



# GIS AND THE SDGs

Presented by:

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For: Nadine Brown

International Seminar on Sustainable Data  
for Sustainable Development in Xi'an, China

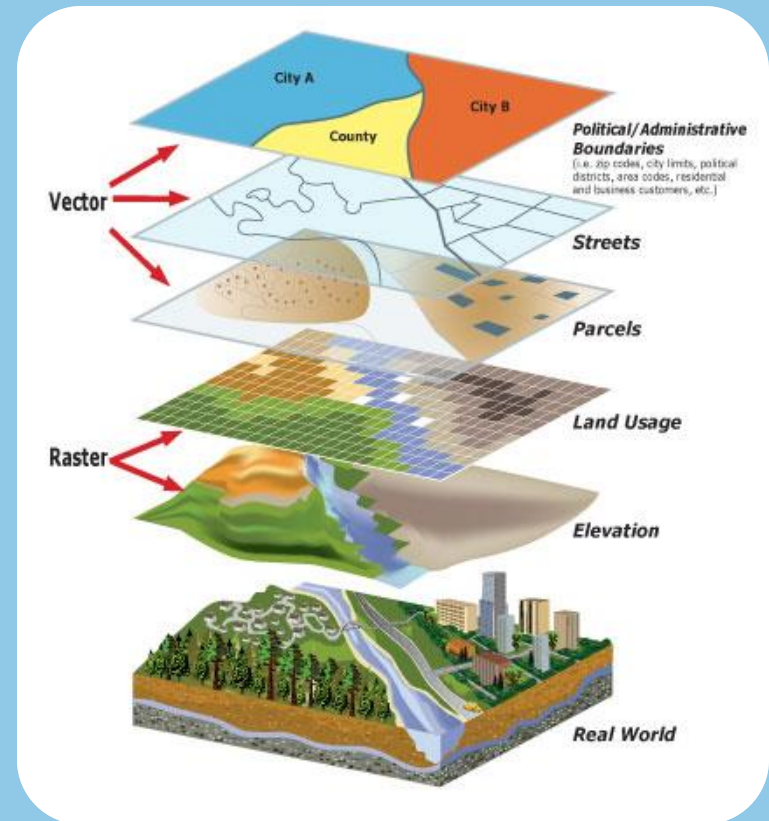
October 20-22, 2015

# Structure of the Presentation

- What is GIS and Sustainable Development?
- Jamaica's Sustainable Development Needs and Vulnerabilities
- Vision 2030 Jamaica - National Development Plan
- Global Goals for Sustainable Development
- The use of Geospatial Data for the SDGS
- Issues and Challenges
- Conclusion

# What is GIS?

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.



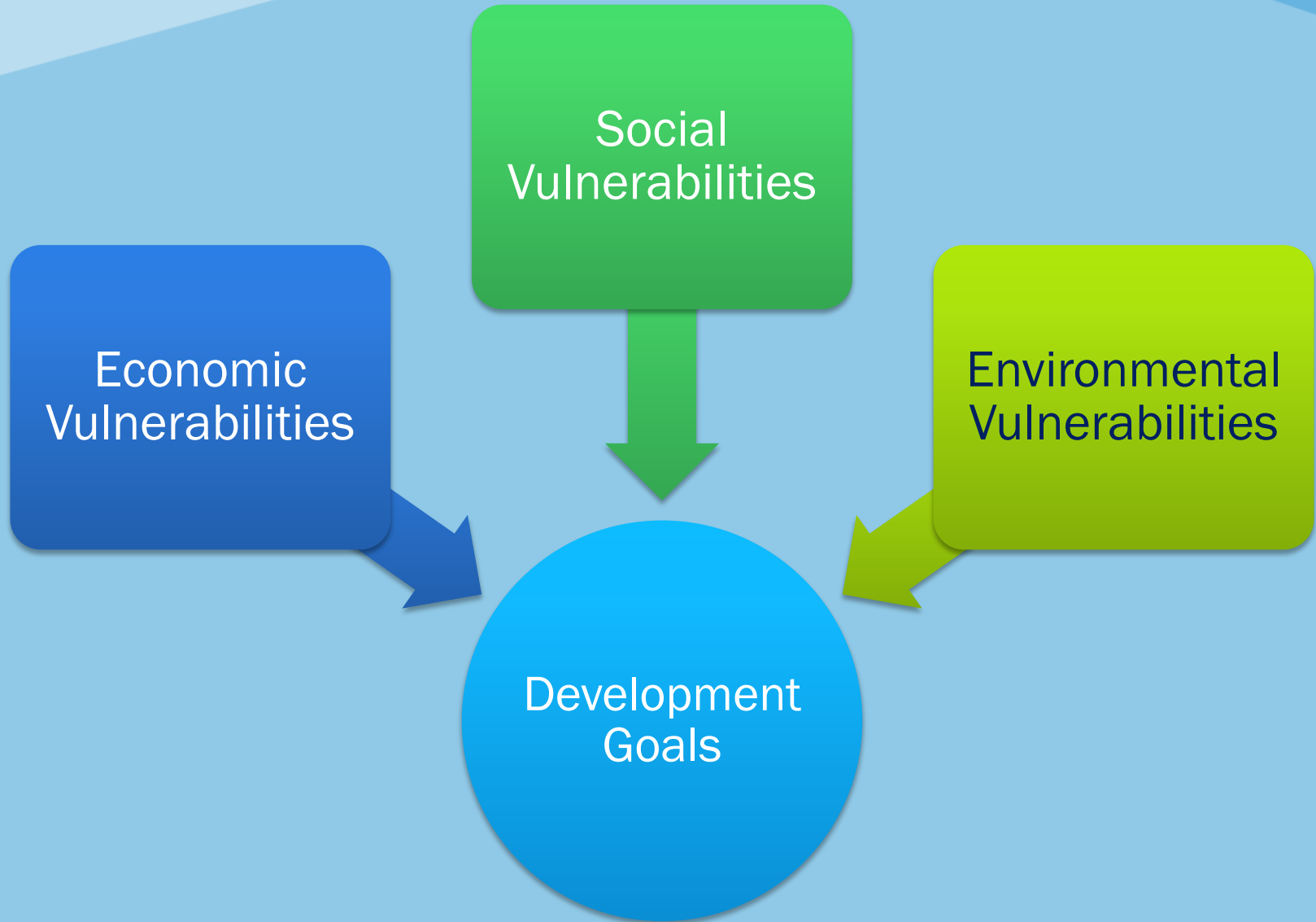
# What is Sustainable Development?

“Development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.”

(The Bruntland Report)



# Vulnerabilities and Development



# Jamaica's Vulnerabilities

Small Size

Fragile  
economy

Dependence  
on fossil  
fuels

Natural  
disasters

Climate  
change

Very open  
economy

# Impact of Natural Disasters on Jamaica

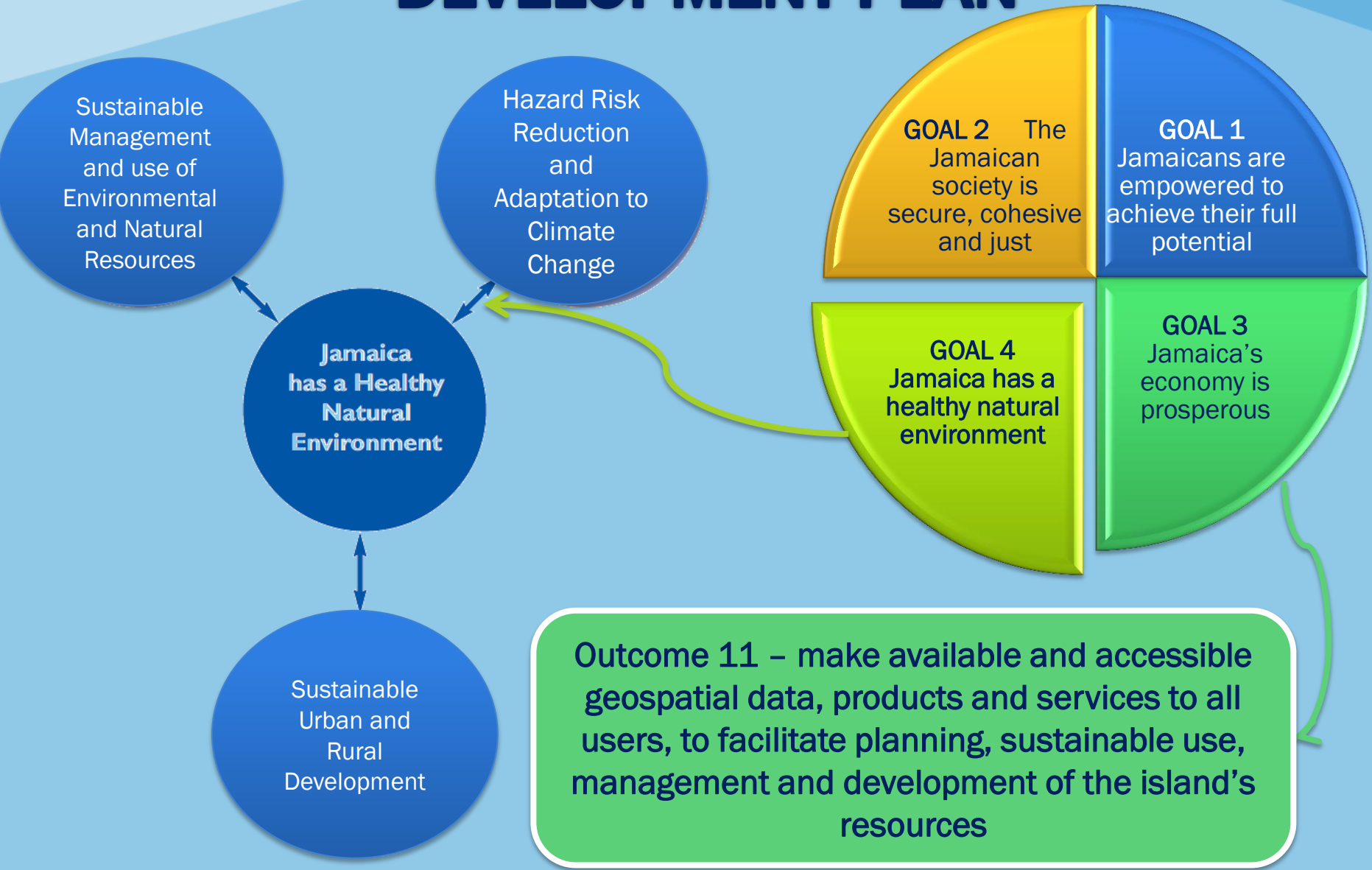
EVENT	Year	Category	Lives Lost	Cost (\$JB)	Impact (% GDP)
Hurricane Michelle	2001	4	5	2.52	0.8
May/June Flood Rains	2002	-	6	2.47	0.7
Hurricane Charley	2004	4	1	0.44	0.02
Hurricane Ivan	2004	3	17	36.9	8
Hurricanes Dennis & Emily	2005	4	7	5.98	1.2
Hurricane Wilma	2005	5	1	3.6	0.7
Hurricane Dean	2007	4	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	9.9	0.8
<b>Total</b>			<b>72</b>	<b>121.71</b>	<b>~ 2.0 p.a.</b>

# Use of GIS for Jamaica's Development

- Jamaica has a number of Spatial Data that can be combined/ overlaid in GIS and analysis done so smart, sustainable decisions can be made.
- Available datasets include :
  - Roads, Bridges, Schools, Land Parcels, Churches, Rivers, Water bodies, Protected Areas, Communities, Population and other socio- Economic Data.
- Datasets can be referenced and attributes joined to these datasets and displayed spatially to assist planners and policy makers to make informed decisions that are sustainable.



# VISION 2030 JAMAICA - NATIONAL DEVELOPMENT PLAN



**1** NO POVERTY



**2** ZERO HUNGER



**3** GOOD HEALTH AND WELL-BEING



**4** QUALITY EDUCATION



**5** GENDER EQUALITY



**6** CLEAN WATER AND SANITATION



**7** AFFORDABLE AND CLEAN ENERGY



**8** DECENT WORK AND ECONOMIC GROWTH



**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE



**10** REDUCED INEQUALITIES



**11** SUSTAINABLE CITIES AND COMMUNITIES



# THE GLOBAL GOALS

For Sustainable Development

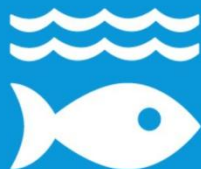
**12** RESPONSIBLE CONSUMPTION AND PRODUCTION



**13** CLIMATE ACTION



**14** LIFE BELOW WATER



**15** LIFE ON LAND



**16** PEACE AND JUSTICE STRONG INSTITUTIONS



**17** PARTNERSHIPS FOR THE GOALS



# Where Does Geospatial Data Fit?

- “Geospatial – or geographic – information shows where social, environmental and economic conditions occur. It helps answer questions such as:
  - Where are people at risk of rising sea levels?
  - How do we protect the people living there?
  - Where is disease occurring?
  - How do we contain it?
  - How many hectares of forests are there? Are we managing them sustainably?
- Such data is indispensable for advancing the global development agenda, particularly the 17 Sustainable Development Goals...”

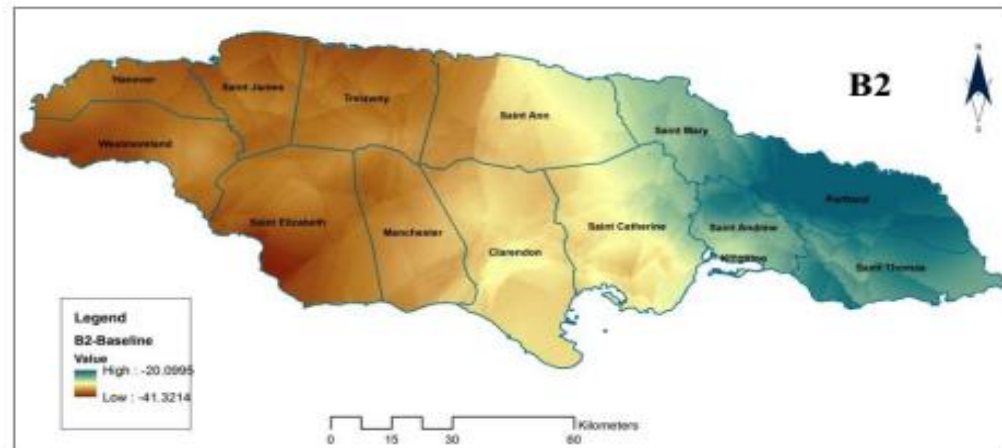
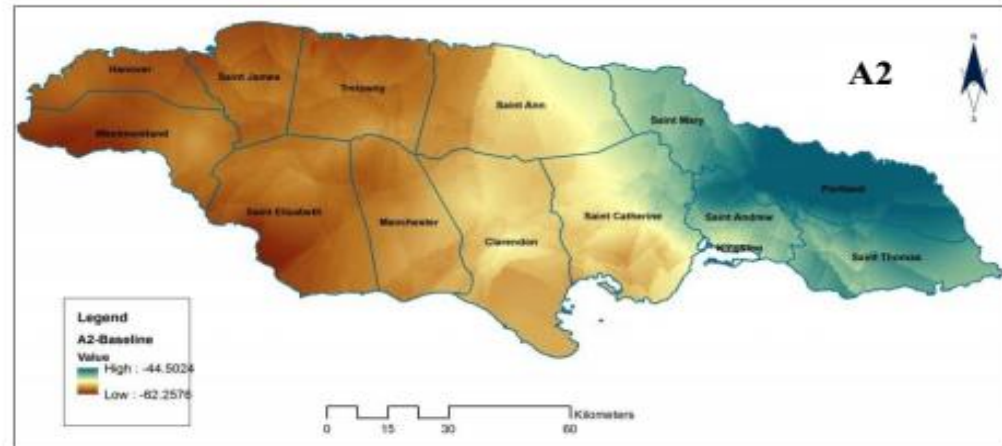
Tim Trainor, Co-chair  
Committee of Experts on Global Geospatial  
Information Management (UN-GGIM)

# State of the Jamaican Climate

13 CLIMATE ACTION



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).



# Jamaica – Near Term Climate Scenarios

## JAMAICA AT PRESENT



Mean temperature increases by 1.3 °C by 2020s.

Decrease in annual rainfall



*“A rise of 7 metres would flood most of Jamaica’s coastal communities. In Clarendon, Lionel Town would be on the beach. Portland Cottage, Portmore and both our airports would be drowned. A rise of 70 metres would make Jamaica look like...”*

## The Future

### Jamaica, If the Ice Caps Melt



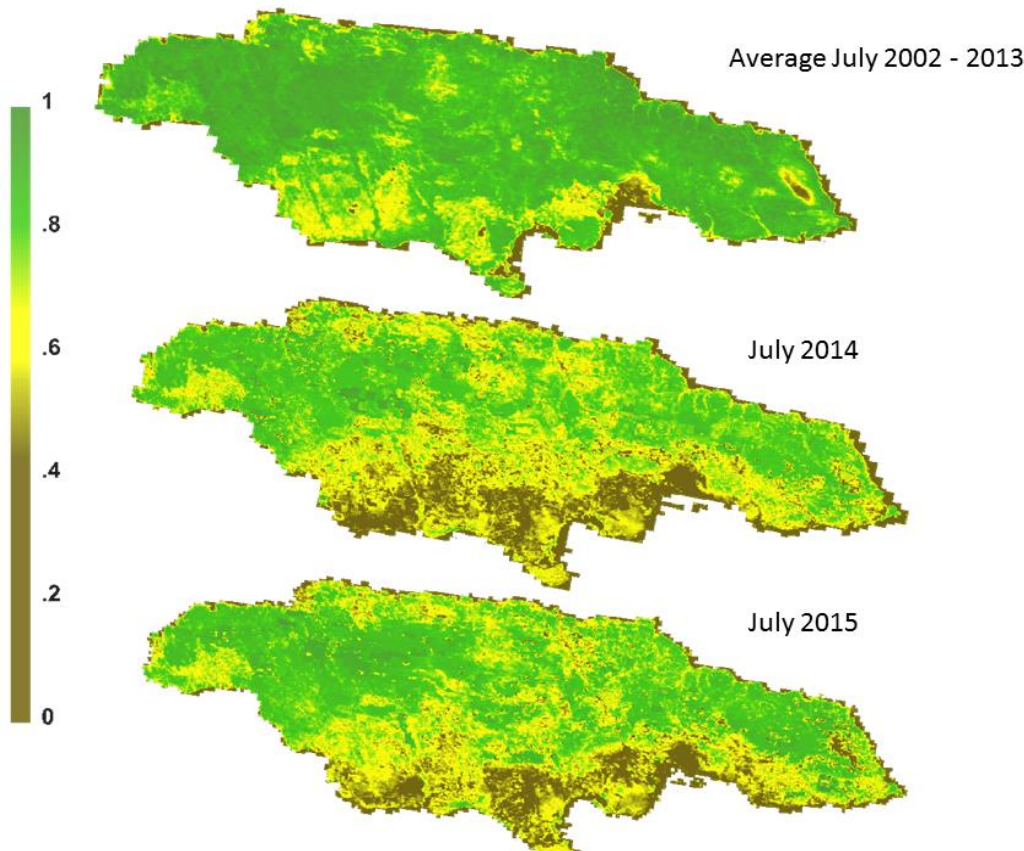
Source: Robinson, Rowe, Khan, (2005)

# Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture



## NDVI maps showing the regional distribution of drought during July 2014 and July 2015

### Normalised Difference Vegetation Index (NDVI)



Vegetation monitoring can be done through satellite based remote sensing analysis

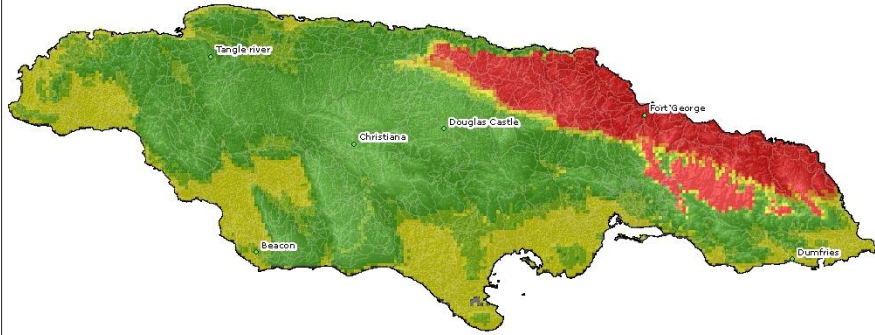
The NASA MODIS sensor measures spectral reflectance from the earth's surface to derive vegetation indices that estimate the amount of chlorophyll in vegetation.

The effects of the 2014 and 2015 summer drought can be seen in changes in mid-summer NDVI compared to average mid-summer NDVI conditions

**THE SOUTHERN REGION OF THE ISLAND TENDS TO RESPOND MORE TO EARLY SUMMER RAINFALL DEFICITS COMPARED TO THE NORTHERN AREAS**



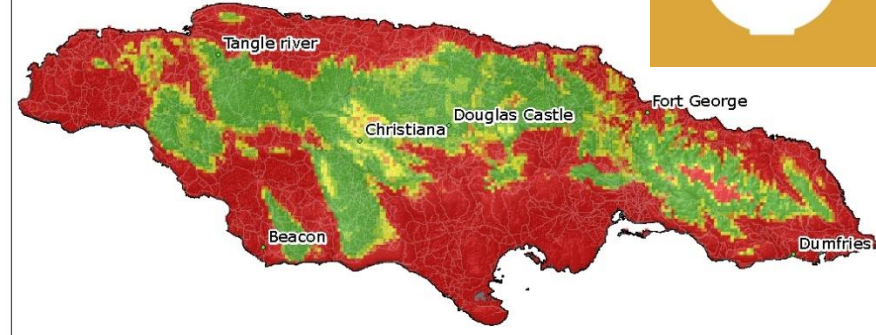
# MODELLING CLIMATE CHANGE IMPACTS ON CROP PRODUCTIVITY IN JAMAICA



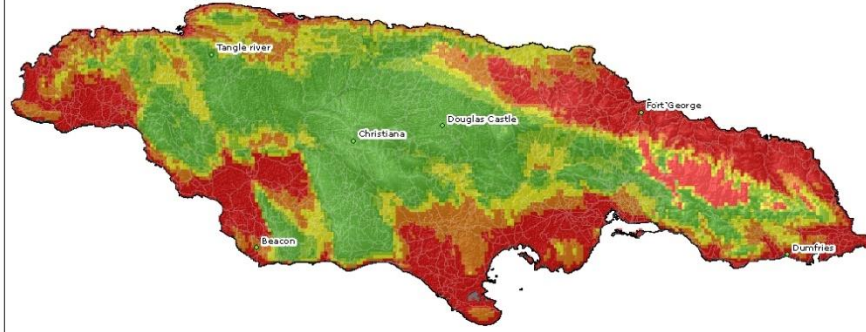
**IRISH POTATOE CURRENT MEAN**



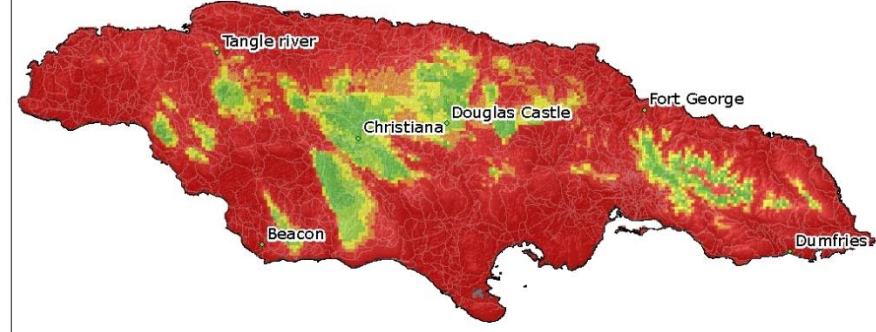
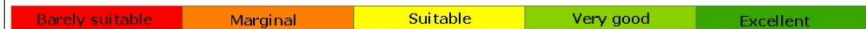
Source: Dr. Kevon Rhiney, Department of Geography & Geology (UWI)



**GINGER CURRENT MEAN**



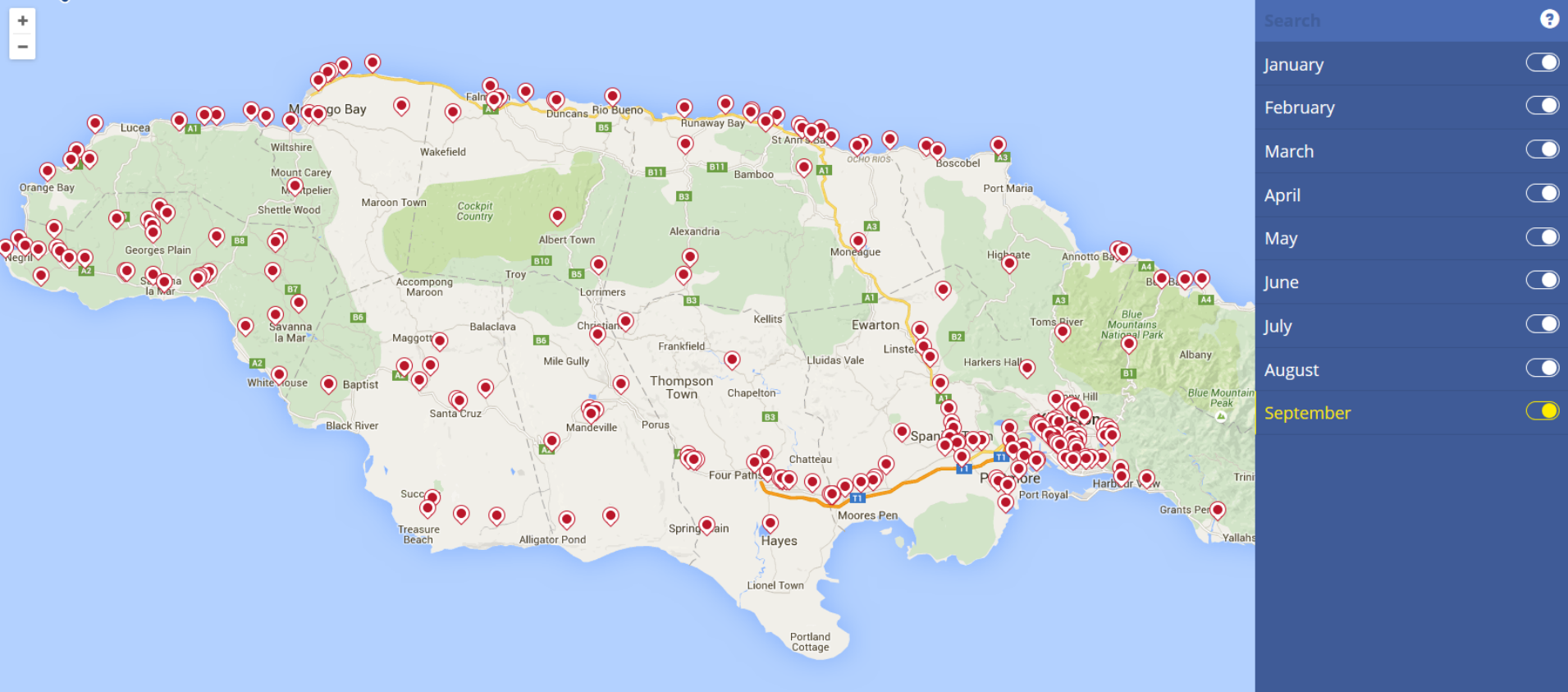
**IRISH POTATOE FUTURE MEAN (2050)**



**GINGER FUTURE MEAN (2050)**

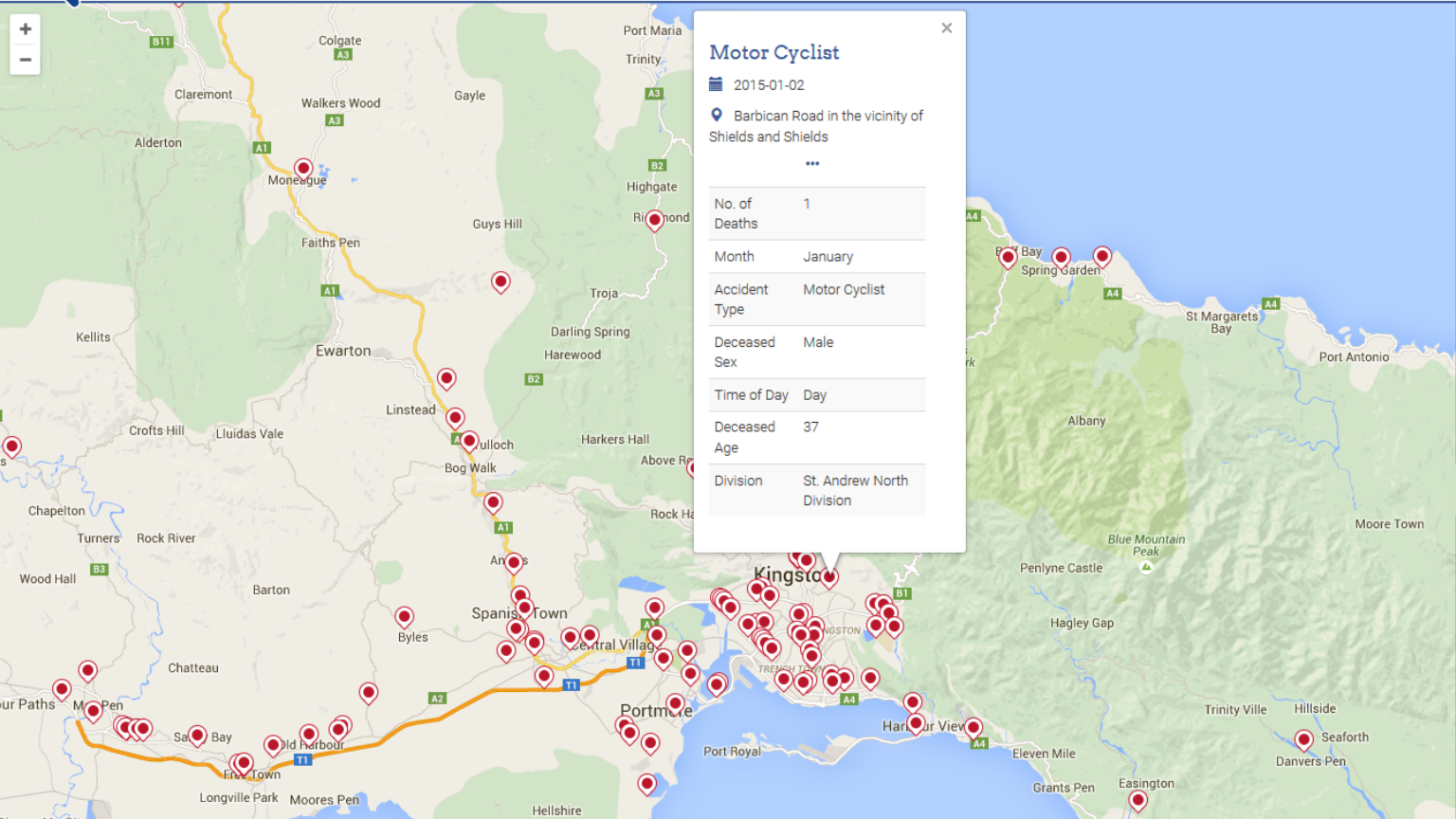


# Target 3.6 - By 2020, halve the number of global deaths and injuries from road traffic accidents





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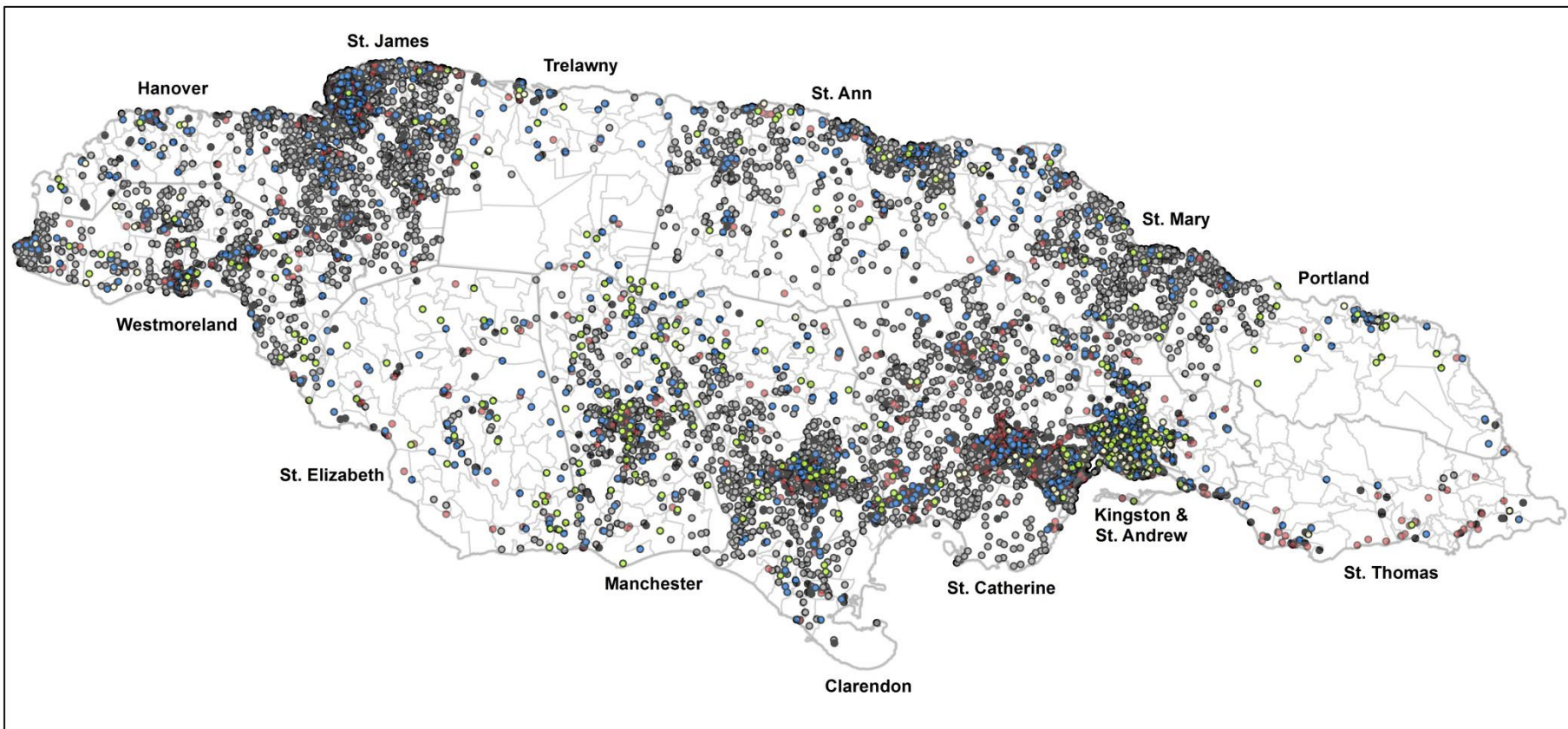


Search ?

- January
- February
- March
- April
- May
- June
- July
- August
- September**

# Target 3.3 *By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases...*

## Health Related Issues by STATIN Communities 2011



5 2.5 0 5 10 15 20 25 Kilometers



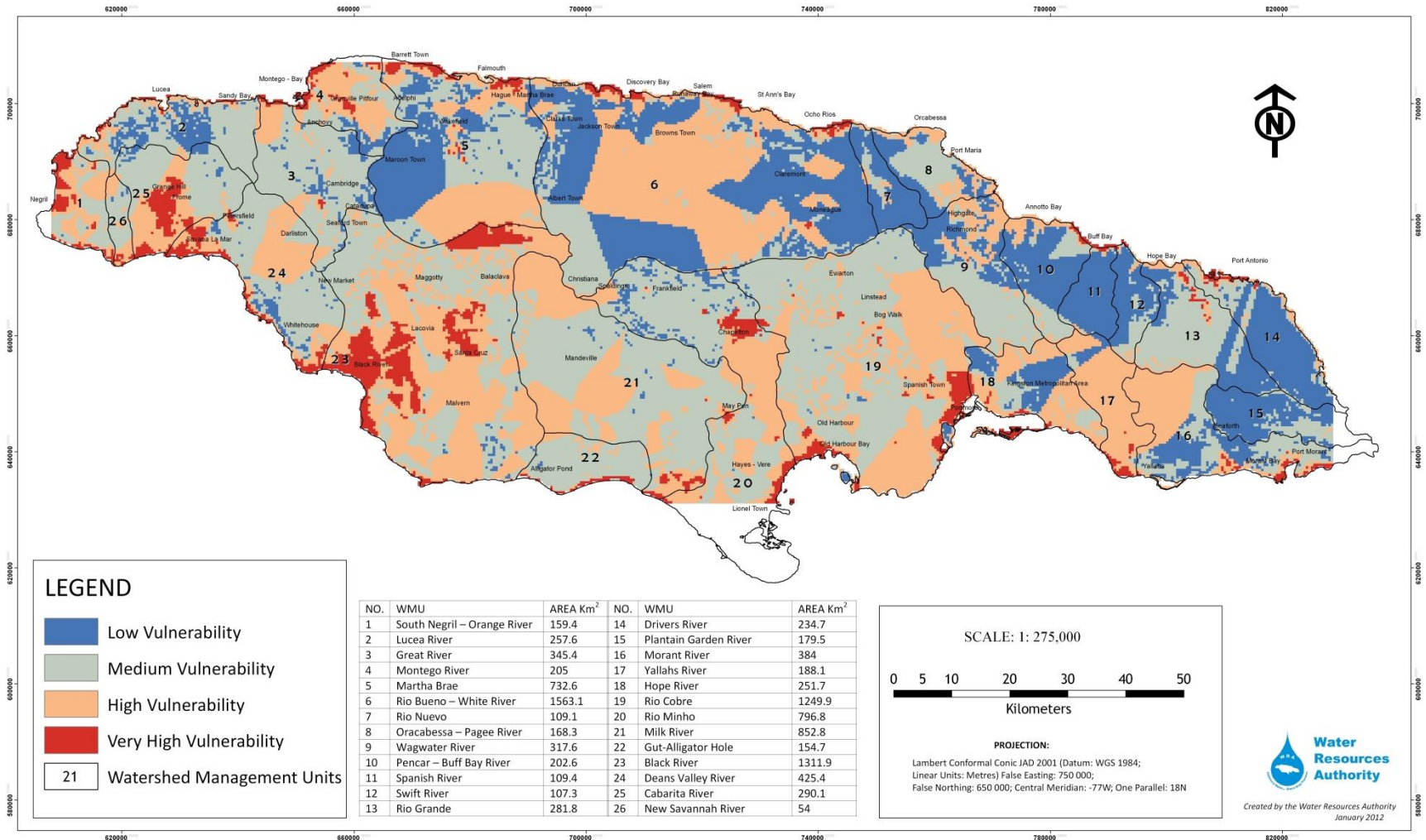
**Legend**

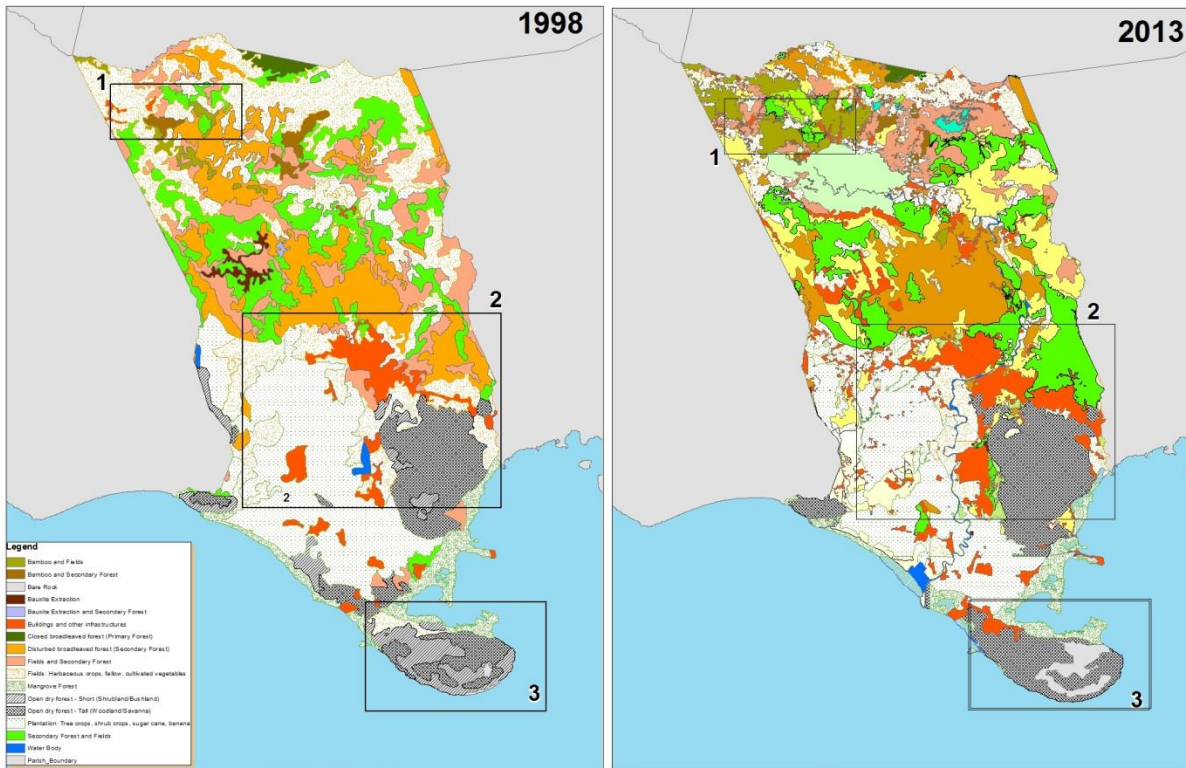
STATIN Communities	Dengue	Shootings
Parishes	HIV/AIDS	Violence Related Injuries
Tuberculosis	Homicides	



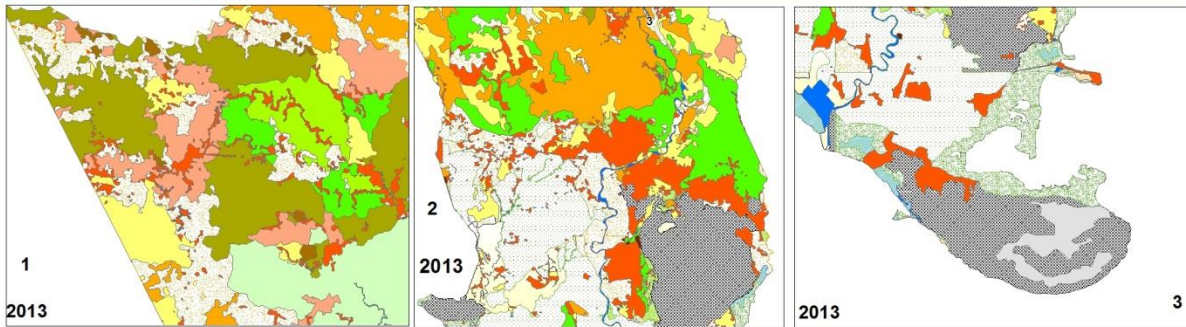
# Target 6.3 By 2030, Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials...

## Limestone Aquifer Vulnerability (Draft)





- Legend**
- Bamboo and Fields
  - Bamboo and Secondary Forest
  - Bare Rock
  - Bauxite Extraction
  - Bauxite Excavation and Secondary Forest
  - Buildings and other infrastructures
  - Closed broadleaved forest (Primary Forest)
  - Disturbed broadleaved forest (Secondary Forest)
  - Fields and Secondary Forest
  - Fields: Herbaceous crops, fallow, cultivated vegetables
  - Mangrove Forest
  - Open dry forest - Short (Woodland/Savanna)
  - Open dry forest - Tall (Woodland/Savanna)
  - Plantation: Tree crops, shrub crops, sugar cane, banana
  - Secondary Forest and Fields
  - Water Body
  - Marsh\_Boundary



1 Lands converted from Fields: Herbaceous crops, fallow, cultivated vegetables to Bamboo & Fields and Fields & Bamboo  
 2 Lands converted from Disturbed Broadleaf to Buildings & other Infrastructures and Secondary Forest & Fields  
 3 Lands converted from Open dry forest - Short to Bare Land

1:102,000

4,000 2,000 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

Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss

Target 15.2 - By 2020, halt deforestation, restore degraded forests, and increase afforestation and reforestation by x% globally



Prepared by the Natural Resources and Environmental Conservation Department  
 Project: Sustainable Land Use Management System  
 Date: 2013

# Issues and Challenges

- Fiscal Constraints
- Data Gaps – lack of baseline data, marine and coastal resources, local level data
- Need to increase awareness and understanding the value of spatial data and its analytical capabilities among decision-makers
- Need to improve local and regional capacity to undertake more in depth geospatial data analysis

# Conclusion

- Geospatial data is critical to contribute to evidence-based decision making in addressing the unique SD vulnerabilities of Jamaica
- Efforts to increase the availability of high-quality, timely and reliable data, disaggregated by geographic location, will be critical to the achievement of both the global goals and our own Vision 2030 goals.

# Closing Thought

“The monitoring of the Millennium Development Goals over the past 15 years taught us that **data are an indispensable element of the development agenda...**

**Knowing where people and things are, and their relationship to each other, is essential for informed decision-making, and to measure and monitor outcomes.”**

Wu Hongbo  
Under-Secretary-General for Economic and  
Social Affairs, UN

# CREDITS

- Nadine Brown, Planning Institute of Jamaica
- Mirko Morant, Statistical Institute of Jamaica
- Tricia-Rae Rodriguez, Water Resources Authority
- Hector Burrowes – Ministry of Health
- Marilyn Headley – Forestry Department
- Dr. Donovan Campbell – CARIBSAVE
- Dr. Kevon Rhiney – Department Of Geography and Geology, UWI
- JNGI, Mona Geoinformatics Institute, JCF, National Road Safety Council





**Thank You**