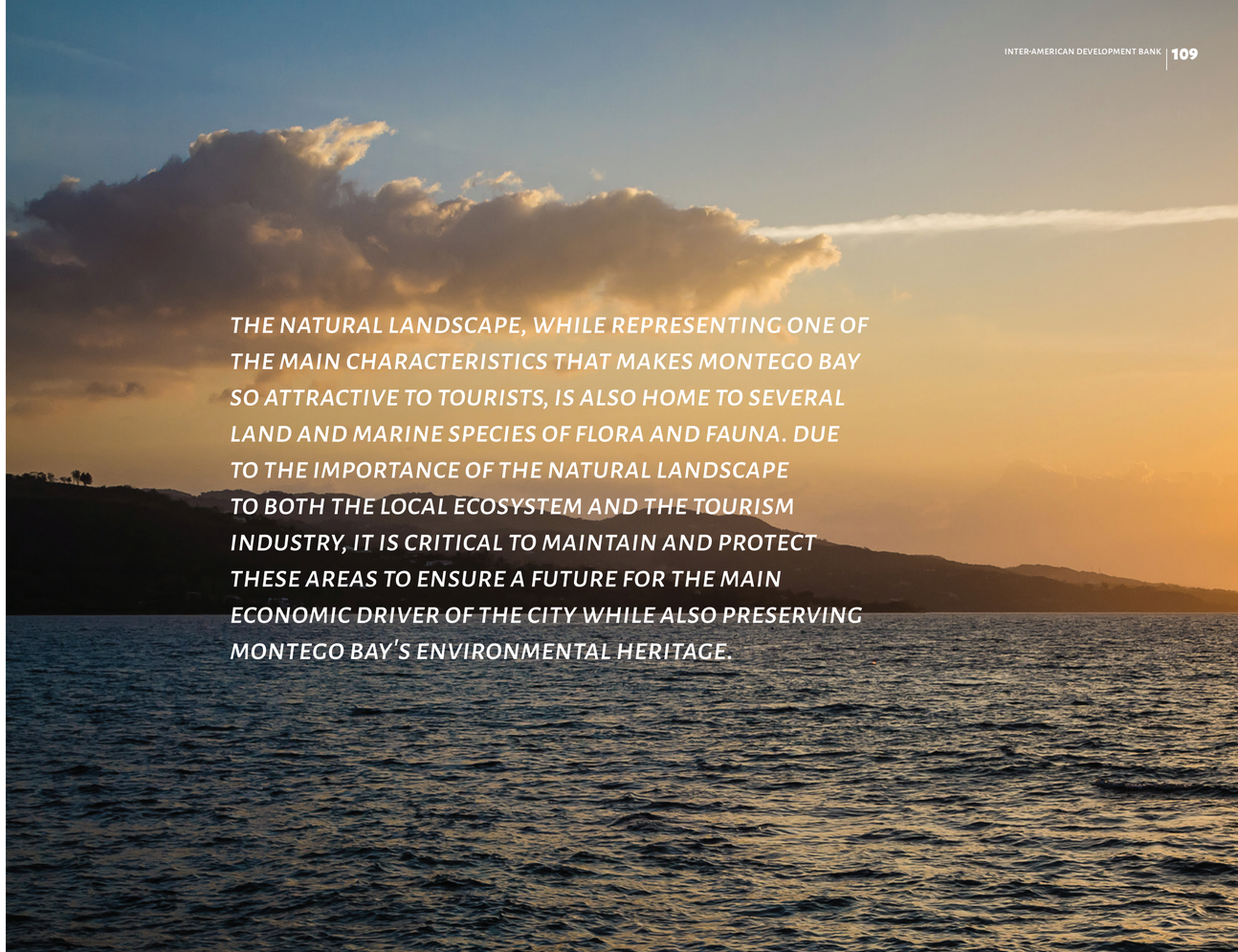
RISK = HAZARD * EXPOSURE * VULNERABILITY

This study is composed of four steps, each corresponding to the conceptual equation described above.

Figure 5.3.1
Methodological process

STEP 1 Hazard and susceptibility analysis:
Determines and measures the location, frequency, and intensity of natural and human-made hazard events. Where relevant, applies climate change scenarios (see Figure 5.3.2) from the Intergovernmental Panel on Climate Change (IPCC) to project potential impact of changes in temperature, precipitation, and sea level rise[49].

49. Scenarios A2 and B2 are the IPCC climate change scenarios considered most appropriate for Jamaica. The A2 scenario was used to model pluvial inundation for 2030 and A2, B2 and Rahmstorf (extreme event) projections for 2030 were used to model sea level rise.



THE NATURAL LANDSCAPE, WHILE REPRESENTING ONE OF THE MAIN CHARACTERISTICS THAT MAKES MONTEGO BAY SO ATTRACTIVE TO TOURISTS, IS ALSO HOME TO SEVERAL LAND AND MARINE SPECIES OF FLORA AND FAUNA. DUE TO THE IMPORTANCE OF THE NATURAL LANDSCAPE TO BOTH THE LOCAL ECOSYSTEM AND THE TOURISM INDUSTRY, IT IS CRITICAL TO MAINTAIN AND PROTECT THESE AREAS TO ENSURE A FUTURE FOR THE MAIN ECONOMIC DRIVER OF THE CITY WHILE ALSO PRESERVING MONTEGO BAY'S ENVIRONMENTAL HERITAGE.

The following natural hazards were selected for analysis after a rigorous review of literature and previous studies in Montego Bay, and consultation with IDB and local experts: pluvial inundation, sea level rise, storm surge, wind, seismic, and landslides.

For pluvial inundation, storm surge, wind, and seismic hazards, risk was assessed through probabilistic analyses for multiple return periods (i.e. probabilities), which provided estimates of potential deaths and asset damage in US dollars. Landslides and sea level rise were assessed using in qualitative categories through a susceptibility analysis. The term susceptibility in this context is used to describe a deterministic modelling of hazards where probabilities or return periods were not calculated. Susceptibility is measured using a relative scale of "very high" to "very low".

STEP 2 Exposure analysis:
Identifies and quantifies the population, assets, and infrastructure located within each hazard area. Population exposure is reported for children, elderly, and adults in order to highlight vulnerable populations throughout the city. Exposure levels are prioritized by amount of exposure (per system), and categorized as follows:

EXPOSURE	PRIORITY LEVEL
<1%	Low
1-15%	Medium
>15%	High

STEP 3 Vulnerability assessment:
Estimates the amount of damage, in financial terms and number of deaths, which may occur as a result of each hazard at specific hazard intensities. Certain characteristics, such as building age and materials, and peoples' socioeconomic situation, are important factors influencing vulnerability.

In order to assess vulnerability, modelling software was used to estimate the percentage of damage for each level of hazard intensity[50]. The vulnerability functions used were selected based on similarities between building materials reported for Montego Bay and the Latin American building types utilized in the software.

STEP 4 Risk analysis:
This final step combines the results of the previous three analyses, and determines the level of risk that occurs as a result of each hazard, and the potential human and physical losses that may be experienced for each.

Property values were estimated by GeoAdaptive using current and local real estate listings, validated by local realtors, and prior reports, in order to calculate the physical risk in Jamaican dollars (JMD or J$). Annual loss for each return period, average annualized loss, and probable maximum loss are also reported in order to help guide decision-making.

These analyses are part of a multi-hazard assessment for the city, which considers the effects of multiple hazards happening simultaneously in Montego Bay.

50. ERN-CAPRA Vulnerabilidad v2.0 software was used to derive vulnerability functions. However, GEC functions were used to assess storm surge vulnerability, as CAPRA does not include this hazard in its vulnerability module.

Global emphasis

Population: maximum levels in 2050, with rates decreasing after

Technology: introduction of clean and source-efficient technologies (A1FT - fossil intensive; A1T - non-fossil energy; A1B - balanced energy sources)

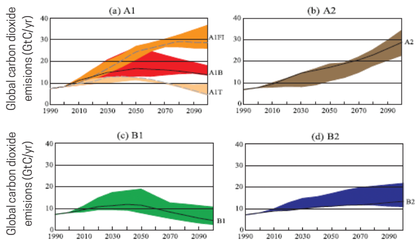


Figure 5.3.2
Climate change scenarios identified by the IPCC. For the analysis of Montego Bay, scenarios A2 and B2 were used. (Adapted from IPCC – Special Report on Emissions Scenarios)

World: heterogenous and self reliant
Economy: per capita economic growth
Government: regional convergence and interaction withdecreases in regional differences in per capita income

World: convergent, towards sustainability
Government: improved equity
Economy: intermediate levels of development /B2); driven towards service and information economies (B1)

Local/regional emphasis

Population:
Continously increasing

DATA USED

The analysis developed in this study is based on a set of publicly available and globally, regionally and locally available data sources. Five main sets of data were used in the analysis:

1. Results of the land cover analysis and urban growth analysis presented in the study "Historical and Current Urban Footprint and Future Urban Scenarios"

2. Existing data on current infrastructure, such as the road network, critical facilities/buildings, open and green spaces, and other social services

3. Geostatistical and census data for the city

4. Hydro meteorological, geological, and elevation data

5. Built conditions and building materials data.

The data collected and the methods and standards used[51] to document, process and visualize the data have been organized through a Geographic Information System (GIS), whose function is the management, distribution and display of critical information for the area of context. The GIS developed for the analysis of effects of climate change and natural hazards for Montego Bay will allow the Parish and its partners to use the data provided as a tool for risk management and decision-making processes.

The following sections highlight the key conclusions of each hazard analysis, including each exposure, vulnerability and risk assessment, and the implications these findings may have for the development of the city.

51. For more detailed information on the methods and data sources used, the complete report is available at www.urbandashboard.org.

PARAMETER	ESTIMATION METHOD	DATA	PROJECTION (PERIOD)	SOURCE	SIMULATION TO YEAR 2030 (ASSUMPTION)
Temperature (mean)	Linear interpolation	Temperature projections for 2071-2099	IPCC A2, B2	Climate Studies Group, Mona (CSGM), 2012: State of the Jamaican Climate 2012: Information for Resilience Building (Summary for Policy makers). Planning Institute of Jamaica (PIOJ), Kingston, Jamaica.	Projected changes (°C): Scenario A2: +1.6 °C (average) Scenario B2: +1.2 °C (average)
Precipitation (mean)	Linear interpolation	Precipitation projections for 2071-2099	IPCC A2, B2	Climate Studies Group, Mona (CSGM), 2012: State of the Jamaican Climate 2012: Information for Resilience Building (Summary for Policy makers). Planning Institute of Jamaica (PIOJ), Kingston, Jamaica.	Projected precipitation change (% relative to current): Scenario A2: annual rainfall decreases about 26% Scenario B2: annual rainfall decreases about 12%
Coastal Inundation: Sea Level Rise	Polynomial interpolation	DEM (MGI)	IPCC A2, B2; Rahmstorf, 2007 (Extreme); interpolation of 1990-2095	IPCC (2011); Rahmstorf, 2007	Projected increase: Scenario A2: +0.16 m Scenario B2: +0.18 m Rahmstorf: +0.30 m
Pluvial Inundation (A2 Scenario only)	Evaluated shifts in return period based on SREX report and IDF curve	Rainfall statistics, Sangster Airport IDF Curve (WRA), climate change projections (SREX)	25, 50 and 100 year return periods	MGI, WRA, Gines Suarez (IDB) IPCC (2012): Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX). A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA.	Precipitation increase by return period (% relative to current): 25 year: +5.9% 50 year: +1.69% 100 year: +1.54%

Table 5.3.1
Climate projections for 2030 (Montego Bay)

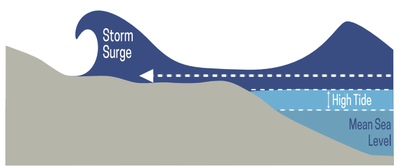


Figure 5.3.3 *Storm surge*

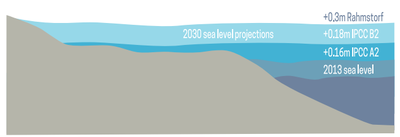


Figure 5.3.4 *Rise in mean sea level projected for 2030*

SEA LEVEL RISE AND STORM SURGE

Sea level rise and storm surge flooding pose dangerous hazards to Montego Bay's economy as well as threats to public and environmental health. Storm surges are described as having three primary components: meteorological variables such as atmospheric pressure, wind stress on the water's surface and wave set-up[52]. Storm surges are also dictated by the water level at the time of the storm (which varies depending on tide levels and can increase due to sea level rise), as shown below in Figure 5.3.3.

MODELLING PROCESS

This study generated storm surge extents and estimated storm surge heights for the 25- and 50-year return periods. Using this information and elevation data, storm surge depths were estimated for both return periods, in order to predict storm surge vulnerability and risk[53].

Sea level rise was projected for 2030 using the A2 and B2 IPCC scenarios, and the Rahmstorf projection for the extreme projection[54]. These projections are listed in both Table 5.3.1 and shown in Figure 5.3.4. Sea level rise is a relatively small hazard as even the extreme scenario (an increase in 0.3 m by 2030) shows little inundation along the coast. Nonetheless, any increase in water levels will impact storm surge levels, thereby increasing storm surge risk.

52. Smith Warner International, LTD (September 1999). Storm Surge Mapping for Montego Bay, Jamaica. CDMP. www.oas.org/cdmp/document/kma/mobay/mobay.htm
53. Storm surge was assessed using prior studies developed for Caribbean Disaster Mitigation Project, developed by Smith Warner International in 1999. Smith Warner International used the TAOS/L model and two methods (the peak-over-threshold approach and the TAOS – Annual Maxima approach) to estimate surge heights for 4 return periods and 4 confidence limits.
54. Rahmstorf, S. (2007). A semi-empirical approach to projecting future sea-level rise. Science, 315 (5810), 368-370.

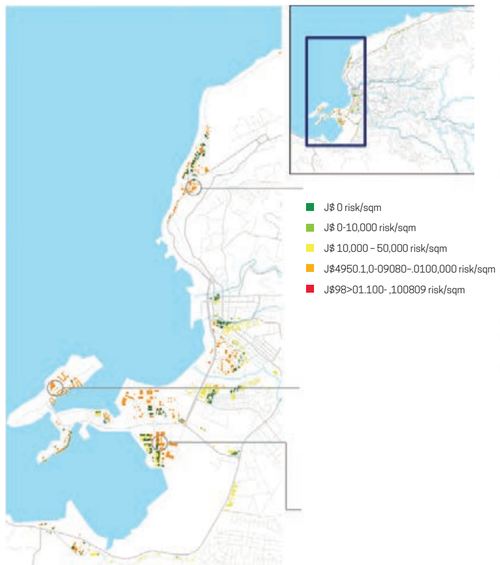


Figure 5.3.5
Storm surge risk 50-year return period Sources: Government of Jamaica GeoAdaptive Smith Warner International /CDMP

KEY FINDINGS

This analysis shows that Catherine Hall, areas surrounding the airport, and Flankers are most vulnerable to storm surge flooding and are expected to experience the deepest flooding for both return periods (see Figures 5.3.6 and 5.3.7 at the end of this section). Areas surrounding the wastewater treatment plant in Bogue are inundated for both return periods as well. Inundation of the wastewater treatment plant could cause harmful algal blooms in coastal waters and degrade ecosystems and the quality of beaches (which are important for tourism and Montego Bay's economy). Furthermore, any contaminated floodwater from these areas could cause a public health risk leading to waterborne illness or infection. Some portions of the downtown area are also inundated by storm surge, which could affect local businesses, further damaging economic productivity for the city.

Municipal buildings, the airport, industrial and commercial land, hotels, and markets, are all highly exposed to storm surge – all key components to the economy and tourism industry of Montego Bay. For example: approximately 72% of airport land and facilities are inundated for the 25 year storm surge return period and approximately 92% are inundated for the 50 year. This can have a large impact on the tourism industry, which can have a deep impact on the local economy. According to Sangster International Airport media resources, of the estimated 1.7 million visitors that come to Jamaica each year, 72% of those visitors travel through the airport in Montego Bay. Therefore, interruptions to flight schedules due to storm surge will not only impact the local economy but the national economy as well.

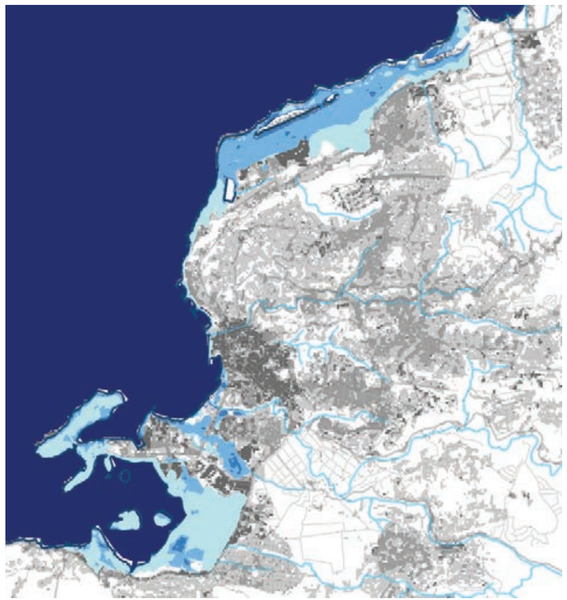
Storm surge risk is high compared to other natural hazards, mainly due to high property values along the coast (see Figure 5.3.5). Considering both return periods, Table 5.3.2 shows the average annualized loss for storm surge at J$ 608.6 million. Maximum probable loss for 50-year storm surge is an estimated J$ 17.9 billion which would cause a serious disruption in the economy and development of Montego Bay should an extreme event occur.

Future projected development will also be affected by storm surge and sea level rise. This was measured using the simulated growth projections from the complementary study, "Historic and Current Urban Footprint and Future Urban Scenarios". Considering the projected urban footprint for the trend growth scenario, by the year 2030 an estimated 567.63 hectares will be inundated by a 50-year storm surge (10% of the future urban footprint). In addition, if trend growth continues, an additional 0.08 hectares will be exposed to sea level rise. Considering this growth scenario and projected populations and development densities for 2030, an additional 4,827 people will also be exposed (50 year storm surge, and Rahmstorf 2030 projections).

In comparison, the projected smart growth scenario shows no additional urban areas inundated by storm surge and only an additional 0.06 hectares of urban area inundated by sea level rise. However, this scenario results in an additional 55 people exposed to storm surge and sea level rise (50 year storm surge, and Rahmstorf 2030 projections).

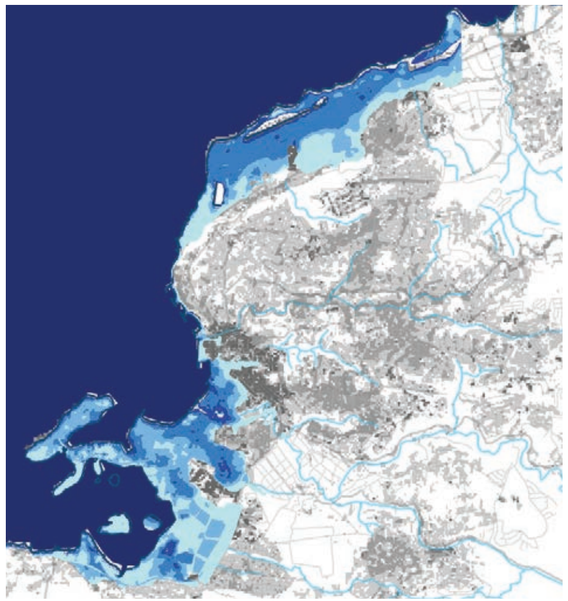
RETURN PERIOD	PROBABILITY OF ANNUAL EXCEEDANCE	MAXIMUM LOSS (J$)	AVERAGE ANNUALIZED LOSS (J$)
25 year	0.04	J$ 6,265,600,000	J$ 608.6 million
50 year	0.02	J$ 17,897,800,000	

Table 5.3.2
Storm surge risk



Inundation depth (m)
0 - 0.3
0.4 - 1
1 - 2
2 - 3

Figure 5.3.6
Storm surge 25- year return period
Source: Government of Jamaica. GeoAdaptive LLC
CDMP Smith Warner International



Inundation depth (m)
0 - 0.3
0.4 - 1
1 - 2
2 - 3
>3

Figure 5.3.7
Storm surge 50- year return period
Source: Government of Jamaica. GeoAdaptive LLC
CDMP Smith Warner International

PLUVIAL INUNDATION

Pluvial flooding describes the flooding of rivers, streams, or channels and is demonstrated in the diagram below (Figure 5.3.8). Urban runoff can contribute to pluvial flooding in developed areas, the degree to which is determined by local pattern of growth as it relates to preservation of open space and density of development. Loss of open space and an increase in the amount of developed surface area of a city result in decreased permeable surface area for absorption of water, thereby increasing urban runoff and pluvial inundation. This can lead to the pollution and degradation of natural systems, while also increasing risk of flooding during a hazard event.

MODELLING PROCESS

Montego Bay has a history of flooding, associated with both tropical storm and low-pressure systems. Three key areas were assessed during the pluvial inundation analysis: the Montego River, the North Gully, and the South Gully. Rainfall values for the 25, 50, and 100-year return periods were used with USACE HEC-RAS software, considering the location of bridges, culverts, and topographic data (including elevation) to model inundation depth and extent. With regards to flood extent, little change occurs between the 25, 50 and 100 year return periods. Depth increases with each return period, however, this change is also minimal. Pluvial inundation was assessed using the A2, IPCC climate change scenario. The IPCC SREX report was used to consider changes in return periods, which then allowed an interpolation of precipitation based on existing IDF curves.

KEY FINDINGS

Currently, flooding is worse along the downstream sections of the North Gully, particularly in the low-lying areas of William Street and St. James Street. Flooding of the South Gully occurs along Dome Street and Princess Street and is frequently associated with clogging of the culverts by debris. Flooding of the Montego River has the most extensive reach, covering sections of farmland at the Barnett Estate, and inundating roads and buildings in the vicinity of Barnett Street, Railway lane, and the Catherine Hall neighbourhood. Table 5.3.3 shows the extent of flooding considering the A2 scenario (2030) as nearly identical to the inundation analysis for 2013 for each channel; however, some increased flood depths were observed, particularly in the lower reaches of the Montego River and North Gully.

Municipal buildings and wastewater facilities are most exposed to pluvial inundation with 20% and 50% of facilities affected, respectively. Commercial land, as well as hotels and markets are moderately affected (10.98% and 1.45% respectively). This could have an

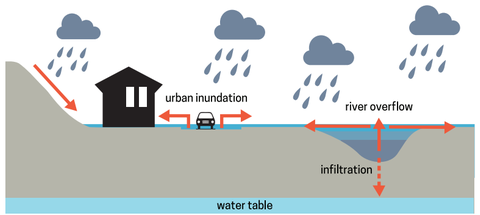


Figure 5.3.8
Pluvial inundation

RETURN PERIOD	PROBABILITY OF ANNUAL EXCEEDANCE	MAXIMUM LOSS (J$)	AVERAGE ANNUALIZED LOSS (J$)
25 year	0.04	J$ 5,020,000,000	
50 year	0.02	J$ 5,764,200,000	J$ 381,900,000
100 year	0.01	J$ 6,581,300,000	

Table 5.3.3
Pluvial inundation risk

RETURN PERIOD	PROBABILITY OF ANNUAL EXCEEDANCE	MAXIMUM LOSS (J$)	AVERAGE ANNUALIZED LOSS (J$)
25 year	0.04	J$ 5,205,800,000	
50 year	0.02	J$ 5,942,200,000	J$ 395,600,000
100 year	0.01	J$ 6,853,800,000	

Table 5.3.3
Pluvial inundation risk (A2 scenario)

impact on Montego Bay's economy. Schools and transportation are also moderately affected with 6 schools or libraries (5.71% of educational facilities), 30.59 km (2.29%) of roads, and 1 bridge (3.45% of bridges) inundated during the 100-year flood event.

The Montego River suffers the greatest risk (see Figure 5.3.9) with approximately J$ 4.3 billion at risk for the 100-year return period. Within the inundation zone for the Montego River, Enumeration District NW 81 (Downtown) is most at risk (shown in Figures 5.3.10 and 5.3.11, without and with climate change, respectively) with an estimated J$1.14 billion at risk. Table 5.3.3 shows the estimated annualized loss will be approximately J$ 381.9 million without climate change, and approximately J$ 395.6 million considering climate change. The maximum probable loss for a 100 year return period is approximately J$ 6.58 billion without climate change and J$ 6.85 billion considering climate change.

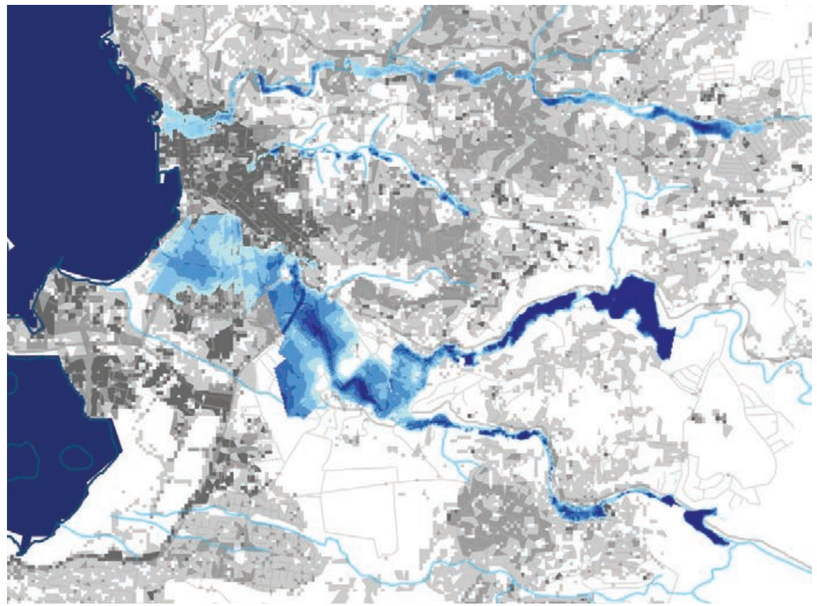
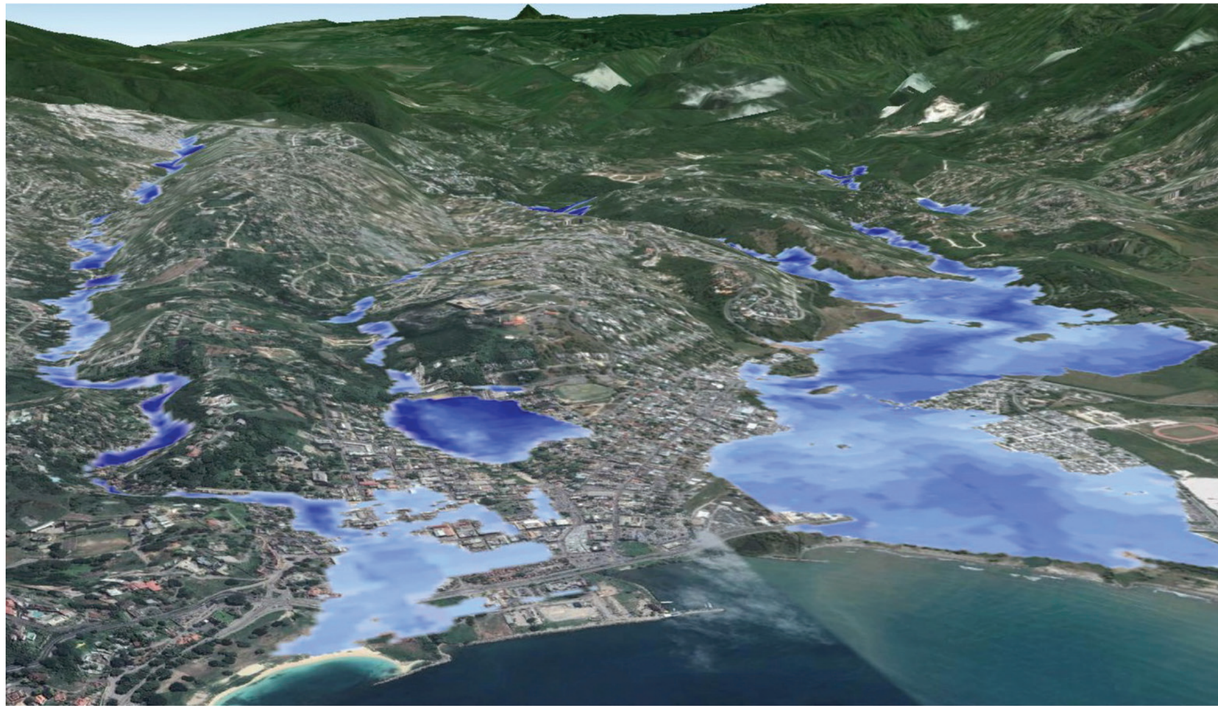
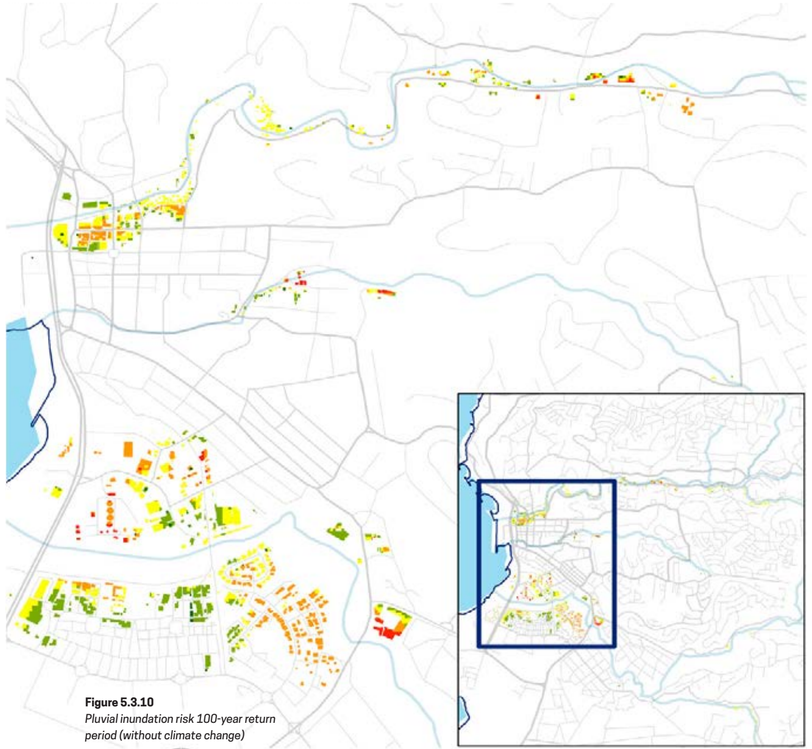


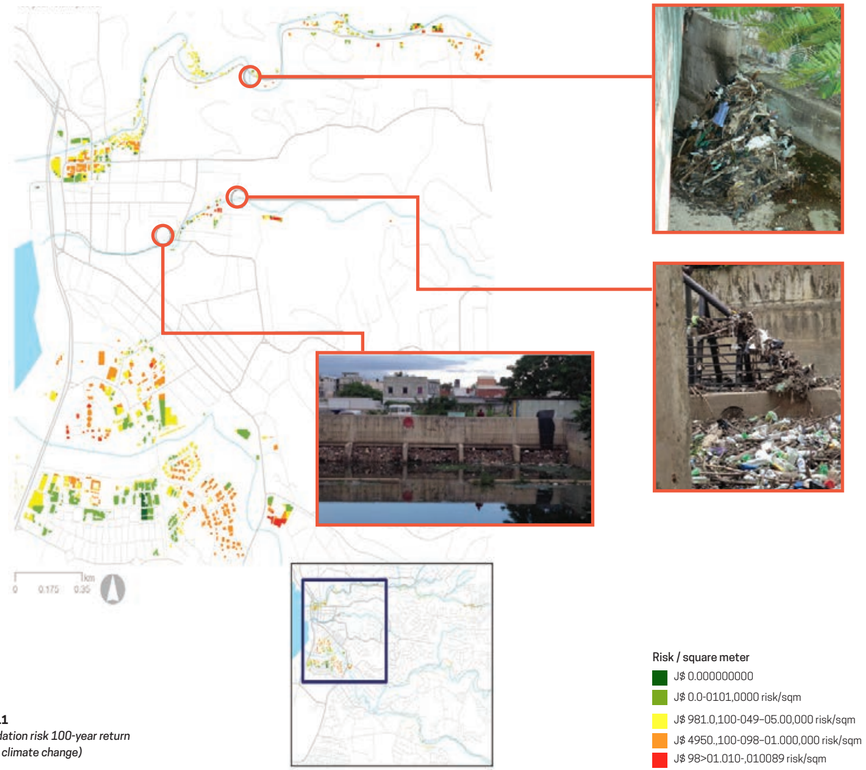
Figure 5.3.9
Pluvial inundation 100-year return period
Source: Government of Jamaica. GeoAdaptive LLC CDMP Smith Warner International





Risk / square meter
- J$ 0.000000000
- J$ 0.0-0101,0000 risk/sqm
- J$ 981.0,100-049–05.00,000 risk/sqm
- J$ 4950.,100-098–01.000,000 risk/sqm
- J$ 98>01.010-,010089 risk/sqm

Figure 5.3.10
Pluvial inundation risk 100-year return period (without climate change)



Risk / square meter
- J$ 0.000000000
- J$ 0.0-0101,0000 risk/sqm
- J$ 981.0,100-049–05.00,000 risk/sqm
- J$ 4950.,100-098–01.000,000 risk/sqm
- J$ 98>01.010-,010089 risk/sqm

Figure 5.3.11
Pluvial inundation risk 100-year return period (with climate change)

WIND

High winds represent a particular danger to critical infrastructure of Montego Bay, such as education and health facilities. Typically, high winds accompany hurricanes or strong storms (as shown in Figures 5.3.12 and 5.3.13). For the purpose of this study, wind hazard grids for the 10, 25, 50 and 100 year return periods were used.

KEY FINDINGS

Highest wind speeds are located in the Northern areas of the city (such as Paradise and Albion) and areas south of the South Gully (shown in Figure 5.3.14). Critical buildings in Montego Bay are also highly exposed to high winds, with approximately 45.69% of schools and libraries, 65.38% of medical centres (including hospitals), and 61.97% of emergency services exposed to high winds for the 50-year return period. These results may indicate decreased emergency capacity during a hurricane event.

Flower Hill and Coral Gardens are the most at risk to wind given different return periods (25 and 100 year, and 50 year, respectively). Wind risk for the 100-year return period, shown in Figure 5.3.15, results in maximum losses reaching up to approximately J$ 2.98 billion. Average annualized loss for wind is shown in Table 5.3.4 to be approximately J$ 88.3 million. Indirect losses from wind likely increase this value, although it has not been calculated here. Oftentimes, high winds can dislodge items, which become dangerous projectiles or debris that block roads or damage infrastructure. When tree limbs break power lines, for example, residents and businesses lose electricity. There are approximately 93.18 km (40.41%) of high-tension electric lines exposed to the wind speeds of above 15 m/s for the 100-year return period. This means potential business hours lost, revenue lost, and possibly product lost (i.e. perishable food spoiling when refrigeration cannot be sustained due to power outages)—overall, an indirect and incalculable economic loss.

RECOMMENDATIONS ADDRESSING WIND

As a result of this analysis, it is recommended that building regulations be enacted and enforced in relation to roofing materials in high wind areas. High winds have the capability to damage structures by tearing off roofs, gutters, shutters and awnings, or by blowing out unsecured or mal-designed windows. Local building codes should require specific wind resilient roofing materials and design, as well as wind resilient windows and facades. Permits for development should only be issued when the construction documents have proven adequate design for wind exposure. New regulations could reduce the direct and indirect impacts and costs associated with high winds.

Figure 5.3.13
Strong winds can damage vegetation and signage

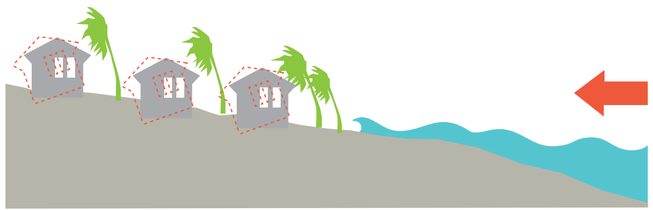


Figure 5.3.12
Danger of high winds

RETURN PERIOD	PROBABILITY OF ANNUAL EXCEEDANCE	MAXIMUM LOSS (J$)	AVERAGE ANNUALIZED LOSS (J$)
10 year	0.1	J$ 75,400,000	J$ 88,300,000
25 year	0.04	J$ 583,100,000	
50 year	0.02	J$ 1,201,800,000	
100 year	0.01	J$ 2,979,000,000	

Ta ble 5.3.4
Wind risk and estimated losses

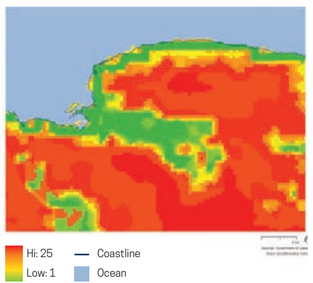


Figure 5.3.14
Coastal wind speeds

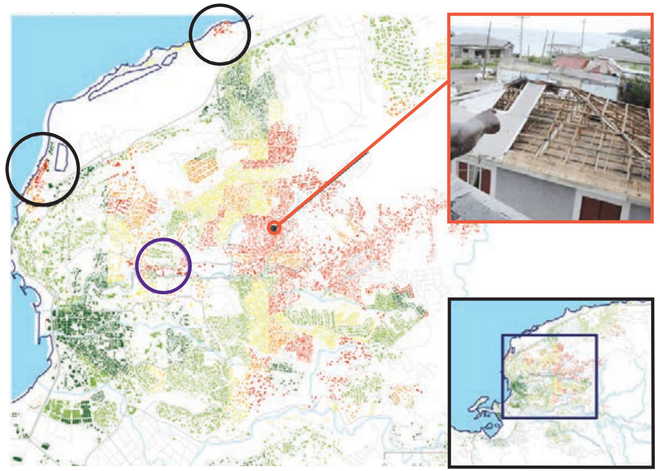


Figure 5.3.15
Wind risk, 100-year return period

SEISMIC

Earthquakes are sudden and can cause great damage, and Montego Bay is subject to moderate impact from Caribbean earthquakes (see Figure 5.3.16). Continued population growth in the city, however, puts more people at risk, emphasizing the need to consider the impacts and management of seismic hazards.

MODELLING PROCESS

Hazard modelling software was used to evaluate the 50, 100, 250, 500, and 1000-year return periods for seismic hazards in Montego Bay[55]. Two main data models were used to calibrate the seismic hazard model: seismic sources (from a 2006 Jamaica Catastrophic Risk Profile) and a ground motion attenuation model. In Montego Bay, very little variation is seen in horizontal ground acceleration for each return period. For example, for the 500-year return period, maximum acceleration in Montego Bay is 294.89 Gal with minimum accelerations of 132.51 Gal (a range of 162.38 Gal).

KEY FINDINGS

Due to the nature of the hazard, everything is exposed to some degree of seismic activity. Because most damage begins to occur at accelerations greater than 200 Gal (see acceleration maps in Figure 5.3.17), according to vulnerability functions for building types in Montego Bay, this threshold was considered during the exposure analysis. Western Jamaica (judged by the available evidence) is subject to moderate impacts from seismic events. However, this should not lead to complacency with regard to seismic risk. Even moderate events may have important consequences. For example, for the 1000 year event shown in Figure 5.3.18, 45 schools or libraries are exposed to >200 Gal and 36 medical centres are exposed to >200 Gal (representing 39% and 70% of each system, respectively). Considering the 500 and 1000 year return periods, Table 6.3.5 shows the average annualized loss for seismic risk at J$ 6.6 million. Maximum probable loss for the 1000-year return period is an estimated J$ 3.7 billion.

Future projected growth will be affected by seismic hazards. Regarding the urban footprint under the trend growth scenario, approximately 1,889.14 hectares of urban areas will be exposed to 200-250 Gal seismic hazard in 2030, and an additional 25,900 people exposed.

Regarding the urban footprint under the smart growth scenario, an estimated 1,934.22 hectares will be exposed to 200-250 Gal seismic hazard in 2030. While most hazards show a decrease in urban area and population exposed under a smart growth scenario, this particular hazard exposes a greater population to >200 Gal. An additional 67,768 people will be exposed to this hazard intensity for smart growth.

In both cases, seismic building codes should be mandated and enforced in order to decrease the vulnerability of inhabitants.

RETURN PERIOD*	PROBABILITY OF ANNUAL EXCEEDANCE	MAXIMUM LOSS (J$)	AVERAGE ANNUALIZED LOSS (J$)
500 year	0.002	J$ 701,000,000	J$ 6,600,000
1000 year	0.001	J$ 3,704,800,000	

Table 5.3.5
Seismic risk

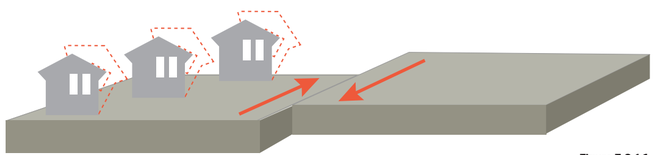


Figure 5.3.16
Earthquakes in Jamaica

55. ERN-CAPRA software was used with the CRISIS2007 module for evaluating seismic hazard scenarios.

Figure 5.3.18
Seismic risk, 1000-year return period;
Lexeagmepnlde structures affected by seismic risk

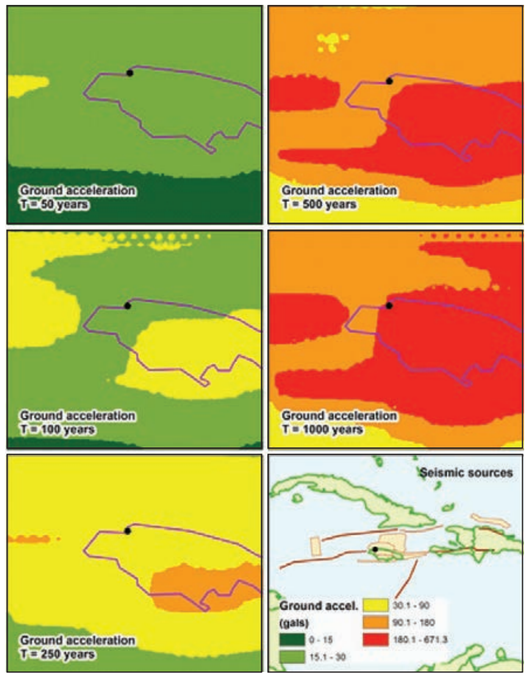


Figure 5.3.17
Maximum acceleration maps Montego Bay
The figures above show the resulting maximum acceleration maps (in Montego Bay) for the five selected return periods, at bedrock level. It must be noted that interactions with soils may further attenuate, or amplify, the ground acceleration. This effect has not been taken into account, due to the very large uncertainties typically present in soil characteristics maps.

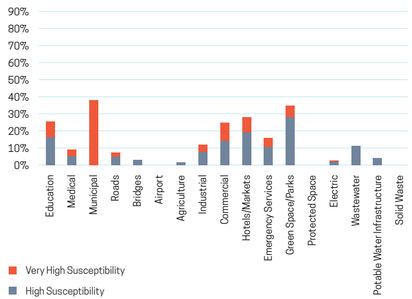


Figure 5.3.21
Landslide susceptibility and land use

LANDSLIDES

Landslides are described as the downslope movement of combined earth materials (soil, rock and vegetation) as influenced by gravity. They are catastrophic events that cause human and economic losses, destroying infrastructure and causing injury and loss of life. Landslides are a result of high slopes and could be induced by land use change through human activities. Typically, the combination of earthquakes and rainfall are ideal factors for a landslide to occur, as shown in Figure 5.3.19 below.

MODELLING PROCESSING

Susceptibility to landslides was modelled as part of the multi-hazard analysis. Level of susceptibility was based on factors such as land use, land cover, vegetation, soil, faults, rivers/gullies, roads (i.e. areas prone to erosion), slope, and historic landslide events. The results of this analysis shown in Figure 5.3.20 indicate that the downtown area of Montego Bay is highly susceptible to superficial translational landslides (which can cause debris flow), with 47% of events happening within the core boundary of Montego Bay and 63% occurring within the administrative boundary defined by the Government of Jamaica. As seen in Table 5.3.6 below, a total of approximately 1,270 hectares are at least highly susceptible to landslides.

KEY FINDINGS

Figure 5.3.21 breaks down very high and high landslide susceptibility as they relate to land use. Industrial and commercial land uses are highly exposed with 4.46% and 10.95% of land exposed to very high landslide susceptibility, respectively. Additionally, 40% of municipal buildings are exposed to high susceptibility to landslides. Additionally 10 schools and one library (9.48% of educational facilities) are exposed to the highest level of susceptibility to landslides. This could result in damaged or destroyed schools (and as a result, a loss in school days for many children), as well as losses in productive sectors and interruption of public services.

SUSCEPTIBILITY LEVEL	AREA (HA)	TOTAL LANDSLIDE EVENTS
VERY LOW	23,656.68	6
LOW	19,041.57	42
MODERATE	5,813.55	37
HIGH	1,120.68	11
VERY HIGH	151.02	32

Table 5.3.6
Areas of varying susceptibility

Figure 5.3.19
Landslides

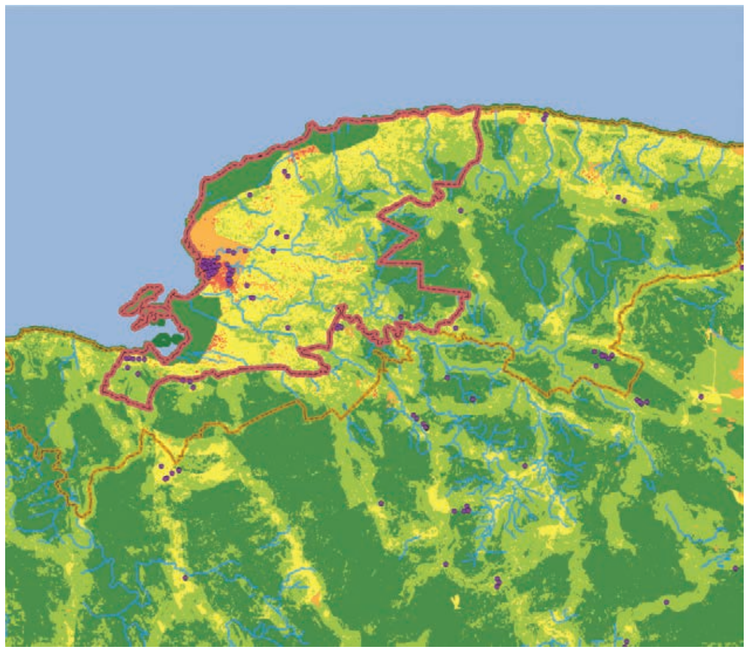


Figure 5.3.20
Landslide susceptibility of the Greater Montego Bay area

Source: Government of Jamaica.
Mona GeoInformatics Institute
Urban Development Corporation

MULTI-HAZARD AND RISK COMPARISON

Areas with the highest susceptibility to natural hazards are mostly located along the coast where both storm surge and pluvial inundation are threats. A few areas farther inland are also within the highest susceptibility categories for natural hazards. These areas are where high landslide susceptibility coincides with higher wind, pluvial inundation, and seismic hazards. This analysis concludes that the most susceptible areas of the city are the airport and downtown, which could have serious implications for the Montego Bay economy, especially if several natural hazard events occur simultaneously or sequentially. The results of this multi-hazard evaluation can be seen in the adjacent map (Figure 5.3.22).

Considering maximum risk (see map in Figure 5.3.23), areas along the coast, Bogue, Glendevon, and Ironshore are all at high risk to natural hazards, while Mount Salem and Coral Gardens experience only moderate risk.

Areas of high susceptibility and areas of high risk from multiple hazards can become areas of opportunity for the city. Green links currently within the city, which are few, can contribute to a potential green infrastructure network. This network, through the integration of landscape strategies and the introduction of key new open spaces, would provide flood plains to reduce flood risk and the need for costly 'grey' infrastructure. Increasing the number of green spaces throughout the city can help Montego Bay mitigate or manage risk in a more sustainable way, while also providing new recreational opportunities to its citizens.

Multi-sectoral coordination for risk management and adaptation planning is key for the management of risk in Montego Bay. Montego Bay experiences a multitude of natural hazards which have direct and indirect effects on multiple sectors including: commercial activities, industrial activities, tourism, ecosystems, public health, education, and transportation, public services (such as provision of water and electricity), agriculture,

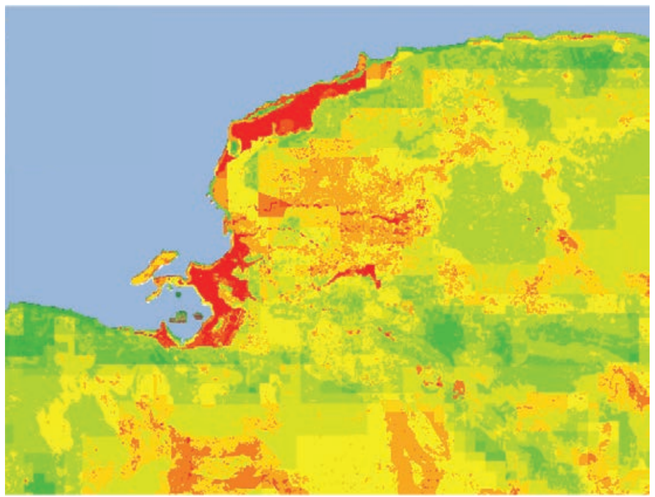


Figure 5.3.22
Multi-hazard susceptibility evaluation

Source: Government of Jamaica.
Mona GeoInformatics Institute
GeoAdaptive
CDMP

and residential development. A multi-sectoral approach should consider the cumulative effects of natural hazards, for example if multiple hazards happen simultaneously or sequentially before full recovery is made.

Furthermore, all sectors should take a proactive approach to preventing risk through the consideration of risk's components: hazard, exposure and vulnerability. In some cases, hazard can be lessened through protective structures. Exposure can be avoided when hazard zones are known and urban development avoids these zones. Vulnerability to hazards can be decreased by increasing resilience and by implementing safe building practices. Vulnerability can also be decreased through awareness and preparedness programs that increase the population's capacity to respond to a natural hazard.

Priority should be given to strategies that address multiple hazards, and strategies that represent long term and sustainable actions that not only lessen risk, but also improve the city in other ways. These strategies will typically entail moderate to high initial investment, but will return the highest (both immediate and long term) benefits. By understanding the components of risk and taking steps to reduce risk before a natural hazard event occurs, the city can reduce potential losses and become a more resilient city.

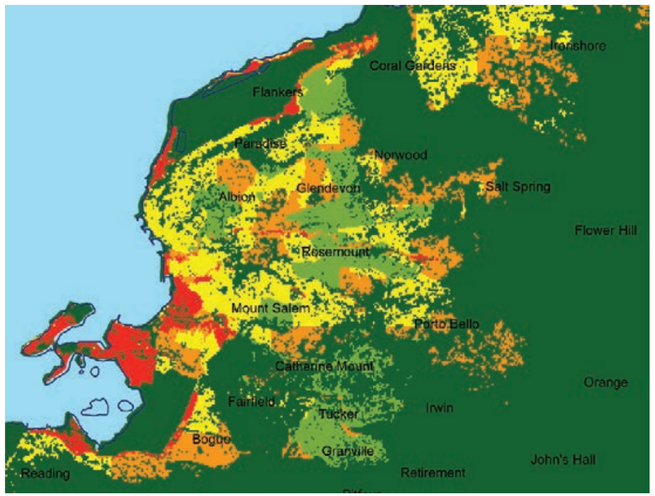


Figure 5.3.23
Maximum risk for all probabilistic hazards
Source: Government of Jamaica.
Mona GeoInformatics Institute
GeoAdaptive
CDMP

Table 5.3.8
Future risk in Montego Bay – 2030 – Trend and Smart growth scenarios.

HAZARD	RETURN PERIOD	ADDITIONAL LOSS UNDER FUTURE SCENARIOS		FUTURE AVERAGE ANNUALIZED LOSS	
		TREND SCENARIO 2030	SMART GROWTH SCENARIO 2030	TREND SCENARIO 2030	SMART GROWTH SCENARIO 2030
Storm surge	25	+ J$ 5,093	+ J$ 14	J$ 608,580,162	J$ 608,579,414
	50	+ J$ 27,417	+ J$ 200		
Pluvial Inundation	25	+ J$ 36,110	+ J$ 215	J$ 381,900,925	J$ 381,898,184
	50	+ J$ 42,362	+ J$ 295		
	100	+ J$ 46,696	+ J$ 330		
Wind	10	+ J$ 608	+ J$ 161	J$ 88,297,971	J$ 88,297,394
	25	+ J$ 4,522	+ J$ 1,845		
	50	+ J$ 11,667	+ J$ 1,796		
	100	+ J$ 26,913	+ J$ 6,333		
Seismic	500	+ J$ 5,659	+ J$ 1,550	J$ 6,608,819	J$ 6,608,782
	1000	+ J$ 29,375	+ J$ 8,335		
Total		+ J$ 236,421	+ J$ 21,075	J$ 1,085,387,877	J$ 1,085,383,773

HAZARD WITH CLIMATE CHANGE	RETURN PERIOD	ADDITIONAL LOSS UNDER FUTURE SCENARIOS		FUTURE AVERAGE ANNUALIZED LOSS	
		TREND SCENARIO 2030	SMART GROWTH SCENARIO 2030	TREND SCENARIO 2030	SMART GROWTH SCENARIO 2030
Pluvial Inundation (IPCC scenario A2)	25	+ J$ 1,750	+ J$ 152	J$ 395,613,141	J$ 395,612,992
	50	+ J$ 2,296	+ J$ 179		
	100	+ J$ 4,428	+ J$ 187		

Table 5.3.7-1
*Hazard impacts in Montego Bay (*Very high susceptibility; **1000 year return period, >200 Gal; ***100 year return period, >15 m/s; ****100 year return period; *****50 year return period)*

	HAZARD	LAND (URBAN FOOTPRINT) (HA) EXPOSED			PEOPLE EXPOSED			MAX RISK (JMD)	AVERAGE ANNUALIZED RISK (JMD)
		CURRENT (2013)	TREND GROWTH (2030)	SMART GROWTH (2030)	CURRENT (2013)	TREND GROWTH (2030)	SMART GROWTH (2030)		
WITHOUT CLIMATE CHANGE	Landslides*	126.57	127.12	126.78	3,069	3,256	3,19	n/a	n/a
	Seismic**	2,185.84	2,254.32	2,299.40	89,539	115,439	157,306	J$ 3.7 billion (1,000 yr return)	J$ 6.6 million
	Wind***	2,969.03	3,144.40	3,024.18	129,297	193,486	190,684	J$ 2.98 billion (100 yr return)	J$ 88.3 million
	Pluvial****	122.80	159.67	122.95	3,938	16,48	4,081	J$ 17.9 billion (50 yr return)	J$ 608.6 million
	Storm Surge*****	553.47	567.63	553.47	4,677	9,49	4,729	J$ 6.58 billion (100 yr return)	J$ 381.9 million

Table 5.3.7-2
*Hazard impacts in Montego Bay (°Very high susceptibility; **1000 year return period, >200 Gal; ***100 year return period, >15 m/s; ****100 year return period; *****50 year return period)*

	HAZARD	LAND (URBAN FOOTPRINT) (HA) EXPOSED			PEOPLE EXPOSED			MAX RISK (JMD)	AVERAGE ANNUALIZED RISK (JMD)
		CURRENT (2013)	TREND (2030)	SMART GROWTH (2030)	CURRENT (2013)	TREND (2030)	SMART GROWTH (2030)		
WITH CLIMATE CHANGE	Pluvial (with climate change- A2 scenario)	115.25	155.64	119.28	4,038	16,539	4,457	J$ 6.85 billion (100 yr return)	J$ 395.6 million
	Sea Level Rise	5.87	0.05	0.01	11	26	15	n/a	n/a

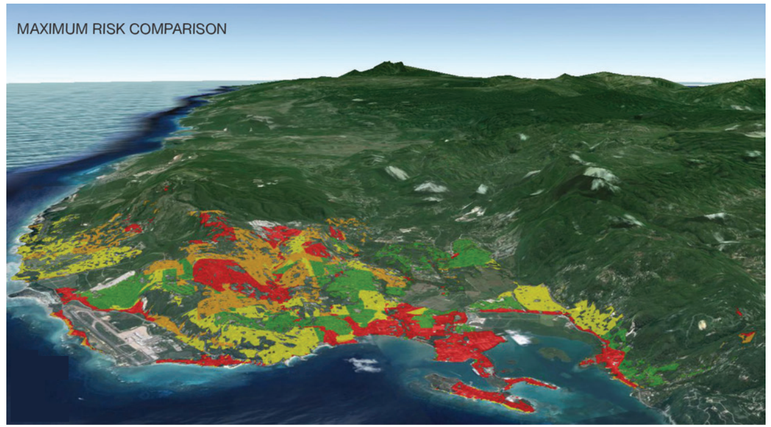


Figure 5.3.24.
Maximum risk considering all hazards

	INCREASE RESILIENCE THROUGH PREPAREDNESS		INCREASE RESILIENCE THROUGH OPEN SPACE PLANNING			REDUCE VULNERABILITY THROUGH BUILDING PRACTICES		REDUCE EXPOSURE AND RISK THROUGH LAND USE PLANNING		REDUCE EXPOSURE THROUGH HAZARD MANAGEMENT	
SHORT TERM STRATEGIES	**Implement a hazard monitoring program for better hazard prediction and early warning:** • Microzonation studies for seismic activity • Rain gauges and stream gauges • Event monitoring stations (record hydrometerologic and geologic activity during an event) • Loss reporting (record physical damages and losses, as well as human injuries and fatalities after an event - include location of where the loss occurs) **Assess current capacities for emergency response and recovery:** • Assess current hospital capacity • Assess emergency shelter capacity • Assess number, location, and capacity of first responders • Evaluate supporting infrastructure	**Actors:** MET, ODPEM, local and national universities, PIOJ, community leaders **Benefits/ Outcomes:** • Inform improvements and extensions of infrastructures and services • Critical for emergency planning and response	**Evaluate current green and open spaces:** • Determine existing open spaces and vacant land • Determine state of current green links • Determine priority natural resources/natural hazard buffers • Acquire key parcels for protection or additional open space	**Actors:** MWLECC, NEPA, PIOJ, local conservation groups **Benefits/ Outcomes:** • Inform a Strategic Open Space Plan • Protect existing natural resources		**Provide training programs to promote safe building practices:** • Provide workshops and trainings for best management practices and construction techniques • Provide certification for attending these programs	**Actors:** UDC, MLGCD, developers, design and construction professionals, local and national universities **Benefits / Outcomes:** • Promotes safe building practices • Supports livelihoods (construction professionals)	**Acquire critical land:** • Secure land/facilities inside known hazard zones where risk is highest (through acquisition or easements) • Acquire land outside of hazard zones to prepare for relocation of critical facilities • Acquire land outside of hazard zones to support emergency planning	**Actors:** UDC, utility companies, building owners, GOJ, PIOJ, MLGCD, WRA **Benefits / Outcomes:** • Supports relocation of critical facilities • Supports emergency planning efforts	**Assess state of infrastructure through an engineering study:** • Evaluate and monitor current hazard control structures • Evaluate conditions of key infrastructure such as roads, communication networks, water and energy supplies	**Actors:** UDC, GOJ, PIOJ, MLGCD, MWLECC, ODPEM **Benefits / Outcomes:** • Informs updates of existing infrastructure • Maintenance helps increase the effectiveness of hazard control structures
MEDIUM TERM STRATEGIES	**Create an emergency and evacuation plan that addresses responses to multiple hazards in Montego Bay:** • Create and emergency and evacuation plan for all hazards; include in the plan actions to • Continually review and update this plan to reflect most current conditions and threats • Include education campaign to increase preparedness in communities **Manage recyclables and litter to reduce clogging of waterways:** • Update policies WT 13 and WT 14 • Consider creating a formal system of recycling in coordination with the national government • Clear trash and debris from gullies periodically • Enact policies mandating fines for littering	**Actors:** GOJ, PIOJ, NEPA, community leaders **Benefits/ Outcomes:** • Increases resilience, response and recovery capacity • Mitigates flood hazards -Increases water quality • Reduces waste	**Create a Strategic Open Space Plan:** • Determine Best Management Practices for the city, informed by case studies and local knowledge • Identify how to use existing green links to create a green infrastructure • Identify strategies to use open spaces throughout the city for natural hazard and climate change adaptation	**Actors:** MWLECC, NEPA, PIOJ, local conservation groups **Benefits/ Outcomes:** • Maximize benefits of vacant land and open spaces • Creates a sustainable way to manage risk by adapting to hazards and climate change		**Retrofit structures and infrastructure:** • Retrofit for low elevation flooding and high winds • Elevate buildings/infrastructure where smaller retrofits and relocation are not viable options • Retrofit critical buildings for low magnitude seismic activity	**Actors:** UDC, MLGCD, developers **Benefits / Outcomes:** • Hazard protection for existing buildings	**Relocate key infrastructure, critical facilities and manage land use in hazard areas:** • Relocate critical structures and infrastructure, and vulnerable populations out of hazard zones • Enforce set back Policy UC 20 • Update Policy UC 20 to include 100 year flood extents • Specify appropriate land uses for hazard zones in planning documents • Create and manage regulatory districts specific to each hazard	**Actors:** UDC, utility companies, building owners, GOJ, PIOJ, MLGCD, WRA **Benefits / Outcomes:** • Facilitates safe land use practices • Reduces physical losses • Reduces exposed population	**Update current infrastructure to handle current and projected hazards:** • Update existing flood control structures • Create maintenance and monitoring plans for key control structures	**Actors:** UDC, GOJ, PIOJ, MLGCD, MWLECC, ODPEM **Benefits / Outcomes:** • Manages hazard intensity and exposure
LONG TERM STRATEGIES	**Manage preparedness and response through public/private partnerships:** • Manage debris proactively • Coordinate clean-up efforts (preparing for post-event clean-up) • Create a management program through public/private partnerships to expedite response and recovery times	**Actors:** Utility companies, tourism sector, ODPEM **Benefits/ Outcomes:** • Reduces business hours lost • Reduces losses -Expedites recovery	**Preserve natural systems buffers and green infrastructure:** • Preserve natural storm surge buffers • Encourage health and preservation of existing and new green links, natural features and ecosystems • Preserve vegetation cover in areas susceptible to landslides • Stabalize banks and manage erosion	**Actors:** MWLECC, NEPA, PIOJ, local conservation groups **Benefits/ Outcomes:** • Healthy, productive, and sustainable natural resources • Supports sustainability of the tourism industry		**Enact, update and enforce building codes to reduce vulnerability to natural hazards:** • Adopt and adapt the International Building Code • Strictly enforce building codes • Require site plan review before approval of new development in hazard prone areas are given • Require soils/geology, foundation, erosion, and stabilization studies for building permit issuance • Require supervision of construction processes and building inspections; issue fines for properties who do not comply • Enact elevation requirements for structures in flood plains	**Actors:** GOJ, UDC, private developers, design and construction professionals **Benefits / Outcomes:** • Significantly decreased vulnerability • Increased value of building stock	**Restrict new development and manage land use through planning:** • Restrict development on slopes • Establish and enforce set backs, restricting development in inundation zones • Enforce guidelines outlined in the Hillside development manual, Mines and Geology Division 2012 • Refer to and integrate these guidelines into building regulations and planning documents	**Actors:** PIOJ, MWLECC **Benefits / Outcomes:** • Prevents future added exposure to natural hazards	**Provide spaces adapted to hazards where possible:** • Design spaces within the city for flood water to occupy temporarily and safely	**Actors:** UDC, GOJ, PIOJ, MLGCD, MWLECC, ODPEM **Benefits / Outcomes:** • Opportunity for development along the coast

Pluvial inundation | Coastal inundation | Landslide | Wind | Seismic | Priority action

Figure 5.3.25.
Summary of Recommendations for Addressing Natural Hazard Risk in Montego Bay

GREEN LINKS

Green and open spaces are a vital and critical part of any urban environment, yet cities are typically built around networks of gray infrastructure (roads, sewers, and other hard infrastructure). In spite of the stiff nature of gray infrastructure, new strategies have been developed that convert open and green spaces into flexible systems that can aid in providing more adaptable networks for cities, allowing them to be more resilient to the effects of climate change and other hazards. Green and natural links serve as connections that can be woven into the urban landscape, as a means to organize the natural and built environment of the city. Strategically located projects can serve as new links within the city, formed as a conjunction of urban and natural systems, and work as integral components connecting the larger ecosystems around the city. This, in turn, can increase and improve the biodiversity of a region and the overall quality of the environment. In addition to the aesthetic qualities provided, green spaces also contribute to the wellbeing of residents and their sense of community. What's more, they add important economic and cultural value (recreation, tourism, and cultural identity), in addition to being an integral part of the water management of the region. When designed correctly and as part of a larger citywide strategy, they can help reduce the need of new, costly, traditional gray infrastructure.

"IN SPITE OF THE STIFF NATURE OF GRAY INFRASTRUCTURE, NEW STRATEGIES HAVE BEEN DEVELOPED THAT CONVERT OPEN AND GREEN SPACES INTO FLEXIBLE SYSTEMS THAT CAN AID IN PROVIDING MORE ADAPTABLE NETWORKS FOR CITIES, ALLOWING THEM TO BE MORE RESILIENT TO THE EFFECTS OF CLIMATE CHANGE AND OTHER HAZARDS."

"IN ADDITION TO THE AESTHETIC QUALITIES PROVIDED, GREEN SPACES ALSO CONTRIBUTE TO THE WELLBEING OF RESIDENTS AND THEIR SENSE OF COMMUNITY."

6

6. PRIORITIZATION

The diagnostic assessment identified 13 of the 22 topics as having exigent issues that seriously impede the sustainability and/or quality of life of Montego Bay. Although with time all of these issues should be addressed, initial efforts should be focused on those that will have the greatest impact on improving the quality of life of residents and the environmental and fiscal sustainability of the city. In order to identify the topics with critical issues that should be priority action areas, a methodical scoring process was used to rank the potential action areas based on the expected impact that improving the problem could have on reducing greenhouse gas emissions or the city's vulnerability to natural disasters; public opinion; expert or specialist opinion; and the cost that the problem could have on the local economy if not resolved. This ranking then informed a discussion in which the results of the diagnostic assessment and base studies (described in previous chapters), the jurisdiction and feasibility of intervention in the topics, and the reality as observed on the ground, were all taken into account to determine the final priority action areas.

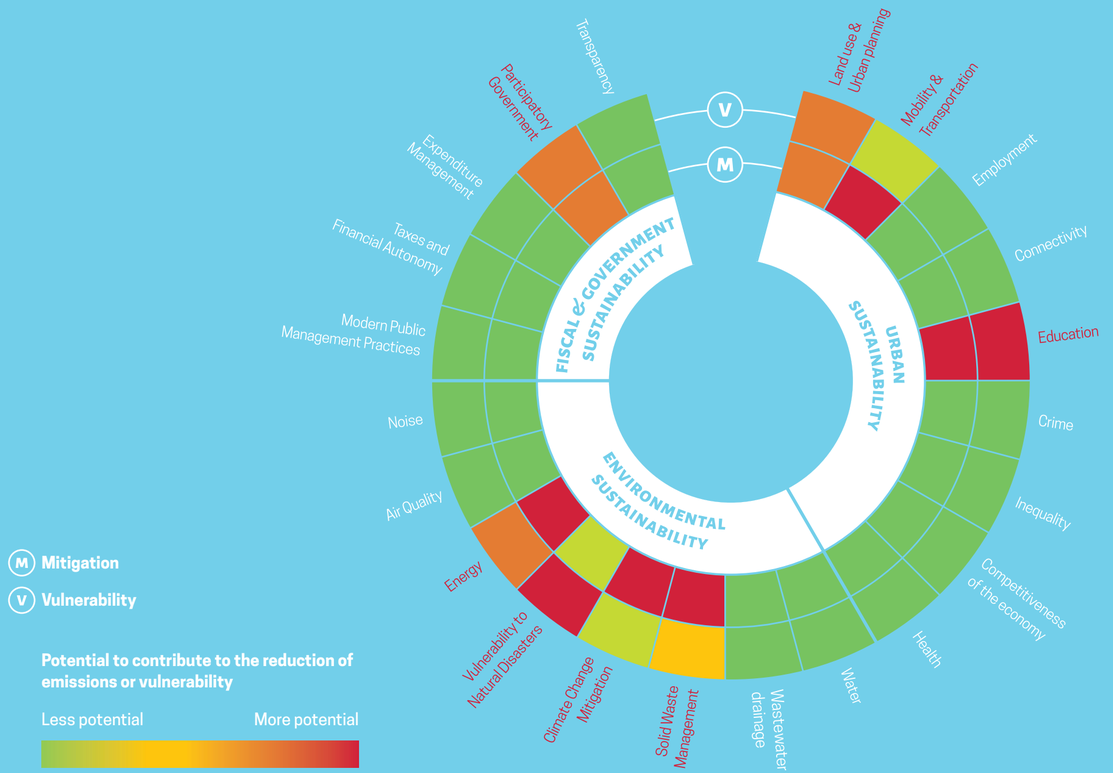
CLIMATE CHANGE AND DISASTER RISK CRITERION

Climate change and natural hazards pose special challenges to the urban sustainability. Because the population and infrastructure of a city are concentrated, a large proportion of its residents and economy are likely to be affected at once when an extreme event strikes. Moreover, Montego Bay, like many LAC cities, is located along the coast, which makes it more susceptible to both sea level rise associated with climate change as well as certain extreme weather events. With its economy heavily dependent on coastal infrastructure, the effects of an extreme climatic event could be particularly devastating for Montego Bay. Furthermore, the problem is compounded by the emission of greenhouse gases that deplete the ozone layer and contribute to global warming. Because of the importance of these issues for cities, the prioritization of action areas for the ESCI considers each action area's potential to reduce greenhouse gas emissions or vulnerability to natural disasters.

The three environmental base studies described in the previous chapter informed the ranking of potential action areas across two dimensions of environmental sustainability: contribution to climate change and vulnerability to natural hazards. For each dimension a score of 1 to 5 was assigned with regard to both the probability and magnitude of the potential reduction in emissions or vulnerability. A score of 1 indicates that the topic has no potential to contribute to the reduction of emissions or vulnerability, and a score of 5 indicates great potential of the same. The scores for each topic were then averaged to provide the overall score used for the prioritization ranking. Table 6.1.1 shows the scores given to each action area that received an average score greater than 3, and a brief explanation of why each score was given.

TOPIC	MITIGATION		VULNERABILITY		AVERAGE
	SCORE	JUSTIFICATION	SCORE	JUSTIFICATION	
Education	5	Educated population needed to take action on energy efficiency, recycling, reforestation, etc.	5	Educated population needed to take action on disaster risk (e.g. where to settle), understand emergency warnings, effects of hazards, etc.; increase resilience through better jobs	5
Energy	5	Dependent on fossil fuel-based energy sources (oil)	4	Power plant, substations and hotel generators in areas prone to coastal and pluvial inundation	4.5
Land Use/ Land Use Planning and Zoning	4	Regulate carbon sinks (forests) transport emissions	4	Disorganized growth exposes the population/infrastructure of the natural hazards	4
Solid Waste	5	The dump and burning of solid waste are the major sources of pollutants since there is no other major polluting industry in Montego Bay	3	Solid waste is blocking major water ways (drainage system), particularly through recyclable elements like tires and bottles	4
Participative Public Management	4	Citizens' participation is essential to taking advantage of their knowledge and guaranteeing their participation in the mitigation programs (public transport, recycling)	4	Citizens' participation is essential to taking advantage of their knowledge and guaranteeing their participation in the mitigation programs (disaster preparedness)	4
Mobility/ Transport	5	Great potential to reduce emissions by improving public transportation	2	Main roads and airport in risk areas (inundations, landslides)	3.5
Climate Change Mitigation	5	Importance of understanding the main sources of emissions and development of mitigation strategies	2	Some mitigation measurements reduce the vulnerability (reforestation, management of coastal wetlands)	3.5
Natural Disasters Vulnerability	2	Coastal wetland management and reforestation have mitigation co-benefits	5	Storm surge is already a major threat that will be increased by sea level rise and storm intensity	3.5

Table 6.1.1.
Climate change mitigation and disaster risk reduction scores for topics with an average score > 3



PUBLIC OPINION CRITERION

Once the areas with serious issues are identified, public opinion is one of the criteria used by the ESCI to determine which of these should be priorities. Public opinion is a useful input to determining the priority action areas because public support improves the feasibility and sustainability of actions. When people think that an intervention is a good idea, they are more likely to contribute to the effort and less likely to impede its progress. Taking public opinion into account in the determination of priorities is also a form of public participation and inclusion.

Although the ESCI includes the participation of a wide range of stakeholders, a well-designed public opinion survey provides a technically rigorous, representative, equal, and systematic way to measure the opinion of the local population. Furthermore, it catches issues and captures opinions that might otherwise be missed, given that some categories of people are less likely to participate in planning processes. An added benefit of conducting the survey for Montego Bay is that it provides more granular data than is currently available; most data in Jamaica is only available at the national level, with only a few major statistical indicators available at the Parish level.

In 2013, the Inter-American Development Bank contracted the firm Marketing Strategy Limited to carry out the survey. The study area was defined as the Montego Bay Local Planning Area as defined in the St. James Draft Development Order and the target population was residents aged 18 years and older. A total of 409 residents were surveyed using a sampling methodology that combined stratified and random elements. Regional quotas were used in the initial selection of enumeration districts/sampling points, followed by age and gender quotas. The sample error was approximately ±5% at the 95% confidence level.

To score each potential action area in terms of public opinion, two types of questions were analysed. The first was an intersectoral, comparative question in which respondents indicated which topics were affecting them the most. The exact question used was:

> "Thinking about the problems that you have today in terms of quality of life, what do you say is currently affecting your quality of life the most? Second place? Third place? Fourth place?"

The results of this question are displayed in Table 6.2.1.

In the analysis of the results, the percentage of respondents who marked an action area as a priority was weighted to take into account relative priority. Table 6.2.1 shows the results ranked taking into account this weighting. The weighted results for each priority were then added and converted to a scale with a range of 1 to 5, with 5 indicating the highest level of importance. This section of the survey comprised 75% of the public opinion score.

The other type of question related to qualitative aspects of specific sectors. The score for this component was based on the general quality of a sector, with a higher score assigned to sectors in a worse state (implying a greater need for intervention). For most topics, a general question was included that gauged the overall state of the issue. For example, under the health topic, the question, "In general, how would you describe your current state of health?" was asked, with the following options for response: very good, good, average, poor, very poor, and don't know. When the majority of respondents considered the state of an action area to be "very good," a value of 1 was assigned indicating that the area did not require intervention. When the greatest number of respondents considered a topic to be "good," it was given a score of 2, and so forth and so on, with topics considered "very poor" scored as 5 (indicating a great need for intervention). The score was then adjusted considering the other questions' responses and their distribution. The sectorial component comprised 25% of the public opinion score.

The scoring for the public opinion component of the prioritization ranking is shown in Table 6.2.2. Taking into account both the intersectoral and sectorial questions, **employment, sufficiency of income to cover basic needs, drinking water, and participation in local government decisions** were determined to be the greatest concerns to residents of Montego Bay.

Marketing Strategy Limited's final report for the public opinion survey is available at www.iadb.org/cities.

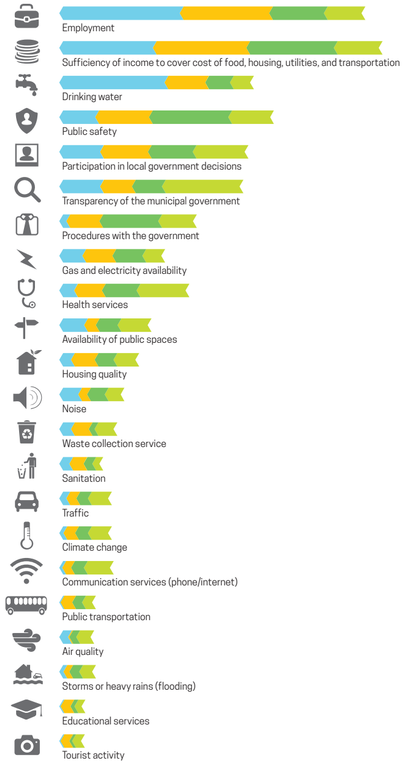
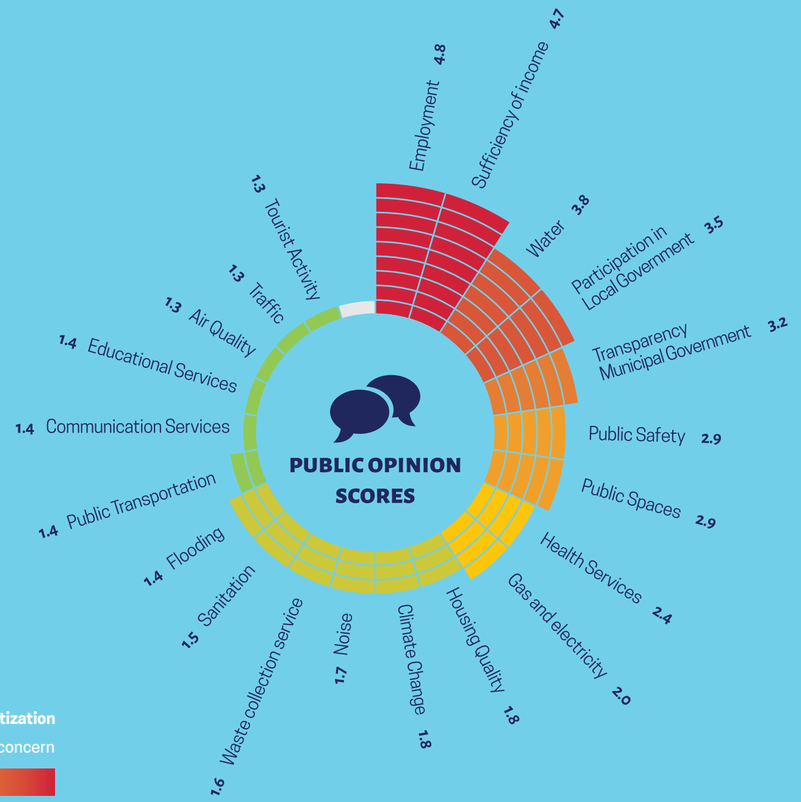


Table 6.2.1
Which of these aspects is affecting your life the most? Second place? Third place? Fourth place?

ACTION AREA	% 1ST PRIORITY	% 2ND PRIORITY	% 3RD PRIORITY	% 4TH PRIORITY
Employment	20.54%	15.16%	9.29%	6.36%
Sufficiency of income to cover cost of food, housing, utilities, and transportation	15.89%	15.89%	14.91%	7.58%
Drinking water	17.85%	6.85%	4.16%	3.42%
Public safety	6.11%	9.05%	13.45%	7.09%
Participation in local government decisions	6.85%	8.07%	7.58%	8.80%
Transparency of the municipal government	6.85%	5.38%	5.13%	13.20%
Procedures with the government	1.22%	5.62%	10.02%	5.87%
Gas and electricity availability	3.91%	5.13%	5.13%	3.18%
Health services	2.44%	4.65%	5.87%	8.31%
Availability of public spaces	4.16%	1.96%	3.67%	5.13%
Housing quality	1.96%	3.91%	3.18%	3.67%
Noise	3.18%	1.47%	2.93%	2.69%
Waste collection service	1.96%	2.93%	0.98%	3.18%
Sanitation	1.71%	2.44%	1.47%	1.22%
Traffic	1.22%	1.71%	1.96%	3.42%
Climate change	0.73%	1.96%	2.20%	3.42%
Communication services (phone/internet)	0.49%	1.47%	2.20%	4.40%
Public transportation	0.24%	1.96%	1.71%	1.71%
Air quality	1.47%	0.24%	1.22%	2.44%
Storms or heavy rains (flooding)	0.73%	0.98%	1.71%	2.20%
Educational services	0.24%	1.71%	0.73%	1.22%
Tourist activity	0.24%	1.47%	0.49%	1.47%

Table 6.2.1
Results of the intersectoral public opinion survey question

Table 6.2.2:
Public opinion scores



Final Scores for Public Opinion Prioritization

Little concern — Great concern

ECONOMIC CRITERION

The third criterion used to prioritize the potential action areas was the relative impact that improvements in the area would have on the economy or, conversely, the cost that the topic's issues would have on society if they were not resolved. This component was included in the prioritization process because of its potential effect on the quality of life for residents and the improvement it could bring in the government's capacity to provide high quality services and programs to residents through an increase in the tax base. As shown in Table 6.2.2 in the previous section, employment and sufficiency of income to meet basic needs are the two biggest concerns of the residents of Montego Bay.

The economic impact of each potential action area was assessed and ranked using subjective and objective components. This method allowed for a rapid assessment without the time needed for a detailed quantitative cost-benefit analysis. There were 2 components considered:

1. the contribution of each action area to the gross domestic product, and
2. the impact of each action area on factors of competitiveness.

Factors of competitiveness consisted of inputs and conditions that improved productivity, such as human capital, e-commerce, reduction of paperwork, and communication infrastructure, to name a few. The complete list of factors considered can be found in Table 6.3.1.

In the first stage of the analysis of economic criteria, specialists ranked the relationship between each action area and each sector of the economy or factor of competitiveness. In the second stage, the score representing the strength of the relationship between each action area and the sector of the economy was weighted by the percentage of the total gross domestic product contributed by the respective sector. The contribution of each sector to the annual gross domestic product is shown in Table 6.3.2.

	FACTORS OF COMPETITIVENESS
Human Capital and Information and Communications Technology	Human capital
	Investment in innovation
	Knowledge-intensive services, creative and cultural companies
	Incubators
	Attraction of Foreign Investment
	Public support/financing for research and innovation
Business Support	Local Productive Arrangements
	Cooperatives
	International integration (diversified products and partners)
	SME support
	Entrepreneurial culture
	Support services (minor)
	Support for commercialization and sales
	E-commerce
Business Environment and Public Transparency	Simplification of municipal taxes
	Ease of opening and closing a business
	Ease of obtaining credit
	Environmental legislation
	Reduction of red tape
	Informality
Infrastructure and Investment	Communications infrastructure
	Logistics infrastructure (including transportation)

Table 6.3.1:
Factors of competitiveness

SECTORS	VALUE ADDED (MILLION J$)	%
Services	$580,213	76.35%
Mining	$16,247	2.14%
Manufacturing	$62,471	8.22%
Agriculture & Fishing	$49,377	6.50%
Construction	$51,597	6.79%
TOTAL	$759,904	100%

Table 6.3.2:
Gross domestic product of jamaica by sector[56]

56. Value added by industry at constant (2007) prices. Statistical Institute of Jamaica, 2012.

Each factor of competitiveness was assigned an equal weight. The results of the two components are found in Table 6.3.3.

ACTION AREA	GDP	COMPETITIVENESS	TOTAL	SCORE
Environmental Sustainability and Climate Change				
Water	3.6	2.5	6.1	3.4
Sanitation and Drainage	3.5	2.7	6.2	3.5
Solid Waste Management	3.5	2.5	6.0	3.4
Energy	3.7	4.3	8.0	4.2
Air Quality	2.6	2.0	4.7	2.9
Mitigation of Climate Change	2.4	0.7	3.0	2.2
Noise	2.5	0.9	3.4	2.3
Vulnerability to Natural Disasters	2.8	2.3	5.0	3.0
Urban Sustainability				
Land Use, Planning, and Zoning	2.7	4.1	6.8	3.7
Urban Inequality	2.5	3.0	5.5	3.2
Mobility/Transportation	2.7	4.1	6.8	3.7
Competitiveness of the Economy	3.2	5.0	8.2	4.3
Employment	3.1	5.0	8.1	4.2
Connectivity	2.9	4.8	7.7	4.1
Education	3.0	4.8	7.8	4.1
Public Safety/Crime	2.5	4.3	6.8	3.7
Health	3.0	1.6	4.6	2.8
Fiscal Sustainability and Governance				
Public Participation	2.6	4.5	7.1	3.9
Modern Public Management	2.4	4.8	7.2	3.9
Transparency	2.4	4.1	6.5	3.6
Taxes and Financial Autonomy	3.6	4.5	8.2	4.3
Management of the Expenditure	2.4	3.9	6.3	3.5
Debt	2.0	3.6	5.6	3.2

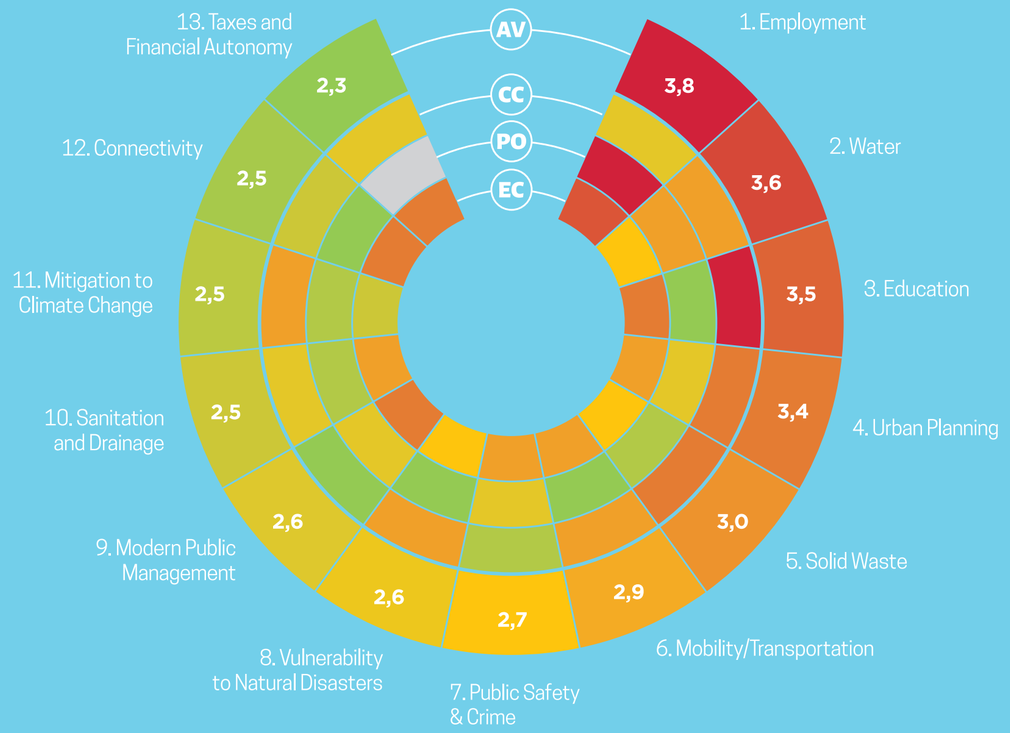
Table 6.3.3:
Economic impact scores of action areas

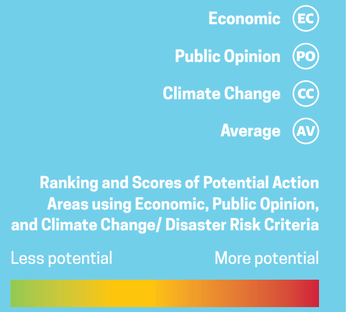
FINAL DETERMINATION OF PRIORITY ACTION AREAS

Table 6.4.1 below summarizes the results of the three criteria on which each potential action area (those that were identified as critical during the diagnostic assessment) received a score.

ACTION AREA	ECONOMIC	PUBLIC OPINION	CLIMATE	AVERAGE
Employment	4.2	4.8	2.5	3.8
Water	3.4	3.8	3.5	3.6
Education	4.1	1.4	5.0	3.5
Urban Planning	3.7	2.4	4.0	3.4
Solid Waste	3.4	1.6	4.0	3.0
Mobility/Transportation	3.7	1.4	3.5	2.9
Public Safety/Crime	3.7	2.9	1.5	2.7
Vulnerability to Natural Disasters	3.0	1.4	3.5	2.6
Modern Public Management	3.9	2.9	1.0	2.6
Sanitation and Drainage	3.5	1.5	2.5	2.5
Mitigation to Climate Change	2.2	1.8	3.5	2.5
Connectivity	4.1	1.4	2.0	2.5
Taxes and Financial Autonomy	4.3	-	2.5	2.3

Table 6.4.1:
Ranking and Scores of Potential Action Areas using Economic, Public Opinion, and Climate Change/ Disaster Risk Criteria





Once the topics were scored and ranked, the results were presented to the authorities and representatives of local civil society. Based on the results of the analysis, the following topics emerged as priorities:

1) urban development and planning, including transportation;

2) reduction of vulnerability to natural and manmade disasters;

3) sanitation, including solid waste and wastewater;

4) public safety and crime; and

5) employment and training.

The topic of education was incorporated into the employment and training strategy, as a mechanism for local action to make education and training more relevant, given that formal education in Jamaica falls under the authority of the national government. Solid waste and sanitation were also considered to be important local-level problems, while water was considered to be a national issue. The topic of vulnerability to natural disasters received a relatively low score on the climate change and disaster risk filter because of its low score in terms of the potential to reduce greenhouse gas emissions, despite its obviously maximum potential to reduce vulnerability. Taking this methodological issue into account and given the importance and vulnerability of the tourism sector in Montego Bay, this topic was also considered to be a high priority. The priority action areas are also aligned with and contribute to the four goals of Vision 2030 Jamaica, as outlined in Table 6.4.2.

The next chapter presents the action plan, which represents the culmination of the first stage of the Emerging and Sustainable Cities Methodology. It identifies strategies and/or actions that offer viable and feasible solutions to urgent sustainability challenges facing Montego Bay. These actions and strategies form a roadmap that leads to long-term sustainability in Montego Bay, which itself is part of the vision for the future of the city. This vision acts as a guide along this road. If the vision is the guide, then the actions are the steps and stops along the journey.

Table 6.4.2:
ESCI Montego Bay Priority Action Area Contribution to Goals of Vision 2030 Jamaica

	ESCI MONTEGO BAY PRIORITY ACTION AREA				
Vision 2030 Jamaica Goal	Urban Planning	Reduction of Vulnerability	Sanitation	Public Safety and Crime	Employment and Training
Goal 1: Jamaicans are empowered to achieve their fullest potential.	x				x
Goal 2: The Jamaican society is secure, cohesive and just.				x	
Goal 3: Jamaica's economy is prosperous.	x	x	x	x	x
Goal 4: Jamaica has a healthy natural environment.	x	x	x		

7

7. ACTION PLAN

This chapter outlines the actions that will be taken to address the main problems in each of the five priority action areas identified and described in the previous phases of the methodology. The action plan was developed collaboratively by a multidisciplinary team of specialists and consultants who determined how to optimize resources to achieve the greatest possible benefit for the city of Montego Bay. Each action was developed in conjunction with one another, and was guided by an overarching vision for the city which is informed by the priority action areas identified in the previous chapter. This allowed for a multi-sectorial, efficient, and impactful action plan comprising both short- and long-term actions. This guiding vision for the city is described in the next section.

If you had the opportunity to reinvent your city, what would it look like and how would you do it? The ESCI allows for such an opportunity and prepares a roadmap, or a plan of action, which leads to a new and improved Montego Bay. The journey to this destination is guided by the city's new vision. Through the research and assessments of the city presented in previous chapters, which included input from the public and key stakeholders, a variety of themes appeared which influenced the formation of this guiding vision for the action plan.

VISION

Jamaica is known for its two different worlds – that of tourists and all-inclusive resorts, and that of the Jamaicans' daily reality – two separate and distinct worlds and experiences. This disparate image of Jamaica rings true also at the local level, in Montego Bay. Connecting these two dimensions of city life will provide increased economic opportunities, an increased sharing of cultures and experiences, and increased access to the city's spaces and valorised areas for all. Better linkages between "green" and "blue" spaces within the urban area also provide recreation spaces and exposure to nature for locals and tourists alike, as well as fostering more sustainable natural systems for Montego Bay's future. Uniting everyone together is not just a by-product of this initiative, but also a necessary input for success. Sharing a common vision and goals for the city will help drive these programs and initiatives on the road toward a sustainable future.

The vision for Montego Bay is to become "One Bay For All" by the year 2030. The motto for the vision is, *Through revitalization, resiliency, and reconnection, we can achieve One Bay For All.* By achieving a more resilient community and environment, reconnecting communities with people and places, and revitalizing urban spaces and services, Montego Bay can become a sustainable place of unity and equality, of safety and health, of justice and security, and of course, beauty. Creating this new image of the city will not only improve the quality of life for local citizens, but will also enhance its reputation and impression internationally. This, in turn, will bolster local economic prosperity and development.

This vision for Montego Bay is aligned with Jamaica's national vision and goals. Their "Vision 2030" motto envisions, "Jamaica, the place of choice to live, work, raise families and do business". Its four goals are the following:

1. Jamaicans are empowered to achieve their fullest potential
2. The Jamaican society is secure, cohesive, and just
3. Jamaica's economy is prosperous
4. Jamaica has a healthy natural environment

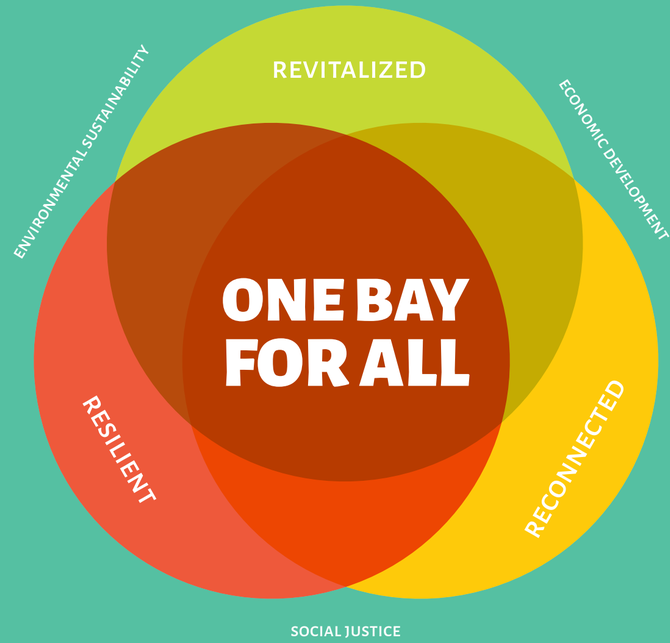
Both of these visions desire a cohesive and just, equal and inclusive, accessible and transparent society. A prosperous and empowered future for all Montegonians will require that changes be made in the city in order to make that future not only a reality, but also a sustainable one.

Though Montego Bay faces many challenges, among them fiscal and political, there still remain hope and opportunity. Montego Bay is a city overflowing with transformative possibility – from its intrinsic natural beauty to the warmth, strength, and creativity of its people – just as Anancy, the popular Jamaican folklore character, symbolized the same. It is this power and possibility that allows Montego Bay to reassert and redefine its identity both locally and internationally, while also creating a better present and future for its people.

The following sections describe the 3 themes that make up the vision for the city: **resilient**, **revitalized**, and **reconnected**. They offer a glimpse into what the city could be in 2030. Organized around these themes are the elements of the action plan. Although this chapter divides the proposed actions by theme, this does not imply that each action is independent from the other. It should be kept in mind that the proposed interventions in the Action Plan overlap with other thematic areas, and contribute simultaneously to revitalization, reconnection, and resiliency. An initiative that will physically reconnect people with places via an improved city transit system, for example, can (i) build resiliency with positive environmental impacts like the reduction of greenhouse gas emissions, and (ii) revitalize downtown areas with increased activity while people move around the city with greater ease. The multi-sectoral approach taken by the ESCI is beneficial in that it allows for these cross-sectoral solutions. Through well-informed and strategic planning, a domino effect can be expected with these actions, most having indirect, if not direct, effects on other sectors. If followed carefully and in an integrated manner, this Action Plan can solve many of the cities current problems and lead to a smart, sustainable, and quality city for all who step foot in Montego Bay.

VISION:

THROUGH REVITALIZATION, RESILIENCY AND RECONNECTION, WE CAN ACHIEVE ***ONE BAY FOR ALL***



RESILIENT

A resilient Montego Bay is one that is ready to adapt to change and respond to and bounce back from unfortunate and damaging events such as natural disasters or crime events. Building resiliency is an important aspect of becoming a strong and sustainable city, especially in a place where such a great portion of the city remains vulnerable in some form or another.

Resiliency is needed in the physical realm of the built and natural environments, and should be incorporated into planning projects and guidelines to reduce the impacts of hazard events and climate change. The environment should also be ready through proper management and provision of sanitation services, all of which can contribute to a clean and orderly environment. Without mitigation strategies such as the proper and timely disposal of waste and management of stormwater and sewage systems, cities become more vulnerable and the effects of natural hazard events are exacerbated.

Resiliency is also necessary in governance and management. Through institutional strengthening and capacity building, and with agencies and public officials being provided the proper training and resources, the city can respond rapidly in the face of adversity and provide continuity of service.

Crime is also another hazard facing the city of Montego Bay, and communities need to reduce vulnerability and build resiliency to criminal victimisation. This can be done through community programs and strengthening and capacity building of the police force.

The following sections set out several specific actions to be implemented in response to the challenges faced by the city. Over the short and long term, these will ensure resiliency for the city, its people, its lands, and its built heritage.

RE·SI·LI·ENT:

ABLE TO BECOME STRONG, HEALTHY, OR SUCCESSFUL AGAIN AFTER SOMETHING BAD HAPPENS; CAPABLE OF WITHSTANDING SHOCK WITHOUT PERMANENT DEFORMATION OR RUPTURE; TENDING TO RECOVER FROM OR ADJUST EASILY TO MISFORTUNE OR CHANGE; BUOYANT, IRREPRESSIBLE; ADAPTABLE, ROBUST, HARDY.

[FEATURED ACTION]

A. INTEGRATED WATERFRONT PARK AND COASTAL ZONE MANAGEMENT PROJECT

Downtown Montego Bay has much underutilized or vacant land that is not suitable for any type of construction due to its exposure to natural hazards. This includes the waterfront, which is disconnected from the city, and the heavily polluted and vacant former railway site, situated next to the existing Transportation Centre. Both the waterfront and the former railway site are very unhygienic and urgently need to be cleaned up. Areas like the Dump-Up Beach and the landfill at the restaurant "Pier One" are commonly used as garbage dumps, temporary car parks or bus stations. The current condition creates a negative image for the city.

The Historical and Current Urban Footprint and Future Urban Scenarios study revealed that there are only 2.7 m2 of open space per inhabitant in Montego Bay. The World Health Organization recommends 10-15 m2 of open space per inhabitant. The long-term target for the urban development plan is to constantly increase this ratio to meet the minimum requirements within 10 years. In order to increase public space for recreational use and also to mitigate disaster risk, the waterfront and other vacant areas like it should be converted into public parks. This will significantly improve the image of the city and the identity and self-esteem of its inhabitants.

Currently, the coast in front of downtown Montego Bay is underutilized and could be much better integrated with the city. Indeed, a well-designed, inter-sectorial waterfront project could act as an anchor to the multitude of urban initiatives being proposed in this Action Plan. Both locals and tourists alike could enjoy the benefits of a new and safe waterfront, with recreational facilities and clean, accessible beaches. One of the main obstacles for development is the presence of fences and the absence of walkways. However, the city built the "Hospital Park", an approximately 250-m long park, which is very well received by the local population. This park serves as a viable reference for the possible development of a stretch of approximately 2 km, starting at the "Margaritaville" restaurant and ending at the "Fisherman Village", into a waterfront park including public beaches.

To connect the city with the sea while at the same time helping protect it from coastal hazards, the UDC will develop the area along the approximately 2-kilometre stretch of coast from the Old Hospital Park to the River Bay Fishing Village. It will be transformed into a boardwalk park including public beaches and seaside recreational facilities, such as cafes, sand beach volleyball, etc. This project will include activities for:

(i) beach enhancement to improve the amenity value of beaches

(ii) shoreline stabilization and erosion control works to protect against storm surge and coastal erosion

(iii) coastal access works to provide contiguous safe public access along the shoreline.

Waterfront Showcase

BEACH FACILITIES AND BARS

The waterfront park design includes a complete transformation of the declined beach area with a lots of beach facilities such as beach volleyball courts and bars. Just a few meters from Montego Bay's KFC, locals and tourists relax at the new facilities, which are all grouped on the new 2,35 km long boardwalk. The boardwalk serves as a connection between Margarita-Ville, the Old Hospital Park, the new plaza and the Fisherman's Village.

CENTRAL PLAZA

The central plaza invites both Montegonians and visitors to stroll from Sam Sharpe Square in Downtown Montego Bay directly into the new plaza. The plaza is a multifunctional area with a hard surface, perfect for cultural events, concerts and shows. On the two ends of the plaza, bars and restaurant facilities serve the visitors. Pier One is kept on the original location and will be the first incubator project on the site.

NATURAL OASIS

The south part of the waterfront park is a much different destination: a quiet and green oasis in the middle of the city. The area has a walking path, with benches and plenty of shade. The trees and the newly designed water basin create harmony with the sea and make this area much more calm and relaxing, a perfect oasis for relaxation.

The waterfront park, which is susceptible to storm surge, will act as a buffer zone between the sea and the constructed city. In addition to increasing the quality of life for residents by providing them with a pleasant place for recreation and beach access, it will act as a pull factor to incentivize denser development around downtown Montego Bay, away from the periphery. It will also provide an alternative local place for tourists to visit, drawing them into Montego Bay, where they can patronize small businesses.

As part of the development of this continuous waterfront park project, the UDC will:

- Establish groynes[57] and breakwater structures, where necessary, in order to interrupt water flow and limit beach erosion. These help to create and protect sand beaches and coastal areas for both locals and visitors.

- Erect facilities at the waterfront park including public showers, small restaurants, garbage bins and collection, lifeguard stand, attractive surface, cultural focus point (acoustic shell), benches, public toilets, bike stands, playgrounds, volleyball fields and low seat walls (which can act as additional protection from storm surge).

- Enable access to the park and beaches from downtown with numerous, visible entrance/exit points

- Establish a neighbourhood watch unit or tourism police with special focus on the waterfront park and other popular tourist sites.

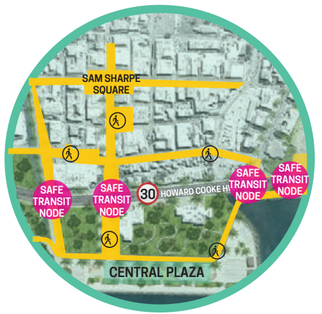
Success of this project will allow for a scalable and replicable model by which to create more public parks, and will foster dialogue amongst key stakeholders about other potential vacant or underutilized sites for future park and buffer zone development.

57. A groyne creates and maintains a wide area of beach or sediment on its updrift side, and reduces erosion on the other. It is a physical barrier to stop sediment transport in the direction of longshore drift.

Design Principles For Waterfront Park

ECO CORRIDORS

In the central area of the urban intervention a system of three ecologic corridors connects the historical downtown area with the newly created multifunctional plaza at the Waterfront Park. The three corridors are designed as green boulevards connecting the existing structures from Barnett Street, the Market Street and the a newly created Eco corridor utilizing the North Gully as an accessible walkable strip.



NEW PEDESTRIAN AREAS

The new Waterfront Park is integrated into a holistic program of making the city more pedestrian friendly. The Downtown area in the mid term is a pedestrian area and connects with the central plaza of the new Park. Safe Transit Nodes are special transition areas for pedestrians at the Howard Cooke Highway. These nodes need a special design with speed bumps or other speed reducing measures. The Highway shall be 30 km/h at the main Downtown area.

A NEW MOBILITY BEHAVIOUR

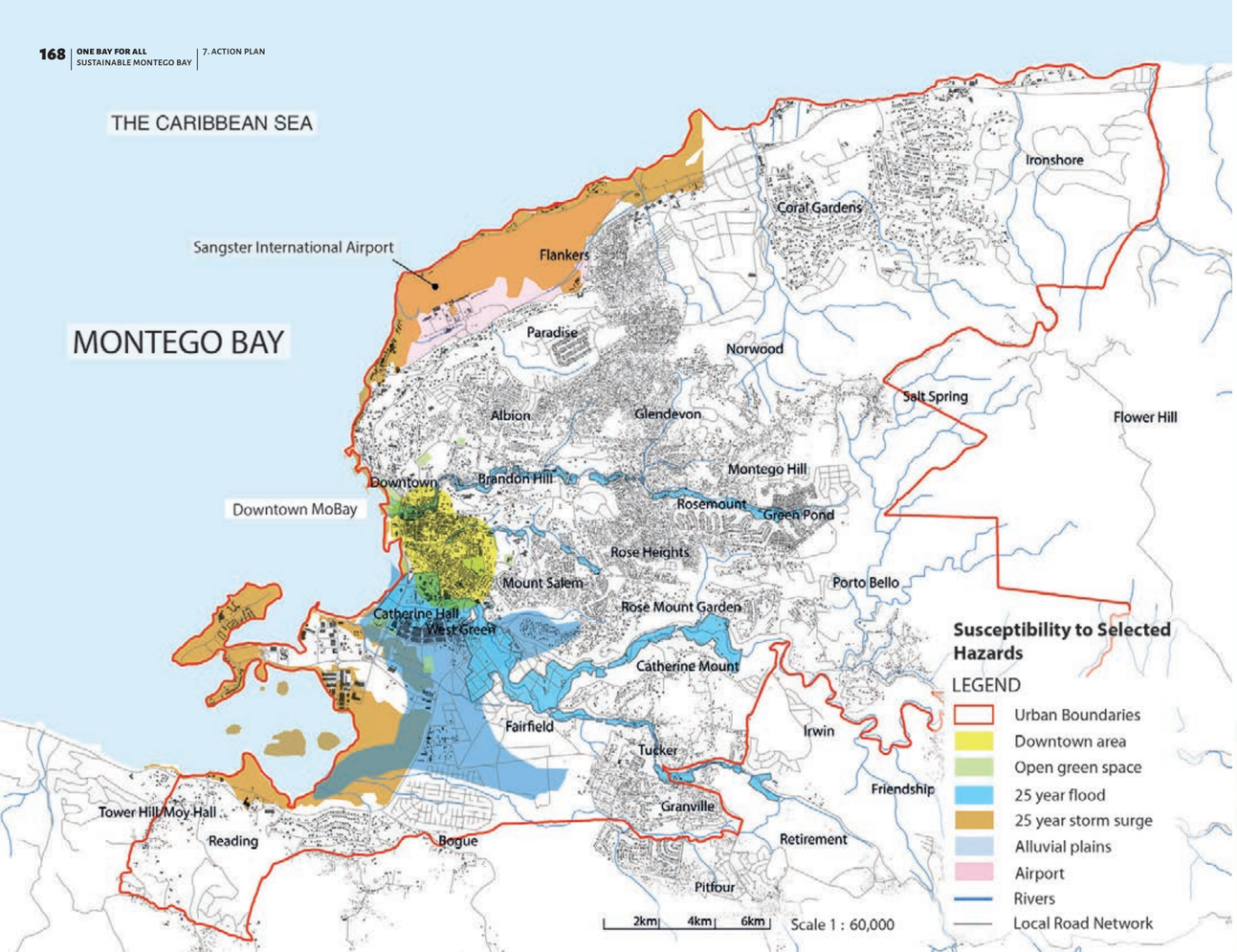
The area is pedestrian friendly for all people. The locals can walk from Downtown Montego Bay to the new Plaza facilities, the bars, the beach Volleyball courts, etc. The tourists have different origin-destination patterns: they might come from the Hip-Strip or stop their cabs at the Taxi stands at the transportation center. Close to Pier 1, a bike-rental will be installed and visitors can take a bike-ride from the central plaza and explore Downtown and its new Waterfront park.

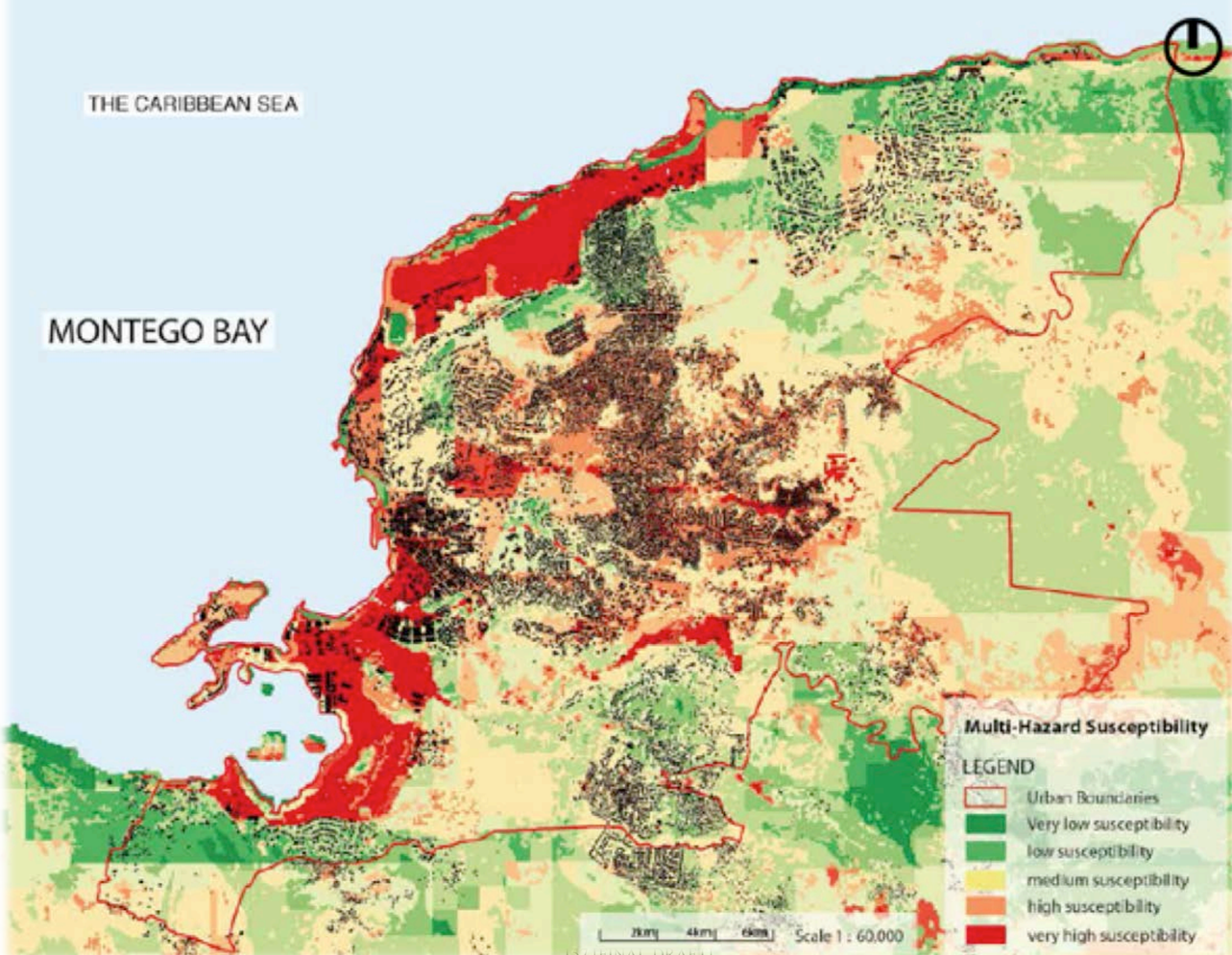
RISK MANAGEMENT AND CAPACITY

Montego Bay is highly prone to multiple hazards, including storm surge and coastal flooding, riverine flooding, hurricane wind, and landslides, the frequency of which is increasing with climate change; and earthquakes. The climate change and disaster risk studies summarized in Chapter 5 show that, under a multi-hazard scenario such as a hurricane or tropical storm, the city would potentially incur very high economic losses. Parts of the city centre would be flooded and severe landsliding would occur in informal settlements located on deforested steep slopes. Moreover, the impact on the coastal zone, where more than 90% of Montego Bay's tourism physical plant and other related critical infrastructure (international airport, port, main roads) are located, would be catastrophic. Major storm surge and associated coastal flooding alone would cause beach erosion; damage to coastal and marine ecosystems (coral reefs, mangroves, ecological sites), hotel infrastructure, and critical infrastructure, including first responder's facilities; and disruption of the city's key transportation network. Alternative roads would be exposed to floods. In the event of such an emergency, many of the potential evacuation routes, which are primarily coastal, could be compromised. Given the significance of the tourism industry to Montego Bay and the Jamaican economy, a single disaster or the cumulative impact of several severe weather systems has important implications for the physical and economic viability of the coastal zone and the city's tourism industry.

The Government of Jamaica and the SJPC have put in place several measures in support of risk reduction. These include (i) planning legislation that incorporates disaster risk; (ii) the establishment of a Planning and Disaster Risk Management Unit (PDRMU) as an integral part of the SJPC; (iii) various studies in hazard mapping and risk assessment of the city have been conducted, including under the ESCI; and (iv) community preparedness programs are being implemented annually.

Notwithstanding, these measures are insufficient to effectively manage the identified risks associated with natural and man-made disasters and the impacts of climate change. There is a need for a comprehensive program of action to reduce the city's vulnerability, and specifically to (i) strengthen capacity of the city government for disaster risk management and the impact of climate change, including disaster preparedness and response and risk-sensitive land use planning; and (ii) build resilience to coastal hazards in order to protect and conserve existing and proposed physical and natural assets in the coastal zone and safeguard the tourism industry. That program of action follows below.


THE CARIBBEAN SEA
MONTEGO BAY
Sangster International Airport
Flankers
Paradise
Ironshore
Coral Gardens
Norwood
Salt Spring
Flower Hill
Albion
Glendevon
Montego Hill
Downtown
Brandon Hill
Rosemount
Green Pond
Downtown MoBay
Rose Heights
Mount Salem
Porto Bello
Rose Mount Garden
Catherine Hall
West Green
Catherine Mount
Fairfield
Tucker
Irwin
Friendship
Granville
Tower Hill
Moy Hall
Reading
Bogue
Retirement
Pitfour
2km
4km
6km
Scale 1 : 60,000
Susceptibility to Selected Hazards
LEGEND
Urban Boundaries
Downtown area
Open green space
25 year flood
25 year storm surge
Alluvial plains
Airport
Rivers
Local Road Network


THE CARIBBEAN SEA
MONTEGO BAY
Scale 1 : 60,000
Multi-Hazard Susceptibility
LEGEND
Urban Boundaries
Very low susceptibility
low susceptibility
medium susceptibility
high susceptibility
very high susceptibility

B1. Vulnerability Audits of Critical Facilities

The SJPC will prepare vulnerability audits of the city's critical facilities (e.g., tax department, police command post, and other critical government buildings to be identified by SJPC) that are located in hazardous (natural and man-made) zones.

B2. Hazard Risk Reduction Strategy

Collaboration between SJPC, ODPEM and the PDRMU will produce a strategy for hazard risk reduction in Montego Bay to include climate change considerations. This strategy will follow the vulnerability audit and draw from and complement the base studies carried out by ESCI (namely, the Disaster Risk and Climate Change Vulnerability Assessment). It will offer a plan that takes a broad approach from a policy and planning perspective to systematically reduce risk.

B3. Contingency Plan for City and Coastal Zone

A contingency plan for severe weather systems, including hurricanes and tropical storms, focusing on storm surge and coastal flooding, will be developed by the SJPC and Office of Disaster Preparedness and Emergency Management (ODPEM). This will be done with the active participation of the private sector, airport management, tourism companies, and communities and will take into consideration the needs of a transient tourist population. It will include a business continuity plan for government buildings, hotels, and critical facilities, such as the airport and the wastewater plant; and plan for its own long term monitoring. As a long-term subcomponent of this action, a plan for airport response to climate change will be developed in coordination with appropriate agencies and authorities. If the Integrated Operating Control Centre (IOCC – see end of Chapter 7) is established for Montego Bay, its use will be incorporated into the contingency plans.

B4. Capacity Building of the PDRMU

The PDRMU's capacity to reduce the city's vulnerability and better prepare and respond to extreme climatic events will be strengthened through (i) risk assessment and management training, and (ii) a GIS-based disaster risk information system.

The PDRMU and other key sectors of the SJPC will be trained in techniques for incorporating risk reduction in planning decision making and the use of hazard, vulnerability, and risk maps (generated from the Disaster Risk and Climate Change Vulnerability Assessment and the Urban Growth Study) in emergency management, land use planning, and cost-benefit analysis. In partnership with ODPEM, the SJPC will develop a GIS-based disaster risk information system in the PDRMU based on available data, including that generated under the ESCI, and train PDRMU staff in its use for planning (for example, mainstreaming hazard risk reduction in subdivision applications) and public education programs (linked to the public awareness campaign in Section 7.4). This should also be linked with the IOCC (see Section 7.4) if that project is implemented.

B5. Coastal Zone Management Program

Over the long term, a risk-resilient coastal zone management program will be implemented. This program will be the shared responsibility of NEPA, ODPEM, and SJPC. Given the expected losses to private sector investment in tourism from natural disasters, partnerships between the public and private sectors in integrated coastal risk management will be explored. This program will include the following components:

- **B5.1. Coastal risk assessment.**

The Disaster Risk and Climate Change Vulnerability Assessment carried out as part of the ESCI had to rely, in part, on existing data, whose quality and level of detail limited the assessment. As a short-term priority, the input data should be improved, including the use of data on coastal and oceanographic processes, with a higher resolution. A coastal risk assessment should be developed with a detailed analysis of coastal erosion and ecosystem mapping and valuation.

- **B5.2. Establishment of a coastal risk information system.**

The PDRMU will also manage and monitor coastal processes and support coastal planning decisions through the expansion of the risk information system for the city described in the previous short-term action (Action B2) and staff training.

- Design and implementation of sustainable measures to reduce coastal risk, including those that incorporate green infrastructure and ecosystems-based adaptation approaches to increase the resilience of critical infrastructure exposed to disasters. This part of the program will involve public-private partnerships.

- Institutional strengthening of the PDRMU of the SJPC in coastal risk management. This can be achieved through training of existing staff; the assignment of specialist staff in coastal zone management, toward the establishment of a permanent function in coastal zone

management in city administration; and enhancement of existing planning and disaster risk management legislation and regulations (including enforcement capacity) to explicitly address coastal risk, including the review of existing setbacks and recommendations for new setbacks in the changing climate.

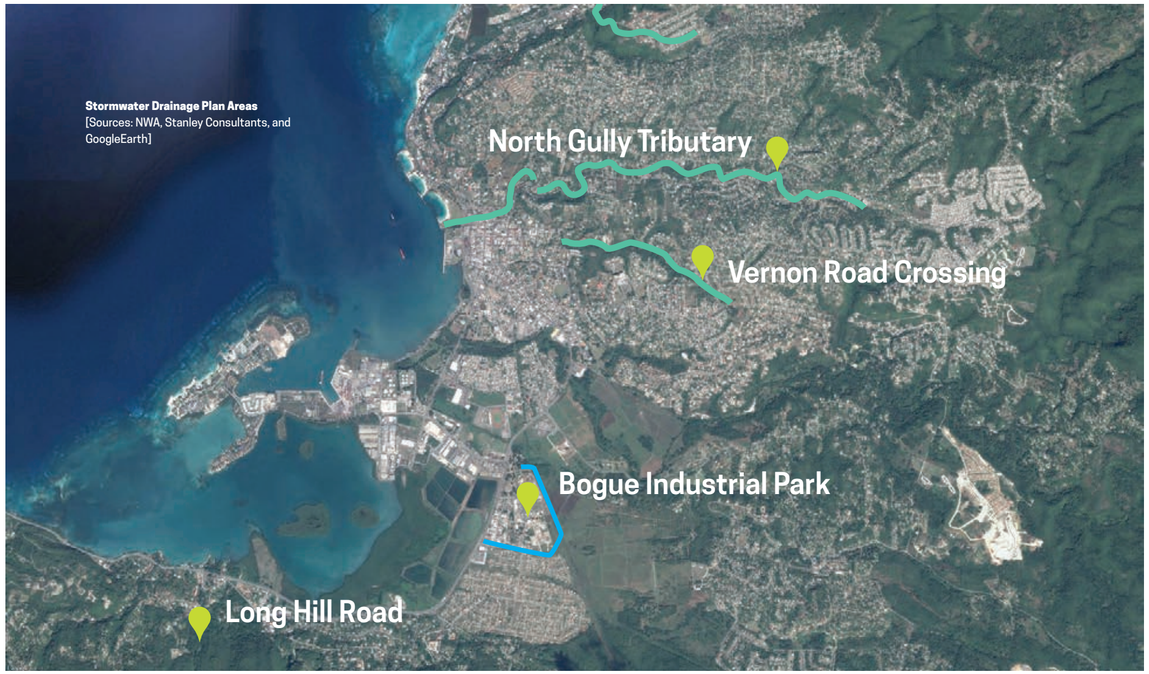
STORMWATER DRAINAGE

C. Stormwater Drainage Plan Implementation

Flooding due to heavy rains or multi-hazard events is a common occurrence in Montego Bay. With a growing urban footprint, the built environment is placing ever more strain on the capacity of the environment to handle storm waters when mitigation measures are not introduced (see the Base studies in Chapter 5). The city has several gullies that provide drainage for the city, however, increased development and pollution as a result of sanitation issues in the city pose major challenges to their effectiveness. Increased runoff from development not only leads to a capacity problem, but also can lead to erosion in gullies causing flow blockages. Pollution and other debris washed into the gullies along with stormwater also contribute to blockages. Couple this with a lack of available capacity, and the result is overtopping of channels and inundation on land and in streets and walkways.

In 2012, the NWA commissioned a comprehensive report on drainage and flood control in Jamaica. Montego Bay was included in this report, and the Parish Council should collaborate its efforts with the NWA to implement the proposals and concept plans of the study in the long term. The areas of intervention as specified in the report include: North Gully (lower end), South Gully at Vernon Road, Hobbs Avenue watershed, Bogue Industrial Estates, the Montego River, and Long Hill Road watershed. This plan also proposes that all efforts be made to require (and enforce) all future development to contain and mitigate runoff as a condition of development.

Sanitation and reduction of vulnerability are priority action areas for the ESCI, making the issue of stormwater drainage highly relevant to this Action Plan. Furthermore, this is an island-wide priority for the NWA. These actions will lessen vulnerability and improve public health by reducing flooding and improving capacity and flow for the drainage system in Montego Bay.



Stormwater Drainage Plan Areas
[Sources: NWA, Stanley Consultants, and GoogleEarth]

SOLID WASTE MANAGEMENT

The WPM is only able to schedule one collection each week per (residential) area in the collection schedule. However due to the frequent breakdown of WPM and private collection vehicles this schedule is not met on a regular basis. The unacceptable service delivery leads to aesthetic and sanitation problems and the proliferation of vectors.

There are a total of 18 WPM trucks (of which 15 are compactors and 3 are tipper trucks) and 10 supplementary contracted units. The majority (over 60%) of the trucks are assigned to St. James. The trucks currently being operated by WPM are in very poor condition and they suffer from frequent mechanical breakdowns. Due to the inability to maintain the WPM trucks (due to budgetary constraints) and the poor quality of the contracted units, the operational efficiency is at about 50%.

The WPM vehicle maintenance facility is inadequate. The collection vehicles are housed at premises situated in Flanker owned by the National Works Agency. The premises are shared with the Human Employment and Resource Training Trust, National Training Agency (HEART Trust NTA). The location is overcrowded with many old and out of service units, not leaving sufficient space to maintain the equipment in use. The facility is not designed for use as a garage and lacks the necessary specialized equipment, such as hoists, to facilitate proper maintenance of the vehicles. The condition of the garage does not meet several requirements for worker health and safety, as the working surface is unpaved and sometimes muddy, making it difficult for the mechanics to work effectively.

Specific Actions:

D1. Private waste collection study

A study is required to ascertain how the capacity of private waste haulers can be increased to provide contracted services for municipal garbage collection so that more of the responsibility for collection can be placed on the private sector. This would be in keeping with the policy and legislative framework for the NSWMA, which would see a separation of the regulatory and operational roles of the entity. The study should include the technical and equipment requirements as well as a sustainable source of funding from the beneficiaries to pay for the service.

D2. Additional waste collection vehicles

Based on the results of the proposed private waste collection study in Action D1 above, which includes identifying a sustainable funding source, additional waste collection vehicles should be provided by the private sector to increase service to the area thereby improving general cleanliness and environmental and aesthetic quality of the city. By collecting more waste, the reduction of litter in streets and streams can allow for quicker recovery after a hazard event and the avoidance of public health issues.

D3. Vehicle maintenance facility

A modern service garage is required that is properly equipped and staffed in order to ensure the timely and efficient servicing of collection vehicles operated by WPM. This will require consultations with the NWA regarding the property currently being utilised or with the Parish Council and or the National Land Agency (NLA) for another appropriate location to be identified.

D4. New Sanitary Landfill and Closure of Retirement Disposal Site

WPM Waste Management Ltd. (WPM) is responsible for the collection of solid waste in the parishes of Westmoreland, Hanover, Trelawny and St. James. Waste generated in these four parishes is transported to the Retirement Disposal Site, which is located in St. James, in the district of a similar name. One of the many issues with this site includes financial issues, given that operational costs far exceed possible revenue. The fact that no tipping fees are charged for waste deliveries and deposits contributes to this revenue shortfall. Another problem is that the disposal site is not regularly covered due to insufficient funds and inadequate and inappropriate equipment. The operation of one active tipping face with regular compaction and covering taking place is critical to reduce the level of exposed areas that give rise to frequent fires set by arsonists.

It should be a priority to commence a study to find a new site for a sanitary landfill as the Retirement Site is already well beyond its useful life. At the same time, a closure plan should also be developed for the Retirement site. The results of these short-term actions should encourage the long-term actions of actually closing the Retirement disposal site, as well as establishing a new sanitary landfill.

In addition to meeting the regular requirements for a sanitary landfill, the new landfill should include the establishment of a system for capturing and burning biogas generated by on-site waste disposal. This will result in the reduction of greenhouse gas emissions by an estimated 32,996 tonnes of CO2e per year through methane destruction[58]. A scale should also be purchased for the site so that depositors can be charged a tipping fee based on weight. This will generate much needed revenue that can be used to operate the site properly with more regular covering of the waste on the tipping face.

58. See Greenhouse Gas Mitigation Analysis (in Annex), p. 118-119.

RECYCLING AND COMPOSTING

There are very few programs aimed at reducing or recycling waste in Montego Bay. Waste is not separated at the source. Therefore, any attempts to institute a household-level program would require a major public education campaign to promote that habit and culture. Organic waste is a major component of the municipal waste generated, so there is an opportunity to divert this component from the municipal disposal site. However, the informal settlements and limited yard space available to many residents of Montego Bay and its environs would not facilitate this approach. On the other hand, the hotels that generate large quantities of organic waste could compost. Montego Bay has no organized recycling program or facility, and this is an area for future study and consideration. Squatters living in or in close proximity to the Retirement Disposal Site scavenge the waste for valuable and useful materials, such as metals, aluminium cans, PET bottles, and cardboard, which are in turn sold to entities that export the recyclable materials overseas. The scavengers come into frequent conflict with the operators of the site, setting it on fire when they are displeased. These fires typically last several days and require the outlay of significant resources to control. The resulting smoke affects large sections of Montego Bay and puts workers and surrounding communities at risk for respiratory illnesses.

Specific Actions:

E1. Materials recovery facility

A social intervention is required for the sorters who make a living from scavenging useful materials from the disposal site. The Parish Council, NSWMA, and WPM will work together to establish an area where the sorters can safely extract useable and recyclable material from the waste without disrupting the operations on the site and putting themselves in harm's way. This intervention should also see the elimination of fires at the disposal site set by disgruntled sorters and other informal settlers who are looking for work.

E2. Composting program and facility

The Greenhouse Gas Mitigation Analysis indicated that there was a potential to reduce annual average greenhouse gas emissions by 160,607 tonnes of CO2e per year by separating organic waste for compost so that it did not arrive at the final disposal site, with a net cost of US$ -38.59/tonne CO2e. The economic benefits, in terms of the reduction of hours worked by associated personnel, reduced volume of emissions, an increase in the useful life of the landfill, and the generation of fertilizer from the compost, were estimated to be US$ 6.29 million per year[59]. Although it would be difficult to implement a household-level composting program at this point, the large quantities of organic waste generated by hotels should be diverted to a composting facility in order to reduce the amount of solid waste that needs to be managed at the municipal site. The hotels would also benefit from the compost to help maintain the landscapes of their facilities. A model similar to that established by Rose Hall Developments Ltd., a private company offering sewage treatment services to a number of hotels in Montego Bay, could be considered for a public-private partnership.

In order for this program to become reality, a pre-feasibility study for establishing a composting facility should be conducted in the short term. Assuming feasibility and recognizing the potential for reducing GHG through this program, a composting facility/plant should be considered for implementation in the long term.

59. See Greenhouse Gas Mitigation Analysis (in Annex), p. 120-121.

VICTIMISATION

Over the past decade, crime and public safety have become increasingly vexing concerns of Montegonians. Montego Bay has seen its violent crime[60] rate increase to 656 per 100,000 inhabitants in 2013[61], which places Montego Bay among the most violent cities in the world. The most troubling crime remains homicide, despite showing declines over the past four year period remains at approximately 150 per 100,000 inhabitants in 2013[62]. As a result of the violence the local health sector is overburdened, the private sector incurs added costs for security and resources are diverted to counter negative press.

The current driver for the high levels of criminality is the advanced fee fraud scheme popularly called the lottery scam. Aimed primarily at fleecing elderly Americans, the perpetrators use the names, numbers and banking information to swindle victims by claiming they won an international lottery and demanding payment to cover taxes and other fees. Conservative estimates place the value of the fraudulent activity at 300 million USD per year[63]. This lucrative scheme has led to fierce competition among rival groups of fraudsters for the materials used in the fraud such as the contact details of potential victims, often resulting in violence shootings and violence. According to one senior law enforcement officer, lottery scam-related homicides accounted for 60% of the homicides in the city over the past three years.

Coordinated efforts by American and Jamaican law enforcement and international money transfer agencies, as well as recent legislation such as the 2013 Law Re-

60. Violent crime includes homicide, rape, assault, felonious wounding, and robbery.
61. Statistics provided by Jamaica Constabulary Force Statistics Unit.
62. Statistics provided by Jamaica Constabulary Force Statistics Unit.
63. David McFadden, "New bill intended to curb Jamaica lottery scams" http://www.businessweek.com/ap/2013-03-15/new-bill-intended-to-curb-jamaica-lottery-scams (July 15, 2014)

form (Fraudulent Transactions) Act, have helped curtail the fraudulent activity since its peak in 2012. However, the fraudsters tend to operate in small cells that can be quickly initiated, making it difficult to dismantle completely. In addition, many of these groups of scammers seem to associate with one of more than a dozen criminal gangs that operate in Montego Bay. These gangs use the illicit gains from the lottery scam to supplement their proceeds from extortion, robbery and drug-trafficking in return for offering those involved with the lottery scam protection from competitors and access to money laundering facilities. These gangs further assist fraudsters to avoid apprehension by providing access to their criminal networks outside of the city as a means of relocating fraudulent operations, while ensuring that the proceeds are still funnelled back to their base of operations.

F.1. Enhance community resilience to criminal victimisation

Geographic location determines the nature of criminal victimisation. Crime in communities plagued by criminal gangs often relate to protection of turf and projections of power over the local residents. In the 2013 National Crime Victimisation Survey (NCVS) for example, St. James respondents with criminal gangs living in their communities were twice as likely to report being assaulted with a weapon in the past 12 months than their counterparts living in communities without criminal gangs. These counterparts, living in more affluent neighbourhoods such as Bogue Village and Ironshore, were more likely to be the victims of property crimes such as robbery and burglary. Community crime prevention interventions must then be customised to address the crime profiles of the respective communities.

The police have worked hard in recent years to revitalise neighbourhood watches with 34 active organisations in the area. Comprehensive community interventions such as CSJP, Peace Management Initiative (PMI) and the Jamaica Social Investment Fund (JSIF) have delivered social development services ranging from conflict mediation to diversion programs for at-risk youths in many of the most vulnerable communities. But there are two ways to empower residents as co-producers of citizen security even more. First, the informal nature of many of these communities constrains a shared sense of community, as social infrastructure is non-existent or under-utilised. This creates a sense of isolation from the wider community and erodes important intangibles such as sense of community and collective efficacy. Second, many of these programs face a targeting dilemma wherein services provided to the community may only be accessed by the more knowledgeable community members while their less empowered neighbours are either unaware or afraid of these opportunities. As a result, these interventions risk reinforcing power imbalances within these vulnerable communities.

F1.1. Strengthen Community Policing Program

The MBCCI and the St. James Police Civic Committee (SJPCC) will procure suitable vehicular transport to support the movement of community policing officers.

F1.2. Foster Economic Engagement of Vulnerable Communities

The UFC and the MBCCI will collaborate to broker improved relationships between private firms and residents of vulnerable communities. Many of these communities have shops that sell many of the island's popular brands but most of the proceeds from these sales leave these communities without contributing to the local economy beyond minimal mark ups. The UFC and MBCCI can enlist the model piloted in Kingston by the Carrington Direct group to bring established firms into the communities and encourage them to grow their market base through branding and the training of local vendors. This private sector-led initiative will be buttressed by the UFC's Crime Prevention through Social Development approach (CPSD) that enlists local stakeholders to address the root causes of crime and violence.

F1.3. Design a Case Management System for Comprehensive Community Interventions

The CSJP will contract a consultant to develop a case management system for monitoring the delivery of services to and behavioural progress of clients within the Montego Bay area. The system will be developed using low-cost, open-source software that will allow the PMI, UFC and CRP to replicate its design for their clients.

G. Support operational priorities of local law enforcement

The involvement of criminal gangs in the lottery scam enterprise underscores a key feature of crime in Montego Bay. There is a distinct geographic component to organised crime in the city as criminal gangs in the city use their communities of origin as a base of operations. In some cases, the community is separated with invisible boundaries distinguishing the turfs of rival gangs within the area. Communities such as Mount Salem, Flanker, Norwood, Granville, Rose Heights, Bogue Hill, Canterbury and Anchovy have been plagued in recent years by the presence of criminal gangs. These areas are primarily under-developed or settled informally making the terrain difficult for policing and contributing to the ease of gang members to operate freely in their criminal activities. Indeed, the 20 informal settlements throughout the parish of St. James represent a sincere challenge to a local police force operating with limited resources.

Personnel in the St. James Policing Division face many difficulties in carrying out their mandate to serve, protect and reassure. Chief among these challenges are limited operational resources and manpower. For example, a large proportion of vehicles assigned to the Division are out of commission, with many of the serviceable vehicles in rotation for more than eight years. Similarly, the current complement of 466 sworn and civilian staff are severely stretched to investigate crimes, monitor high-crime areas, secure key public spaces, and service the court and penal facilities while providing acceptable and efficient responses to calls for service. The prevalence and sophistication of organised crime in the parish requires an equally robust technological rejoinder by law enforcement that is currently not present. The policing infrastructure has simply not kept pace with the changing dynamics and demands for law enforcement.

The police continue to make gains in recent years, despite the many challenges. In keeping with national policing strategies, local law enforcement has increased partnerships with local stakeholders in the private sector and civil society and advanced a new policing model termed proximity policing that combines the strengths of community policing techniques with increased presence and strategic deployment in the most vulnerable communities. The increased use of advanced forensic equipment for fingerprints and ballistic identification has also bolstered investigative efforts. Still, without further support to eliminate material and technical constraints, it is unlikely that gains in public safety and crime reduction will be maximised or sustainable.

Specific Actions:

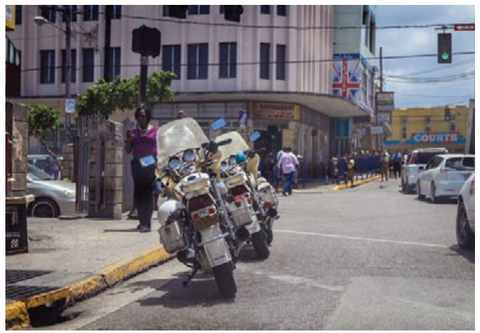
G1.1. Eliminate deficiencies in electronic crime fighting technology

The ESCI will fast-track the strengthening of the information technology infrastructure of the SJPD. Internet and computer facilities will be made available for all 17 stations and posts in the parish. Accomplishing this requires a preliminary study on IT infrastructure gaps within the St. James Policing Division. In addition, the SJPD will institute a peer-training system to ensure competency in basic computer skills for record-keeping and internal communication.

The JCF will implement plans for a local office of the Communication Forensic and Cyber Unit (CFCU). The CFCU is charged with assisting all investigations involving the use of digital media and a Montego Bay office is greatly needed to address the increased demand for service locally and buttress the present structure of telecommunication liaison officers. Accomplishing this requires the acquisition of office space, work stations and required software and tools to conduct network penetration testing; the preparation of a cadre of trained personnel; and the establishment of an interactive web site which is publicly accessible for case reporting and information dissemination.

G1.2. Consolidate Local Law Enforcement Fleet

The large number of service vehicles in need of repair requires a critical intervention that is beyond the current scope of internal vehicle maintenance systems of the JCF. The Transport and Repairs Division of the JCF will



use data from its most recent audit of the SJPD fleet of service vehicles to develop an outsourcing plan for the repair and redeployment of service vehicles. This outsourcing plan at a minimum will include the cost and timelines for repairs as well as a contingency component where it may not economically viable to repair vehicle and salvaging may be more feasible.

Private-public partnerships have enjoyed great success in the procurement of motor vehicles for Montego Bay. It is incumbent on future procurement initiatives to incorporate maintenance plans for vehicles that ensure fleet standardisation; availability of parts and servicing required; and appropriateness to the local terrain. A policy document containing this requisite information will be developed by the SJPD and the MBCCI with guidance from the relevant agencies within the JCF and MNS charged with procurement oversight.

G1.3. Recruitment and retention plan to improve police/citizen ratio

St. James has the 2nd highest growth rate among the 14 parishes and population growth is projected to increase in the medium term. In addition to rural-urban drift, new housing developments such as Rhyne Park, Rosevale Estates and Bogue Village have expanded the population that the SJPD is mandated to serve and protect. The current police/citizen ratio of 242 per 100,000 is above the minimum standard cited by the United Nations[64] but well below the national average of 398 per 100,000. An additional 250 law enforcement personnel are necessary to align current police strength in the division with the national average. This improvement requires a dedicated recruitment and retention plan orchestrated by the relevant JCF agencies and reflective of Force-wide operational priorities and resources.

64. "Police-public ratio in state far below UN standard: DGP" http://timesofindia.indiatimes.com/city/mysore/Police-public-ratio-in-state-far-below-UN-standard-DGP/articleshow/6332577.cms (July 15, 2014)

REVITALIZED

The following interventions make up the short and long-term actions that will imbue the city with new life and activity. They are designed to manage rapid urban growth at the urban fringes and revitalize the downtown area in an integrated way. While rejuvenating urban vitality, these actions also offer the benefit of bolstering the economy, both locally and nationally; rekindling the relationship between local citizens and tourists through a mutual attraction for an energetic, accessible, and culturally rich city centre; strengthening public health through the provision of fresh opportunities for activity in public open and recreational spaces; and fortifying the city against the negative impacts of natural hazards and climate change.

RE·VI·TAL·IZED:

MADE ACTIVE, HEALTHY, OR ENERGETIC AGAIN; IMBUED WITH NEW LIFE OR VITALITY; FORTIFIED, BOLSTERED; RENEWED, REFRESHED; STRENGTHENED; REJUVENATED, REKINDLED.

A. UPGRADE OF THE URBAN DEVELOPMENT PLANNING INSTRUMENTS

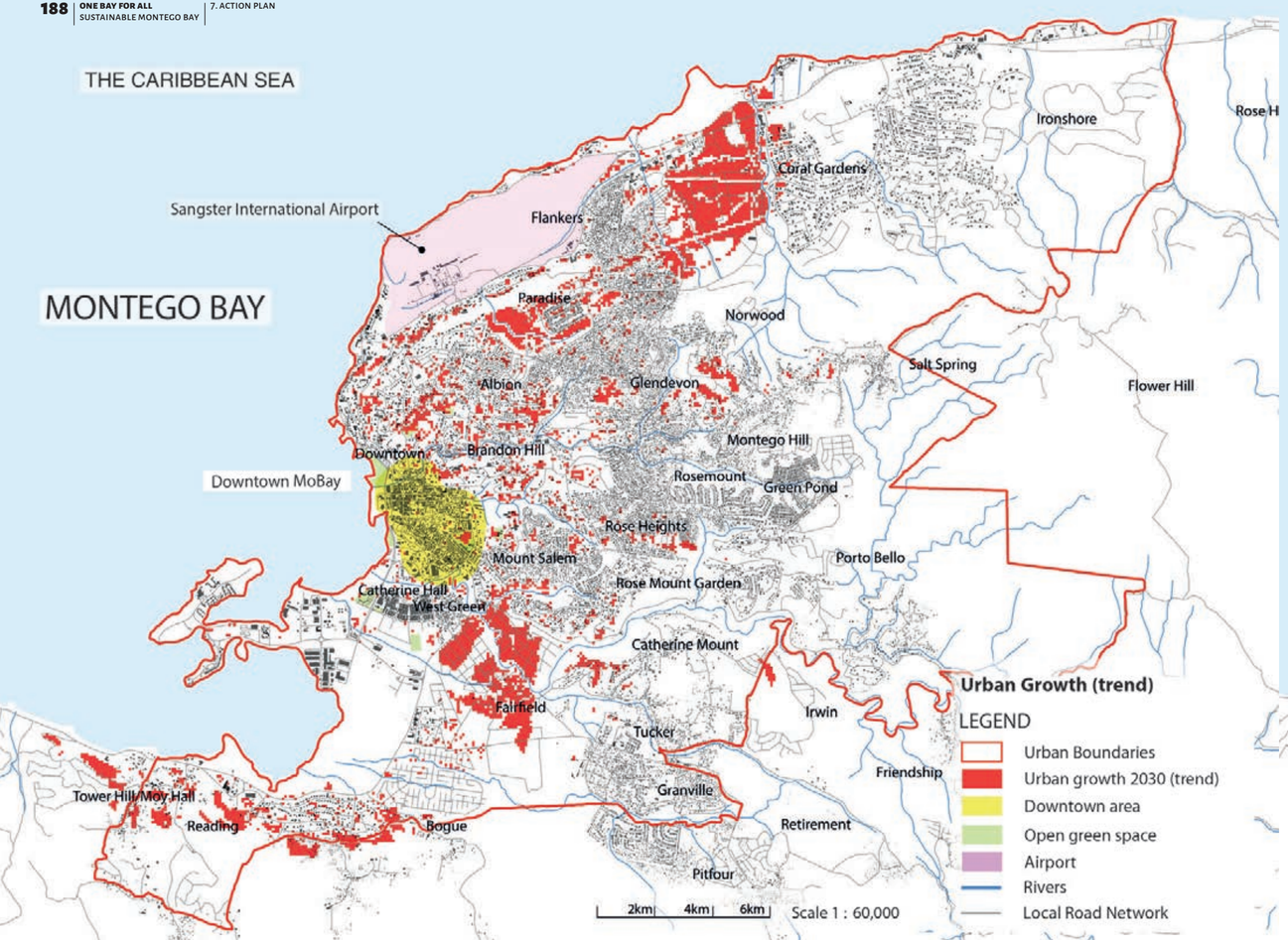
Montego Bay's current land use plan was designed in 1983 and has not been updated since. The draft development plan from 2010 is comprehensive yet lacks plans or drawings that envision sustainable spatial development for Montego Bay. The Development Plan should be revised and updated, applying innovative rules for intelligent spatial growth and also incorporating the findings of the base studies. Updating the development plan for the city will ensure a legal and policy framework for future sustainable development projects and plans.

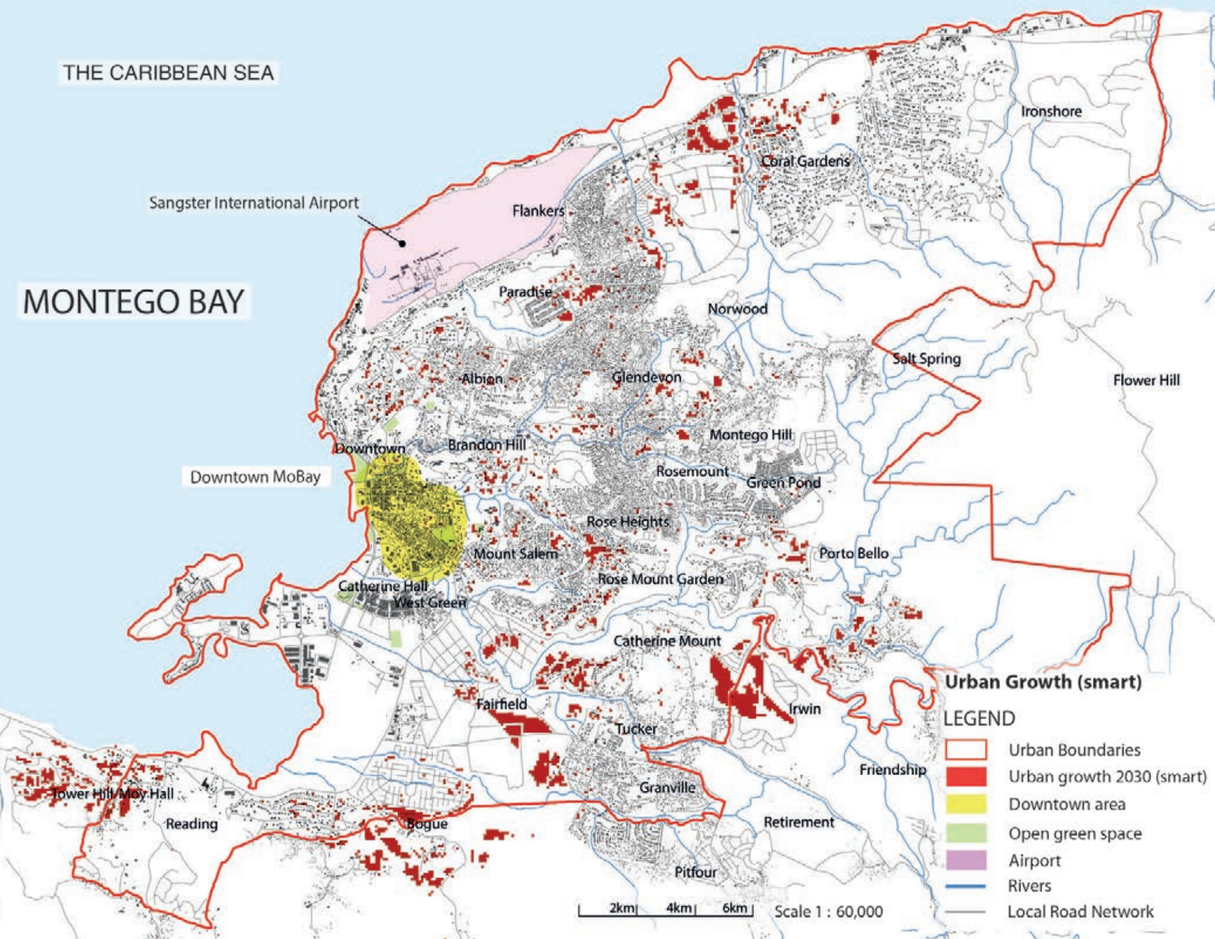
A1. Update and Complete the Development Plan

It is urgent that a sustainable urban development strategy or plan be made within 12 months. The strategy should, ideally, involve all relevant national and local stakeholders, including local NGOs and civil society in an inclusionary and participatory planning process that would positively impact governance in the second city. This plan could be used in conjunction with the Monitoring System (described in Chapter 8) to track progress. The SJPC and the MLGCD will lead the proposed activities with the support of the national government, NEPA, and international urban planning experts, and will include an on-going capacity building/training component.

The recommendations made in this Action Plan should be included in the revised Development Plan. Some specific considerations (in line with smart growth policies) to be incorporated into the revised Development Plan are listed below:

- Promote long-term sustainability and a better balance of urban land uses. Design a system of sub-centres with mixed-uses including residential areas, services and public space (increase public space per inhabitant from 6.9 ha/100,000 inhabitants to at least 10 ha/100,000 inhabitants by 2025) along the routes of public transport.
- Define a clear settlement boundary around the city identifying forested and agricultural land which can be conserved and serve as a buffer for new development. Limit or prohibit development on existing agricultural lands in order to protect valuable soils and ecological functions of farmland.
- Promote downtown redevelopment with a plan complete with ordinances and instruments to promote, incentivize, and guide future investments and population increase in the area. This instrument should be very transparent and publicly visible (e.g., through a website) to clearly communicate the potential for the prosperous development of the city centre.
- Promote higher density development by changing existing zoning downtown to include Mixed-Use with higher, minimum density requirements
- Expand the Urban Renewal Act to provide fiscal incentives for private developers to build housing in the downtown area, with the option to partner with the National Housing Trust in public-private partnerships (PPPs). Designate a Special Development Area downtown for these purposes.
- Launch a program to promote downtown Montego Bay as a "place to live," tying into the Vision 2030 Jamaica motto, "Jamaica, the place of choice to live, work, raise families and do business".
- Include in the plan an inventory identifying all buildings and sites of historic, scenic, architectural, and/or cultural importance that should be preserved and/or rehabilitated as landmarks.
- Incorporate climate change adaptation and mitigation and disaster risk prevention and management into legal and planning instruments.
- Incorporate measures and strategies for promoting or incentivizing "green" or eco-friendly features in development (e.g., use of non-fossil fuel energy, energy efficiency, LEED certification, green roofs, recycled materials)


THE CARIBBEAN SEA
MONTEGO BAY
Sangster International Airport
Flankers
Coral Gardens
Ironshore
Rose H
Paradise
Norwood
Salt Spring
Albion
Glendevon
Flower Hill
Montego Hill
Downtown
Brandon Hill
Downtown MoBay
Rosemount
Green Pond
Rose Heights
Mount Salem
Porto Bello
Catherine Hall
West Green
Rose Mount Garden
Catherine Mount
Fairfield
Irwin
Tucker
Friendship
Granville
Tower Hill
May Hall
Reading
Bogue
Retirement
Pitfour
2km
4km
6km
Scale 1 : 60,000
Urban Growth (trend)
LEGEND
Urban Boundaries
Urban growth 2030 (trend)
Downtown area
Open green space
Airport
Rivers
Local Road Network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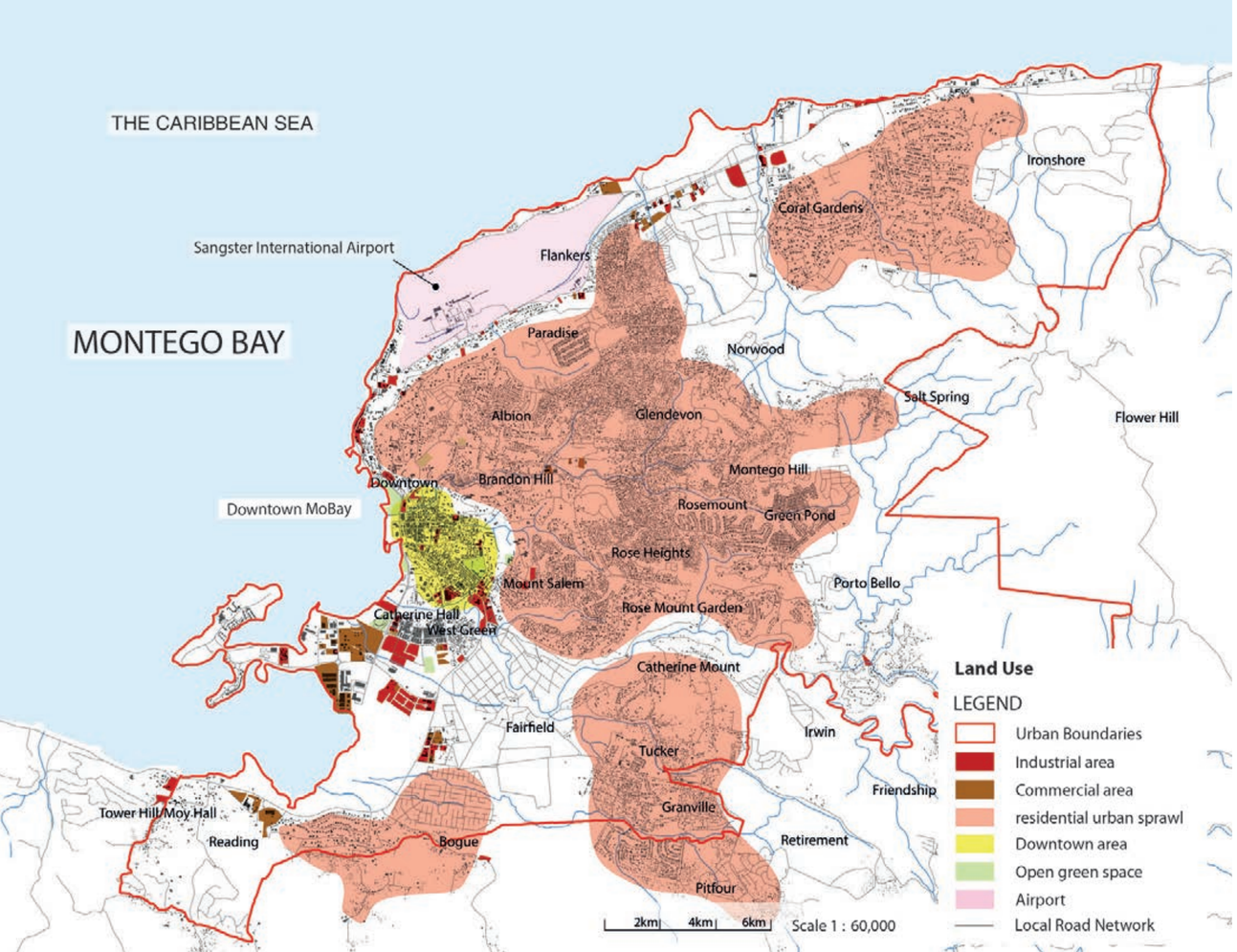
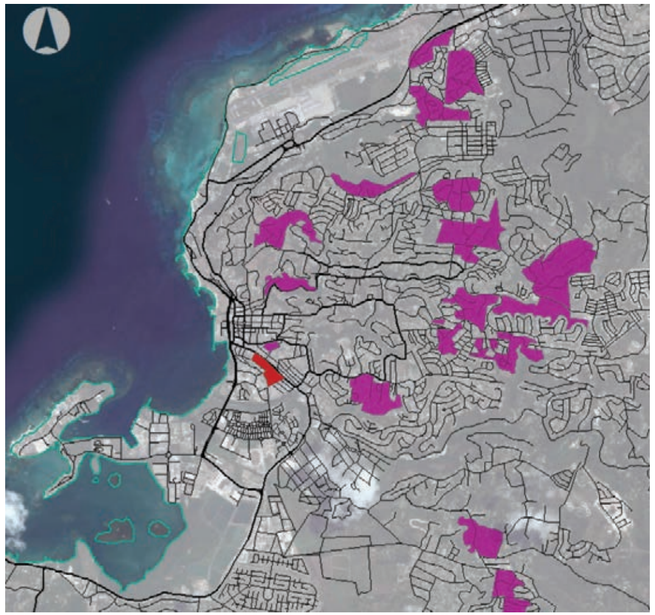
Flower Hill
Montego Hill
Downtown
Brandon Hill
Downtown MoBay
Rosemount
Green Pond
Rose Heights
Mount Salem
Porto Bello
Catherine Hall
West Green
Rose Mount Garden
Catherine Mount
Fairfield
Irwin
Tucker
Friendship
Granville
Tower Hill
May Hall
Reading
Bogue
Retirement
Pitfour
2km
4km
6km
Scale 1 : 60,000
Urban Growth (smart)
LEGEND
Urban Boundaries
Urban growth 2030 (smart)
Downtown area
Open green space
Airport
Rivers
Local Road Network





Montego Bay Informal Settlements:
19 informal settlements identified in pink, with the addition of Railway Lane, the location of the pilot downtown housing project, in red.

A2. Capacity Building and Training

In parallel with the preparation of the Development Plan, the SJPC's institutional capacity to plan, design and execute will be strengthened. In particular, the following activities will be undertaken:

- Strengthening the capacity of the SJPC to promote PPPs.
- Evaluation of the possibility of creating an Urban Growth Management Unit in the SJPC and design of an implementation strategy.
- Development and implementation of a communication strategy for the dissemination of the new Development Plan. Organization of exhibitions, symposia or other public events to promote the vision of a sustainable city.
- Connection of planners in Jamaica with the international planning and urbanism networks (e.g., American Planning Association, Lincoln Institute of Land Policy, or the New Urbanism Movement) in order to promote regional and international ex change of ideas, knowledge, practice, and experiences.

B. Integral Neighbourhood Upgrading Strategy and Pilot Downtown Housing Project

The city of Montego Bay is characterized by very extensive and low-density urban sprawl patterns in the west and northwest of the city centre. The leftovers of residential use downtown are mostly informal settlements in the area of Canterbury and at the corridors of Hart Street, Barnett Street, Barnett Lane and Railway Lane. A previous attempt to relocate the inhabitants of Railway Lane was unsuccessful. In that case an area close to the airport was specially designed for the new settlement, about 5 km from the original one. Although the living conditions were better, transportation costs associated with the new location were higher and residents lost the social support they had in their original surroundings. Therefore, most of the people returned to their original settlements.

This program aims to promote smart growth policies by increasing the resident population in the city centre by changing the existing zoning from commercial to mixed-use in order to provide a legal basis for residential use in the city centre and encourage higher density developments in already developed areas. It also aims to improve the living situation of vulnerable populations throughout the city, by providing them access to utilities and services and making them more re-

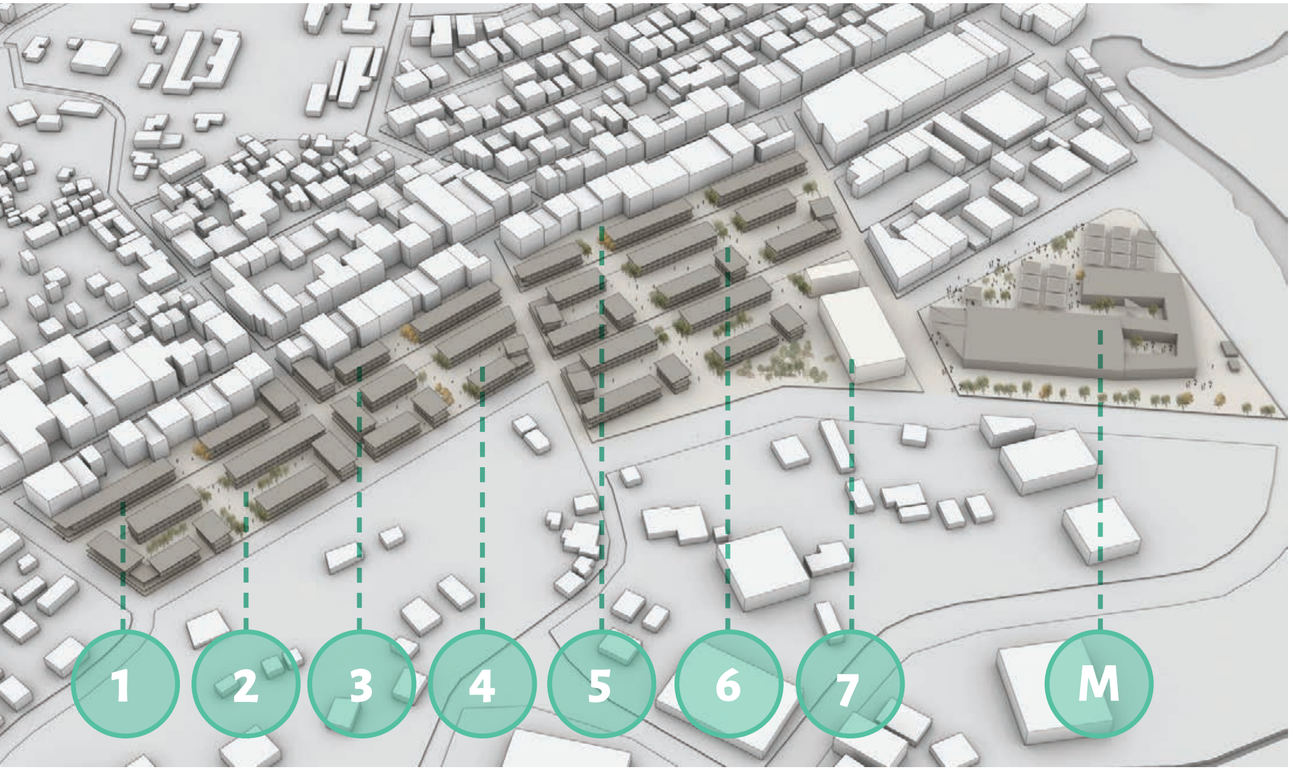
HOW TO INCLUDE THE COMMUNITY

DESIGN
Define an architectural project through 3 participatory sessions with the resident families:
1. community workshop for creating ideas,
2. preliminary design exercise,
3. definitive architecture design

TENDER
Organize an informative workshop where the actors and residents are informed about public subsidies and grants as well as the financial contribution of each family. Start bidding process for the construction works.

CONSTRUCTION
Temporary relocation of residents during construction (e.g., railway area) and establish construction committees for the shared spaces of each building site. Organize 3 participatory activities:
1. visit the building site,
2. workshops for extending the properties,
3. workshops for collective space

HABITAT
Support the families with the design of the extension of their homes. Organize technical workshops, social and cultural activities to support the community building process and explain to the families how to obtain a loan to extend their homes.



BLOCK 1
- 39 HOUSING UNITS
- FLOOR AREA: 1,2
- PLOT OCCUPATION: 0,4
- SEMI-PRIVATE GREEN SPACE: 1128 M²
- SEMI-PUBLIC GREEN SPACE: 445 M²
- BLOCK AREA: 2724 M²
- BUILT AREA: 1168 M²

BLOCK 2
- 71 HOUSING UNITS
- FLOOR AREA:1,2
- PLOT OCCUPATION: 0,4
- SEMI-PRIVATE GREEN SPACE: 1970 M²
- SEMI-PUBLIC GREEN SPACE: 756 M²
- BLOCK AREA: 4897 M²
- BUILT AREA: 2123 M²

BLOCK 3
- 36 HOUSING UNITS
- FLOOR AREA:1,0
- PLOT OCCUPATION: 0,4
- SEMI-PRIVATE GREEN SPACE: 1517 M²
- SEMI-PUBLIC GREEN SPACE: 436 M²
- BLOCK AREA: 2953 M²
- BUILT AREA: 1050 M²

BLOCK 4
- 61 HOUSING UNITS
- FLOOR AREA: 1,2
- PLOT OCCUPATION: 0,4
- SEMI-PRIVATE GREEN SPACE: 1503 M²
- SEMI-PUBLIC GREEN SPACE: 765 M²
- BLOCK AREA: 4171 M²
- BUILT AREA: 1800 M²

BLOCK 5
- 48 HOUSING UNITS
- FLOOR AREA: 0,9
- PLOT OCCUPATION: 0,4
- SEMI-PRIVATE GREEN SPACE: 2097 M²
- SEMI-PUBLIC GREEN SPACE: 1005 M²
- BLOCK AREA: 4511 M²
- BUILT AREA: 1505 M²

BLOCK 6
- 93 HOUSING UNITS
- FLOOR AREA:1,0
- PLOT OCCUPATION: 0,4
- SEMI-PRIVATE GREEN SPACE: 2801 M²
- SEMI-PUBLIC GREEN SPACE: 1556 M²
- BLOCK AREA: 7694 M²
- BUILT AREA: 2833 M²

BLOCK 7
- 71 HOUSING UNITS
- FLOOR AREA: 0,6
- PLOT OCCUPATION: 0,2
- SEMI-PRIVATE GREEN SPACE: 2398 M²
- SEMI-PUBLIC GREEN SPACE: 824 M²
- BLOCK AREA: 8173 M²
- BUILT AREA: 1788 M²

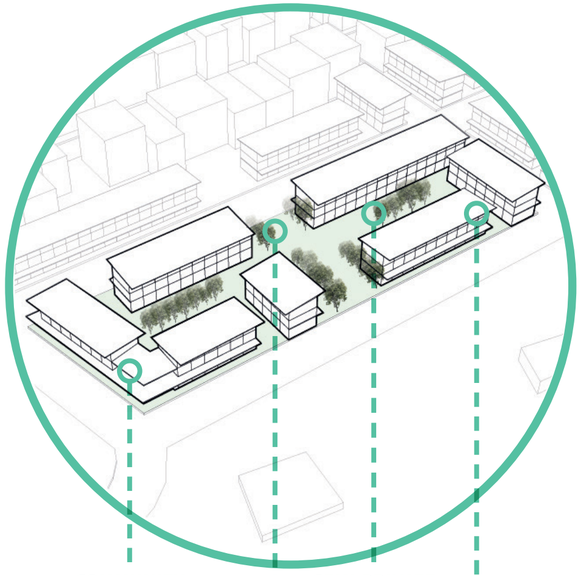
MARKET
- INDOOR & OUTDOOR MARKET
- RESTAURANTS & BARS
- GREEN INDOOR COURTYARDS & GREEN AREAS OUTSIDE
- NEW ROOF INSTALLATIONS FOR SHADE

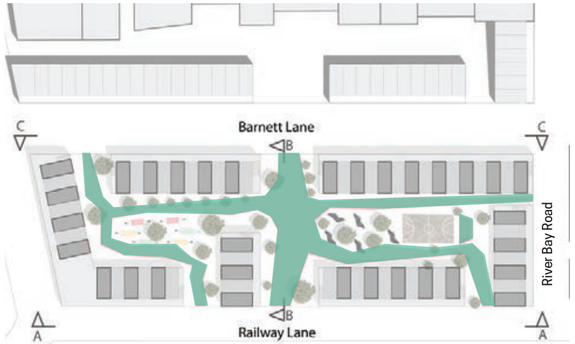
silient to disastrous weather events with structural improvements. Eco-friendly designs and crime prevention measures will also be built into the plan to make these communities more sustainable.

As a result, it is recommended the SJPC, in cooperation with the National Housing Trust (NHT) and the Urban Development Corporation (UDC), use a participatory approach to **devise and implement a comprehensive urban development strategy** for the upgrading of existing neighbourhoods in Montego Bay. The base studies (summarized in Chapter 5) allowed for the identification of 20 informal settlements in Montego Bay, and these communities should be the target of this strategy. The strategy, at a minimum, will incorporate considerations of land titling, resolution mechanisms for disputes regarding land ownership and improvements in the provision of public utilities. Some specific actions include the following elements:

- Establish a control system for informal settlements whereby new settlements will not be allowed to emerge and existing structures will be regularized
- Identify informal settlements and conduct surveys/censuses for data collection
  - Identify unsafe structures to be demolished
- Using participatory planning methodologies, identify solutions for low-income families, including the upgrade of informal settlements, in accordance with the land use policies of the city.
  - Work with community groups to obtain buy-in for regularization program
- Develop a special strategy for addressing high-risk situations in areas such as Coral Gardens, Fairfield and Catherine Mount. If needed,

Housing Block 2 Showcase



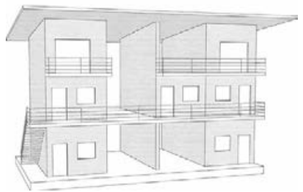


Urban Layout Block 2

INCREMENTAL HOUSING: KEY CONSIDERATIONS

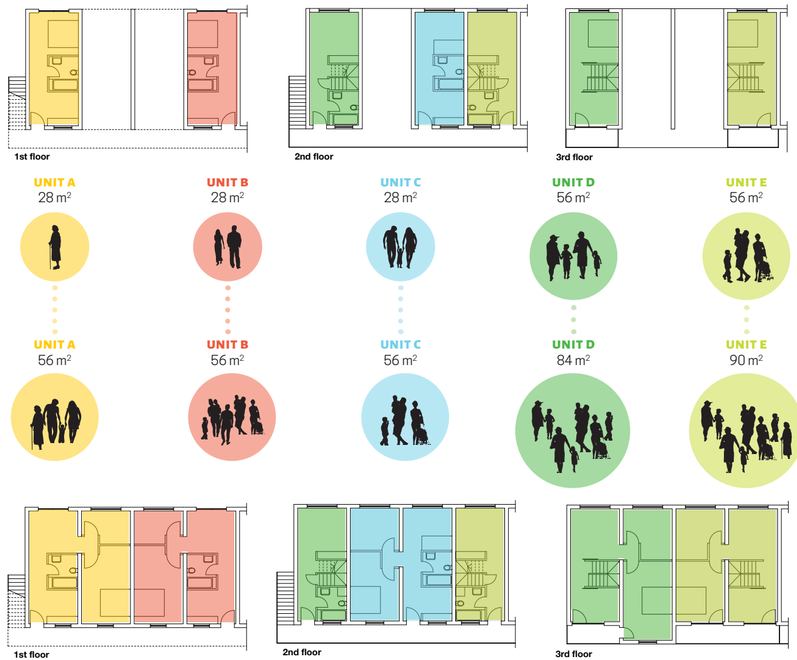
- housing infrastructure gets established
- residents can expand their housing units if needed
- community terraces for social interaction
- shared semi-private courtyards for residential community
- semi-public courtyards open for public with recreation facilities etc.

My Growing Home: The Extension Process

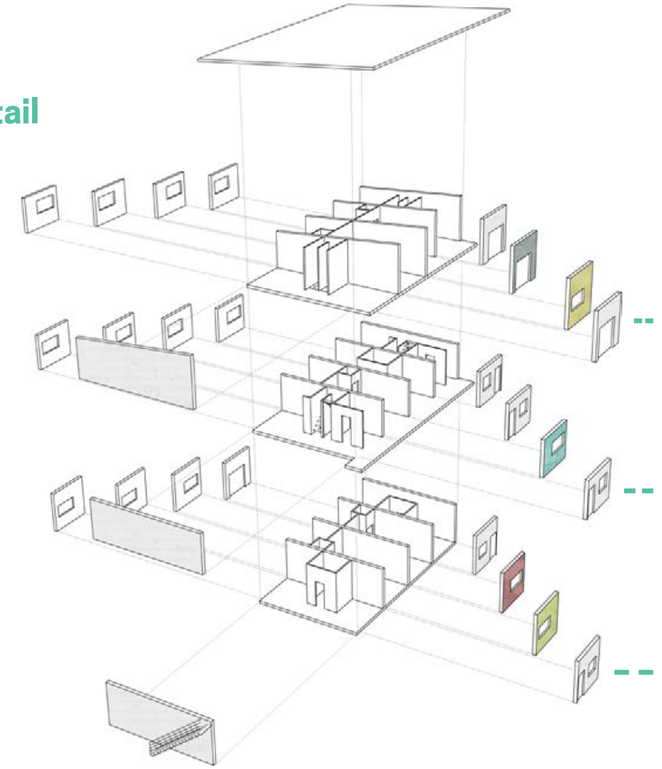


BASIC
BASIC HOUSING UNITS VARY FROM 28M² UP TO 56M²

EXTENDED
EXTENDED HOUSING UNITS VARY FROM 56M² UP TO 90M²



Detail



3RD FLOOR

upper level of 2nd floor units
accessed trough 2nd floor through interior staircase
extendable with/without balcony
shading through projecting roof

2ND FLOOR

3 extendable housing units
basic: 28m2, 2x 56m2 (duplex)
extended: 56m2, 84m2 (with balcony), 90m2
access through exterior staircase and balcony

1ST FLOOR

2 extendable housing units
basic: 28m^2
extended: 56m^2
shops can be integrated in first floor zone

provide relocation assistance to residents already living on steep, unstable hillsides.

- Determine order of priority for interventions
- Promote mixed-use areas/design as much as possible
- Identify existing housing programs and projects that can address the different needs of the city, while promoting investment in the city, social inclusion and mixed-used development, all in line with the Development Plan
- Receive direct input of local police leadership to maximise benefits of crime prevention through environmental design
- Strengthen sanitation and solid waste management by involving NWC, NWA, NSWMA/ WPM in planning process

  - make program contingent on service delivery by state agencies as well as payment by beneficiaries for the services.

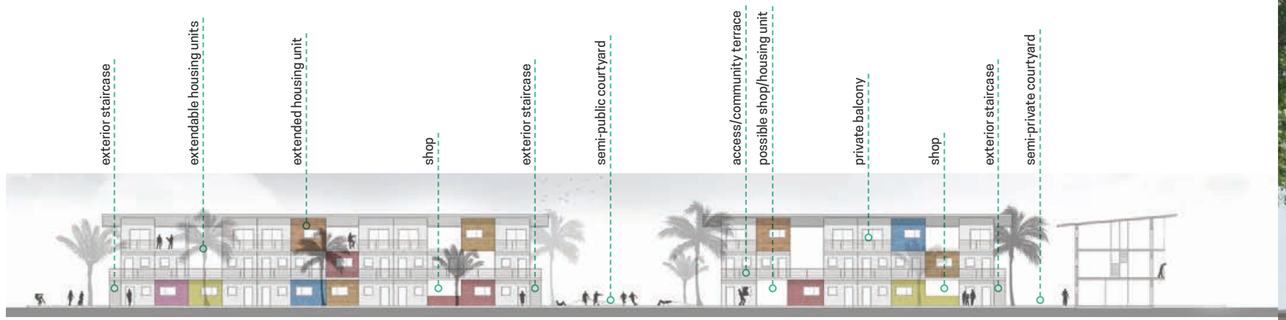
As a first **pilot project** in the downtown area, the NHT together with the UDC will develop the informal settlement at Barnett and Railway Lane. The following actions are proposed as part of the development process:

- Collect information about the existing situation of the settlement (families living there, condition of homes, etc.)
- Clear the situation of property rights and, if needed, purchase the site.
- Organize an inclusionary neighbourhood development and participation process based on cultural activities with the community.
- Collectively design a social housing project, if possible by using the existing parcel-structure of land. It is estimated that it is possible to build 419 housing units on the existing block structure.

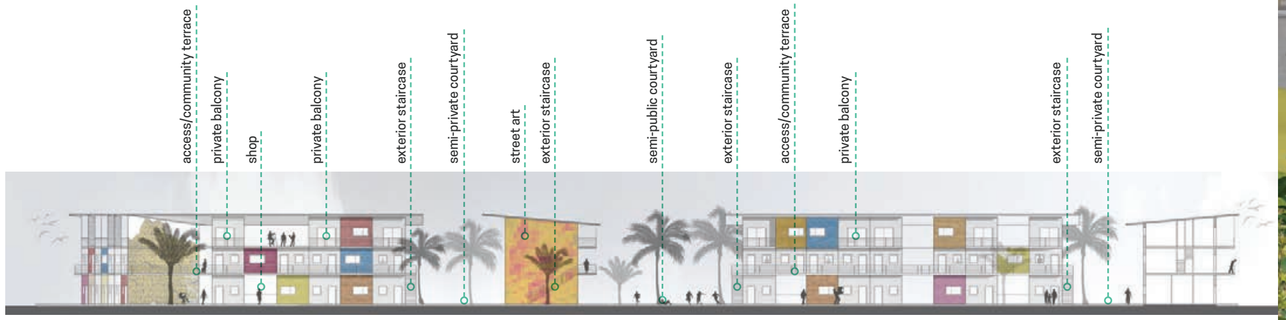
The proposed conceptual plan, shown here, would increase public space in the city while providing a safe and quality place to live for hundreds of people in vulnerable situations. The plan proposes the provision of incremental housing units for families, which are an economically feasible option that allow families to grow their home with their family as needed. Aside from housing, the community will be landscaped and designed with quality outdoor spaces, both semi-private and semi-public. The community infrastructure will also be updated, with necessary improvements made to streets, sidewalks, and infrastructure to include anything from street lighting to sewage system connections. For this program to be sustainable, it must use a participatory process which offers a sense of ownership within the community, and also be paired with public education campaigns, described in following sections, which promote community living which is safe, clean, smart, and active.

As part of the overall neighbourhood upgrading strategy, this pilot project will also include a design for the proposed renovation of the Charles Gordon Market. This Market is an important landmark for the city but also a central node for the Railway Lane community. A description of its proposed revitalization project follows in the next section.

Sections



Section A: View On Facades From Viewpoint Of Railway Lane



Section C: Facades From Viewpoint Of Barnett Lane

C. REVITALIZATION OF CHARLES GORDON MARKET

Markets are traditionally the economic backbone for people with low incomes in Montego Bay. The main market, the Charles Gordon Market, is a very well visited market facility and, with its 2.2 hectares, is the largest market in the area. On weekends, especially, the streets around the market are really busy. This market also serves as a wholesale for hundreds of small vendors who sell fruits and vegetables with their traditional wooden pushcarts in the downtown area. The Charles Gordon Market is divided into three sectors: the market hall, the open-air market and the wholesale market.

The market's main problems are a lack of fresh air circulation in the main hall and structural degradation. These issues limit the markets' use and attractiveness to vendors and customers. This problem does not allow the market facility to maximize its utility, evidenced by the fact that only two thirds of the market hall is occupied; the rest is vacant or cannot be used. The vendors complain about the neglected state of the market, especially the rentable storage boxes. Another issue is that the wholesale section is not divided from the rest of the market, which causes some friction between the sellers, wholesalers, and street vendors. Crime has become an issue, leading some vendors to live in the boxes to avoid mugging and stealing.

Although some important improvements have been made, this public market would benefit from additional revitalization and upgrading, with better infrastructure for both sellers and customers. In order to achieve this goal of renovating the market, the SJPC will conduct the following activities:

C1. Revitalization concept

• **Design:** Develop a conceptual design for the market which includes the following elements:

- Separation of wholesale and retail vendors at the open-air market

- Redesign of the entrance areas and creation of a spacious entrance area with an interesting landscape design.

C2. Implementation

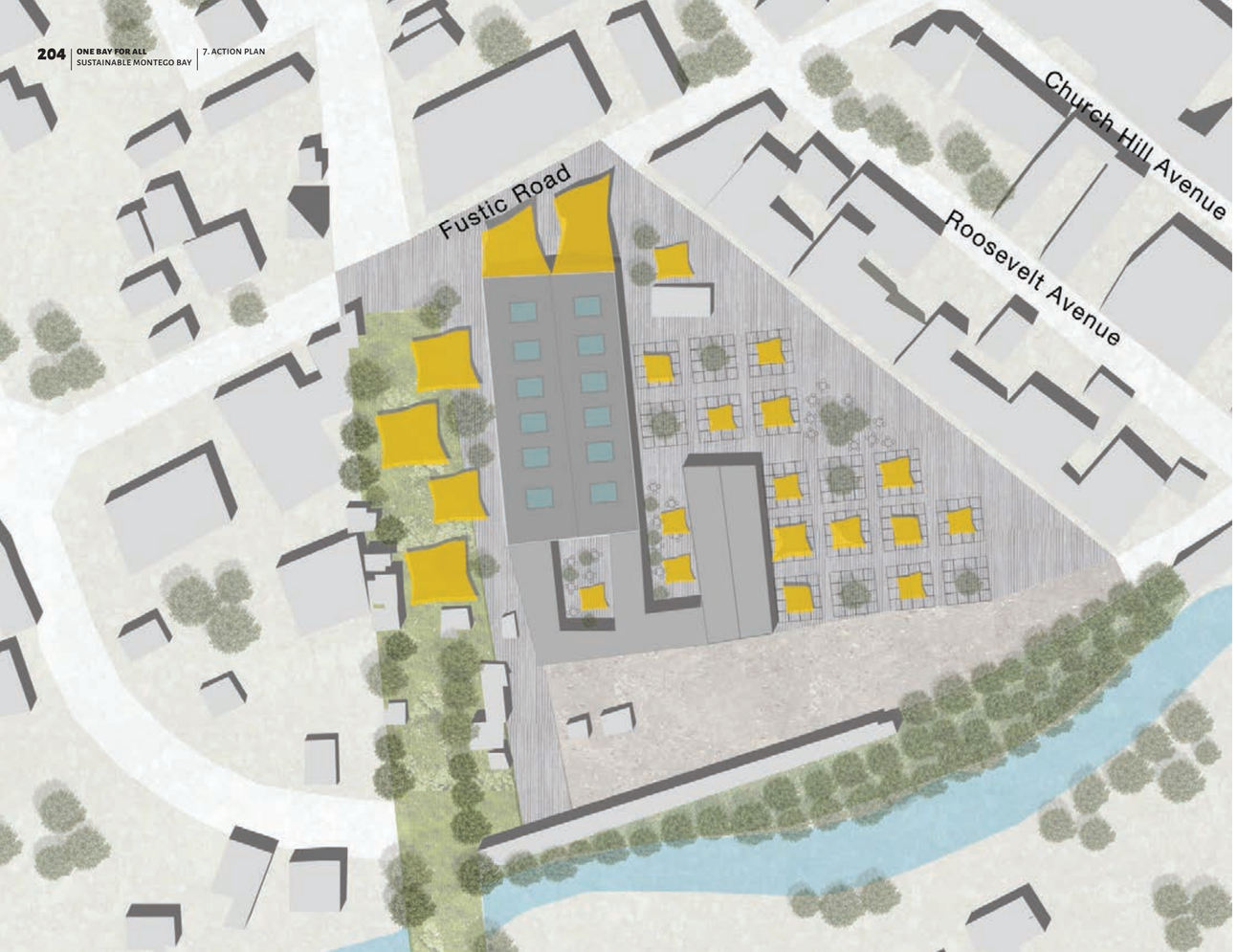
• **Better facilities and amenities:** Modernize the main-façade, the roof, hygiene facilities, administration area, waste management and security.

- Incorporate short term conceptual design elements into rehabilitation of market

- Elaborate an architectural design based on a participatory planning process that includes both the sellers and the market authorities.

• **Image:** Establish a marketing concept to create a positive image of the market. Organize pushcart vendors as cooperatives and include them as a positive image in the urban core of Montego Bay.

• **Safety:** Implementation of new design separating uses and improving aesthetic quality through structural upgrades and landscaping. The new design should include creation of safe, central storage for pushcarts in the market, which should be administrated by the Market Authority.



D. CLEAN AND GREEN INITIATIVE

Insufficient waste collection, lack of appropriate receptacles, and lack of public awareness contribute to dumping waste in inappropriate areas and littering. These practices result in a degradation of the aesthetic quality of the environment, the proliferation of vectors, pollution of the ocean via gullies, and hazardous sanitary conditions.

Concrete garbage receptacles in the town are inappropriate, in disrepair, and are poorly maintained. The improper containerization and disposal of waste places a strain on the already stretched resources of WPM Waste Management Ltd. (WPM) as it usually takes longer to collect garbage where it is not properly contained. Business and commercial entities, especially older food establishments and supermarkets, in downtown Montego Bay do not have proper temporary storage facilities for garbage, instead dumping their waste directly in the streets in front of their establishments, with the expectation that it will be collected that day. This practice encourages rats and flies and creates an aesthetically displeasing environment. The SJPC, through the Local Health Department, is working toward ensuring that new facilities make accommodations for proper waste storage until collection.

Illegal dumpsites create an inefficient situation for the WPM, as special operations are required to clear them and residents and commercial entities often return to deposit waste at these sites after they have been cleared. Several informal communities are situated along major gullies that convey storm water to the sea. These gullies receive large quantities of solid waste consisting of garbage and (bagged) faecal matter[65]. Despite several clean-up programs sometimes involving members of the communities, the problem reoccurs. Importantly, if the drain is not cleaned of the solid waste regularly, particularly before each rainy season, the free flow of water to the sea is obstructed, resulting in flooding in some areas and the choking of the outlet to the sea thereby endangering marine life.

Due to these shortcomings across the waste collection and management system, and the lack of public awareness, littering and illegal dumping are a major problem for the city. This has impacts not just on the aesthetic quality of Montego Bay, but also has ripple effects into citizens' sense of pride of place, environmental degradation and pollution, and even public health issues. The following actions can help revitalize the city and its image.

D1. Provision Of Receptacles For Litter In Public Spaces And Informal Communities

A clean city is a city one can be proud of, and with the addition of appropriate types and numbers of litter receptacles in strategic places throughout the city, including public spaces, commercial and retail establishments, and informal settlements, this can be achieved. A survey shall be conducted to identify best locations for receptacles, and a design made for the containers that allows ease of emptying yet resistance to vandalism and scrap metal theft.

This program to clean up the city should be done through a partnership between public and private sectors. Social corporate responsibility should be encouraged, with Kingston serving as a model, where organizations can "adopt-a-street" and be responsible for its regular maintenance and clean-up. Commercial entities can also sponsor programs to donate/provide drums as garbage receptacles for the residents in informal communities and rural areas to replace the inappropriate receptacles currently being used.

Metal skips are also required at locations that act as collection points where access by waste collection trucks is not possible. Skips will also replace concrete receptacles in the city since they are easier to manage and will improve operational efficiency. The receptacles will be emptied regularly, as coordinated in the consultations described in the Section 7.4, so that they do not develop into unsightly and unsanitary dumpsites. A public awareness and education campaign, described later in this chapter, will accompany these efforts. This simple yet impactful intervention will greatly complement the other short-term revitalization efforts downtown: it will enhance the cleanliness of the city and its waters, and improve the ease and efficiency of waste collection everywhere.

D2. Transformation Of Illegal Dumpsites

Illegal dumping throughout the city is a challenge that will be alleviated by the provision of proper waste containers in conjunction with the transformation of illegal dumpsites. Once all of the sites currently being used for illegal dumping of waste are identified, they will be transformed through beautification projects to prevent future misuse. A targeted education program will be implemented to further this effort, by identifying sources of garbage and offering information on legal disposal options and the penalties for illegal dumping.

An example of such a project would be the creation of rock gardens bearing messages promoting a cleaner city in areas that have traditionally been used by commercial entities for the placement of their waste on the sidewalks. Small beautification projects such as these could serve as tiny pocket parks improving the aesthetic quality of the city while also eliminating unsightly dumping sites. In conjunction with the provision of new waste receptacles as described in the previous section, these illegal dumpsites would no longer be needed and simultaneously add value to the city through their transformation.

Citizen engagement is key for the success and sustainability of this project. Community groups and commercial establishments will be mobilised to participate in the beautification projects and be involved in the maintenance of the areas to prevent future illegal dumping. The short-term rollout of this project will begin in key downtown areas complementing the other

65. The north gully is the main storm water drain that is so affected. This gully extends for over 32 km from the community of Green Pond and is fed by drains from other areas. Solid waste from a number of marginal and informal communities including Rose Heights ends up in this gully.

interventions, gradually spreading across the city in the long-term as more partnerships with commercial entities and community groups are formed.

E. DOWNTOWN WALKABILITY PROJECT

Sam Sharpe Square has the potential to become an important attraction in Montego Bay. As the main square of Montego Bay's downtown, it offers much needed public space and is home to the city's Cultural Centre. However, it is a vehicle-dominated space, which compromises its quality and the level of enjoyment for it users. Increasing pedestrian connectivity in the area could significantly decrease motor vehicle traffic volumes and encourage more people to walk in the city. If Sam Sharpe Square is renovated and converted into a vehicle-free zone, it will become a significant and appealing gathering place in Montego Bay.

The long term vision of this intervention is to create a pedestrian-friendly corridor which links the most important spots in the city centre: the Hip Strip, Fort Montego Bay, the public library and KFC, North Gully Bridge, Sam Sharpe Square, Transportation Centre, Barnett Street and Railway Lane, and Charles Gordon Market. An integrated urban design plan will be developed and implemented beginning with the area around Sam Sharpe Square. The goal for these corridors is to increase accessibility for pedestrians (and other modes of non-motorized transportation) by creating a shared space for pedestrians and cyclists on homogenized surfaces, with shading and adequate green spaces to complement the design. Other important actions are:

- Close Railway Lane for individual car traffic and renovate the road surface
- Initiate a public safety program, including increased police presence and community watch groups
- Install eco-friendly street lighting with solar technologies for a safer pedestrian environment
- Include communities in a comprehensive planning process

The Urban Development Corporation (UDC), together with the National Works Agency (NWA), will implement the project in three phases:

- Pilot Project: As a testing phase, temporary pedestrianization of the area bound by Strand Street, Church Street, Orange Street and Union Street by using paint for the public space.
- Phase 1: Definitive Pedestrianization of the area targeted in the Pilot Project
- Phase 2: Pedestrianization of the same area, but with the boundary expanded to include St. Claver Street and Creek Street.

Further expansion of this project to link all key points will require an assessment of traffic conditions as a result of the pilot project and initial phases. A successful plan for pedestrianization should be comprehensive, coordinated with the Sustainable Mobility Master Plan (see Section 7.4), and take into account the types of business that would be appropriate for pedestrian traffic. The updating of the Development Plan should consider these impending needs.


Hip Strip
Old Hospital Park
Boardwalk
Integrated Waterfront Park
Public Library
Transportation Center (North)
Montego Bay Cultural Centre
Sam Sharpe Square
Shoes Market
Pier 1 Restaurant
Transportation Center (South)
Integral Waterfront Park
Railway Station Park
River Bay Fishing Village
Charles Gordon Market
Catherine Hall
Queens Drive
Gloucester Avenue
Union Street
Creek Street
Barnett Street
Cottage Road
Barnett River
Canterburry
Informal Settlement
Hart Street
Informal Settlement
Railway Line
Informal Settlement

F. REHABILITATION OF HISTORIC LANDMARKS

The Jamaican National Heritage Trust (JNHT) lists 22 buildings in the St. James Parish, of which 10 are located in downtown Montego Bay. Jamaica's rich architectural history is demonstrated in its historic churches, forts, homes, and other buildings dating back to the 1700s. All of these historic and architectural landmarks are under monument protection, however, their potential as monuments is not being fully exploited. Some buildings are used as office space, tourist shops, or are vacant. The Rehabilitation of Historic Landmarks Project aims to preserve these landmarks and proposes the revitalization of heritage sites in order to support local identity and create new sources of income for the people of Montego Bay.

The JNHT will work with private sector partners to carry out the following main actions:

- Design a rehabilitation project of Historic Landmarks in Montego Bay as a PPP model including the local tourism and hotel sector.
- Assess all historical buildings and include buildings from the modernism period.
- Design a strategy for the revitalization of landmarks; propose new uses for these buildings, such as museums or cultural centres. Restore buildings to their original condition and make them enjoyable for locals and tourists. For example: excavate "The Dome", built in 1837 to provide drinking water for the city from underground springs, and create a small adjacent park.
- Establish a marketing strategy for the landmarks. Include the creation of a heritage walking trail throughout the city with signs, maps, and descriptions accompanying the monuments.
- Include communities and schools in the development process in order to strengthen local identity.

These revitalization actions comprise a strategy to transform Montego Bay into a sustainable city full of vitality for all to enjoy. In summary, these interventions aim to: (i) update the Parish Council's existing urban planning instruments, especially for the city centre; (ii) improve walkable connectivity while decreasing traffic and reducing greenhouse gas emissions; (iii) revitalize the city centre and renovate its housing stock while reducing hazard vulnerability and fostering citizen engagement; (iv) rehabilitate and restore the built cultural heritage and the central market; and (v) improve and increase public and green spaces, including through better sanitation practices.

RECONNECTED

The ESC Initiative is the catalyst that will make Montego Bay be reconnected by the year 2030. A reconnected Montego Bay is one that re-establishes connections, both tangible and intangible, between people, places, services, information, and employment. Doing this requires reconnecting people with places through better mobility and an improved transport system; reconnecting people with people by facilitating dialogue and cooperation amongst key agencies and organizations involved in various social, environmental, and economic services and programs to improve service coordination; reconnecting people with services through program and service development and expansion; reconnecting people with information through public awareness campaigns and programs to better disseminate public information and data; and reconnecting people and youth with employment through improvements in education, training and job programs.

By enhancing equality of access to better life opportunities through improved services and programs, information availability, mobility options, and job opportunities, Montego Bay can be a city for all to enjoy now and into the future.

RE·CON·NECT·ED:

BROUGHT TOGETHER OR INTO CONTACT AGAIN SO THAT A REAL OR NOTIONAL LINK IS ESTABLISHED; JOINED TOGETHER AGAIN; REESTABLISHED A RAPPORT; JOINED OR FASTENED TOGETHER AGAIN, USUALLY BY SOMETHING INTERVENING; ESTABLISHED IN RELATIONSHIP AGAIN.

PLACES

An unsustainable and inefficient transport scheme hinders Montegonians from easily reaching jobs, schools, hospitals, recreational activities, beaches, parks, etc. Despite being a small city, Montego Bay already suffers from significant traffic jams, particularly during the morning, midday and evening peak hours in the downtown area. In a laissez-faire scenario, this situation would worsen in the future given fixed street space and the projected increase in population size and number of vehicles. Hence, addressing mobility in a sustainable manner is imperative.

Among critical mobility issues are the lack of both a public bus transport network and adequate pedestrian spaces. The local public transportation system consists of route-taxis only, some of which are run illegally. A formal local bus system does not exist. As of January 2014, the Jamaican Transportation Authority had licensed 2,897 route taxis in Montego Bay, which ply along 81 routes. Most of them have downtown Montego Bay as their destination, though they can be flagged down when needed and taken to almost any location in the city.

A properly designed public transportation system and the introduction of bus routes to efficiently serve the communities will meaningfully improve the quality of life of residents by reconnecting them with desired locations, contributing to public order and reducing the congestion in the city. A properly regulated transportation system with environmental standards with regard to both emissions and fuel use could serve to reduce future air pollution and greenhouse gas emissions from local sources.

A1. Sustainable Mobility Master Plan

The establishment and implementation of a Sustainable Mobility Master Plan will be the foundation of better mobility for Montego Bay's residents. The objective of this plan's policies, programs, and actions will be to promote the use of sustainable transport modes (walking, biking, and public transportation) that reconcile economic, environmental, and social issues, with the result of improving the quality of life of citizens. The vision of this master plan is to decrease individual car and route-taxi traffic in the city and decongest the downtown area in order to improve the quality of public spaces. Decongesting downtown Montego Bay is a precondition to implementing the Downtown Walkability Project, which is described in the previous section. This is why special attention will be given to the downtown area, to set the pillars of an organized and efficient integrated public transport system, and ensure access to mobility for the entire population, especially the most vulnerable or the disabled.

The National Works Agency (NWA) will conduct the following activities while developing the Sustainable Mobility Master Plan:

- Assess transport supply and demand and their interaction, and pinpoint institutional, financial, regulatory, and land use issues related to mobility in Montego Bay.
- Carry out an origin-destination analysis and compute a simple Transport Model for Downtown Montego Bay.
- Develop a scheme for the spatial reorganization of the current location of taxis stands and bus stations.
- Organize the licensing of concessionaires through the Transportation Authority. In parallel, seek alternatives in order to reduce taxi licenses on those routes that will be served by buses.
- Subsidize or incentivize the purchase of fuel-efficient and environmentally friendly buses, while creating the appropriate corresponding infrastructure at bus stations.

A2. Development and Construction of an Intermodal North Transportation Hub

The Urban Development Corporation (UDC), in partnership with the SJPC, NWA, and NEPA, will consider the construction of a north transportation centre to complement the existing transportation centre to the South. This will consolidate taxi stands in the North, improve system efficiency, and balance service throughout the area. This new transportation centre will be located close to North Paradise Street and near important buildings of public interest like the Public Library, the Court House and the Post Office. This location may also benefit from the public parking lots owned by the SJPC, which can be included in the design of this project to create a more spacious and accessible transportation hub.

Key aspects of this intervention include the following:

- Development of a strategy for, design, and implementation of a new Intermodal North Transportation Hub
- Reorganization and/or separation of route-taxis from regional buses
- Redesign and clean up of the surrounding public spaces and sidewalks, to include more shade, small restaurants, and enjoyable open green space. Converting the area into an attractive pedestrian and user-friendly environment will increase customer comfort.

The concentration of public transport at the Intermodal North Transportation Hub together with the existing south transportation centre will significantly reduce vehicular traffic in the downtown area, thereby making a car-free and revitalized Sam Sharpe Square possible.

KEY GROUPS

B1. Interagency coordination between key groups for climate change resilience

In order to stay abreast of best practices in reducing vulnerability, building resiliency to natural and man-made disasters and adapting to climate change, consultation will be arranged between stakeholders at the local, national, regional, and international levels, to include government agencies, private organizations, community organizations and NGOs. Through the sharing of knowledge and experiences and the coordination of efforts, Montego Bay can enhance its ability to better plan for, adapt to, mitigate, and respond to natural disasters and climate change.

B2. Consultations between the Parish Council and service delivery entities

Solid waste management and sewage treatment in Montego Bay suffer from several major issues, including insufficient interagency coordination. The various agencies involved in ensuring a clean and sanitary Montego Bay have overlapping and complementary responsibilities. Because of this, effective coordination between these agencies is essential for the success of any solid waste management program in the area. At this time, communication is not smooth and the working relationship is not at the optimum level.

A series of consultations will be held between the Parish Council, the local Board of Health, the WPM, the National Water Commission (NWC), the National Works Agency (NWA) and the police to address service delivery issues as well as the social, governance and enforcement issues affecting the public's compliance with requirements for solid waste management and sewage treatment and disposal. A sustained and coordinated approach is necessary.

The consultations will cover the key sanitation topics and actions as identified throughout this chapter. A detailed strategy will be agreed on, possibly in the form of a Memorandum of Understanding (MOU) with milestones.

B3. Strengthen coordination mechanisms for crime prevention interventions.

Public safety remains a major concern for Montegonians, especially in the past decade, as rates of violent crime have continued to rise. Ranked as one of the most violent cities in the world, Montego Bay has a crime and safety problem that extends beyond the local to the international sphere, broadcasting a damaging image for the city and causing negative impacts on the economy. Notwithstanding, there is tremendous work being undertaken by a variety of actors to reduce crime and improve public safety in the area. Government social interventions target the most vulnerable communities for service delivery, private sector groups provide on-going material support to the police and civil society groups seek to promote pro-social behaviours among vulnerable populations. Indeed, local philanthropists commonly fund and implement anti-crime initiatives at the micro-level. However, these efforts are often done independent of other initiatives and there is no document or institution that coordinates these efforts.

There are several interventions that operate with various degrees of overlap. This situation contributes to an unequal allocation of limited resources. For example, six private and public sector organisations currently work in the community of Flanker while vulnerable communities with similar or more serious levels of crime receive less attention. These overlaps also hinder a fluid response to developing crime trends, as it is difficult for established programmes to divert resources away from current projects given sunk costs.

For the coordination to work in a short time frame, stakeholders in the government, private sector and civil society will recognise other actors as equal partners in the fight against crime and the promotion of public safety. The MLGCD is set to implement a Parish Safety and Security Mechanism (PSSM) for St. James that draws on the strengths of the Parish Council, PDC, St. James Policing Division (SJPD), Citizen Security and Justice Programme (CSJP) and the Montego Bay Chamber of Commerce and Industry (MBCCI). Each body will have the capacity required to mobilise its resources and constituents as well as share information on the progress and results of local efforts. Likewise, the MLGCD will also devote the resources necessary to convene and lead this planning and oversight group.

Specific Actions:

B3.1. Develop Local Government Capacity to Lead Multi-stakeholder Crime Prevention Group

The MLGCD will establish a secretariat to support the development and operation of the PSSM in Montego Bay. The secretariat will be staffed by a senior or mid-level local government official and, in the initial instance, undertake enlisting the participation of CSJP, SJPD, MBCCI in keeping with the Terms of Reference.

The MLGCD will compile relevant information on all local crime prevention and public safety interventions and store in a central repository within the PSSM secretariat. This repository will preserve information on the scope, objectives, resources and timelines for relevant programmes and projects at the parish, municipal and community level. The information will be stored in an easily retrievable format to accommodate public access. Data from this repository will be used to monitor these interventions and guide PSSM deliberations on the proper allocation of resources.

The MLGCD will design the proper mechanisms to facilitate communication and policy discussions between the municipal and national governments on crime and public safety. Where local priorities require a policy response at the national level, the MLGCD will clearly articulate the approach that local stakeholders will take and ensure that dialogue occurs in a timely manner.

B3.2. Cultivate Stakeholder Participation in Multi-stakeholder Crime Prevention Group

The ESCI will organise study visit(s) for local stakeholders to municipalities in the Latin American and Caribbean region with successful models of multi-stakeholder

coordination for crime prevention. Local stakeholders will learn good practices for maintaining healthy working relationships among council members and promoting transparency and accountability for council decisions.

The SDC, CSJP, Community Renewal Programme (CRP), and Unite For Change Initiative (UFC) all offer community governance training and this will be fully utilized in support of local civil society initiatives. These agencies will provide training to civil society stakeholders affiliated with the PSSM in grant writing, monitoring and evaluation, and collaborative problem solving.

B4. Develop a Local Anti-corruption Initiative

Over the past few years agents of the state in St. James have suffered from negative publicity arising from several cases of alleged corruption. The JCF in particular has implemented a number of measures to address real and perceived corruption among the rank and file. Still, the current level of trust among key stakeholders in the public and private sectors is less than desirable and requires a collaborative approach to build local consensus on remedial steps for reducing corruption. The National Integrity Action organization (NIA) is a group that enjoys widespread support in its fight against corruption in the island. The Parish Council, through the PSSM, will forge a partnership with the NIA aimed at formulating and implementing a comprehensive anti-corruption drive for Montego Bay. This drive will include public sensitization to reduce tolerance towards corruption; a review plan for local government business practices and oversight mechanisms to improve transparency; and a mechanism for measuring and communicating progress to key stakeholders.

INFORMATION

C1. Public Awareness Campaign on Hazards, Vulnerability, Climate Change and Risk; and Community Preparedness Programs

A public awareness campaign on hazards, vulnerability, climate change and risk, and their impact on the environment and local economy will be implemented by the SJPC through PDRMU in partnership with the private sector (Montego Bay Chamber of Commerce), ODPEM, UDC, MLGCD, and the Ministry of Education. The campaign will promote best practices and disseminate the existing hazard and risk information using appropriate tools for different social groups. It will build on existing community preparedness programs that are currently under implementation, expanding to a broader program that addresses disaster risk in the context of an integrated approach to environmental management and sustainable development. It will focus on vulnerability mapping for natural and man-made hazards, safer and more resilient building design and techniques, effects of deforestation and climate change, ecosystem importance and protection, solid waste disposal, etc. A long-term goal will be to train communities in disaster risk management and implement a Building Resilient Communities Program. Target groups include the SJPC, public sector agencies, the private sector and vulnerable communities.

C2. Public Education Campaign on Sanitation

Public behaviour is influenced by the incentives and alternatives available; simultaneously, the habits of the population influence the success of any government intervention, with people often continuing behaviour until they are made aware that a more advantageous one is

available. For this reason, it is essential that the other sanitation-centred actions be conducted concurrently with a public education campaign. Upon the launch of the Action Plan, an initial, intense public education campaign will be carried out for a period of at least 18 months. The continuation of public education messages over the long term should be implemented, reminding citizens how to contain their garbage properly for collection and to avoid littering and illegal dumping. The campaign should relate to the following subject matters:

- Solid waste management. This campaign can include the current Clean Schools Competition that the NSWMA currently has. Incentives can be given to the best-kept communities.
- No littering.
- Payment of water and associated sewage bills.
- The correct type of on-site sewage treatment and disposal systems for residential premises.

C3. Establishment of a help desk regarding on-site sewage treatment and disposal options

Inadequate and inappropriate on-site sewage treatment and disposal systems constructed in informal settlements pose great risks and are a major concern in Montego Bay. Informal settlers do not submit their building plans to the Parish Council so there is no opportunity to regulate the suitability of proposed on-site sewage systems. The on-site sewage disposal systems are oftentimes undersized. Dwellings in informal settlements tend to start with one room and a small shallow absorption pit constructed for sewage disposal. When the house is expanded to several rooms, the pit is not upgraded accordingly. There are even cases when the pit ends up underneath the expanded house. Since Montego Bay is hilly, this practice where the pits are undersized causes sewage to run downhill from one property to another causing strife between residents. Since these settlements are informal, there is often not enough space to expand the pit or install another appropriate treatment and disposal system. In some cases a pit should never have been constructed due to unsuitable soil conditions.

Many people constructing dwellings are not aware that the Public Health Department no longer approves absorption pits as a form of on-site residential sewage treatment and disposal. They are also unaware of the options that are available to achieve the same objectives. Once a host institution is identified to start and run the help desk, an online help facility, brochures, and a physical desk with personnel who can provide guidance will be established. The help facility through these media will provide guidance on sewage treatment and disposal options and direct people to where they can obtain professional guidance. The facility will also provide information on legal requirements and standards that are to be met.

C4. Support for enforcement of sanitation laws

Littering, illegal dumpsites and improper sewage disposal are all breaches of existing laws, yet enforcement of these laws remains a challenge, which limits the proper management of both solid waste and sewage. The responsibilities of the Public Health Inspectors include monitoring solid waste and sewage disposal, sometimes to include confiscation measures, to ensure that health standards are met. They determine the appropriateness and adequacy of the design of sewerage treatment systems and solid waste storage and containerisation mechanisms. The Municipal police's responsibilities include enforcing litter regulations and protecting the Public Health Inspectors when needed.

The cadre of Public Health Inspectors has not kept pace with the rapid growth of Montego Bay. An initial increase in the number of Inspectors of at least 50% is required to give good coverage. The low overall numbers presents a particular problem when conducting inspections in high crime areas, where up to ten Inspectors go into these locations at a time for safety. This places a severe strain on resources. Financial constraints also limit resources, like the provision of a pick-up vehicle for food confiscations, and the number of facilities that Public Health Inspectors can travel to inspect. This means that for locations far from base, sometimes only two establishments can be visited, well below the number that really need to be covered.

Fines levied against perpetrators are intended to be a deterrent to littering and could be a revenue stream while at the same time promoting behaviour change. The Public Health Inspectors note that the Municipal Police that accompany them on enforcement actions (in high crime areas) are sometimes more aggressive compared to the approach of the Public Health Inspectors, who in addition to taking enforcement action also take the opportunity to educate the offenders. The Public Health Inspectors would prefer a more tempered approach especially since they have to go back to many of these communities on their own.

To address these issues, the following actions and initiatives will be taken:

- Refresher training for the municipal police: In conjunction with the training program, diligence in the enforcement of sanitation laws will be systematically recognized and incentivized.
- Scholarships for students pursuing a career in public health inspection: Scholarships will be offered to students of environmental health or similar field who agree to work as Public Health Inspectors in St. James after graduation.

Furthermore, as a long-term goal, a dedicated vehicle for the local Health Department will be procured. A vehicle, such as a pickup van, is required for the Public Health Inspectorate to facilitate the transportation of confiscated food products to the municipal disposal site, as it is not appropriate for some of the confiscated products to be transported by personal employee vehicles.

C5. Promote Collective Efficacy in Crime Prevention

Though the preferred unit for social interventions in Montego Bay is the community, there is work to be done at the city level. Montego Bay's reputation has suffered both nationally and internationally due to challenges with local organized crime and rehabilitative work on the city's image is necessary to encourage continued competitiveness for capital investments and residential choice. All Montegonians will feel a sense of collective efficacy in facing these challenges and making the city safer. A city-wide public awareness campaign aimed at instilling local pride, fostering social bonds across various social cleavages and promoting ownership of anti-crime solutions will be implemented, using all forms of mainstream media. The UFC, MBCCI, JHTA can partner in developing and implementing this marketing strategy, with financial support coming from the TEF. To ensure effectiveness, an annual survey of city residents can monitor receptivity to pro-social messages and desired behaviour change.

SERVICES

D1. Create a plan for and implement an increase in residential sewage interconnections

The main issues associated with the central sewerage system are related to fiscal sustainability and the challenge of getting more homes to connect to the system. There is one main sewage treatment plant situated at Bogue that is operated by the National Water Commission. The plant, which consists of several treatment ponds, was constructed in 1997 and provides treatment to the secondary level. The plant has a capacity of 10 million imperial gallons per day but is only being utilised at about 50% of its capacity. There have been several attempts in the past to increase the number of connections to this treatment plant but there are a number of challenges.

Although the cost of connecting to the sewerage system is a onetime cost, it is a very expensive one and most residents are unwilling or unable to pay it. Furthermore, many households, especially in communities such as Rose Heights, do not pay their water bills, which is where sewerage charges are included. In addition, the conditions and layout of some of the informal settlements make it difficult to install sewage lines there. In order to preserve the fiscal sustainability of its operations, the NWC is reluctant to invest capital to expand the sewerage system in these areas where the cost is unlikely to be recovered. On the positive side, the NWC has been able to get some of the developers of new residential schemes to incorporate the tie-in of the housing units to the Bogue sewerage system, offering the developers incentives such as discounts to encourage and facilitate their compliance.

There was a program in the past implemented by the NWC with support from a commercial bank aimed at increasing the number of residential connections to the sewerage system, which achieved some level of success. The NWC took a loan to fund several residential interconnections to the sewerage system in the Montego Bay area. They recovered the cost of the connections by entering into agreements with residents to pay over time through their water bills.

Specific Action:

Conduct a study to inform preparation of a plan to increase residential sewage interconnections. This study should involve the review and analysis of similar programs, including the program (mentioned above) implemented some years ago in Montego Bay by the NWC in partnership with a commercial bank. A new plan should be developed in the near term and a program implemented in the long term, all of which build on the strengths and improve the weaknesses of other comparable programs. Important stakeholders include the Parish Council, NWC and the Local Heath Department and community group representatives.

D2. Place Emphasis on At-risk Youth Population

One defining feature of crime in Montego Bay relates to the demographic characteristics of perpetrators and victims of crime and the deficit of public efforts to abate crime levels. Perpetrators and victims of crimes generally fall within the age group of 15 to 24 years old. In addition, comparisons of survey data with police administrative statistics suggest that many crimes go unreported due to fear of reprisals and a culture that discourages cooperating with law enforcement.

Approximately 98% of persons arrested for major crimes over the last four years were male. In addition, 3 out of every 4 persons arrested for major crimes was between the ages of 16 to 24[66]. According to the police, young persons are co-opted by adult family members as couriers for the tele-fraud crimes or attempt these activities on their own.

Young persons are overrepresented in the population of those victimised by crime. As a result, young persons expressed the highest levels of concern for personal safety. The 2012 NCVS found that persons aged 16 to 24 were the age group most worried about being attacked in public, being attacked by strangers and being attacked by persons they know.

66. Statistic provided by Jamaica Constabulary Force Statistics Unit.

A sustainable public safety plan for Montego Bay will give attention to the physical and mental health of future generations. Young Montegonians have different experiences with crime so interventions will be targeted- addressing the specific needs of young victims and perpetrators of crimes as well as those at risk of falling into those categories.

Specific Actions:

D2.1. Facilitate Dialogue among Youth Diversion Service Providers

Youth diversion components are a staple of many community interventions in the city such as the CSJP and Sandals Foundation Flanker initiative. Similarly, UNICEF, the Child Development Agency (CDA) and the JCF all have formal arrangements and programmes with the Ministry of Education to promote school attendance and involvement in after-school activities. For example, the SJPD is seeking to launch or revive 12 police youth clubs in this year alone. These initiatives do not require seamless coordination as they operate at different levels. However, a regularly scheduled meeting that facilitates information sharing among these different service providers can lead to greater synergies in service delivery. These meetings can be held on a quarterly basis and co-chaired by local representatives of the MoE and MNS in a similar manner as the Safe Schools Programme based in Kingston.

D2.2. Expand General Support Services for Victimised Youth

The ESCI will provide financial support to the local Victim Support Unit (VSU) to implement a more pro-active model of victim support that includes a physical presence at medical facilities and increased awareness campaigns at schools and churches. The VSU and PMI offer a range of services for victims of crimes. However, most of these services are only offered after the victim has come forward seeking assistance. In addition, the local VSU office is under-staffed with only two officers and there is a dire need for additional trained social workers to address the backlog in cases. This additional support can be sourced from volunteer recruitment drives spearheaded by the VSU, UFC and the National Volunteer Centre. Other areas for improvement will be identified through a needs-based assessment of VSU service delivery.

D2.3. Create Entrepreneurial Opportunities for Youths in Conflict with the Law

The incentives for young persons engaged in criminal activity to renounce crime and become law-abiding citizens will match or surpass the proceeds of ill-gotten gain to be effective. For example, current job training programmes offered by the CSJP are primarily focused on vocational training but many local youths in conflict with the law have acquired technologically advanced skill sets that outpace vocational skills in terms of earning potential. The CSJP, UFC and National Centre for Youth Development (NCYD) will convene meetings with local tertiary institutions to discuss developing a computer-based training curriculum that affords youths in conflict with the law formal certification and entrepreneurial training. An initial step in the process can be the hosting of a cyber-fair to gauge interest among the target group for such an undertaking and garner additional support from the private sector.

The PDC and MBCCI will initiate plans to develop a business incubation centre in Montego Bay. At a minimum, the centre will assist young entrepreneurs by providing office space, legal services, mentoring and start-up funding. The actors can consult with the University of Technology and the Kingston-based JGX Labs regarding viable aspects of their models to replicate.

D3. Build responsiveness to Gender-based violence and Exploitation

The St. James policing division has the highest number of reported sexual assaults over the last three years. Sexual assault is a notoriously under-reported crime category so the high number of cases suggests that this is a pervasive problem in Montego Bay and its environs. At the same time, the high number of cases can indicate the willingness of victims to report cases to the authorities. Indeed, the local office of the Centre for the Investigation of Sexual Offences and Carnal Abuse (CISOCA), the police agency responsible for sex crimes investigations, has ramped up its efforts to increase reporting rates by holding awareness sessions at schools, community gatherings and church meetings.

State agencies have shown good progress in coordinating efforts around gender-based violence. The CISOCA local office networks with the VSU of the Ministry of Justice to provide counselling and other support services to victims of sexual assault. The Child Development Agency and Office of the Children's Registry are often involved in cases of carnal abuse, particularly when the child will be relocated, and were instrumental advocates for having a social worker placed on staff at the CISOCA local office.

The commercial sex industry is an unfortunate adjunct to tourism. Police officers surmise that sexual trafficking is a problem but data on its prevalence is not available. The Ministry of Health, through its HIV/STI prevention work, has made inroads with the commercial sex worker population. Sex and human trafficking investigations are referred to the Major Organised Crime and Anti-corruption Task Force (MOCA).

Specific Actions:

D3.1. Strengthen State Responses to Gender-based Violence

A comprehensive needs-based assessment of local CISOCA service delivery is needed to identify areas where additional services are needed or which current initiatives need expansion. One proposal for improvement will be to further strengthen the work relationship between CISOCA and regional health officials. The next step in this already growing collaboration is the assignment of a trained medical officer to conduct on-site medical examinations of persons reporting sexual victimization at the local CISOCA unit office. This assignment will increase the likelihood of maintaining the integrity of physical evidence and reduce the risk of secondary victimisation by having victims wait extended periods for an examination at local medical facilities.

The local CISOCA office affords enhanced privacy for persons wishing to report sexual victimisation. Improving the friendliness and infrastructure of the facilities will only serve to enhance service delivery for citizens seeking assistance. A properly resourced examination room is urgently needed to maintain the integrity of physical evidence. Age-appropriate facilities for taking reports from and providing care to victims of carnal abuse will also be prioritised. In addition, administrative equipment for the receipt and dissemination of information will be procured. The annual police budget is unlikely to cover the cost for these expenditures but private actors identified and engaged by the St. James Police Civic Committee (SJPCC) can offer goods and services to accommodate this need.

D3.2. Conduct Survey on Commercial Sex Workers

The CSJP will include a sample of commercial sex workers in the undertaking of its survey of women's experience with violence. The survey will ascertain their level of exposure to physical harm and the prevalence of the sexual exploitation of minors.

EMPLOYMENT

The labour market in the English-speaking Caribbean has shifted over the last 15 years, moving from agriculture and manufacturing to the service industry. Jobs in these new fields require greater numbers of skilled workers and professionals, and workers need more general life skills to adapt to new situations[67]. Basic literacy and numeracy skills are essential, as are life skills such as strong communication, working on teams, critical thinking and problem solving. These life skills are especially critical for youth at risk.

Both the SJPC and the MLGCD have expressed concerns regarding youth unemployment and weak links between employment and training. They are particularly interested in seeking solutions for unattached youth who are not in school or working[68], but are also generally concerned about improving youth employment opportunities through development of skills training. Recent data validates this concern[69]. The 2013 unemployment rate for the age group 15-24 years old was 36.3% for men and 51% for women, compared to the overall rate of 14.9%[70]. A 2007 Jamaica Labour Force Survey found that 68% of unemployed youth had no academic qualification; almost 90% of youth outside the labour force had no skills training; and 70-75% of all unattached youth would need remedial education as a first step. Further, October 2013 data shows that even among those youth who are employed, 46% have no academic qualification and 74% had no training prior to entering the job[71].

Despite investments in the education sector, Jamaica's children are still leaving secondary school with weak language and math skills. The percentage of Grade 11 students passing the Caribbean Secondary Education Certificate (CSEC), administered by the regional Caribbean Examinations Council (CXC), increased in English language from 28.5% in 2001 to 63.7% in 2013, and in math from 16.6% to 42.2%, showing significant improvement yet just on par with the Caribbean average as of 2013. In 2011, only 15.5% of the cohort leaving secondary school attained passes in five CSEC exams including Math and English, which is the minimum requirement for entry into tertiary education programs. And, the Human Employment and Resource Training Trust, National Training Agency (HEART Trust/NTA), Jamaica's national vocational training agency, reported that in FY2013, only 53% of its applicants passed the diagnostic test (equivalent to a Grade 9 level)[72]. This leaves a significant number of youth with limited post-secondary training options to develop skills for the work force.

Some youth enrol in short-term training programs (government or NGO, or HEART technical and vocational education and training (TVET)). Unfortunately, the success rate for these training programs is low. Jamaica's National Youth Service (NYS under the Ministry of Youth and Culture) places youth in internships following training, but a recent study showed that only 20% ever received certification and less than 5% were retained in the jobs where they were placed.[73] Moreover, training in and of itself is not sufficient. Several international studies have shown that mentoring or accompaniment are critical to help youth at risk to sustain their jobs once they are in them (e.g. basic assistance and coaching in things like organizing transportation, child care, dressing appropriately, arriving at work on time, going every day, etc.).[74] Finally, although the unemployment rate is fairly high, employers still state that they are unable to find qualified workers to fill available jobs, especially professional-level jobs, thereby indicating that there may be a mismatch between the training provided and the needs of the labour market.[75] More data is necessary to better understand the magnitude of the problem in Montego Bay and to gauge whether training programs are providing relevant skills training for the labour market. To date, very few programs track the results of their training in these terms.

There are a number of training programs in St. James, offered through the Ministry of Education (MOE), Ministry of Youth and Culture (MYC), Ministry of Labour and Social Security (MLSS), HEART Trust/NTA, NGOs and church organizations. In order to maximize the effectiveness of the training programs, more information is required on the area of focus of those programs, their relevance to the current and future labour market, and their ability to prepare youth for the world of work. Specifically, more information is required regarding the trends in the labour market and whether employers perceive that the skill needs are being met by existing training programs. More information will also be needed to target youth at risk.

67. Blom, A. and C. Hobbs, School and Work in the Eastern Caribbean: Does the Education System Adequately Prepare Youth for the Global Economy? The World Bank, Washington, DC, 2008.
68. 40% of youth ages 15-24 were not in school or working in 2010, according to that year's Survey of Living Conditions (PIOJ, 2010).
69. National statistics are cited in this report, since disaggregated data for Montego Bay was not readily available.
70. Labour Force Survey, PIOJ, 2013.
71. Data provided by Statistical Institute of Jamaica, April 2014.
72. Data provided by HEART Trust/NTA. April 2014.
73. Hull, D., et.al. Policy Brief: Impact Evaluation of the National Youth Service of Jamaica. 2010 (unpublished).
74. EQUIP3. 2012. EQUIP3 Lessons learned: Experiences in livelihoods, literacy, and leadership in youth programs in 26 countries. Washington, DC: Education Development Center. Retrieved from: http://idd.edc.org/sites/idd.edc.org/files/EQUIP3%20Lessons%20Learned%20-%20Book_0.pdf.
75. Blom and Hobbs. 2008; Bassi, Marina, et.al. Disconnected: Skills, Education and Employment in Latin America, IDB, Washington, DC, 2011.

The dialogue on labour market trends and relevance of the training as it relates to employment opportunities will be carried out by a committee of key stakeholders, led in the first instance by the Montego Bay Chamber of Commerce[76]. The following actions are recommended.

76. Per agreement made at an Employment and Training meeting with the IDB and representatives from the St. James Parish Council, St. James Parish Development Committee, Social Development Commission, Peace Management Initiative, Flanker Peace & Justice Centre, HEART Trust NTA and the Chamber of Commerce on 8 April 2014.

Specific Actions:

E1. Consultancy to gather information on the target population and the training landscape.

The preparation of this action plan has relied on national data. However, it is important to know how many youth in St. James/Montego Bay are seeking jobs, what their academic qualifications are (test pass rates, highest level of schooling), and whether they have received general training and/or specific training in the field in which they seek work. Information will be garnered from the MOE, the Ministry of Labour and Social Security (MLSS), HEART Trust NTA and the Statistical Institute of Jamaica (STATIN).

The Parish Council should also have a clear picture of the available training programs and areas of focus. To do this, SJPC will: (a) Take stock of the existing training programs such as the Career Advancement Program (CAP) through the MOE, HEART TVET programs, NYS and others, as well as the number of people being served and map out the technical areas for which training is being offered and ensure there are no overlaps in some areas and/or lack of training in others. The MYC's electronic youth programmatic inventory can assist with mapping NGO programs. (b) Determine how many training programs require their trainers to regularly upgrade their skills (every 3-5 years is good practice) to ensure their curriculum, knowledge and teaching methodologies are relevant. (c) Liaise with the Ministry of Education to determine what plan is in place to provide the spaces needed to accommodate all school-age children, especially at the secondary level.

E2. Develop a central database of information for job seekers and employers.

Information regarding work and training opportunities needs to be more readily available. There are some sources of information, such as the MYC's electronic youth programmatic inventory and the link in the MYS/National Centre for Youth Development website with the MLSS job bank. However: (a) a central database will be developed to include lists of available jobs and training

programs. This will require coordination between GOJ, training programs and the private sector. The Chamber of Commerce has offered to establish and house the database. (b) Develop the capacity of the Chamber of Commerce to establish and manage the database and employment and training development process. This will require an initial assessment of current capacity and the development of some kind of training plan.

E3. Labour market assessment and Matching of training programs.

The Parish Council will: (a) Conduct a local labour market assessment. (b) Use the local labour market survey and the city's projected focus for development and growth to determine whether there is a match between training programs offered and skills needed in the work force. Emerging job opportunities might include local arts/crafts and culture (craft market or artisan village), jobs in the sports and entertainment industries, animation, information and technology programming, call centres and business process outsourcing. (c) Survey local employers to assess whether skills needs are being met by existing training programs. (d) Based on the information coming out of this exercise, make recommendations regarding the closing of some programs and opening of others.

E4. Establish modes of communication to bring together and better coordinate the key stakeholders.

International good practice shows that TVET institutions and schools need to work more effectively with industry to respond to the rapidly changing 21st century workforce. In all successful cases, the links between education institutes (secondary and tertiary), vocational training programs and the private sector are very strong. In St. James, better modes of communication need to be established. There is need to: (a) Establish regular meetings between the Parish Council, the heads of the predominant training agencies and schools, and the Chamber of Commerce to discuss employment and training issues. An agreement was made to hold a quarterly meeting of these key stakeholders, organized initially by the Chamber of Commerce. The first meeting will be used to determine the structure and purpose of the committee and establish dates and agendas for future meetings. (b) Look at what other agencies are doing to engage youth (e.g. Youth Information Centre, Community Development Centre, National Youth Service, church groups, Citizen Security and Justice Program) and seek ways to develop better synergies among them. (c) Organize a public "push-off" to more widely communicate plans for better coordination of agencies, mentorship opportunities, and the development of a database of information on jobs and training programs.

E5. Carry out a tracer study

The best way to determine whether a program is relevant is to follow the graduates once they leave the program. The Parish Council should first determine how many training programs have done tracer studies of their graduates. Thereafter, a tracer study can be initiated with one or more programs to collect data on the number of graduates who have found jobs in their area of study, how long it took them to find a job, how long they have stayed in that job, whether the entry job led to professional growth and opportunities for advancement in the work place, and so forth. Programs will be adjusted based on the results of this study.

E6. Create opportunities for youth to better understand job and career choices and what they entail

Some organizations, such as the YMCA, have mentorship programs. And schools organize a career day once a year to inform students in grades 11 and 12 of different career options. However, more guidance and information is needed to help youth understand what their choices are and how to prepare for those choices (academic and skills training, networking, internships, etc.) as follows: (a) Organize career days more frequently and include younger students (grades 9 and 10) to give them more time to think about and prepare for career and training options. (b) Inform school guidance counsellors, teachers, youth empowerment officers and mentors about new trends in the labour market and pathways to prepare for the different careers. (c) Create a central space to organize and roster mentors (possibly through the YMCA).

E7. Develop demand-based training programs and further support work internships and mentorship programs

The private sector should be more involved in establishing the focus areas for training (see Barbados, Grenada, and St. Lucia for examples), so that training content matches skills needs. Training programs should provide students with the opportunity to gain experience in the workplace. Internships could be channelled through existing programs or through private sector funding. (a) The Chamber of Commerce already has begun to think about how to draw in and retain youth in training programs and is interested in setting up a mentorship program. (b) There is mutual concern regarding the large number of unattached youth who do not have the requisite literacy and numeracy skills to access other skills training (e.g. HEART programs). Programs such as those run by Jamaica for Lifelong Learning (JFLL) should be more widely available. Another suggestion is to train trainers to offer this type of training, reaching out to youth in target communities. (c) Experience shows that it is difficult to draw at-risk youth into programs solely focused on literacy and numeracy training. However, when this training is combined with apprenticeship or internship programs where youth also learn practical, hands-on skills, it serves as an incentive to keep them enrolled and engaged. A corporate outreach strategy should be developed to better link students in training programs with job opportunities.

TRANSVERSAL

A transversal and integrated strategy for Montego Bay to become sustainable is through an Integrated Operations Control Centre, or IOCC. The IOCC, through connections and integration across agencies and sectors, would revitalize the city and improve resiliency to hazards.

F. Integrated Operations Control Centre

In addition the five priority action area strategies, an Integrated Operations Control Centre (IOCC), which would help improve law enforcement, emergency response and transportation management, is being considered, contingent on funding and a cost-benefit analysis. In 2013, as part of the Korean Knowledge Sharing Program (KSP), a technical project design was made for a centre of this type in Montego Bay.

The IOCC is a platform solution, powered with modern technologies operated by experts from multiple government agencies, working collaboratively to provide integrated solutions for complex urban challenges. The IOCC receives large quantities of data, in real time, from connected devices (surveillance cameras, devices and sensors) installed within the city; the IOCC processes this data to support focused responses for routine events (e.g. mobility, transportation, public safety, energy, etc.); and, most importantly, the IOCC allows integrated responses in cases of emergency events that require intense collaboration.

The proposed IOCC project would allow the municipality of Montego Bay to handle incidents of traffic, public security, and natural disaster in a prompt and effective manner. It would have the following major focus areas: (a) transportation division, (b) police division, (c) disaster division, and (d) public transportation division and would include the following 7 subsystems: (i) Advanced Traffic Signal Control; (ii) Advanced Traveller Information; (iii) Route Taxi and Metro Bus Management; (iv) Automated Enforcement; (v) Parking Information; (vi) Crime Prevention; and (vii) Disaster Prevention.

The IOCC pre-feasibility studies include (i) a cost-benefit analysis for the IOCC investments; and (ii) the Executive Project, which includes the detailed multiphase implementation plan with the respective Requests for Proposals. It is estimated that the cost-benefit analysis would cost US$100,000 and the Executive Project would cost US$400,000.

The IOCC pilot project includes the implementation of the Operating Centre, network infrastructure, software applications, and pilot implementation for five field systems: (i) advanced traffic signal control system; (ii) advanced traveller information system; (iii) enforcement system; (iv) crime prevention system; and (v) disaster prevention system.

Fostering better and renewed connections, whether they are physical or intangible, leads to a more united Montego Bay. A reconnected Montego Bay is a city where people, places, information, and opportunities are joined together and accessible to everyone. These new connections engender more open, equal, and transparent government and society, and inevitably, One Bay For All.

CONCLUSION

It is of vital importance that these actions be taken as a whole and not as individual, separate parts. For the vision of a sustainable One Bay for All to be achieved, these actions need to be implemented in a holistic and integrated way. Coordination of plans, programs, projects and services will ensure that the waterfront isn't revitalized without proper waste collection receptacles, that neighbourhoods aren't upgraded without connections to the sewage system, and that improvements in opportunities for jobs and training aren't hindered by a lack of access to reliable public transportation to reach those opportunities.

This chapter presented the sustainable vision for a united Montego Bay, its themes and components, and a detailed action plan. The table below summarizes these actions and shows their correlating priority action area and phase of implementation.

The next chapter offers more detailed, technical aspects of the action plan, to include timelines, estimated costs, and when possible, responsible persons and/or organizations and financing sources. The next stage in the process, as mentioned in the methodology chapter, includes pre-investment, establishing a monitoring and evaluation system, and investment and implementation.

FOSTERING BETTER AND RENEWED CONNECTIONS, WHETHER THEY ARE PHYSICAL OR INTANGIBLE, LEADS TO A MORE UNITED MONTEGO BAY. A RECONNECTED MONTEGO BAY IS A CITY WHERE PEOPLE, PLACES, INFORMATION, AND OPPORTUNITIES ARE JOINED TOGETHER AND ACCESSIBLE TO EVERYONE. THESE NEW CONNECTIONS ENGENDER MORE OPEN, EQUAL, AND TRANSPARENT GOVERNMENT AND SOCIETY, AND INEVITABLY, ONE BAY FOR ALL.


8
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8. WHERE DO WE GO FROM HERE?

IMPLEMENTATION TIMELINE AND COSTS OF INVESTMENT

This section reviews the next steps along the path toward sustainability. Now that we have a plan of action, it is important to coordinate efforts toward to make the plan a reality. A project management team will be in charge of organizing the details of implementation, to include final determination of a feasible timeline for implementation, selection and recruitment of appropriate collaborators, securing funding form appropriate sources, project management, and establishment of a long-term monitoring and evaluation system. A proposed implementation timeline and estimated costs of the action plan are laid out in the next section, along with further details about the final steps to be taken to realize the vision of a revitalized, resilient, reconnected Montego Bay.

For the action plan to be successful, careful attention should be paid to taking the appropriate steps at the right time. The effectiveness of this action plan and the success of the proposal depend mainly on the will, cooperation, and coordination between public and private entities, including national and local government and civil society organizations. The involvement and support of local citizens, and commitment, including financial, from various agencies and organizations, local and international, are what will make this vision a reality.

The estimated cost of investment for short and long term actions totals nearly US$ 425,000,000.00, or over J$ 48 billion[77]. The following consolidated action tables present estimated costs for all proposals, including any pre-investment, along with the proposed implementation timeline. Short term, or priority, actions should be implemented within the first 3 years, and the long-term actions should be in place between year 3 and year 15. The year 2030 is around the corner, and that means a sustainable Montego Bay is on the horizon.

77. Conversion from US$ to J$ uses average mid-market rate from January 2015 (US$1 = J$114.7)

PRE-INVESTMENT	ESTIMATED COST (US$)	ESTIMATED COST (J$)*
Develop neighbourhood upgrading strategy/plan	$150.000,00	$17.205.000,00
Survey of informal settlements, data collection	$40.000,00	$4.588.000,00
Conceptual design of park and coastal zone management project	$110.000,00	$12.617.000,00
Base studies (ESCI – COMPLETED)	$280.000,00	$32.116.000,00
Action Plan (ESCI – COMPLETED)	$130.000,00	$14.911.000,00
Design and siting of appropriate waste receptacles; develop PPPs to help	$10.000,00	$1.147.000,00
Identification of illegal dumpsites and garbage sources; establish public outreach program and PPPs	$7.000,00	$802.900,00
Conduct study to inform preparation of the sewage connection plan	$15.000,00	$1.720.500,00
Conduct preliminary study on IT infrastructure gaps w/in the St. James Policing Division	$7.500,00	$860.250,00
Conduct a needs-based assessment of VSU service delivery	$6.000,00	$688.200,00
Conduct a needs-based assessment of local CISOCA service delivery	$5.000,00	$573.500,00
Pre-Investment Total	**$760.500,00**	**$87.229.350,00**

*Conversion from US$ to J$ uses average mid-market rate from January 2015 (US$1 = J$114.7)

Urban Development and Planning
Reduction of Vulnerability to Disasters
Sanitation
Public Safety and Crime
Employment and Training
Transversal
Short
Medium
Long

VISION	ID	ACTION	ESTIMATED COST US$	ESTIMATED COST J$*	IMPLEMENTING AGENCY / FUNDING SOURCE	TERM	PRIORITY AREA
RESILIENT (72)	A	Integrated Waterfront Park (including Coastal zone management project)*	$8.000.000,00	$917.600.000,00	UDC	●	
	B1	Vulnerability audits of critical facilities	$30.000,00	$3.441.000,00	TBD	●	
	B2	Create Hazard Risk Reduction strategy	$80.000,00	$9.176.000,00	TBD	●●●	
	B3	Contingency Plan for city and coastal zone	$50.000,00	$5.735.000,00	ESCI	●	
	B3.1	Proposal/Plan for long-term monitoring program of contingency plan	$15.000,00	$1.720.500,00	TBD	●●●	
	B3.2	Plan for Airport Response to CC	$40.000,00	$4.588.000,00	TBD		
	B4	Build capacity for response of PDRMU / training in risk assessment and management	$20.000,00	$2.294.000,00	ESCI	●	
	B5	Risk-resilient coastal zone management program	$20.000.000,00	$2.294.000.000,00	TBD	●●●	
	B5.1	Coastal risk assessment	$400.000,00	$45.880.000,00	TBD	●	
	B5.2	Coastal and disaster risk information and planning system (GIS-based), to include training	$25.000,00	$2.867.500,00	TBD		
	C	Stormwater Drainage Plan Implementation	$4.243.934,00	$486.779.229,80	TBD	●●●	
	D1	Private waste collection study	$25.000,00	$2.867.500,00	TBD	●	
	D2	Additional waste collection vehicles	$7.000.000,00	$802.900.000,00	TBD	●●●	
	D3	Vehicle maintenance facility	$160.000,00	$18.352.000,00	TBD	●●●	
	D4	New sanitary landfill	$8.000.000,00	$917.600.000,00	TBD	●●●	
		Closure of Disposal site in Retirement	$800.000,00	$91.760.000,00	TBD		
	D4.1	Study to identify site for sanitary landfill and Plan for closing of Disposal site in Retirement	$30.000,00	$3.441.000,00	TBD	●	
	E1	Materials recovery facility	$160.000,00	$18.352.000,00	TBD	●●●	
	E2	Composting facility	$1.773.000,00	$203.363.100,00	TBD	●●●	
	E2.1	Prefeasibility study for composting plant/facility	$30.000,00	$3.441.000,00	TBD	●	
	F1.1	Strengthen community policing program	$60.000,00	$6.882.000,00	TBD	●●●	
	F1.2	Foster economic engagement of vulnerable communities	$70.000,00	$8.029.000,00	CD, MBBCI	●	
	F1.3	Design case management system/database for comprehensive community interventions	$8.000,00	$917.600,00	CSJP		
	G1.1	Eliminate deficiencies in electronic crime-fighting technology	$55.000,00	$6.308.500,00	MBCCI		
			$25.000,00	$2.867.500,00	ESCI	●	
	G1.2	Consolidate local law enforcement fleet	$15.000,00	$1.720.500,00	ESCI		
	G1.3	Recruitment and retention plan to improve police-citizen ration w/ related activities	$50.000,00	$5.735.000,00	TBD		
		Increase police-citizen ratio (Additional officer salaries) - (over 15 years)	$30.000.000,00	$3.441.000.000,00	TBD	●●●	
REVITALIZED (73)	A1	Update and complete development plan	$200.000,00	$22.940.000,00	GOJ	●	
	A2	Capacity building and training for urban planners	$50.000,00	$5.735.000,00	ESCI	●	
	B	Pilot Downtown Housing Project	$23.205.512,00	$2.661.672.226,40	GOJ, UDC	●	
		Integral Neighbourhood Upgrading	$247.682.736,00	$28.409.209.819,20		●●●	
	C1	Design for Revitalization of Charles Gordon Market	$80.000,00	$9.176.000,00	ESCI	●	
	C2	Revitalization of Charles Gordon Market	$1.000.000,00	$114.700.000,00	TBD	●●●	
	E	Downtown Walkability Project (pilot + phase 1 + 2)	$5.150.000,00	$590.705.000,00	TBD	●●●	
	F	Rehabilitation of Historic Landmarks	$2.200.000,00	$252.340.000,00	TBD	●●●	
	D1	Provide more receptacles for litter throughout city	$30.000,00	$3.441.000,00	TBD	●	
	D2	Transformation of illegal dumpsites	$20.000,00	$2.294.000,00	ESCI	●	
			$500.000,00	$57.350.000,00	TBD	●●●	

VISION	ID	ACTION	ESTIMATED COST US$	ESTIMATED COST J$*	IMPLEMENTING AGENCY / FUNDING SOURCE	TERM	PRIORITY AREA
RECONNECTED (7.4)	A1	Sustainable Mobility Master Plan (including subsidies)	$1.500.000,00	$172.050.000,00	TBD	●●●	
	A2	Development and construction of intermodal north transportation hub	$4.000.000,00	$458.800.000,00	TBD	●●●	
	B1	Interagency coordination / consultations between key groups	$5.000,00	$573.500,00	TBD	●	
	C1	Public awareness campaign	$40.000,00	$4.588.000,00	ESCI	●	
		Implement Building Resilient Communities Program	$50.000,00	$5.735.000,00	TBD	●●●	
	B2	Consultations between SJPC and service delivery entities	$5.000,00	$573.500,00	STJPC, NWC, WPM	●	
	C2	Public education campaign (initial phase)	$50.000,00	$5.735.000,00	ESCI	●	
		Continued public education campaign (over 15 years)	$1.500.000,00	$172.050.000,00	TBD	●●●	
	C3	Help desk for on-site sewage treatment and disposal options	$10.000,00	$1.147.000,00	TBD	●	
	C4	Training for enforcement of sanitation laws	$5.000,00	$573.500,00	ESCI	●	
		Additional health department vehicle	$50.000,00	$5.735.000,00	TBD	●●●	
	D1	Create Sewage connection program plan/strategy	$15.000,00	$1.720.500,00	TBD	●	
		Increase residential sewage interconnections	$37.000.000,00	$4.243.900.000,00	TBD	●●●	
	B3.1	Develop local government capacity to lead multi-stakeholder crime prevention group	$30.000,00	$3.441.000,00	MLGDC		
	B3.2	Cultivate stakeholder participation in multi-stakeholder crime prevention group	$65.000,00	$7.455.500,00	SDC, CSJP, CRP	●	
	B4	Develop local anti-corruption initiative	$20.000,00	$2.294.000,00	TBD	●	
	C5	Public awareness campaign / promote collective efficacy in crime prevention	$200.000,00	$22.940.000,00	TBD	●●●	
	D2.1	Facilitate dialogue among youth diversion service providers	$1.000,00	$114.700,00	SSP	●	
	D2.2	Expand general support services for victimized youth	$60.000,00	$6.882.000,00	ESCI		
	D2.3	Create entrepreneurial opportunities for youth in conflict with the law	$300.000,00	$34.410.000,00	TBD	●●●	
	D3.1	Strengthen state response to gender-based violence and exploitation	$40.000,00	$4.588.000,00	JF, MBCCI, JHTA, CSJP		
	D3.2	Conduct survey on commercial sex workers	$15.000,00	$1.720.500,00	CSJP	●	
	E1	Consultancy to collect information on current training programs and target population	$7.000,00	$802.900,00	ESCI		
	E2	Development of central database of information for job-seekers and employers	$40.000,00	$4.588.000,00	ESCI		
	E3	Matching of training programs with labor market needs, to include local labor market assessment	$25.000,00	$2.867.500,00	ESCI	●	
	E4	Communication strategies and establishment of regular meetings to improve coordination between key stakeholders	$3.000,00	$344.100,00	ESCI		
	E5	Tracer study	$40.000,00	$4.588.000,00	TBD		
	E6	Create mentorship programs / development of career guidance opportunities	$15.000,00	$1.720.500,00	TBD	●●●	
	E7	Establish demand-based training and internship programs	$50.000,00	$5.735.000,00	TBD		
	F	IOCC: cost-benefit analysis	$100.000,00	$11.470.000,00	TBD	●●●	
		IOCC: Executive Project	$400.000,00	$45.880.000,00			
		Integrated Operations Control Centre: Pilot	$4.000.000,00	$458.800.000,00			
		IOCC: Implementation for Greater MoBay	$14.000.000,00	$1.605.800.000,00			
TOTAL			**$424.924.182,00**	**$48.738.803.675,40**			

MONITORING AND EVALUATION

The intention of this action plan is that its realization will be monitored by an independent system of citizen follow-up, whose implementation will be supported by the IDB. The ESCI will support the initial establishment of the monitoring system in conjunction with the Parish Development Committee. The Committee will take ownership of the system and continue to update and expand it with the support of private donors.

The monitoring system will track two types of information: results and impacts. Results must be achieved before outcomes can be reached. Therefore, in its initial stages, the monitoring system will focus on results (from highest to lowest priorities) over impact indicators. Baselines must be established for all indicators, though many were established during the diagnostic phase of the process.

For the monitoring system to function successfully, it must receive periodic inputs from the Parish Council and executing agencies regarding the progress of the implementation of actions and achievement of results; statistical data from STATIN and other relevant entities; and public opinion data. Public opinion data will be collected as part of the monitoring system, using a questionnaire specifically designed for this purpose. The monitoring system must also make data publicly available online, where citizens can view and track the Action Plan's progress, as well as offer feedback about the types of information they would like to see.

Tracking the implementation of the Action Plan and the indicators over time becomes a good internal administrative monitoring tool and increases transparency and efficiency in public administration. This is an important way to empower citizens, by providing them useful information about the progress achieved by their elected officials, about whether actions are being implemented on schedule, and whether they are having the desired impact. When citizens take a more proactive and participatory role in local government, in ensuring programs continue, grow, and improve, the resources and tools provided by the ESC Initiative, including the baseline indicators, can help sustain positive change and development over time.

Beyond this phase, the IDB will also assist Montego Bay to raise funds and prepare projects to accompany the key interventions included in this action plan.


9

9. FINAL THOUGHTS

The process of implementation requires an organized effort from all major stakeholders, including national and municipal government agencies and officials. Clear identification of rules and resources, as well as clarification of roles, responsibilities, and relationships of and between stakeholders, are needed. These stakeholders, in coordination with the executing agency's project manager and IDB representatives, will work together to organize execution of the action plan, in an effective, efficient, and transparent manner.

Implementation of the Action Plan will take an inter-sectoral approach to project preparation, delivery, and supervision that includes representatives of all relevant public sector agencies and private and public stakeholders. Furthermore, community participation will be encouraged throughout the lifecycle of each project. Community engagement can be encouraged through social marketing to reach out to the public and disseminate information while boosting awareness. Multi-sector collaboration and coordination, and especially public participation, are the keys to success of the Action Plan and for the proposed projects to make the expected impact and change necessary to become one sustainable Mo'Bay for all.

As discussed previously, further coordinated efforts are needed to establish a monitoring system that tracks the progress of the ESCI Montego Bay Action Plan. This continued effort of informing and involving the citizenry of Montego Bay is expected to result in a sustainable transformation in the quality of life for Montegonians. After several years of interventions, by 2030 this city should be on track toward a more sustainable future that is in line with Latin American and Caribbean standards.

BUILDING A SUSTAINABLE CITY REQUIRES CONTINUOUS EFFORTS AND AS SUCH, CITIZENS SHOULD BE ENCOURAGED TO SUPPORT AND FORMALLY EVALUATE THE PROCESSES THAT HAVE AN IMPACT ON THE PRESENT AND FUTURE OF THEIR CITY.

ANNEX

The following documents are available at www.iadb.org/cities or www.urbandashboard.org:

1. GeoAdaptive Studies
   a. Greenhouse Gas Inventory and Mitigation Analysis Report
   b. Probabilistic Hazard and Risk Assessment Study
   c. Historical and Current Urban Footprint and Future Urban Scenarios
2. IOCC Final Report
3. Public Opinion Survey Final Report


THROUGH REVITALIZATION,
RESILIENCY AND RECONNECTION,
WE CAN ACHIEVE ***ONE BAY FOR ALL***