

**Experts  
say rainfall  
may lessen  
drought**

By Julia Glick  
The Associated Press

DALLAS—Heavy rainfall that  
flooded roads, drenched pro-

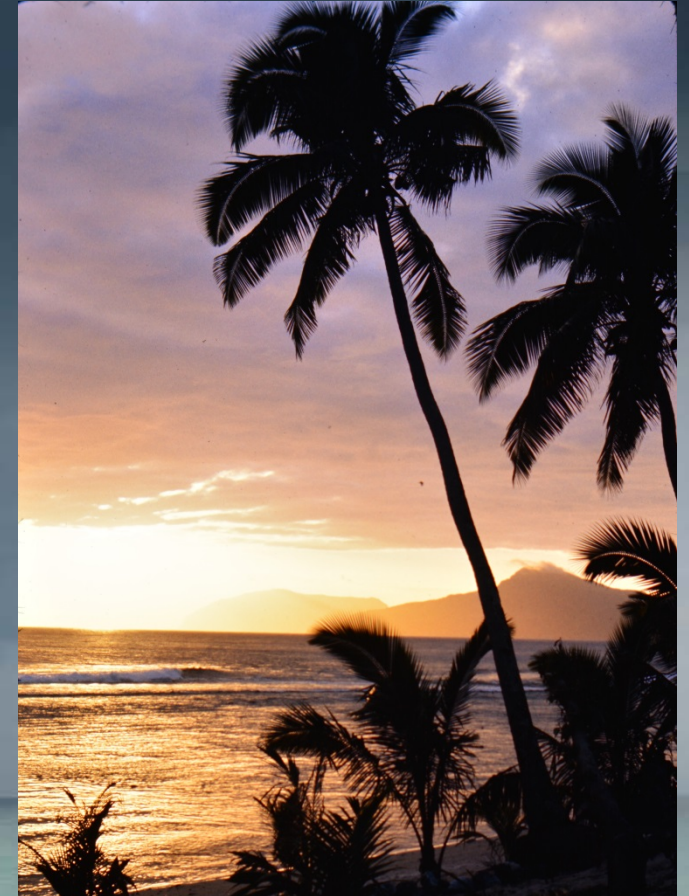


**'Whole world' at risk from simultaneous  
droughts, famines, epidemics: scientists**

Research published by US National Academy of Sciences warns  
climate change impacts could be worse than thought



Corn crops in New Florence, Missouri, wither in the devastating drought of 2012.  
Photograph: MCT via Getty Images



Roger S. Pulwarty

Senior Scientist

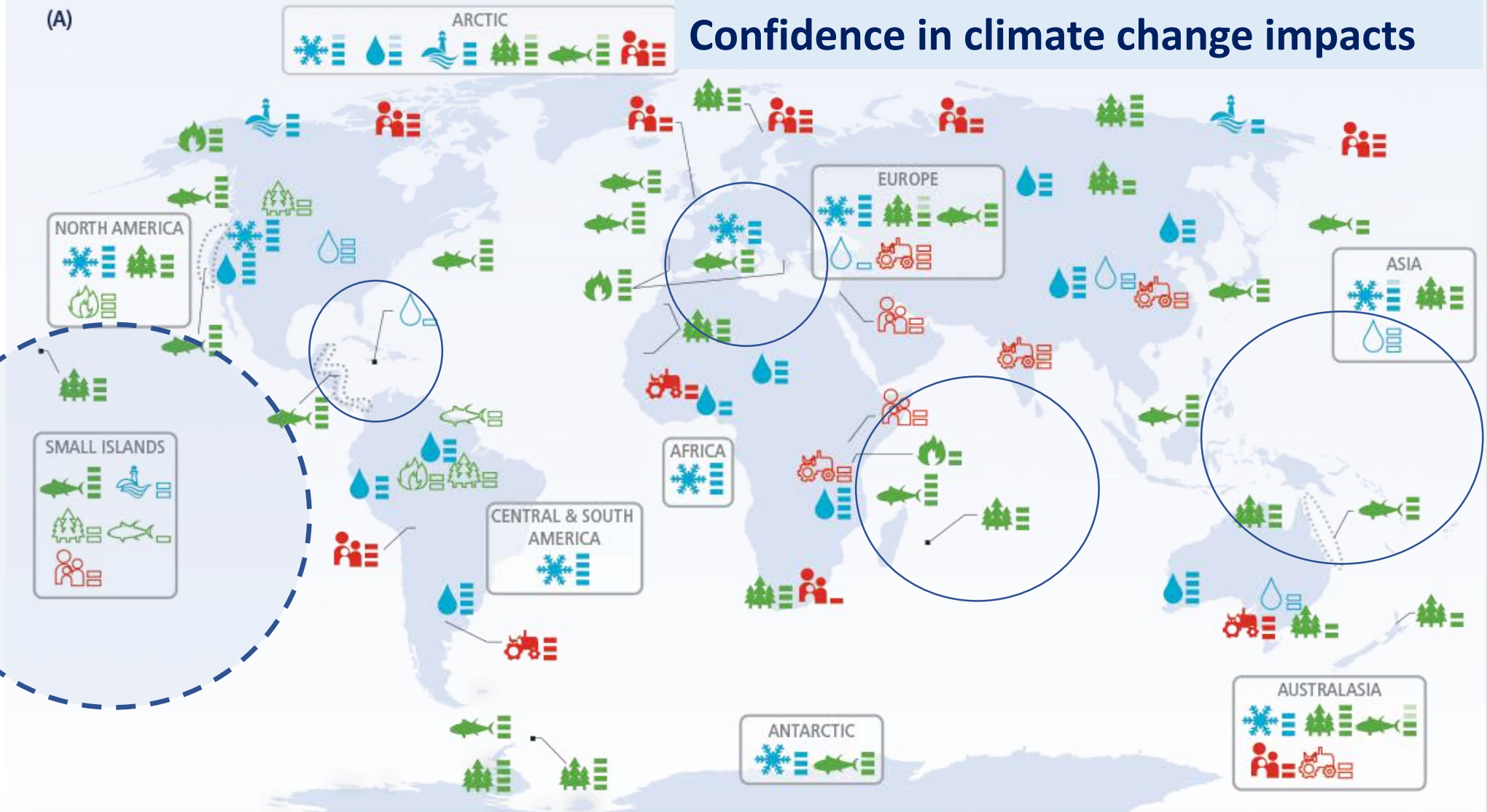
National Oceanic and Atmospheric Administration



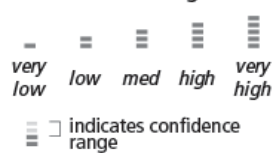
# Confidence in climate change impacts

(A)

Marine ecosystems  
Coastal erosion  
Livelihoods, nutrition



Confidence in attribution to climate change

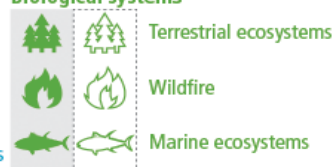


Observed impacts attributed to climate change for

Physical systems



Biological systems



Human and managed systems



Regional-scale impacts

Outlined symbols = Minor contribution of climate change  
Filled symbols = Major contribution of climate change

# Managing the risks: sea level rise in small islands

## Risk Factors

- shore erosion
- saltwater intrusion
- coastal populations
- tourism economies



## Risk Management/Adaptation

- early warning systems
- maintenance of drainage
- regional risk pooling
- relocation
- Smart infrastructure

**Emergent risks---compound events and rapid transitions (NCA4, 2018) from droughts and heat waves. to. storms and floods... and back again**

2017 Atlantic Hurricane Season: Twenty-two (22) of 29 Caribbean SIDS impacted:  
4 were affected by 1 storm, 13 by two storms, 5 by three storms

**Maria was the fourth storm in a month to undergo rapid intensification**

Maria could lower Puerto Rican incomes by 21% over the next 15 years, undoing roughly 26 years of economic development (Hsiang 2017).....  
**“provided there are no other storm impacts in that period”**

**‘OUR ISLAND DESTROYED’**

Roseau, Dominica

Before Maria

on Puerto Rico  
■ Bravest,  
Finest to help

**BREAKING NEWS**

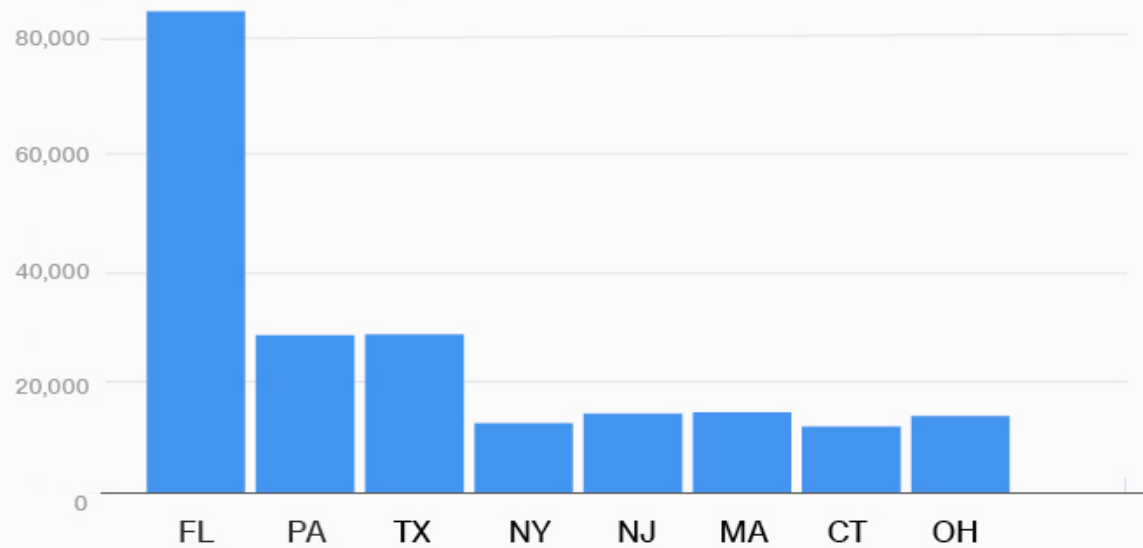
ISLAND OF ST. MARTIN LEFT IN SHAMBLES AFTER HURRICANE IRMA

Razed—United States  
Legation Unroofed.

ENTIRE ARMY CALLED OUT

### Post-Maria Exodus from Puerto Rico

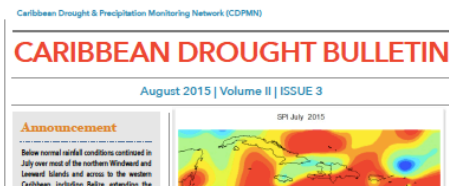
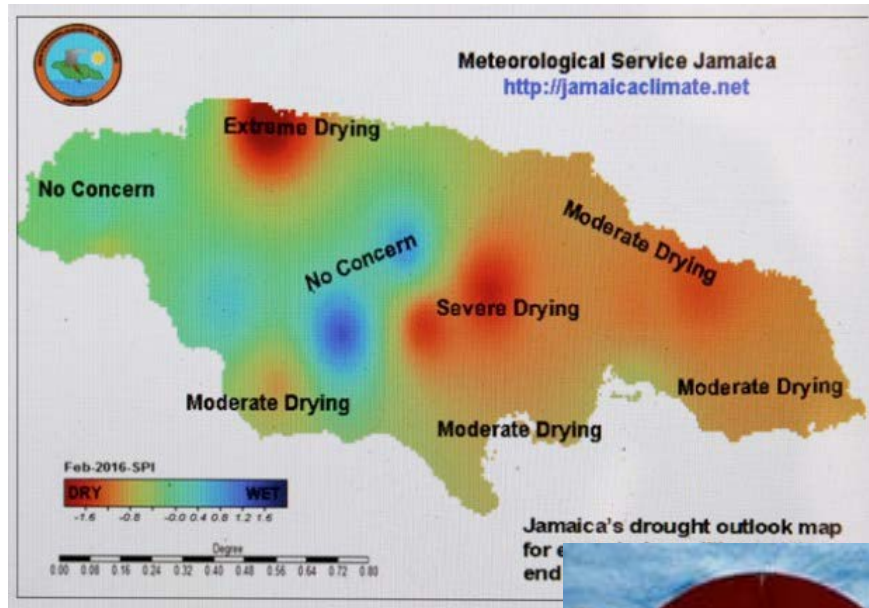
Based on recent migration trends, here's how many Puerto Ricans could flow to each state as a result of Hurricane Maria.



SOURCE: THE CENTER FOR PUERTO RICAN STUDIES AT THE CITY UNIVERSITY OF NEW YORK

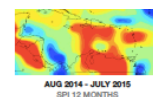
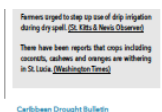
# Caribbean Drought

2013-2016



The 2013–16 Caribbean multiyear drought was most severe and extensive period of dry conditions in the Caribbean and Central America since at least 1950.

Appears to be related not only to El Niño–driven precipitation deficits, but also to temperature- driven increases in potential evapotranspiration



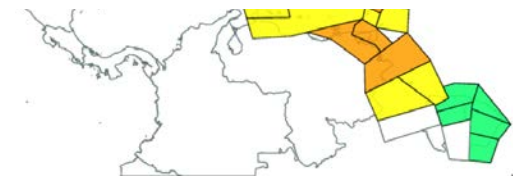
Records have shown that there has been less rainfall over successive years. This year Saint Lucia is starting with a water deficit.

"The conservation of water is imperative. We will not have enough water for people to do everything that they want. So water that we produce must be used sparingly," Hippolyte said.

He said too that "Predictions indicate that water is going to be in scarce supply because El Niño is going to strengthen."

The region's current drought conditions are as a consequence of El Niño, an international weather system that has been strengthening since October 2015. Below normal conditions are expected well into April 2016.

Mexico to help



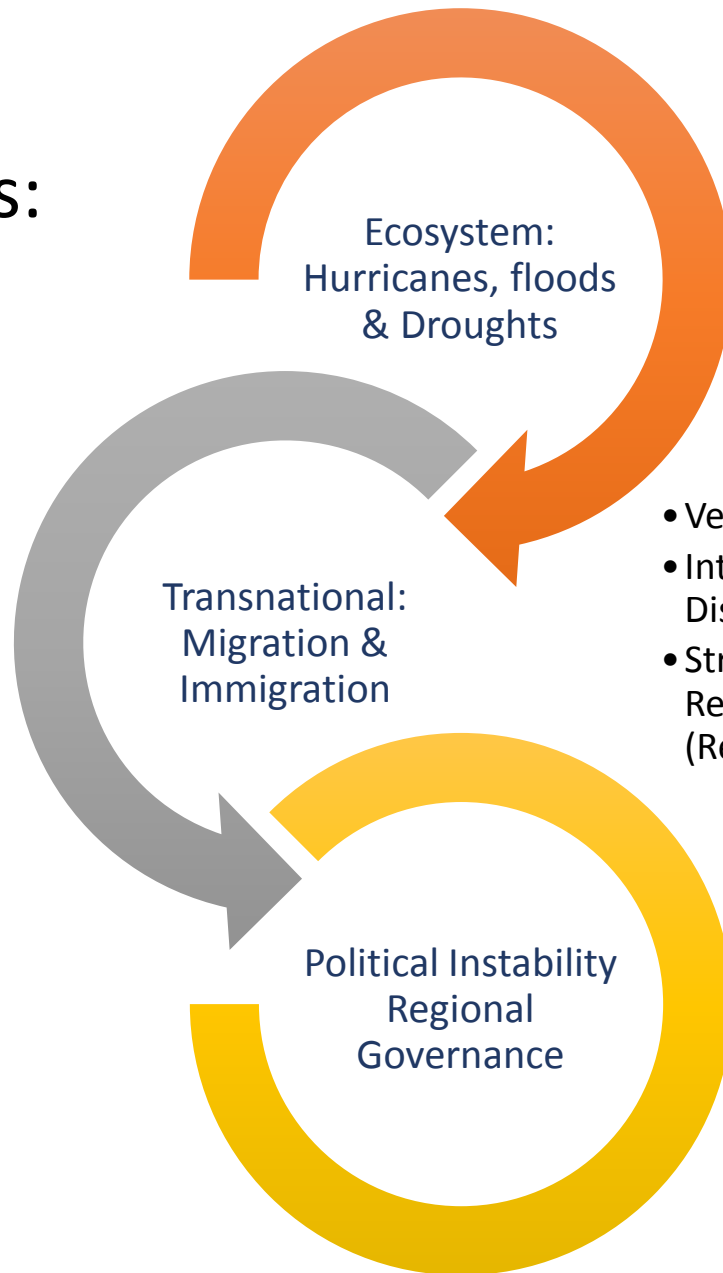
	Trend	Implication	Feature
Present Climate	High temperatures Variable Rain More intense storms Rising sea levels	Emergence of a new climate regime	Unfamiliarity
Future Climate	Higher temperatures Drying trend Intense extremes Higher sea levels	Entrenchment of the new climate regime	Unprecedented

## Critical Transitions

The 2018 Caribbean 1.5 project reported that 2.0 degrees will result in even further significant changes (over 1.5) in regional climate which take the region closer to climates it has not experienced to date



# 3 Key Tipping Points: The Caribbean



- Coastal Populations
- 90% of Caribbean economies are in coastal areas
- Poor (Coastal) Infrastructure

- Venezuelan Migration
- Inter-regional Displacement
- Strong Economic Relationship with U.S. (Remittance Flows)

- Government Corruption
- Lack of Economic Diversity
- High Level of Indebtedness (China) & FDI
- Vulnerable to Exploitation as a Transshipment Point for Trafficking Drugs, Guns, and Increasingly, People

## Risks and Vulnerabilities





## CARICOM Implementation Plan

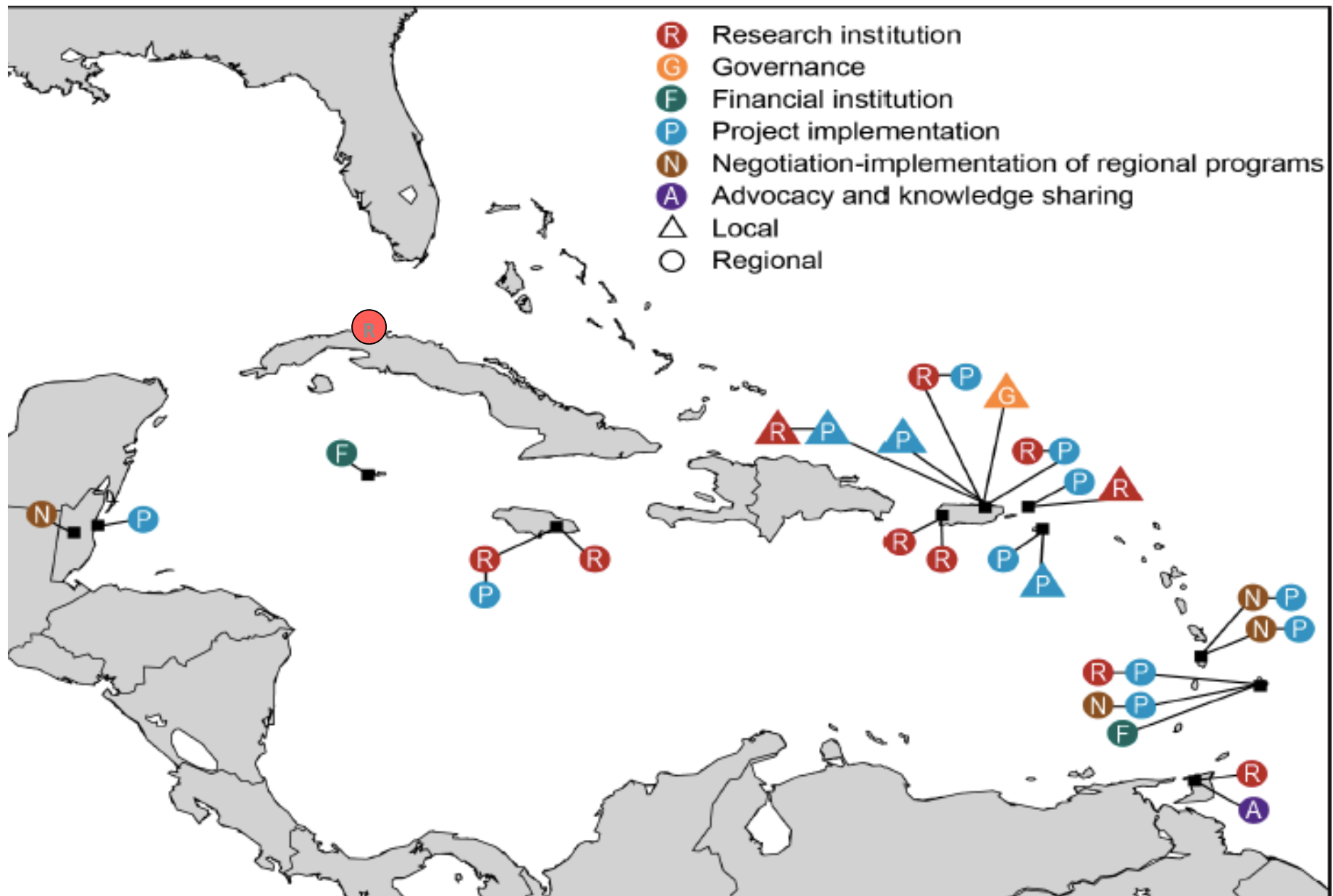
*The Regional Framework for  
Achieving Development  
Resilient to Climate Change*

CLIMATE CHANGE AND THE CARIBBEAN  
A REGIONAL FRAMEWORK FOR ACHIEVING DEVELOPMENT  
RESILIENT TO CLIMATE CHANGE  
(2009-2015)



The Implementation Plan (IP) for the Regional Framework, defines the regional strategy for coping with Climate Change over the period 2011-2021

Approved by the 23<sup>rd</sup> Inter-Sessional Meeting of CARICOM Heads held in Suriname 8-9 March, 2012.

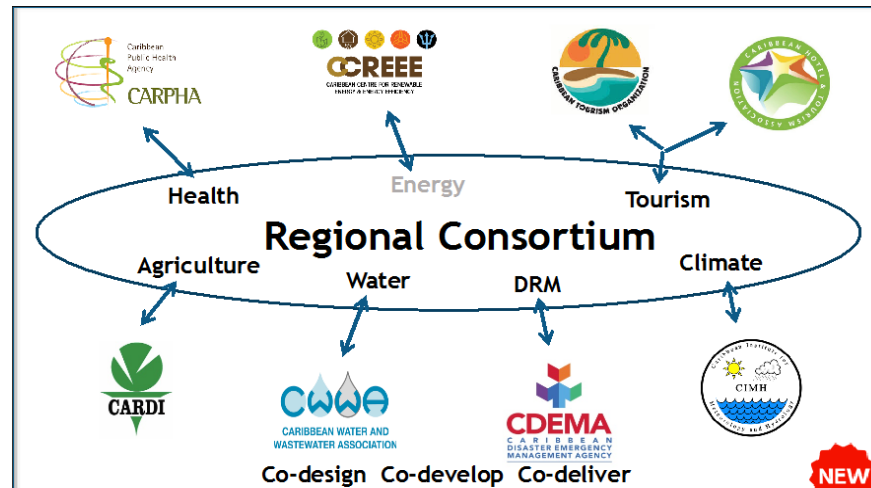
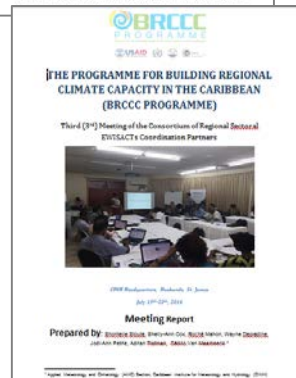


Climate Risk Management –Regional Network (NCA4, 2018)

# Early Warning Information Systems Across Climate Timescales

## EWISACTs

The Consortium is a key regional mechanism to champion the design, development and delivery of tailored climate products and services in the agriculture and food security, disaster risk management, energy, health, tourism and water sectors.



### Co-development of sector-specific climate indices

- Facilitates broader dialogue and sustained engagement with regional and national stakeholders;
- Facilitates the identification and sharing of textual and georeferenced sectoral datasets;
- Facilitates the identification and sharing climate-related impact data;
- Supports research that examines associations between climate and relevant sectoral productivity outcomes; and
- Promotes the dissemination of climate information.



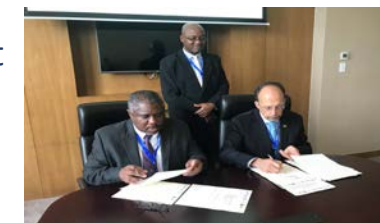
CTO and CHTA sign the LoA, September 16th, 2016



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

# Payouts

**Basis risk**  
CCRIF was not designed to cover  
all losses on the ground

**Total payouts since 2007:  
US\$123.5 million to 12 member governments**

<b>Recent Events</b>	<b>Countries Affected</b>	<b>Payouts (US\$)</b>
Tropical Cyclone Erika, August 2015	Dominica	2.4 million
Tropical Cyclone Matthew, September 2016	Barbados, Haiti, Saint Lucia, St. Vincent & the Grenadines	29.2 million
Tropical Cyclone Irma, September 2017	Anguilla, Antigua & Barbuda, St. Kitts & Nevis, Bahamas, Turks & Caicos, Haiti	31 million
Tropical Cyclone Maria, September 2017	Dominica, Anguilla, Antigua & Barbuda, St. Kitts & Nevis, Turks & Caicos, Barbados, St. Vincent & the Grenadines, Saint Lucia	23.8 million

**All payments made within 14 days**

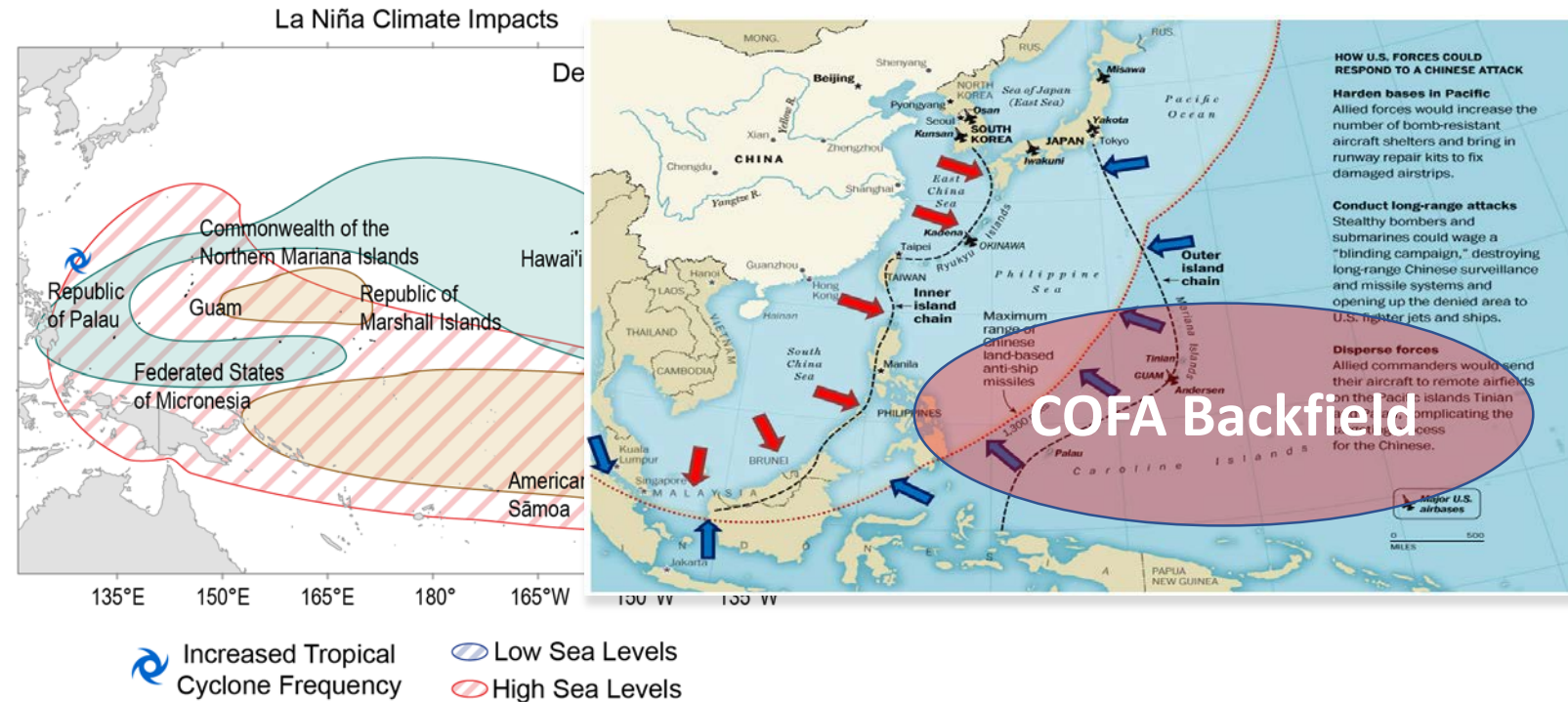
# Roadmaps: The Caribbean in 2050

## Alternative futures



# The Western Pacific

## El Niño: Hazards, Food & Water Security



(NCA4, 2018)

- Driest period on record from 2008-2012
- Hawaii is 99% groundwater dependent, and baseflows have declined over the past 100 years
- Declining size of fish in Pacific fisheries
- Record cyclone season in Hawaii in 2015
- Wildfire burns ~8000 acres of Hawaii every year for the past decade



# Threats to Lives, Livelihoods, and Cultures

“Mounting threats to food and water security, infrastructure, and public health and safety are expected to lead to increasing human migration from low to high elevation islands and continental sites, making it increasingly difficult for Islanders to sustain the region’s many unique customs, beliefs, and languages”

National Climate Assessment  
Caribbean and Hawaii and Pacific Islands Chapters  
2018

# Some Lessons Drawn- if not, learned



What is learned?  
By whom?

And, what do they do  
with the lessons?

**Tinkering vs  
Innovation?**



# 1. “Layering”- Working across the alignment continuum

## Informal alignment

Policy documents are developed independently

Actors involved in the different policy processes share information

Collaboration in implementation is on an ad-hoc basis

## Strategic alignment

Synergies identified in policy documents

Formal coordination mechanisms established to facilitate alignment

Joint initiatives implemented

## Systematic alignment

Shared vision for climate-resilient development across policy documents

Systematic coordination across actors, sectors and levels of government

Harmonized implementation strategies

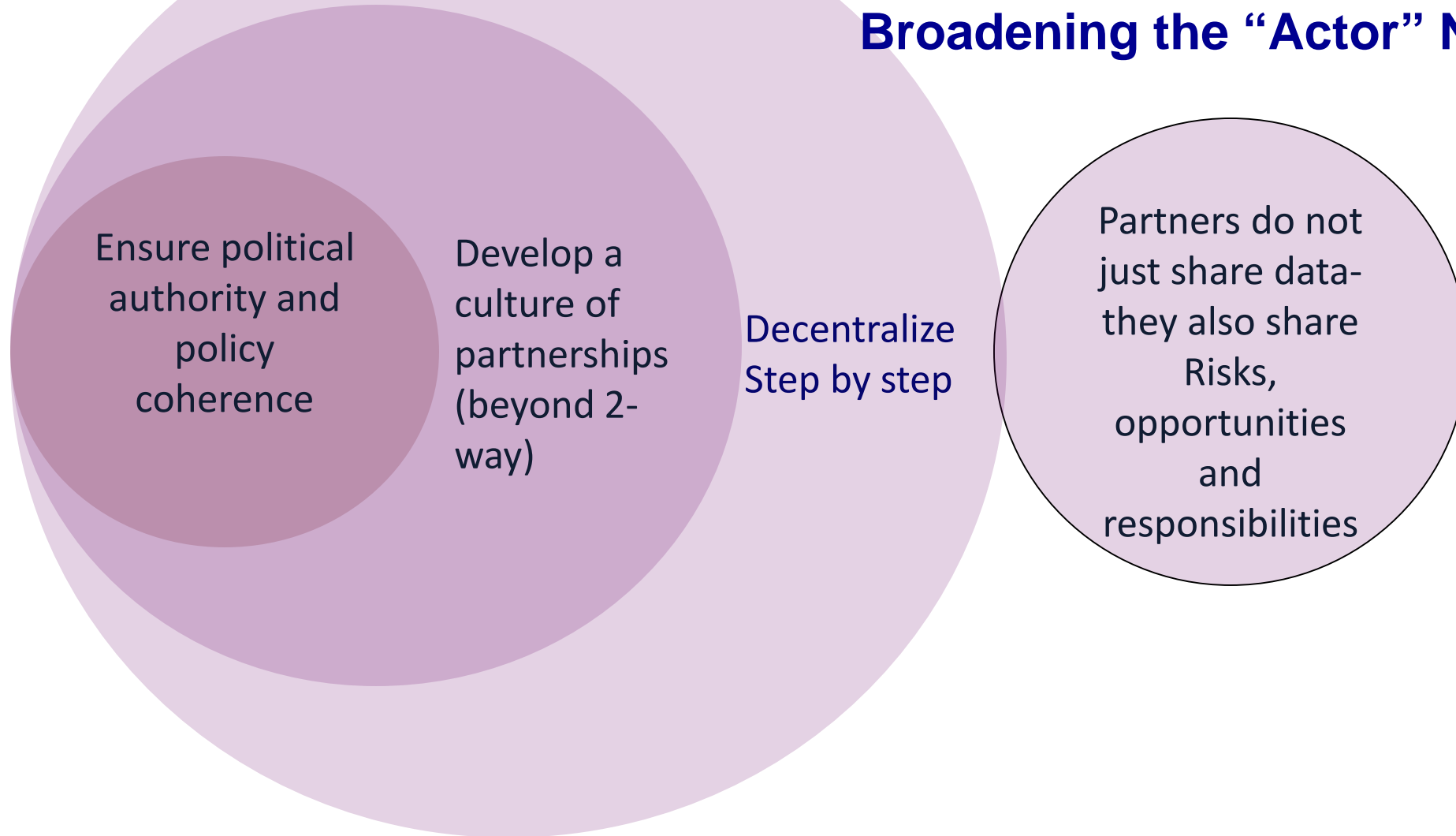
**Institutional arrangements**

**Information sharing**

**Capacity development**

## 2. Governing climate risk assessment and management

### Broadening the “Actor” Network



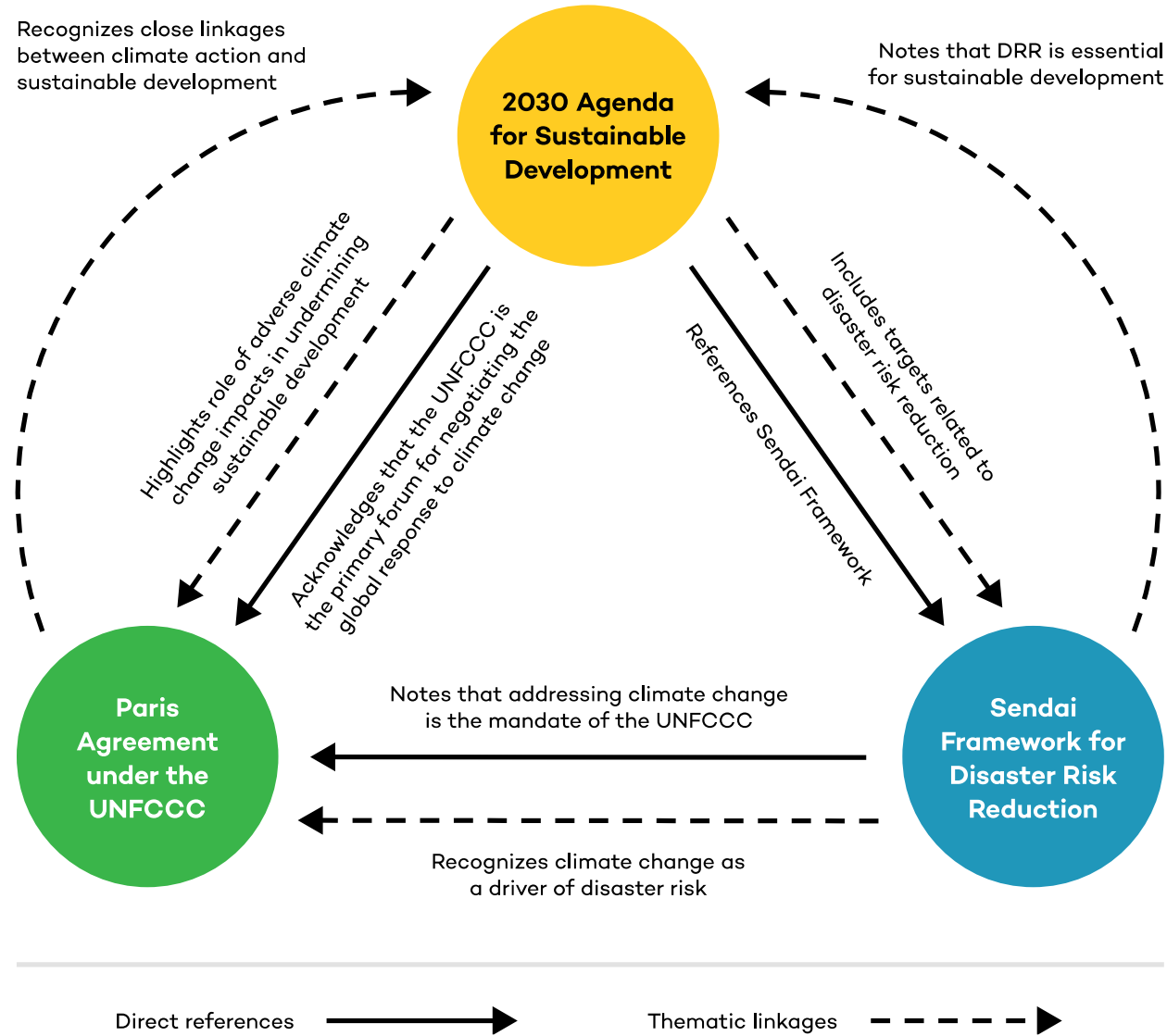
Accountability.....Efficiency

The final stages of collaborative problem solving are fragile

**Barbados  
Program of  
Action/Mauritius  
Strategy**

**National  
Adaptation  
Programs of  
Action**

**Global Framework  
for Climate Services**



### 3. Anticipation and Agility

When do things go “right”/at least “acceptably wrong” ....or

What has led to being “proactive”?

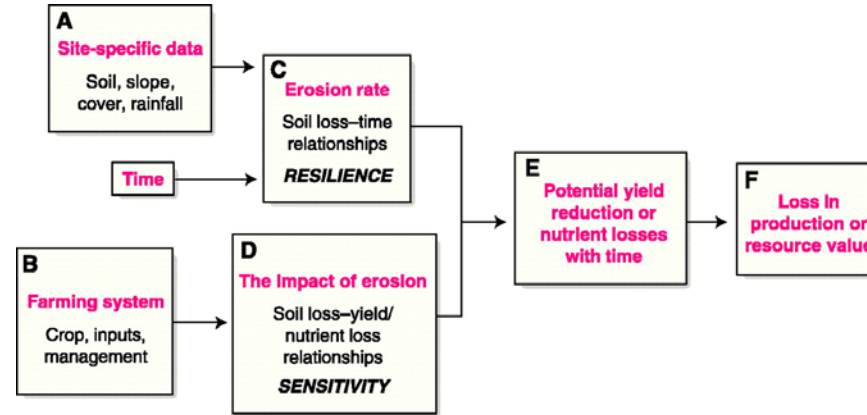
- Early warning and windows of opportunity
- Leadership and the public are engaged
- Existing social basis/pressure for securing the common good

**“Bad ideas have windows too”** - so what else is needed?

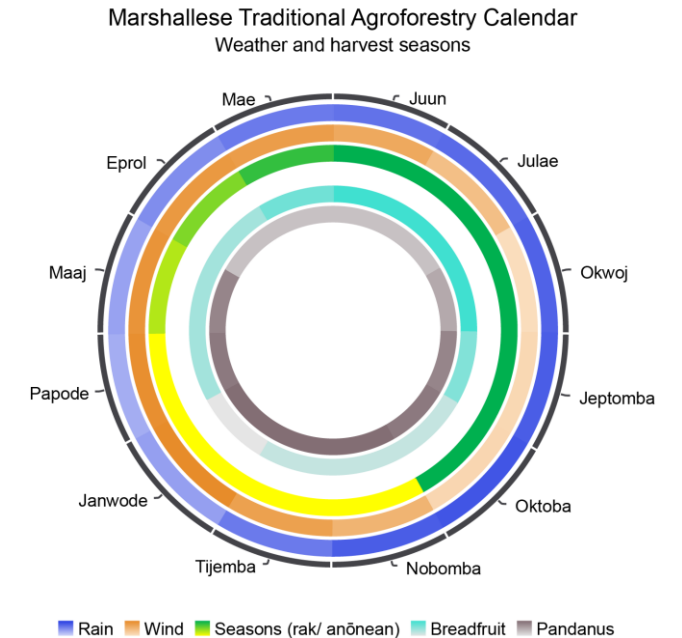
- A collaborative framework between research and management—  
multidisciplinary, context-based, problem-focused
- Individuals dedicated to championing the issue—  
science-policy entrepreneur(s)



# We're all in this together



**Thank You!**



# Capacity Building For Community Partners

- Apart from training of NMHSs...
- **CariCOF Stakeholder Forum** - Dry Season (agriculture and water); Wet Hurricane Season (DRM); 2016 strong health focus, 2017 Heat products
- **Drought monitoring, management and planning**
- **Media** – Dry Season CariCOF 2015; Special media event February 2016; Wet Season CariCOF 2017.
- Support from **EWISACTs Consortium**

