

# The Use of Geospatial Data to address the Unique Vulnerabilities of Caribbean SIDS



## THE CASE OF JAMAICA, W.I.

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UN-GGIM Side Event - Unleashing the power of 'Where...'

April 22, 2015  
United Nations Headquarters, New York

# PRESENTATION OUTLINE

- Jamaica Sustainable Development Needs and Vulnerabilities
- Vision 2030 Jamaica National Development Plan
- Examples of How Geospatial Data is being used to address vulnerabilities
- Conclusion

# SIDS Sustainable Development Needs and Issues

- Small Size
- Fragile economies
- Heavy dependence on fossil fuels
- Exposure to natural disasters
- Exposure to the impacts of climate change

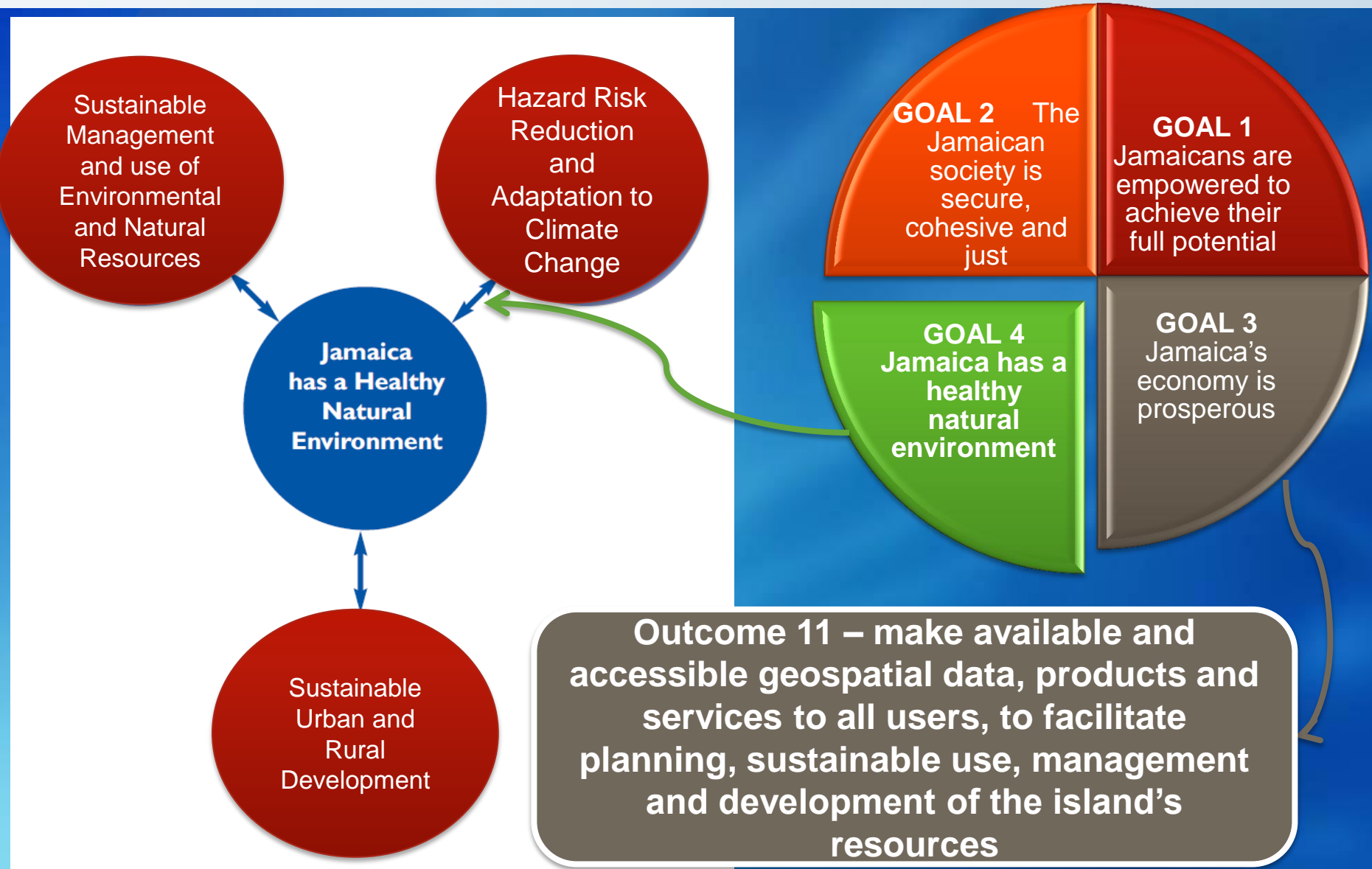
**Environmental Vulnerabilities often  
Influence Economic Vulnerabilities**

# Jamaica

**Total impact of natural disasters on Jamaica's economy - 2.0 % of total GDP between 2001 and 2012.**

EVENT	Year	Category	Lives Lost	Cost (\$JB)	Impact (% GDP)
Hurricane Michelle	2001	4	5	2.52	0.8
May/June Flood Rains	2002	-	6	2.47	0.7
Hurricane Charley	2004	4	1	0.44	0.02
Hurricane Ivan	2004	3	17	36.9	8
Hurricanes Dennis & Emily	2005	4	7	5.98	1.2
Hurricane Wilma	2005	5	1	3.6	0.7
Hurricane Dean	2007	4	6	23.8	3.4
Tropical Storm Gustav	2008		12	15.5	2
Tropical Storm Nicole	2010		16	20.6	1.9
Hurricane Sandy	2012	2	1	9.7	0.8
<b>Total</b>			<b>72</b>	<b>115.53</b>	<b>~ 2.0 p.a.</b>

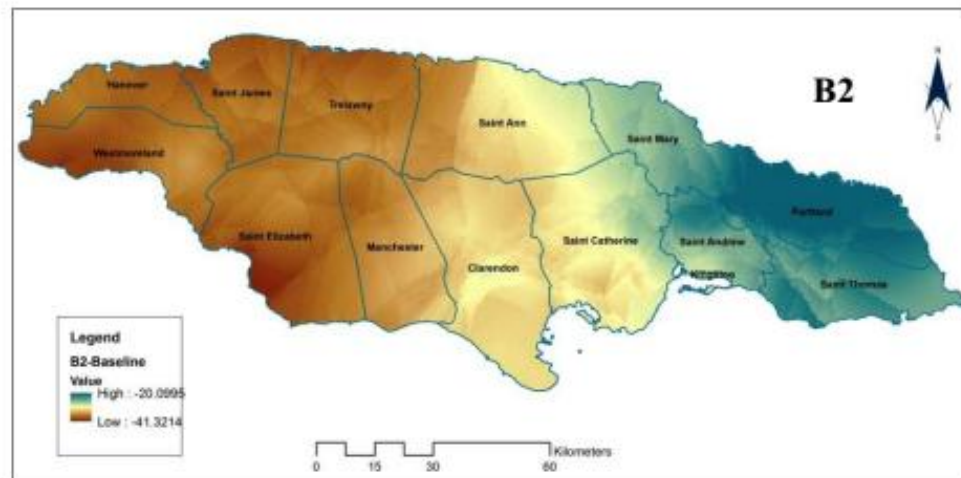
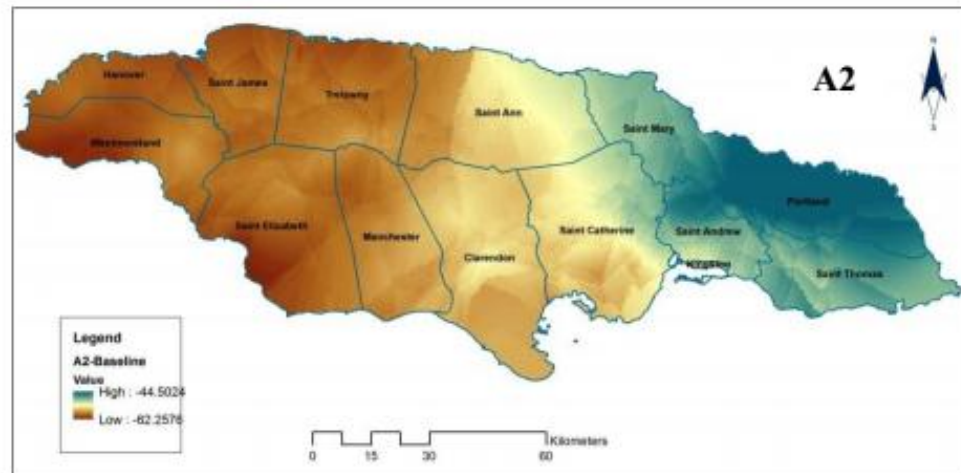
# VISION 2030 JAMAICA - NATIONAL DEVELOPMENT PLAN





# State of the Jamaican Climate

A. Source: Climate Studies Group, Mona (2012)



Source: Climate Studies Group, Mona (CSGM), 2012: State of the Jamaican Climate 2012: Information for Resilience Building (Full Report). Produced for the Planning Institute of Jamaica (PIOJ), Kingston Jamaica.

**Figure 7.3.1:** Change maps showing projected precipitation changes over Jamaica for the A2 (top) and B2 (bottom) simulations comparing baseline to 2071-2099 (produced using GIS mapping). Images produced using output from dynamic areal downscaling done for the island following the method outlined in Charlery (2010).

# Near Term Climate Scenarios

- generated at the scale of the watershed
- for wind, temperature and precipitation
- Impact on key sectors – Tourism, Agriculture, water

Source: Climate Studies Group, Mona (CSGM), 2014: Near-Term Climate Scenarios for Jamaica (Technical Report). Produced for the Planning Institute of Jamaica (PIOJ), Kingston Jamaica.

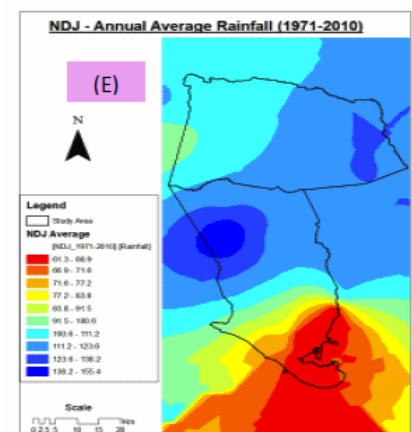
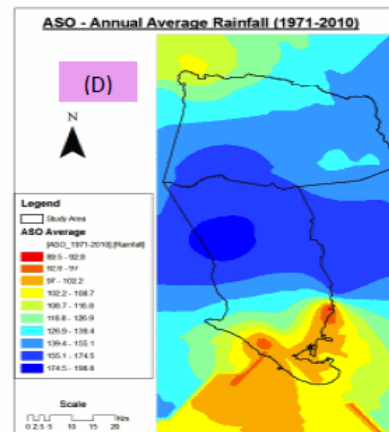
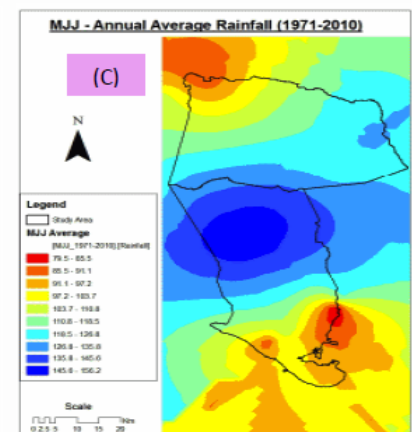
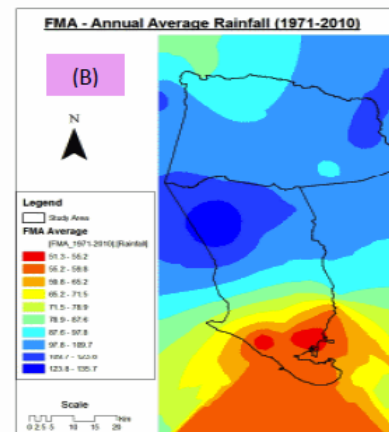
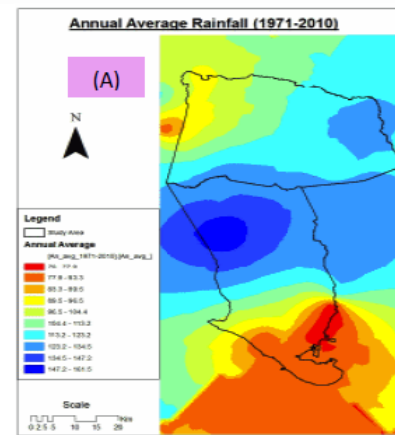
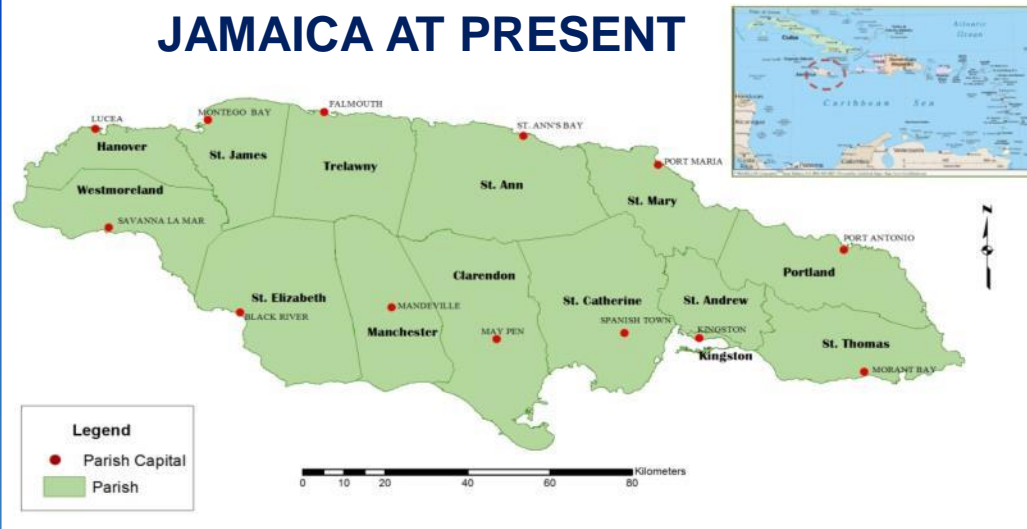


Figure 4-7: Map of rainfall means for Study Area for (A) Annual, (B) November-December-January (C) February-March-April (D) May-June-July and (E) August-September-October.

# Jamaica –Near Term Climate Scenarios

## JAMAICA AT PRESENT



Mean temperature increases by 1.3 °C by 2020s.

Decrease in annual rainfall



If sea level rises by **0.18m** the predicted loss of land area is **101.9 km<sup>2</sup>** and **416.4 km<sup>2</sup>** for a **10 m increase**. Areas forecasted to be inundated are fast growing urban areas

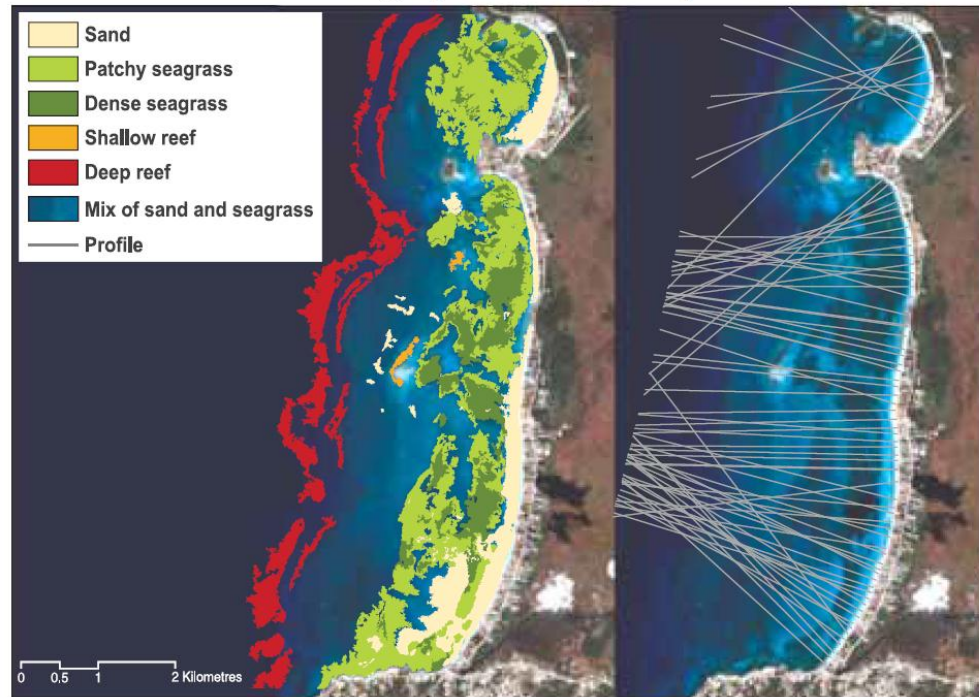
## The Future

### Jamaica, If the Ice Caps Melt

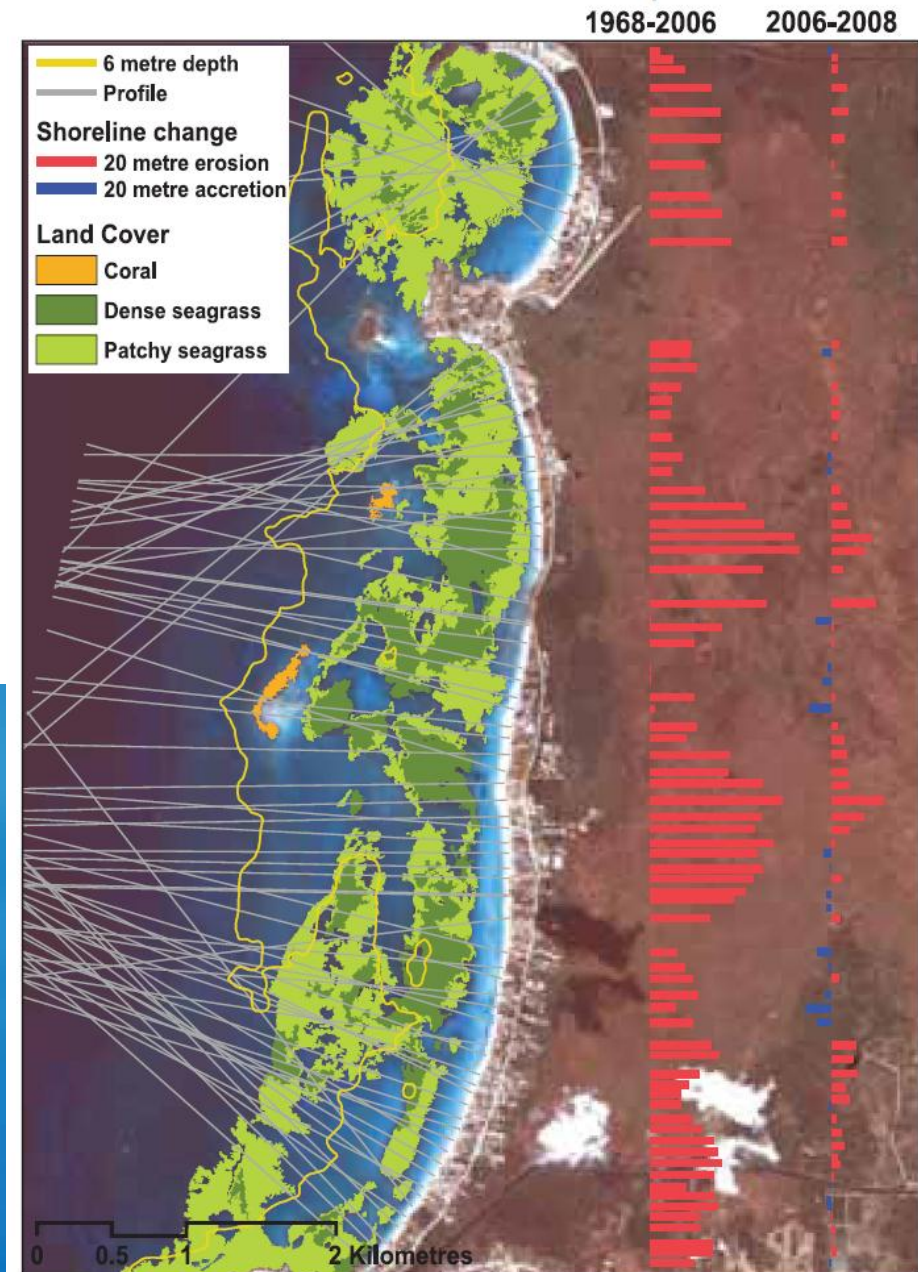




Map 4.3 Distribution of the coastal ecosystems and locations of the profiles used for the multiple regression analysis, based on the QuickBird satellite image (16 January 2008)



Map 4.4 Nearshore bed cover and shoreline changes along Negril's beaches, showing also the location of the 74 beach profiles used



# Linking Ecosystems to Risk and Vulnerability Reduction

Source: Risk and Vulnerability Assessment Methodology Development Project (RiVAMP) Linking Ecosystems to Risk and Vulnerability Reduction The Case of Jamaica Results of the Pilot Assessment UNEP,PIOJ (2010)



# Exposure of assets to Flooding

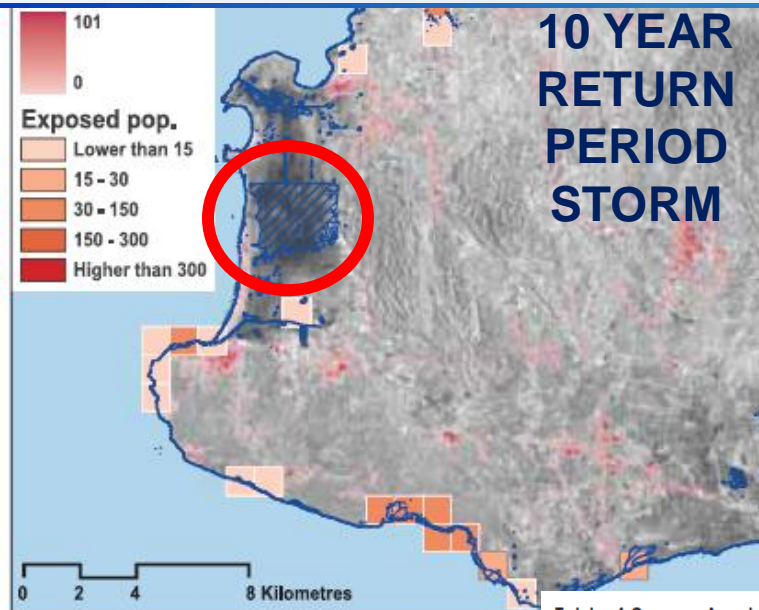


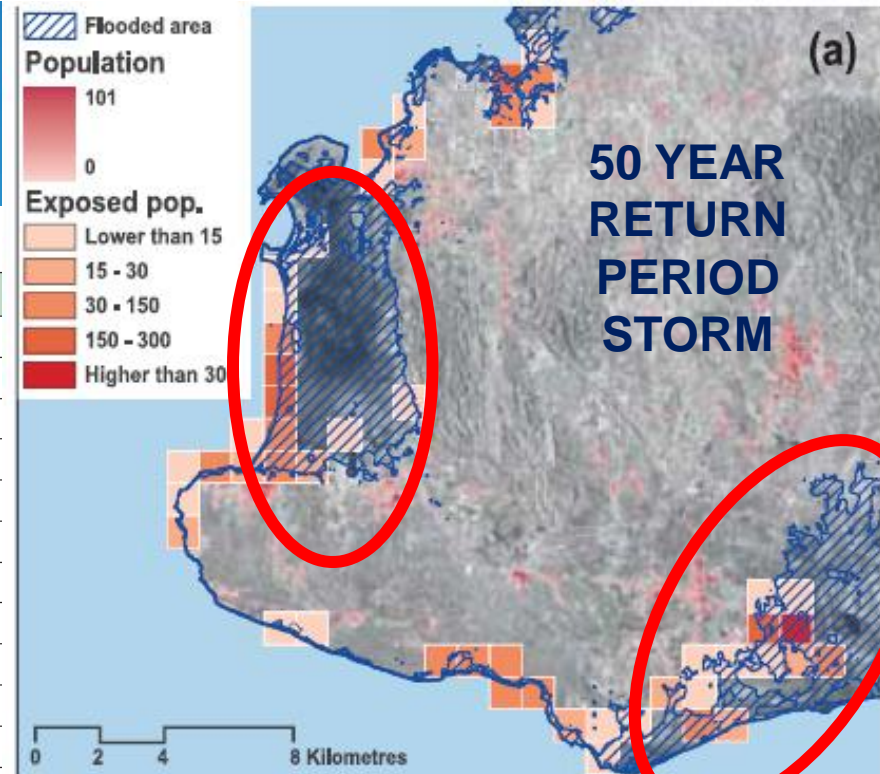
Table 4.8 Assets exposure from a 10-year return period storm

Asset type	Beach	Cliff
Hotels		2
Markets	1	
NWC priority facilities	1	
Wastewater facilities		2
Wells	1	



Table 4.9 Assets exposure from a 50-year return period storm

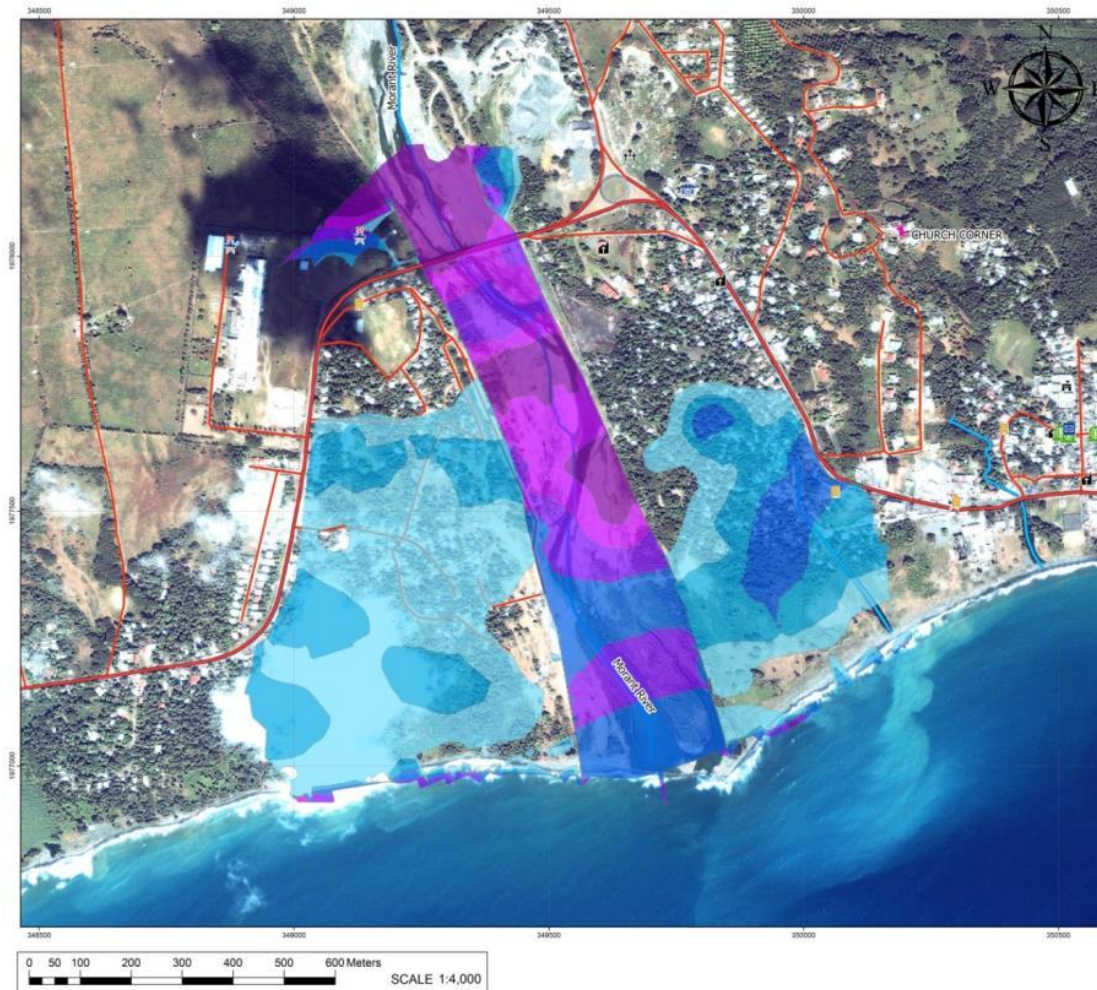
Asset type	Beach	Cliff
Emergency shelters		1
Health centres	3	
Health facilities	2	
Hotels	61	2
Markets	1	
Nwc priority facilities	2	
Public schools		1
Touristic facilities	3	
Waste water facilities	6	2
Wells	9	
licj airport	1	



Source: Risk and Vulnerability Assessment Methodology Development Project (RiVAMP) Linking Ecosystems to Risk and Vulnerability Reduction The Case of Jamaica Results of the Pilot Assessment UNEP,PIOJ (2010)

# Coastal Multi-Hazard Mapping and Vulnerability Assessments

**RIVER FLOODING HAZARD MAP  
25 YR. RETURN PERIOD EVENT FOR  
MORANT BAY, JAMAICA**

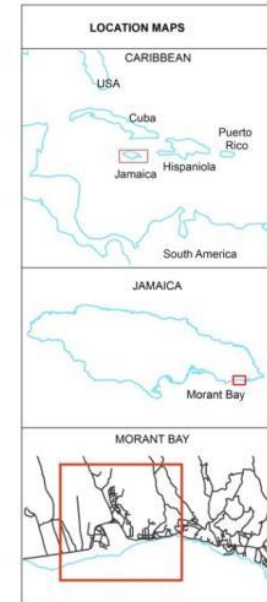


**FLOOD DEPTHS (m)**

- 0 - 0.5m
- 0.5 - 1.0m
- 1.0 - 1.5m
- 1.5 - 2.0m
- 2.0 - 2.5m
- 2.5 - 2.6m

**CRITICAL FACILITIES**

- BANK
- CEMETERY
- CHURCH
- FIRE DEPT.
- GOV'T OFFICE
- HOSPITAL
- INFIRMARY
- LIBRARY
- NHS
- POLICE STATION
- POST OFFICE
- PUBLIC BUILDING
- SCHOOL
- UTILITIES
- MAIN ROAD
- OTHER PAROCHIAL ROAD
- RIVERS & GULLIES
- SETTLEMENTS



**NOTES**

Map Projection: UTM  
Datum: WGS\_1984  
Units: Meters  
Date Map Produced: January 2010  
Satellite Image: IKONOS 2001

**Map Use Limitations**

The accuracy of the topographic data determines the accuracy of the prediction of flooding extent.

A buffer zone may be applied to the flooding extent as a precautionary measure for preparedness purposes.

Prepared For:  
The Government of Jamaica



Funded by:  
The Global Facility for Disaster Reduction & Recovery & The World Bank



Author:  
Smith Warner International Ltd.

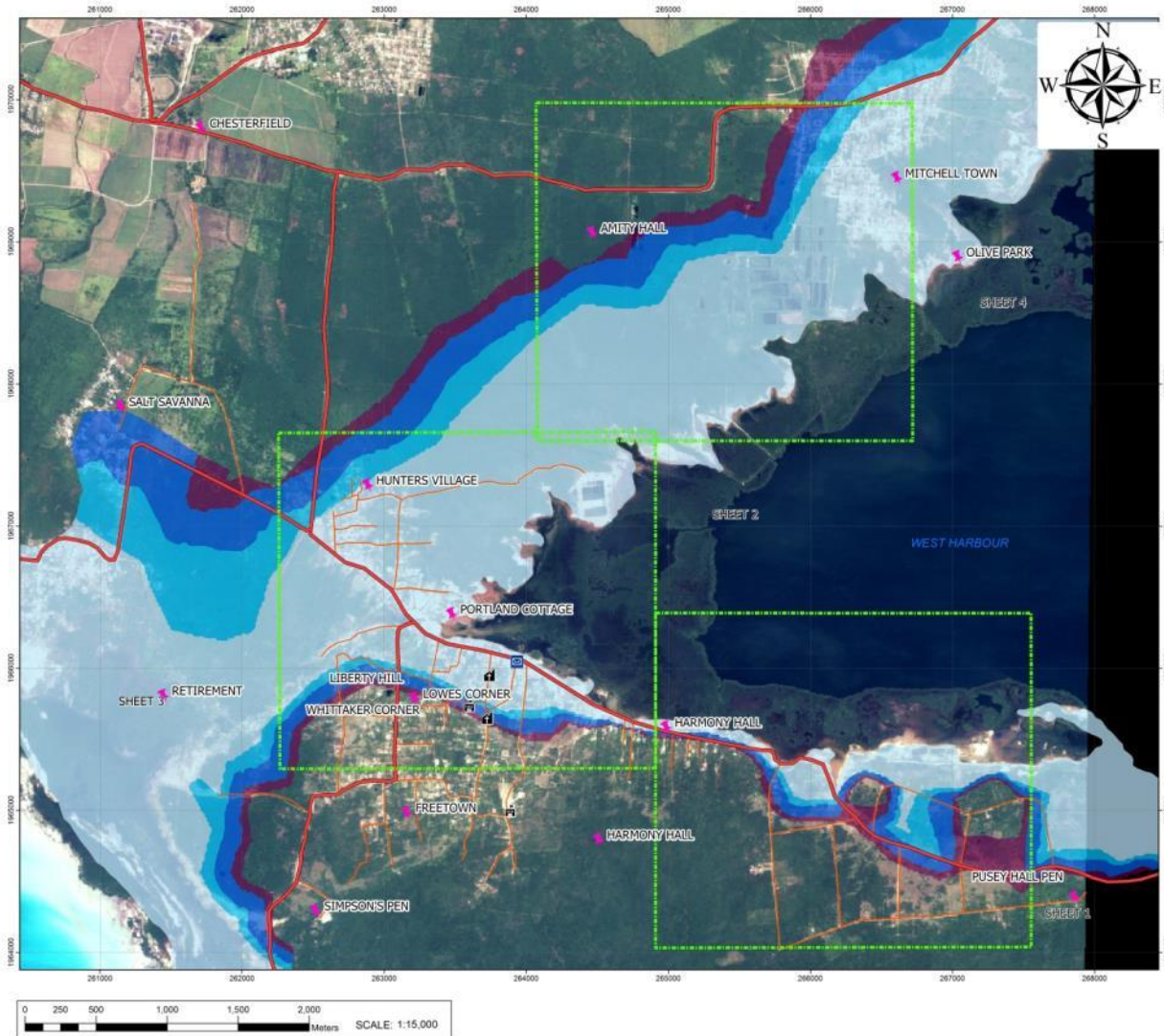


in association with





# STORM SURGE HAZARD MAP 25, 50, 100, 150 YR. RETURN PERIOD EVENT FOR PORTLAND COTTAGE, JAMAICA - MASTER PLAN



## CRITICAL FACILITIES

- CHURCH
- POLICE STATION
- POST OFFICE
- SCHOOL
- OTHER PAROCHIAL ROAD
- MAIN ROAD
- SETTLEMENTS
- SHEET INSETS

## STORM SURGE VALUES (m)

- 25yr - 2.9m
- 50yr - 3.6m
- 100yr - 4.4m
- 150yr - 4.9m

## NOTES

Map Projection: UTM  
Datum: WGS\_1984  
Units: Meters  
Date Map Produced: January 2010  
Satellite image: IKONOS 2001

A flooding event with a Return period of T- years is the flood which is expected to occur on average once every T- years.

### Hazard Map Interpretation

It is recommended that the 150 year storm surge hazard map be used for planning purposes;

It is recommended that the 50 year storm surge hazard map be used for preparedness measures;

### Map Use Limitations

The accuracy of the topographic data determines the accuracy of the prediction of storm surge extent.

A buffer zone may be applied to the storm surge extent as a precautionary measure for preparedness purposes.

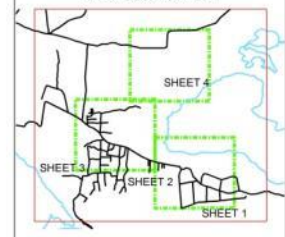
## LOCATION MAPS



## JAMAICA



## PORTLAND COTTAGE



Prepared For:  
The Government of Jamaica



Funded by:  
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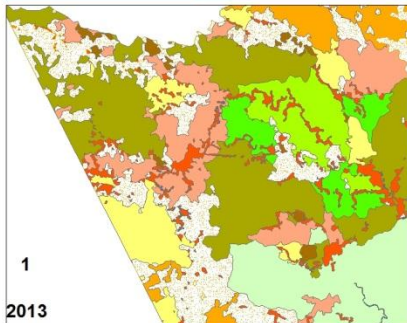
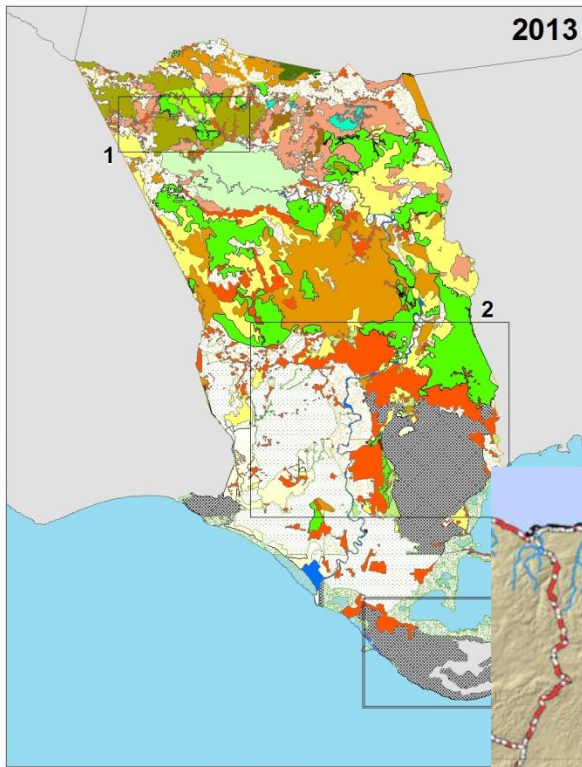
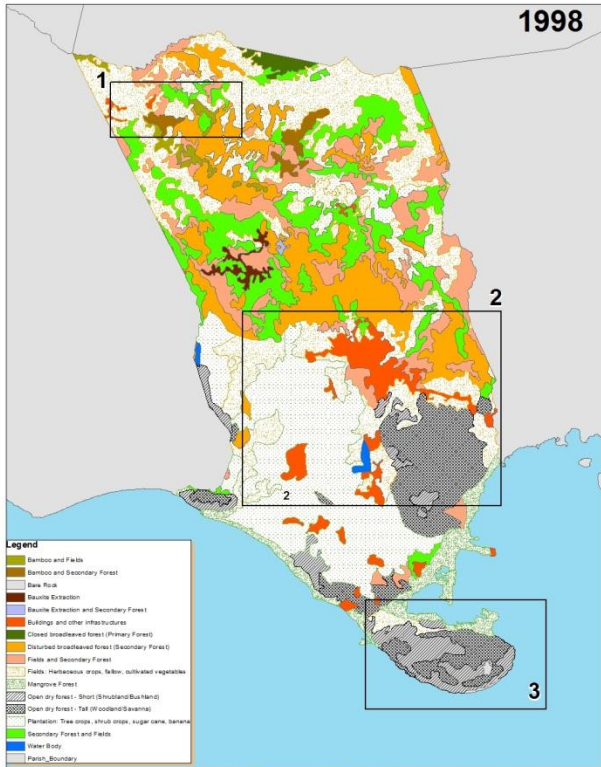
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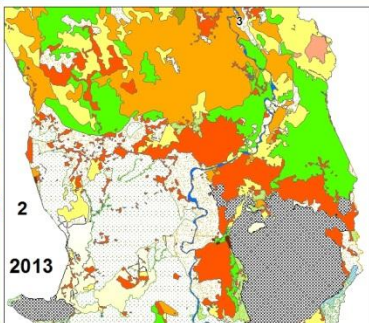
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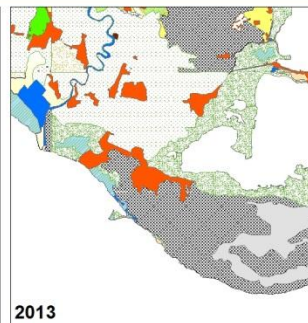




Lands converted from Fields: Herbaceous crops, fallow, cultivated vegetables to Bamboo & Fields and Fields & Bamboo



Lands converted from Disturbed Broadleaf to Buildings & other Infrastructures and Secondary Forest & Fields



Lands converted from Open dry forest - Short to Bare Land



Prepared by: Environmental Sciences and Technology Institute  
 Project: National Land Use Change Assessment  
 Date: 2014

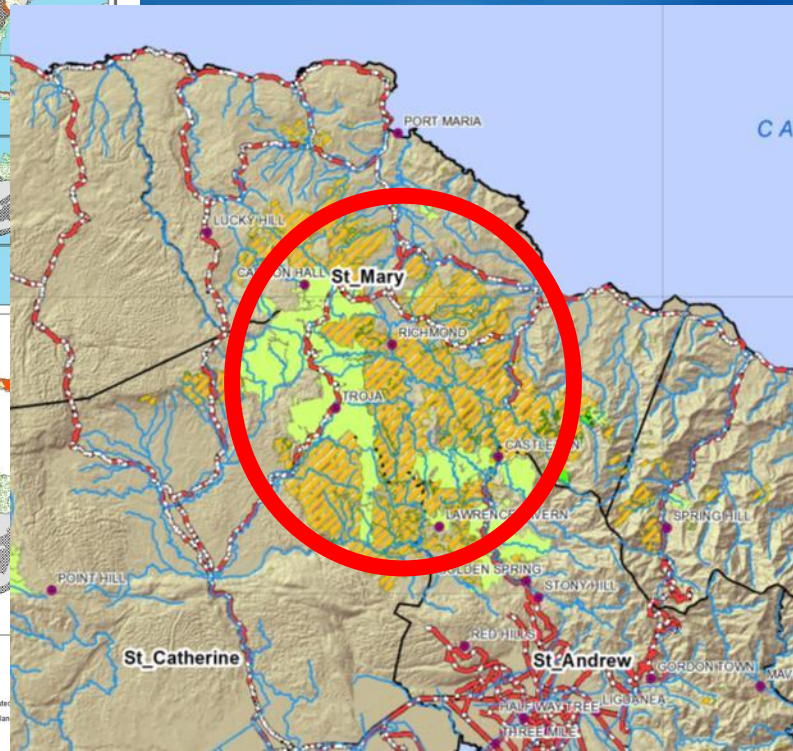
1:102,000

0 4,000 8,000 12,000 Meters



- Legend**
- Bamboo
  - Bamboo and Fields
  - Bamboo and Secondary Forest
  - Bare Rock
  - Bauxite Extraction
  - Buildings and other infrastructures
  - Closed broadleaved forest
  - Disturbed broadleaved forest
  - Fields and Bamboo
  - Fields and Secondary Forest
  - Plantation
  - Fields: Bare Land
  - Fields: Herbaceous crops, fallow, cultivated vegetables
  - Fields: Pasture: Human disturbed, grassland
  - Hardwood Plantation: Mahogany
  - Herbaceous Wetland
  - Mangrove Forest
  - Open dry forest - Tall (Woodland/Savanna)
  - Plantation: Tree crops, shrub crops, sugar cane, banana
  - Quarry
  - Secondary Forest and Bamboo
  - Secondary Forest
  - Water Body

# LAND USE CHANGE ASSESSMENT





# CONCLUSION

- Geospatial data is critical to contribute to evidence-based decision making in addressing the unique vulnerabilities of SIDS
- Because of its ability to combine and analyse a multiplicity of data GIS and related technologies are useful tools for monitoring and reporting on Post 2015 SDGs;
- While geospatial data may be useful to monitor and report on progress towards achieving SDG, many SIDS lack the human and institutional capacity required to do so.



# Thank You !

**Vision 2030 - “Jamaica, the place of choice to live, work, raise families and do business”**