The Role of Science Advice in Extreme Weather Events and Tackling Climate Change

Ronald Jackson

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International Network for Government Science Advice Caribbean Capacity Building Workshop

Kingston, Jamaica, February 20, 2018

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PRESENTATION OVERVIEW

- Background on CDEMA
- Reflections on the 2017 Hurricane Season
- War Gaming Exercise
- CDEMA's use of Science in CDM Process
- Lessons, Challenges and Opportunities

CDEMA: WHO WE ARE…

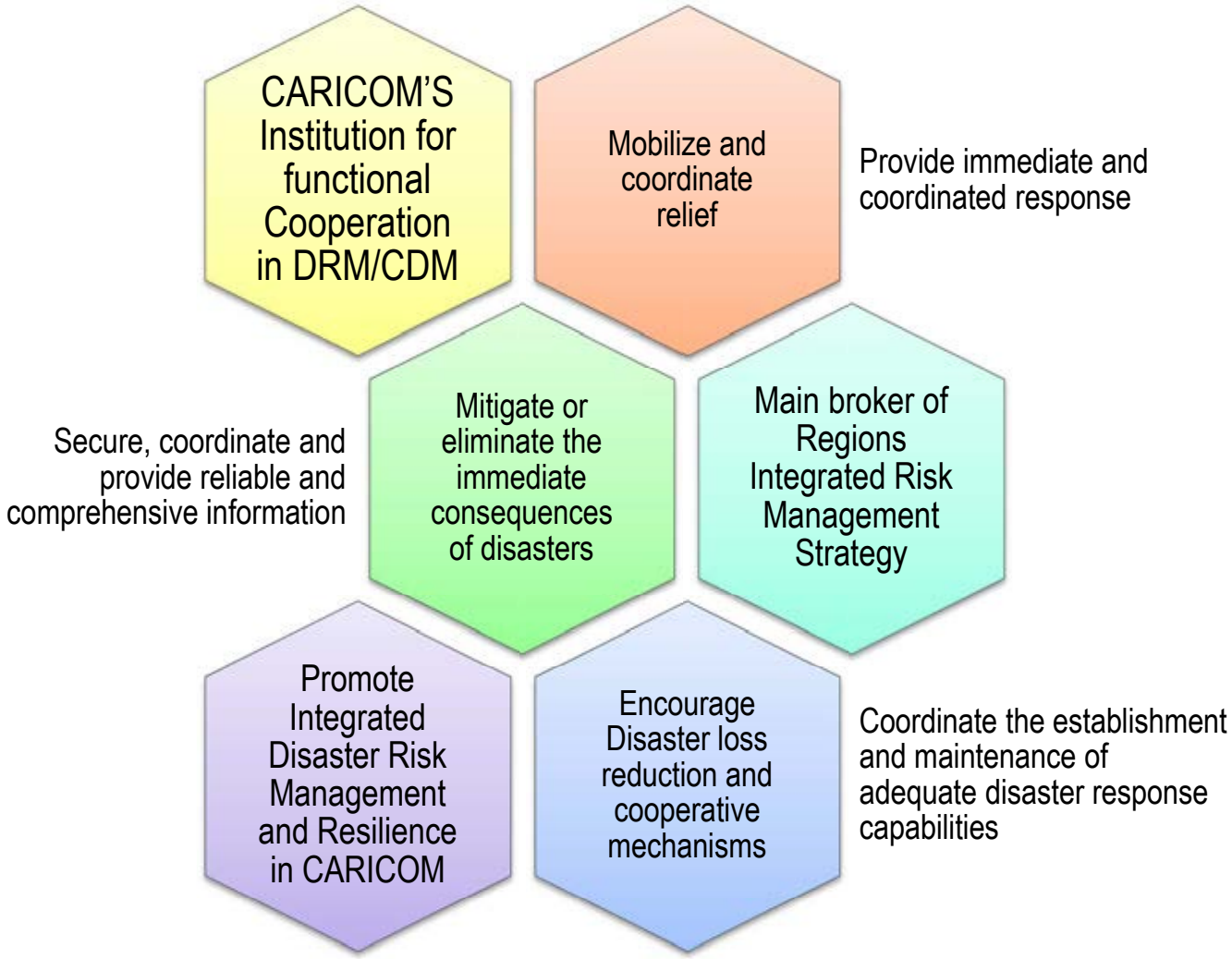
- Institution of the Caribbean Community (CARICOM)
- Caribbean Disaster Emergency Management Agency is the regional inter-governmental Agency responsible for disaster management in the Caribbean Community (CARICOM)

CDERA
- September 1991

→

CDEMA
- September 2009

CDEMA MANDATE (since 2009)



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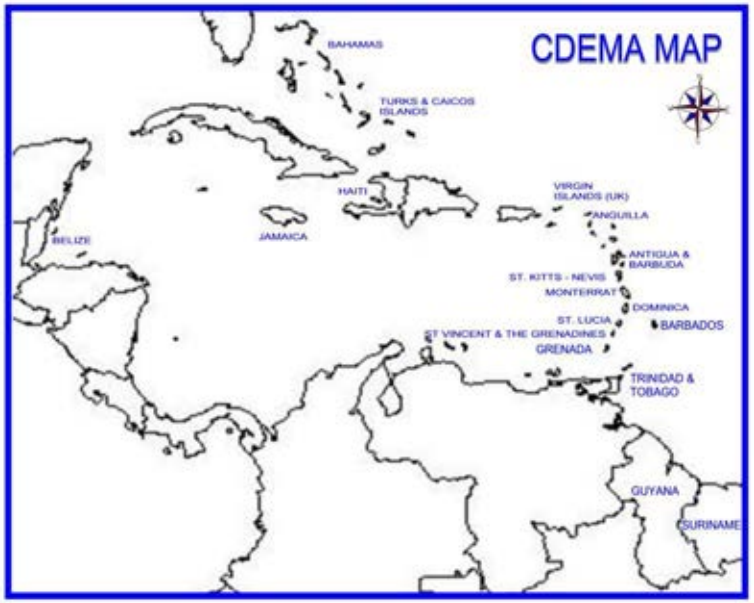
CDEMA PARTICIPATING STATES

The CDEMA System is made up of 18 Participating States (PS)

- Anguilla
- Antigua
- Bahamas
- Barbados
- Belize
- British Virgin Islands
- Dominica
- Grenada
- Guyana
- Haiti
- Jamaica
- Montserrat
- St Kitts and Nevis
- Saint Lucia
- St Vincent and the Grenadines
- Trinidad & Tobago
- Turks & Caicos Islands
- Suriname



THE CDM STRATEGY 2014-2024

Regional Goal: Safer more resilient and sustainable Caribbean States

Institutional Strengthening

- DM Organizations (national and regional) Strengthened for Supporting and monitoring the advancement of DRM
- CDM Integrated into policy, strategy, legislation
- Development Partner Programming aligned
- Strengthened Coordination for preparedness, response and recovery
- Adequate resourcing of CDM Programming

Knowledge Management

- Regional Network for Risk Informed Decision Making
- Integrated System for fact based decision making at all levels
- Incorporation of Community and Sector Knowledge in Risk Assessments
- Education and Training materials, standardized, improved and applied

Sector Integration

- Strategic Disaster Risk Management Programming for Priority Sectors
- Hazard Information integrated into development planning and programming for priority sectors
- Incentive programs developed and applied for the promotion of risk reduction/CCA in infrastructure investment

Community Resilience

- Standards for safe communities developed and applied
- Community Based Disaster Management Capacity built/strengthened
- Community EWS integrated, improved and expanded
- Community Livelihoods safeguarded

Gender

Climate Change

Information Communication Technology

Environmental Sustainability

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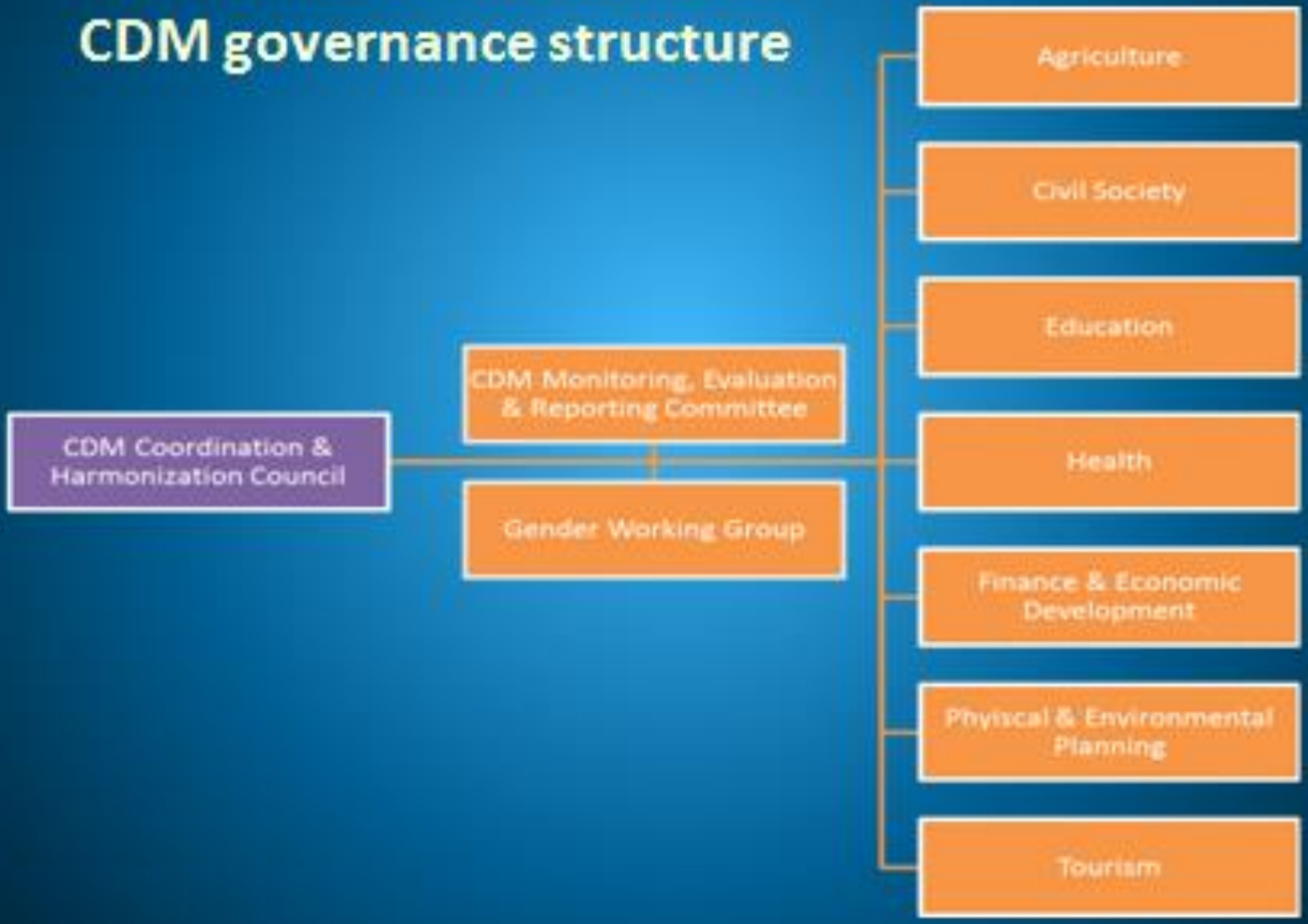
CDM governance structure



MANAGING RISK INFORMATION

Spatial data forms an essential basis for informing decisions before, during and after disasters

CDEMA is mandated to "develop and maintain a comprehensive and reliable database of all relevant resources necessary to achieve the objectives of CDEMA and a system for updating the database

CDEMA has envisioned the Caribbean Risk Information System (CRIS) to be a digital/virtual platform for hosting risk management data/information accessible to stakeholders to facilitate analysis, research, greater awareness of risk management in the region and to support evidence based decision making processes

CURRENT STATE OF PLAY IN THE REGION

Caribbean countries have inherent vulnerabilities to natural hazards due to small size, limited resource base, concentration of coastal development

The magnitude, timing, location and impacts of a hazard event are difficult to predict

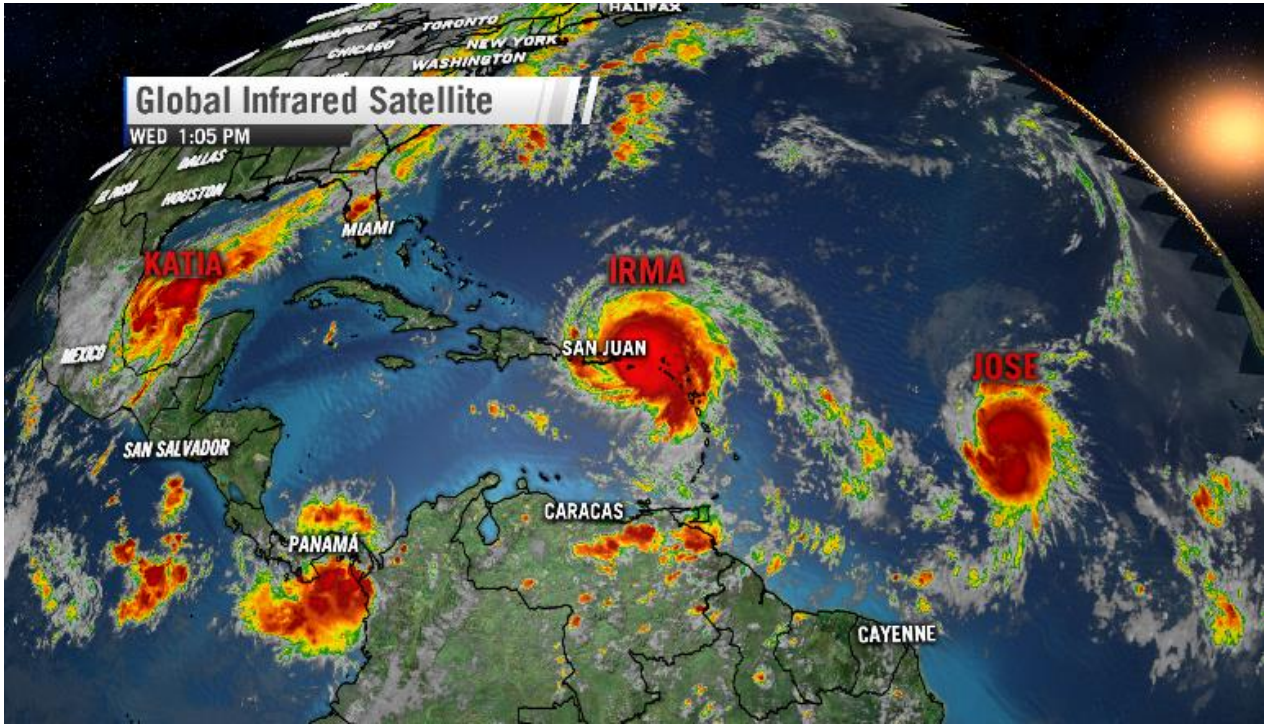
Changing climate is increasing the unpredictable nature of weather patterns

Increasing urbanisation of our societies are placing greater burdens on our environmental resources

Changing societal dynamics - work-life patterns, lifestyle expectations, demographic changes, community fragmentation are increasing community vulnerability

Disaster impacts set back or reverse development gains

2017 AN ACTIVE SEASON …



Wednesday September 6, 2017

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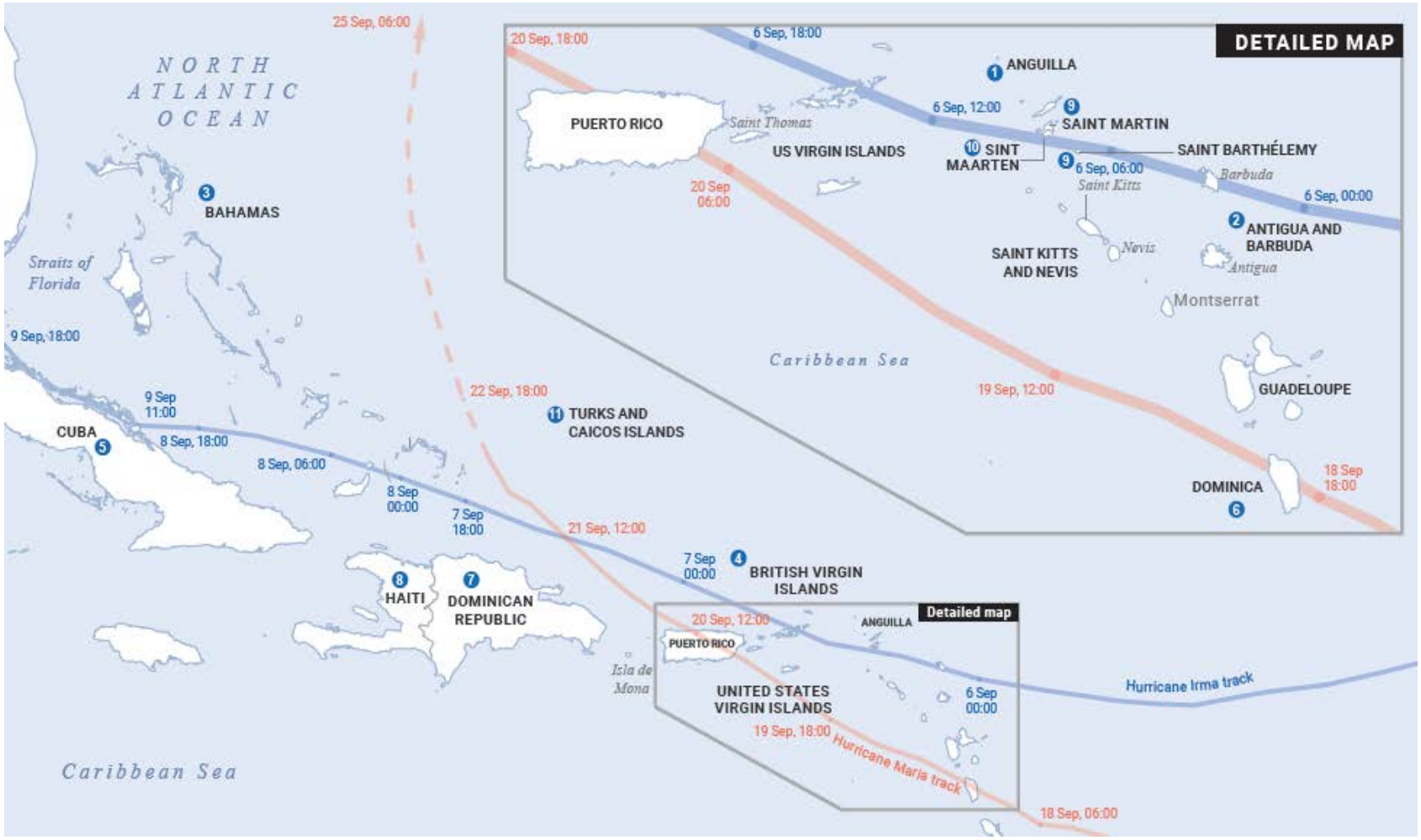
TRACKS – HURRICANES IRMA AND MARIA



TROUBLE IN THE TROPICS

Three CAT 5 in two weeks, equaling second highest strength on record and strengthening over a short time period

Between 10-225% GDP

90-95% Infrastructure Damage

Incidence of 100% direct impact on the population

12 affected.

9 CARICOM Members/Ass. Members

>US$114 Billion in Damage and Losses

>200 Deaths (37 in CDEMA States)

75%-95% Damage to Building Stock

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THE RESPONSE – IRMA & MARIA

- First support deployments dispatched within 24 hours of impact
  - Timing of Irma response affected by Hurricane Jose

- **194 persons deployed (at October 29, 2017) supporting**
  - damage assessment and needs analysis
  - emergency response coordination
  - relief operations
  - search and rescue

CATASTROPHIC HURRICANE DAMAGE

ALL TOO FAMILIAR STORY

Direct impacts:

- Increased critical infrastructure damage; additional emergency preparedness requirements; higher operating expenses business interruptions

Indirect societal impacts:

- Risk to future socio-economic development; especially where loss and damages are similar to GDP

ALL TOO FAMILIAR STORY

Direct Costs

- Destruction critical economic infrastructure
- Coastal degradation
- Short to medium term loss of revenue
- Increased expenditure to rehabilitate

Indirect Costs

- Future investment in some key industry affected by perception of increased risk
- Overall impact on local and foriegn investment into the country.

LESSONS RECONFIRMED

- Need for enhanced response capacity for multiple and catastrophic events
- Importance of building standards, codes, enforcement
- Engage in perpetual readiness, particularly for fast onset hazards
- Recognize vulnerabilities and provide measures to treat them
- Need for enhancements in understanding spatially the risk exposure, vulnerability and hazard interface
- Typically lengthy process for access of emergency grant funds - consider other measures to treat the immediate post-impact operations

WAR GAMING EXERCISE

OBJECTIVE

- A means of sensitization on how science can support a risk informed agenda.
- Provide an opportunity for Policy Makers to think through their information needs to make critical decisions in managing risks and disasters
- Allows Scientific community to determine what resources or information they are in a position to provide to ensure successful management of risk at all phases.

SCENARIOS

Scenario 1 – A Tropical Wave impacts Jamaica causing widespread flooding

- Decision making when Jamaica is threatened and later impacted by a hydrological hazard how can the scientific community support?

Scenario 2 – A Major Hurricane Threatens and impacts Jamaica

- Decision making when Jamaica is threatened and later impacted by a major meteorological hazard

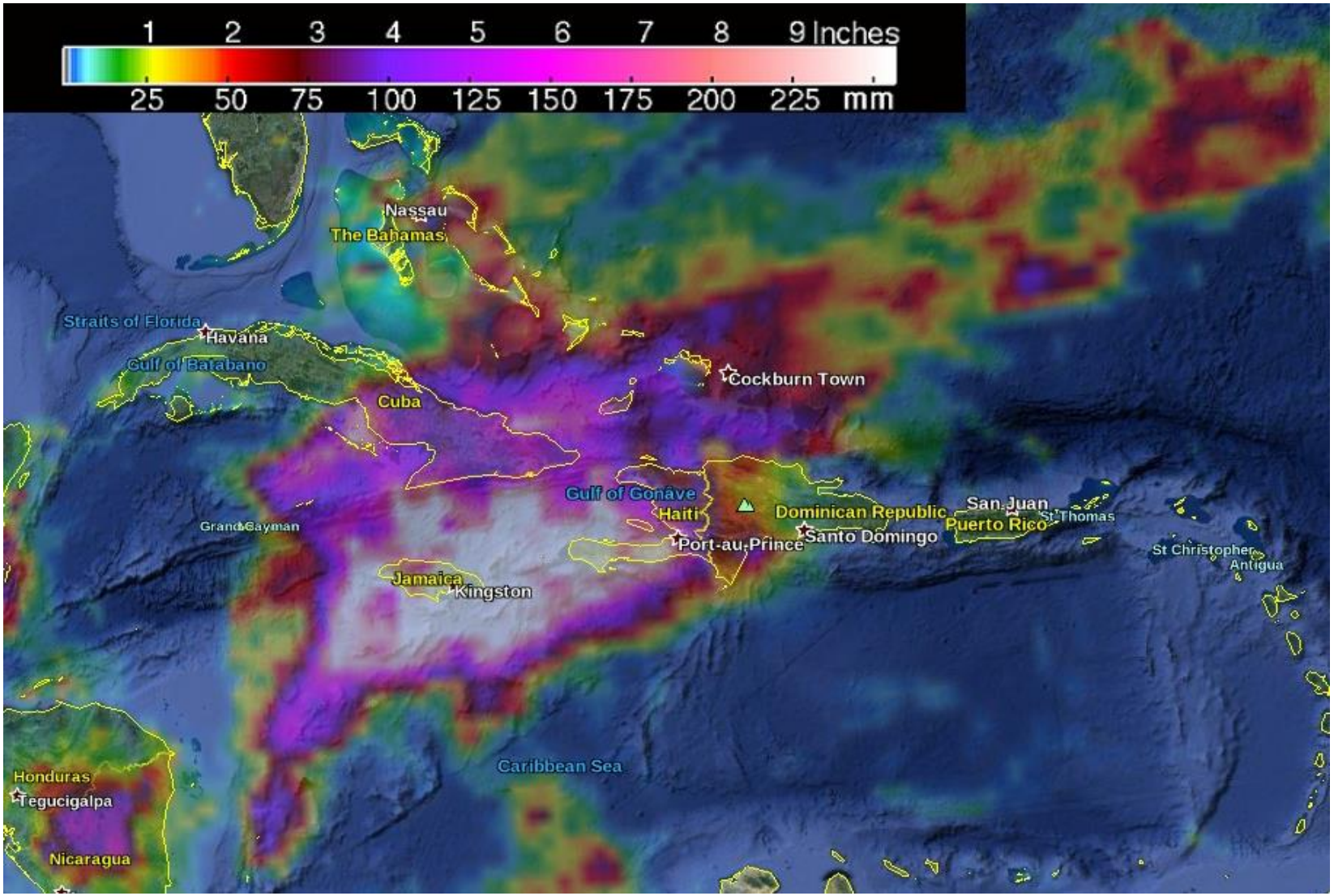
Scenario 3 – Post Disaster Activities – Response and Recovery Operations

- Some of the key decisions to be made after a disaster event what can scientist do to make this process more effective

SCENARIO 1(A)

Period	Objective	Activity/Event
August 25, 2018 10:00 a.m.	Responding to a Tropical Wave with potential to cause widespread across Jamaica	A Tropical Wave across the central Caribbean is dumping extremely heavy rain on parts of Jamaica since Saturday evening, August 25, 2018, causing major flooding and landslides. Flooding affected 10 of country's 14 parishes, with Clarendon the worst hit. The Health Ministry has issued gastroenteritis and leptospirosis alert. Met Service said the island experienced an unprecedented level of rainfall. Some parishes saw more rain over the four days than the usual average for the entire months of June, July and August

EXTREME RAINFALL HITS JAMAICA, MAJOR FLOODING AND LANDSLIDES



SCENARIO 2(A)

Period	Objective	Activity/Event
September 9, 2018 10:00 a.m.	Responding to a major Hurricane threatening Jamaica	At 10:00 a.m. the centre of Hurricane Gilbert was 200 miles east of Jamaica with 130 miles per hour winds. Hurricane winds extend 20 miles from its centre and Tropical Storm winds extend 100 miles out. The projected rainfall is 10-18 inches. Gilbert is travelling in a westerly direction at 20 mph; and on this current track the centre will pass over Kingston later tonight. At this rate, the effects of the outer bands will be felt in Jamaica by 5:00 p.m. today.

SCENARIO 2 (B)

Period	Objective	Activity/Event
September 1, 2017	Responding to a major Hurricane impacting Jamaica	Hurricane Gilbert impacted Jamaica with 130 miles per hour winds and 18 inches of rainfall. Severe flooding, major wind damage and Looting reported in several areas. Towns and villages completely devastated (unable to quantify as roads are blocked, power lines down and no telephones functioning in the area) An estimated 200,000 persons will require shelter and food. Approximately up to 50,000 persons will be displaced (including 5,000 tourists who were not able to leave).

“WAR GAMING EXERCISE”

HURRICANE GILBERT

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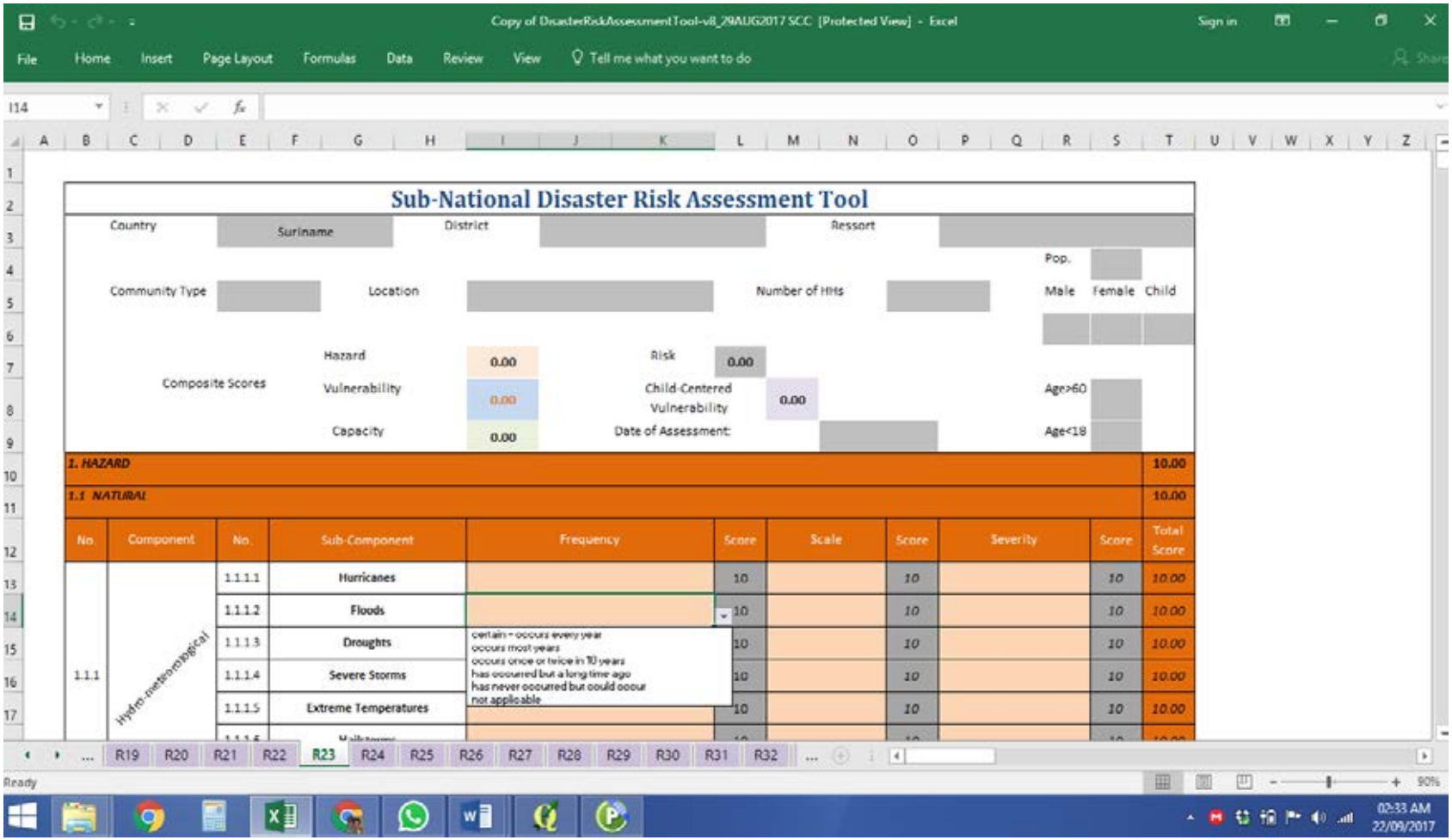
CDEMA'S USE OF SCIENCE TO ADVANCE CDM

HOW CDEMA USES SCIENCE TO ADVANCE THE RESILIENCE AND SAFETY AGENDA

- Risk Assessments to inform our Response to Humanitarian Crisis and Disasters
- Advocacy and Policy advice
- Hazard Monitoring, Disaster Alerting and Early Warning
- Assessment of the Social, Environmental and Physical impacts of Disasters
- In the development of model tools for DRR Practice
- Provide Situational Awareness

COUNTRY	ISO3	Natural (0-10)	Human (0-10)	HAZARD & EXPOSURE (0-10)	Socio-Economic Vulnerability (0-10)	Vulnerable Groups (0-10)	VULNERABILITY (0-10)	Institutional (0-10)	Infrastructure (0-10)	LACK OF COPING CAPACITY (0-10)	INFORM RISK (0-10)	Rank (1-33)	Reliability Index (*) (0-10)	Missing Indicators (Number) (0-81)
Guatemala	GTM	8.4	8.7	8.6	8.8	8.0	8.4	8.5	8.5	8.5	8.5	1	2.9	4
Haiti	HTI	7.7	7.4	7.6	9.6	7.8	8.9	7.2	9.6	8.7	8.4	2	4.6	6
Honduras	HND	8.1	8.7	8.4	8.7	7.8	8.3	8.7	7.3	8.1	8.3	3	3.1	4
El Salvador	SLV	7.6	9.1	8.5	6.2	8.1	7.3	8.8	6.0	7.7	7.8	4	3.8	5
Colombia	COL	7.8	8.0	7.9	4.9	8.4	7.0	7.1	5.9	6.5	7.1	5	2.7	1
Venezuela	VEN	7.0	8.1	7.6	4.7	7.2	6.1	7.8	5.2	6.7	6.8	6	4.9	6
Nicaragua	NIC	8.3	4.2	6.7	6.7	4.6	5.8	6.9	7.8	7.4	6.6	7	5.6	5
Mexico	MEX	8.5	8.3	8.4	4.7	6.7	5.8	6.2	5.0	5.6	6.5	8	2.3	2
Ecuador	ECU	7.7	5.0	6.5	5.1	7.5	6.5	6.2	6.4	6.3	6.4	9	2.0	2
Dominican Republic	DOM	7.3	4.9	6.2	5.9	4.4	5.2	7.5	6.6	7.1	6.1	10	2.1	1
Bolivia	BOL	5.9	4.9	5.4	7.4	5.0	6.3	6.7	6.3	6.5	6.0	11	4.3	1
Peru	PER	7.3	4.1	5.9	5.3	6.4	5.9	5.8	6.5	6.2	6.0	11	2.1	1
Guyana	GUY	4.6	3.4	4.0	6.7	5.2	6.0	7.2	6.9	7.1	5.5	13	7.3	9
Jamaica	JAM	5.8	6.1	6.0	5.3	2.4	4.0	8.0	5.1	6.8	5.5	13	5.8	5
Brazil	BRA	5.3	7.1	6.3	3.6	5.5	4.6	5.1	4.2	4.7	5.1	15	3.4	3
Panama	PAN	5.9	2.8	4.5	4.5	5.5	5.0	5.5	5.4	5.5	5.0	16	3.7	3
Belize	BLZ	6.3	4.8	5.6	5.0	3.6	4.3	3.9	6.0	5.0	4.9	17	5.6	6
Paraguay	PRY	4.1	2.7	3.4	5.3	3.7	4.5	7.0	6.4	6.7	4.7	18	4.1	4
Costa Rica	CRI	6.4	2.4	4.7	3.4	4.4	3.9	4.0	4.1	4.1	4.2	19	2.4	3
Saint Kitts and Nevis	KNA	3.2	5.3	4.3	4.3	1.2	2.9	7.6	3.7	6.0	4.2	19	7.4	27
Argentina	ARG	5.0	3.5	4.3	3.1	3.9	3.5	4.1	3.6	3.9	3.9	21	5.2	5
Saint Vincent and the Grenadines	VCT	1.7	5.9	4.1	4.7	1.7	3.3	3.2	5.0	4.2	3.8	22	7.8	17
Trinidad and Tobago	TTO	2.2	4.1	3.2	2.7	3.0	2.9	7.6	4.1	6.1	3.8	22	7.9	9
Chile	CHL	6.7	2.4	4.9	2.9	3.8	3.4	2.9	3.1	3.0	3.7	24	3.4	6
Cuba	CUB	6.9	4.1	5.7	3.5	2.2	2.9	3.5	2.4	3.0	3.7	24	6.9	15
Bahamas	BHS	4.3	4.5	4.4	2.6	1.7	2.2	5.9	4.0	5.0	3.6	26	7.1	21
Dominica	DMA	4.9	2.0	3.6	4.8	2.9	3.9	3.0	3.8	3.4	3.6	26	8.5	22
Suriname	SUR	3.9	1.7	2.9	3.3	2.0	2.7	5.9	5.8	5.9	3.6	26	5.6	9
Saint Lucia	LCA	2.8	3.5	3.2	3.6	1.5	2.6	4.8	3.9	4.4	3.3	29	7.9	13
Antigua and Barbuda	ATG	3.8	2.1	3.0	3.7	1.6	2.7	5.0	3.4	4.2	3.2	30	7.8	21
Barbados	BRB	3.1	1.6	2.4	3.5	1.5	2.6	3.2	2.7	3.0	2.7	31	6.9	11
Uruguay	URY	2.2	1.7	2.0	3.2	3.0	3.1	3.7	2.5	3.1	2.7	31	4.4	6
Grenada	GRD	0.7	1.7	1.2	4.4	1.1	2.9	4.6	3.5	4.1	2.4	33	6.6	22

CARIBBEAN COMMUNITY RISK INFORMATION TOOL



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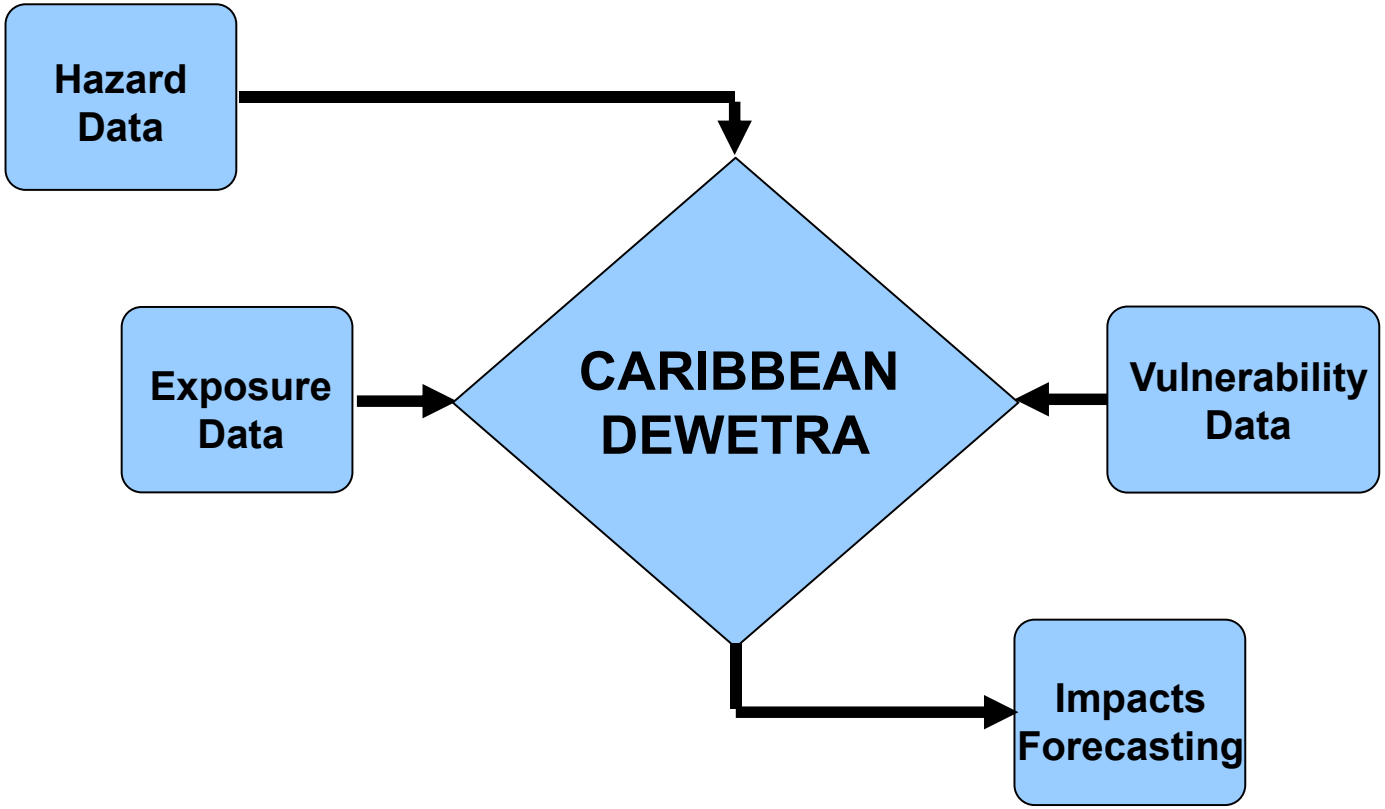
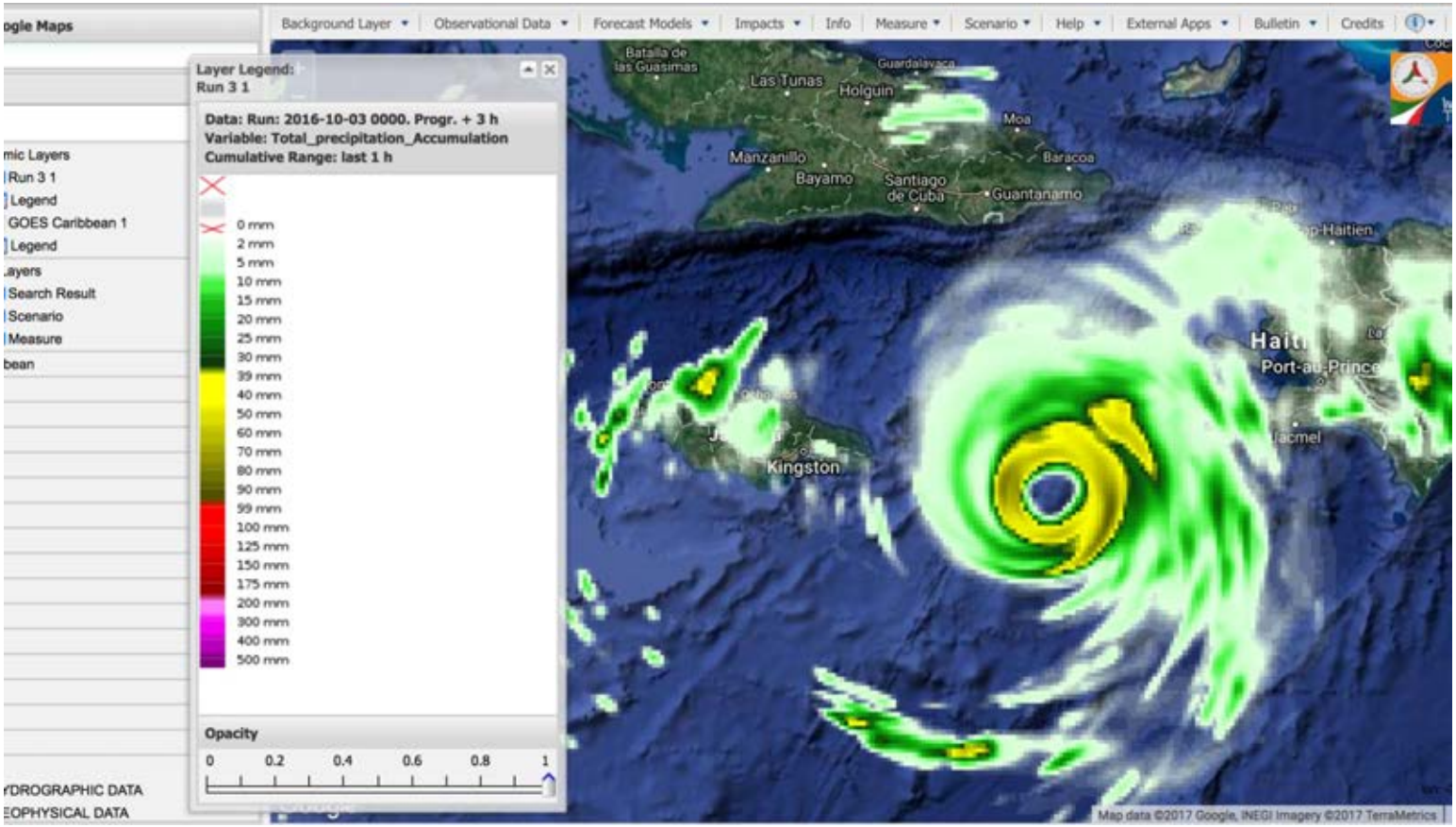
Impacts based forecasting



Impacts based forecasting



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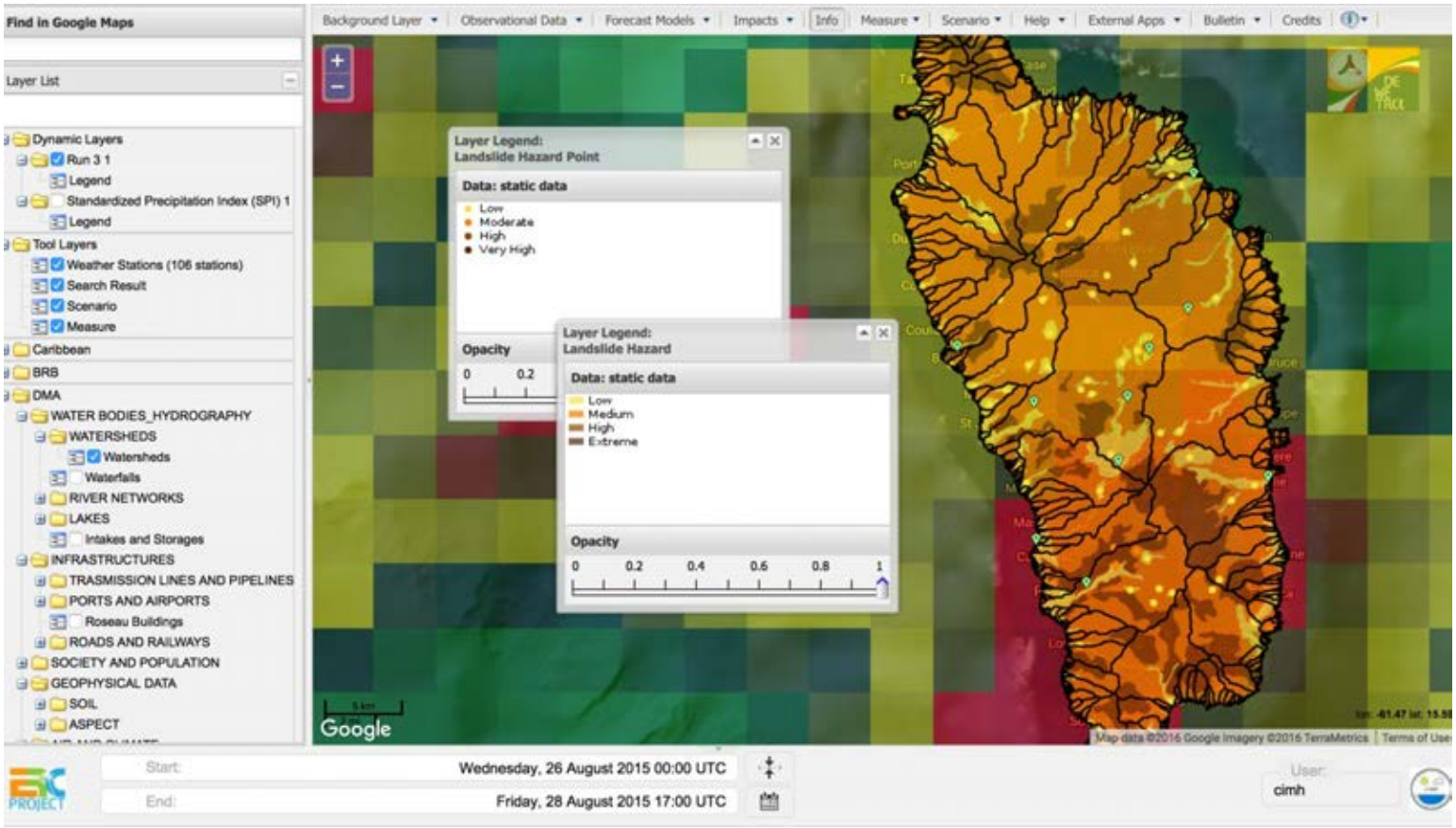
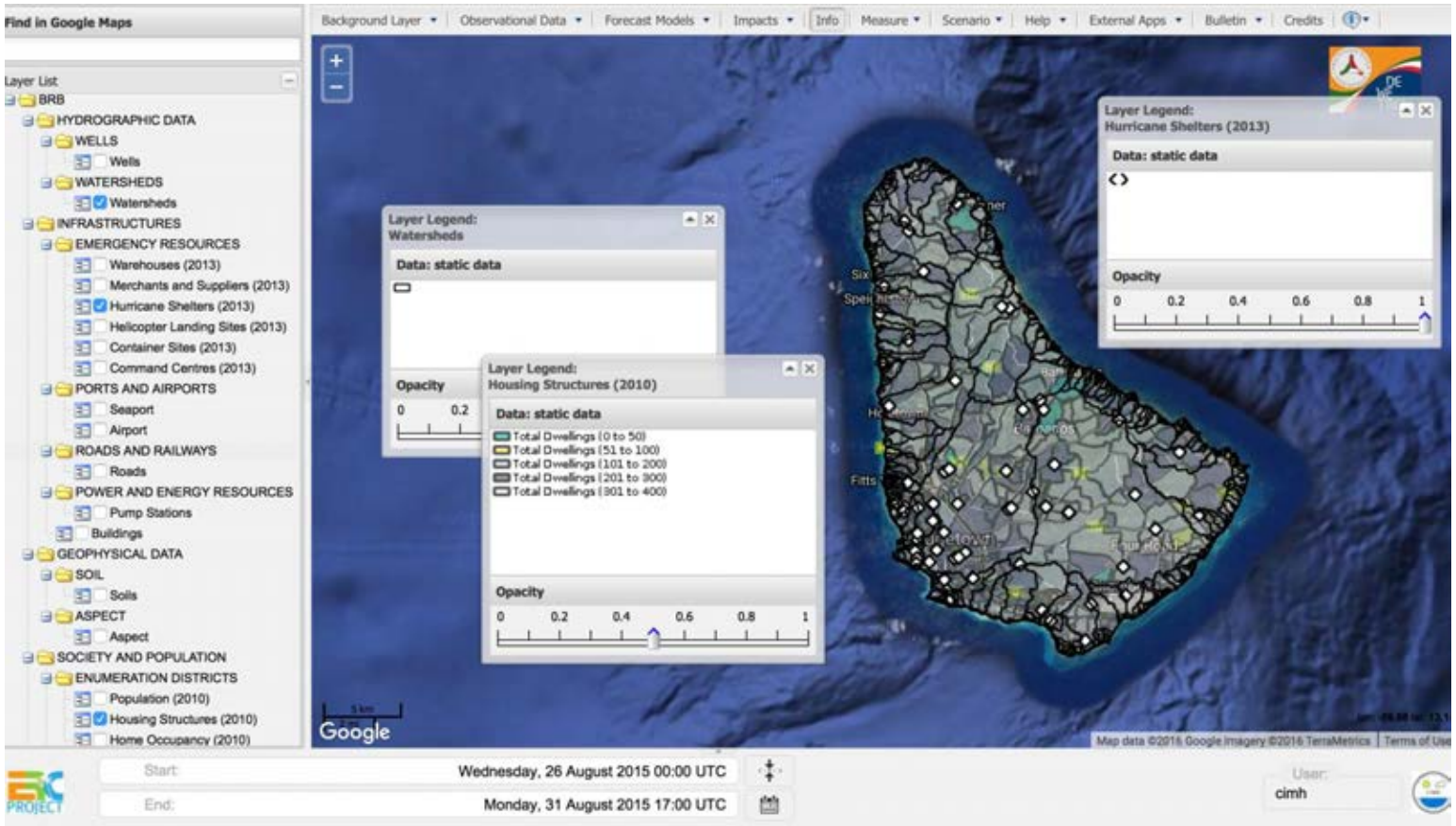


Impacts based forecasting



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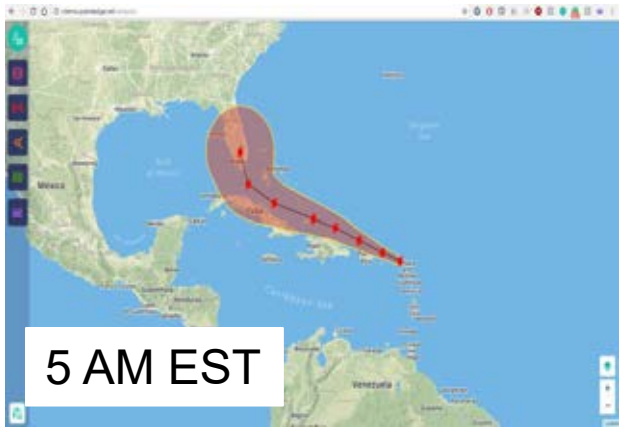
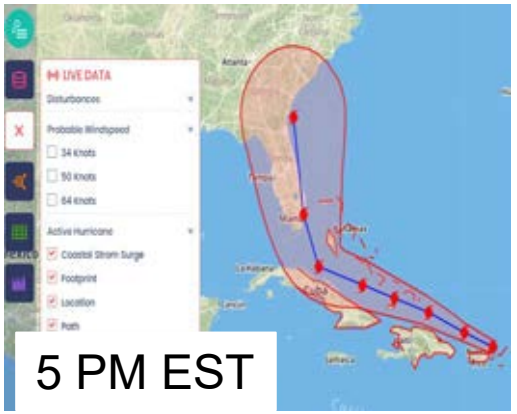
HURRICANE IRMA – STATUS – SEP 6/7, 2017

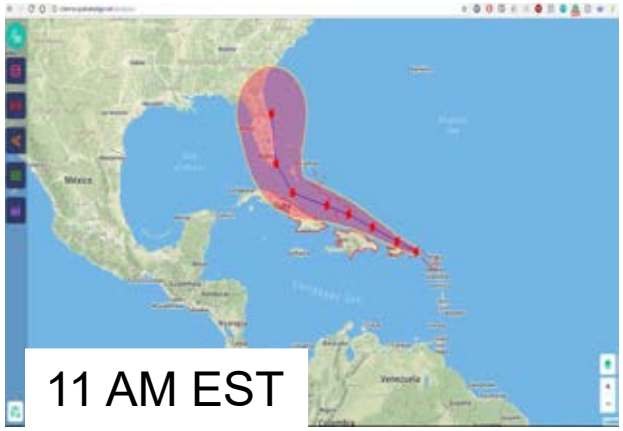
CDEMA has started using SpatialEdge platform to dynamically pull tropical storm hazard data from National Hurricane Center.

While there are a few applications that provides the visualization of this type, we are further upping the ante to use these dynamic data in evaluating impact on population and exposure, at real time.

As hurricane change its course, the analysis results are reflected at the dashboard in real time.







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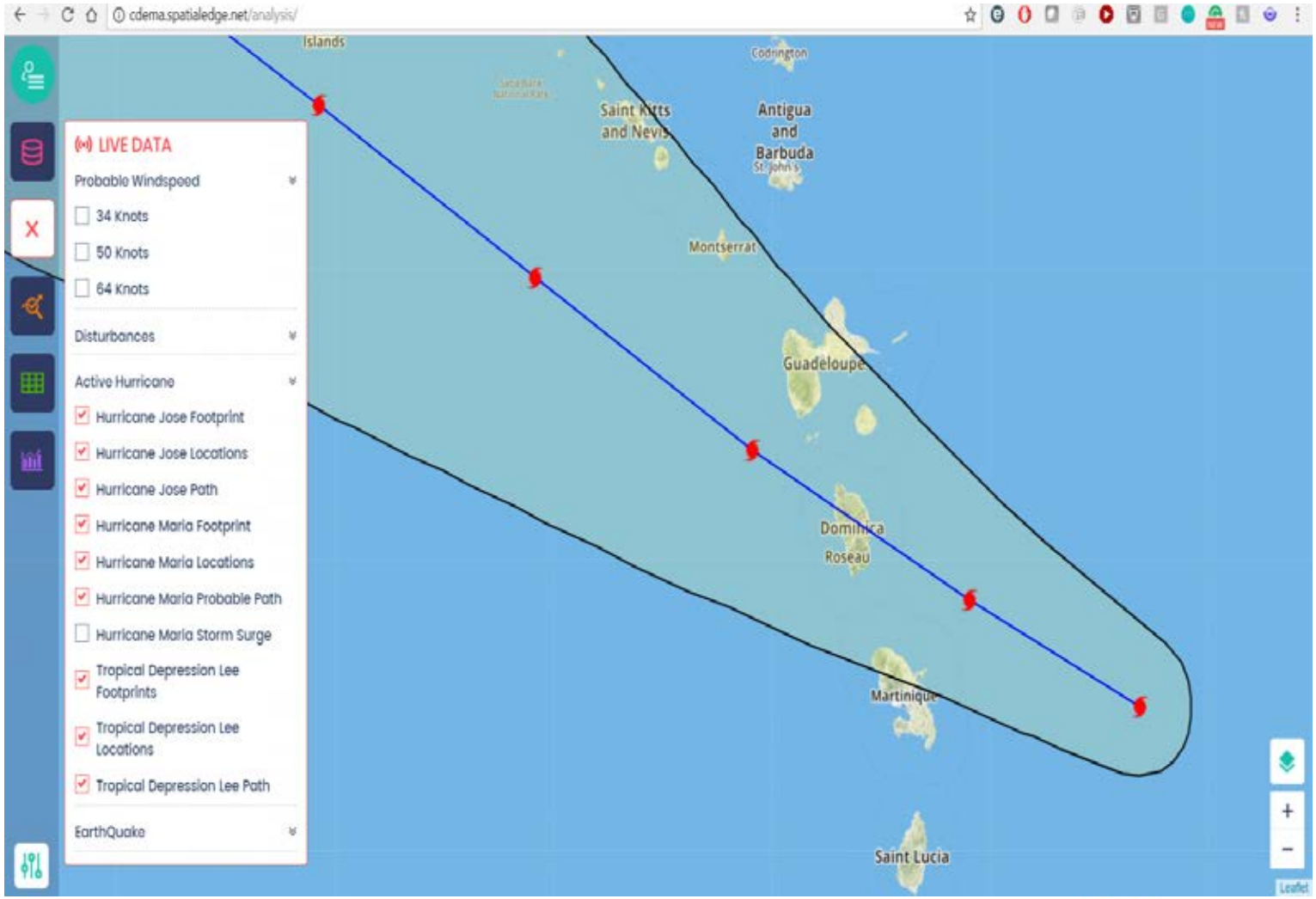
HURRICANE MARIA, SEP 18, 2017, 5 AM EST



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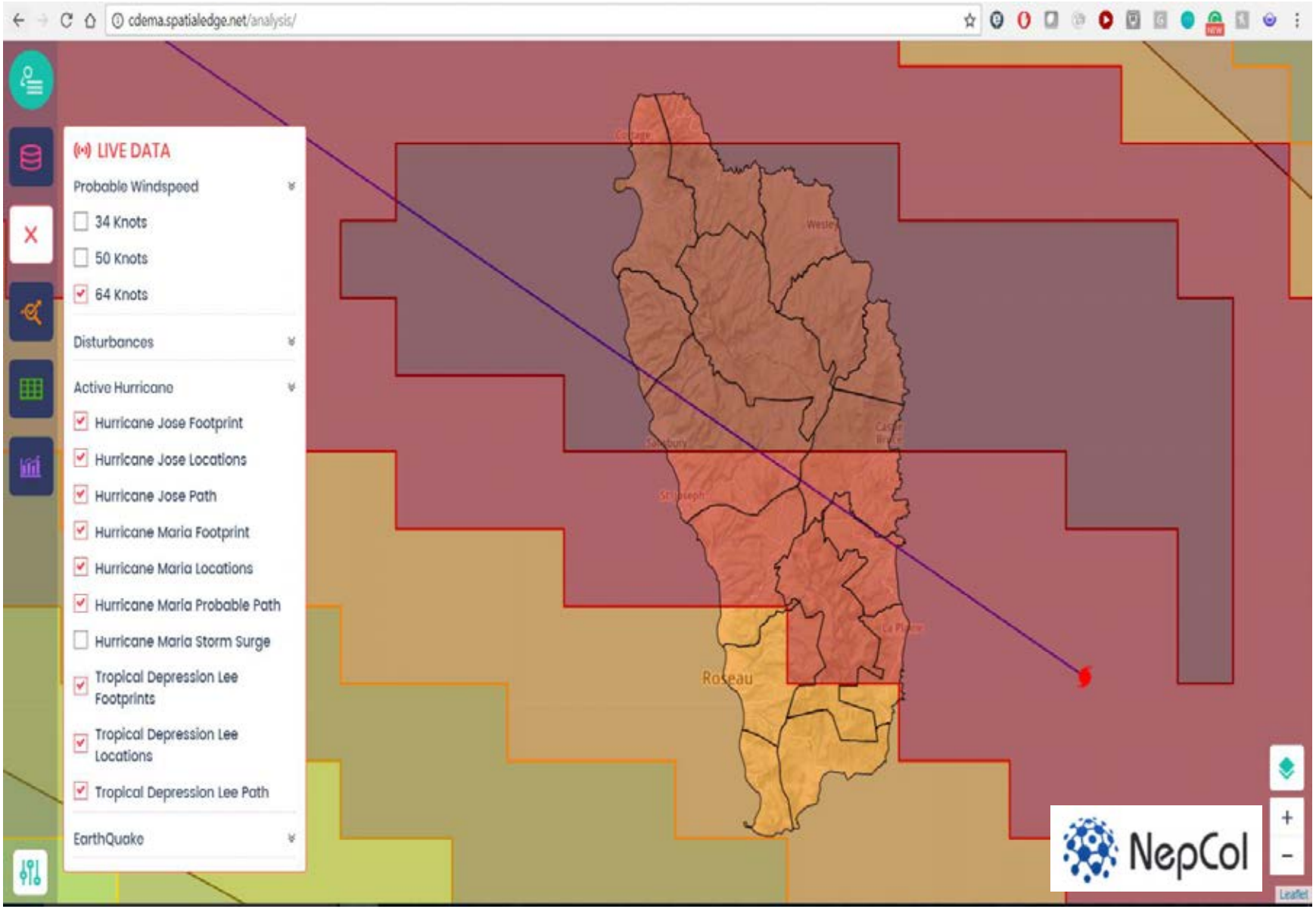
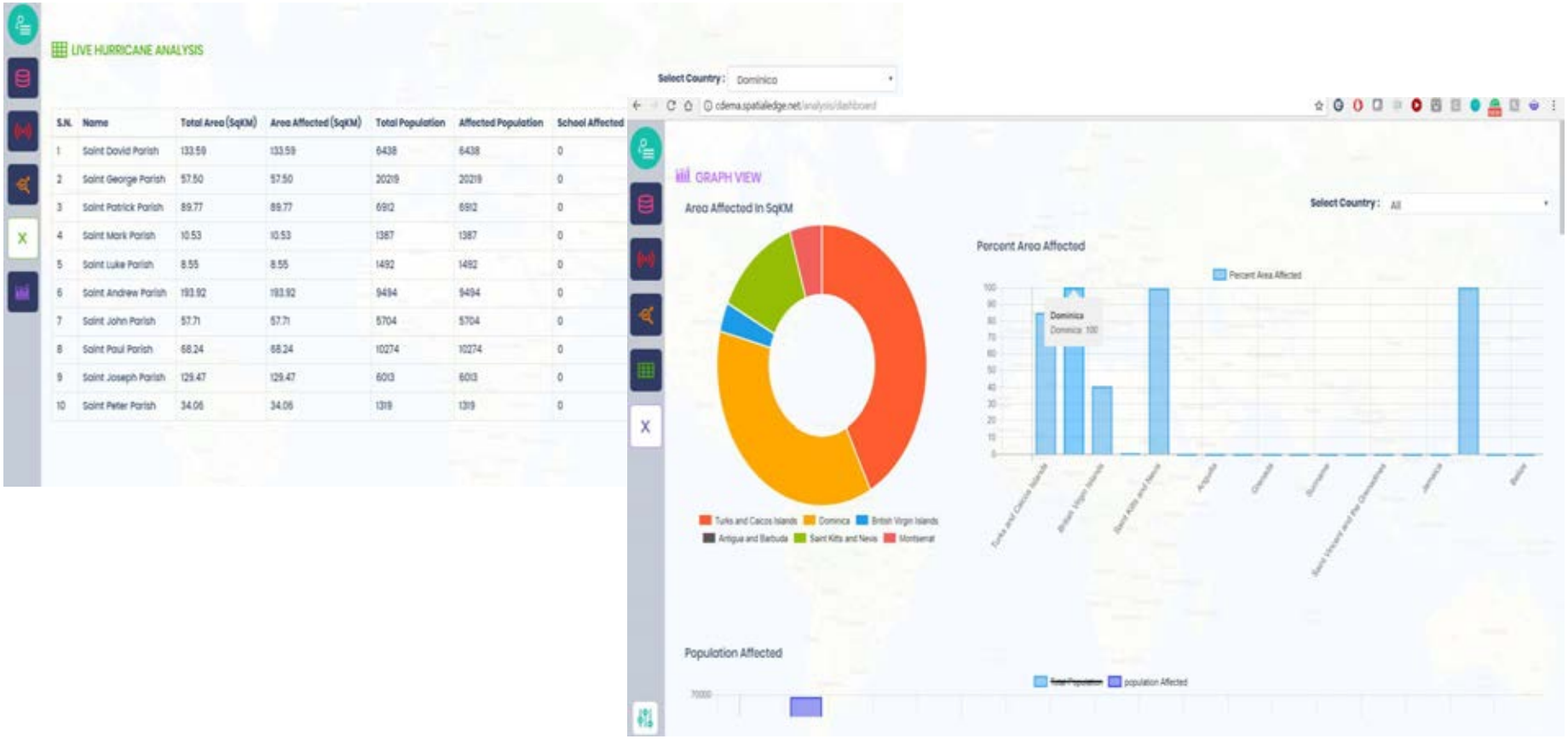
HURRICANE MARIA - PROBABLE WINDSPEED



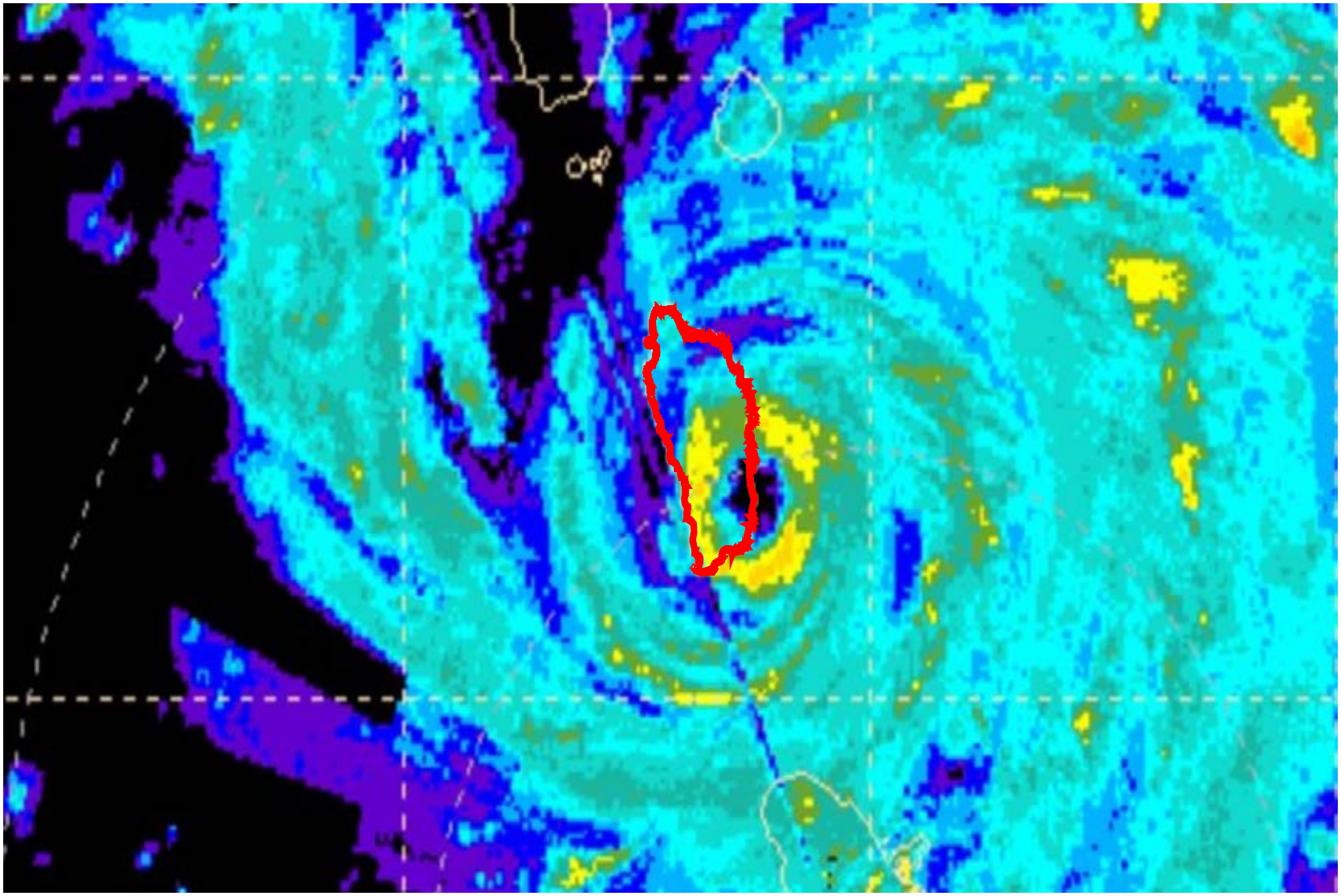
ANALYSIS RESULT – DOMINICA



Data on School, Bridge and Hospital not yet uploaded in the application

NepCol

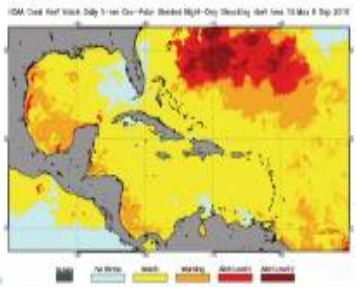
HURRICANE MARIA, CATEGORY 5 SEP 18, 2017, 9:15 PM EST



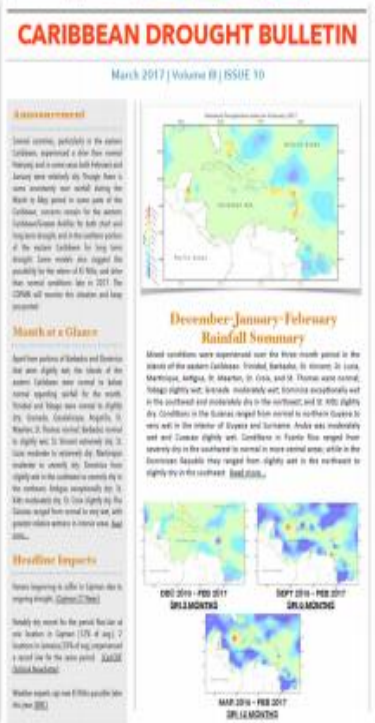
Source: Radar Martinique – 9:15 PM, Sep 18, 2017

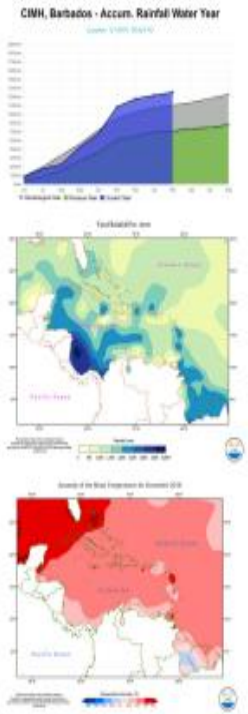
CIMH CLIMATE EARLY WARNING PRODUCTS

CLIMATE MONITORING

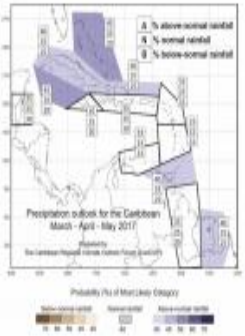


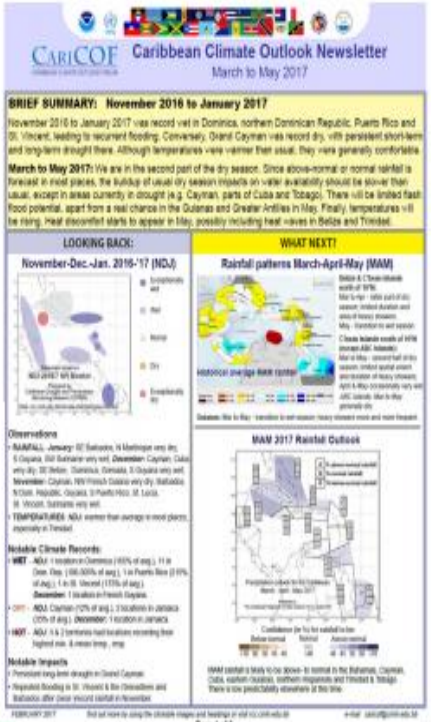
Alert Level	Interpretation
No Stress	No Thermal Stress
Watch	Low-level thermal stress
Warning	Thermal stress is accumulating
Alert level 1	Bleaching expected
Alert level 2	Widespread mortality and some mortality expected

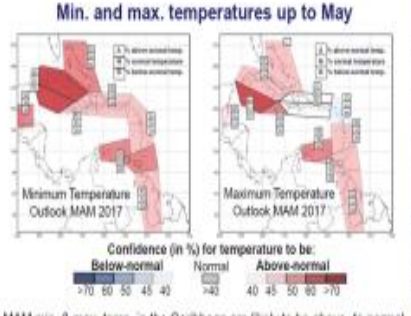




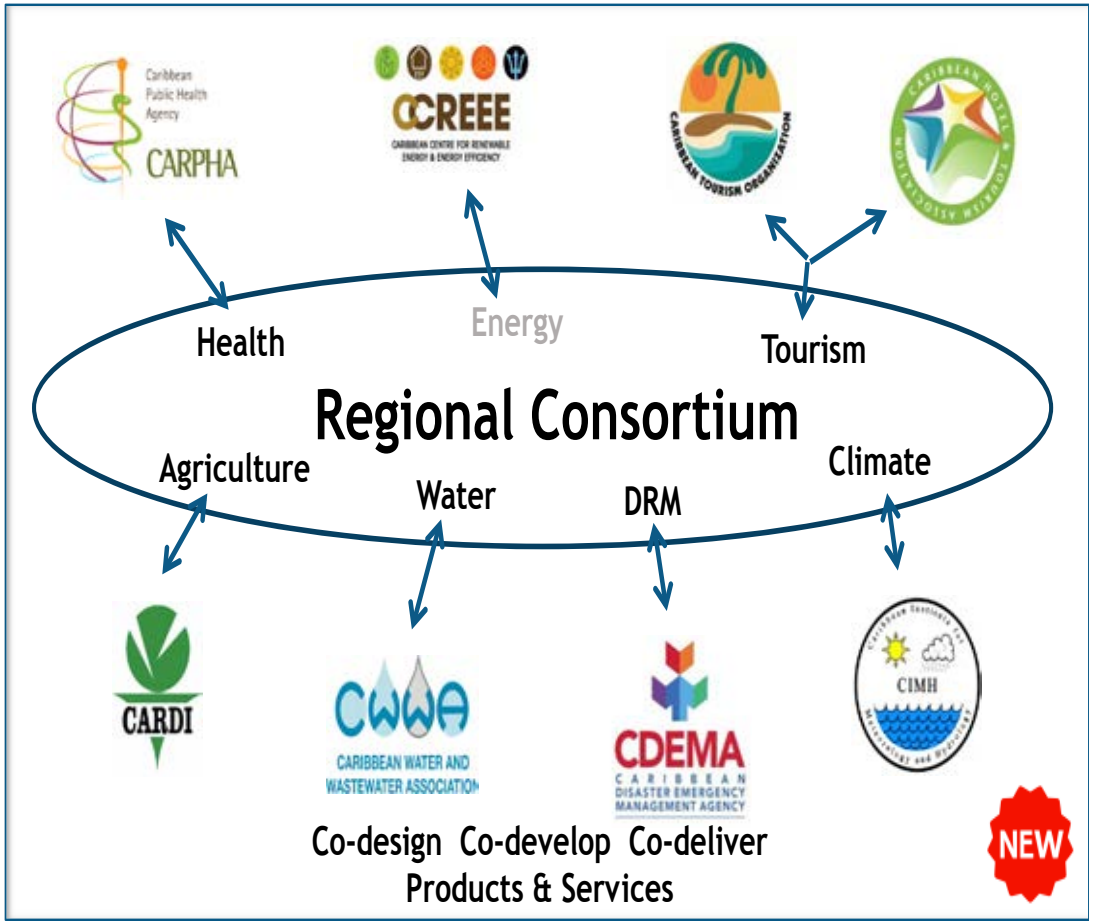
CLIMATE OUTLOOKS







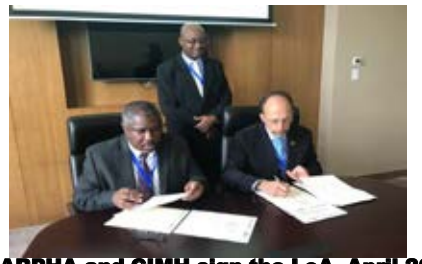
Consortium of Sectoral EWISACTs Partners



CTO and CHTA sign the LoA, September 16th, 2016

CWWA signs the LoA, October 26th, 2016

CARDI and CDEMA sign the LoA, December 6th, 2016



CARPHA and CIMH sign the LoA, April 26th, 2017

KEY LESSONS CHALLENGES AND WAY FORWARD

LESSONS

- Multi-island Catastrophic impacts require ability to rapidly scale up regional response support
- Investment in building resilience at the individual, community and sector level is essential
- Recovery planning must be done ahead of a disaster
- Hydro-met hazards are requiring new scenario considerations
- Resilient Emergency Operations Centres are essential for effective coordination
- Resilience of our security arrangements is key

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CHALLENGES

- Capacity to manage hazard events
- Data quality, sharing, access, analysis
- Effective capture, quantification and dissemination/reporting of impact
- Shared situational awareness
- Sustainable platform for consequence management

OPPORTUNITIES AND CHALLENGES

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Main Opportunities

- To pursue synergies & promote harmonisation of approaches to building disaster and climate resilience through alignment of regional and global frameworks
- To share knowledge, expertise and good practices across regions

Key Challenges

- Understanding risk is key to implementation of Sendai Framework. Greater investment needed in the Caribbean region in understanding the level of risk associated with multi-hazards, and application of risk information to development planning decision.

ENABLING RESILIENCE

Finance and Economics

Physical and Environmental Planning

Agriculture

GOVERNANCE, COORDINATION AND PARTNERSHIPS

Education

Tourism

Civil Society

Health

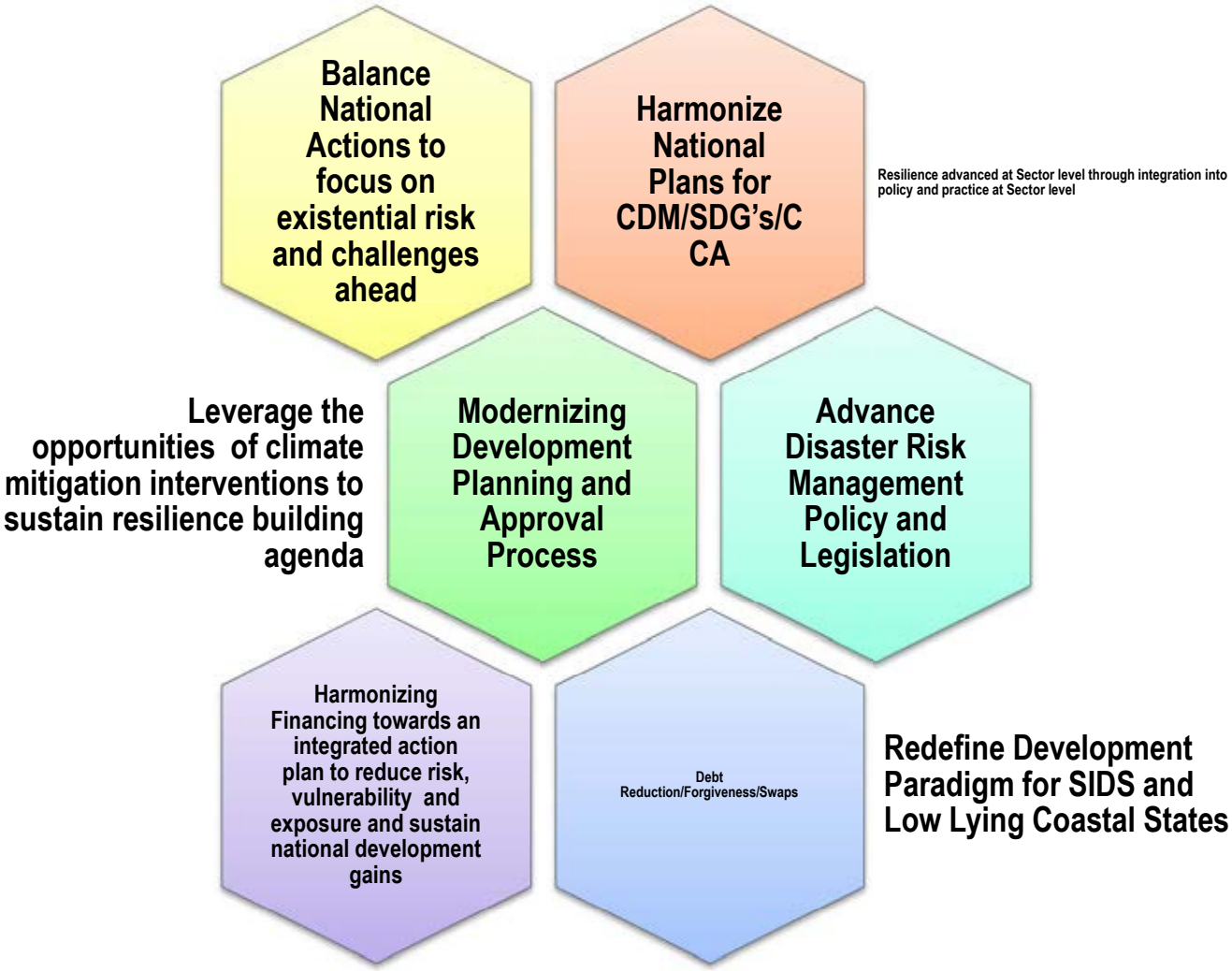
ON THE ROAD TO RESILIENCE

- Defining what ***RESILIENCE*** means in the Caribbean SIDS and Low Lying Coastal States Context, Baseline and Measure.
  - What are the pillars of Caribbean Resilience
  - How do we measure progress towards attaining this goal
- Pursue a Comprehensive and Integrated Risk Management Agenda where Climate Change and Variability is part of the mainstreamed discussion on Managing Risk
- Development Resilience - Promote Risk Informed and Risk Sensitive Development Strategies Pursue Sound Recovery Planning – "Balancing the "urgent with the important" – move beyond the rhetoric of "building back better"
- Greater investment will be required to limit future such impacts in the near term and beyond

ON THE ROAD TO RESILIENCE

- Create an enabling environment - incentives and disincentives that foster appropriate development practices
  - Will require Public Private Partnerships
- Wide Stakeholder Engagement
- Strengthen National and Regional Protocols For Catastrophic Events and Multi-Island impact – Enhance the National and Regional Response Mechanisms
- Enhance national systems that deal with the vulnerable population in “times of blue skies” to address “grey skies” needs

TRANSFORMATIONAL OPPORTUNITY/ MOMENT



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PRIORITIES

- Regional Training Centre - Deepening technical capabilities within national disaster organizations
- Knowledge management:
  - Build out of the CRIS – decision making platform
  - Risk Profiles for CDEMA PS
- Sector Mainstreaming
  - Supportive role; strategic guidance and promotion
- Community Resilience
  - Support to PS in advancing community resilience programmes including EWS
  - Safe Schools Programme

THANK YOU

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