



**World Meteorological Organization**

Working together in weather, climate and water

**5th Caribbean Conference on Comprehensive Disaster Management**

**National Disaster Coordinators and Meteorologists  
Dialogue: Advancing Multi-Hazard Early Warning  
Systems in the Caribbean**

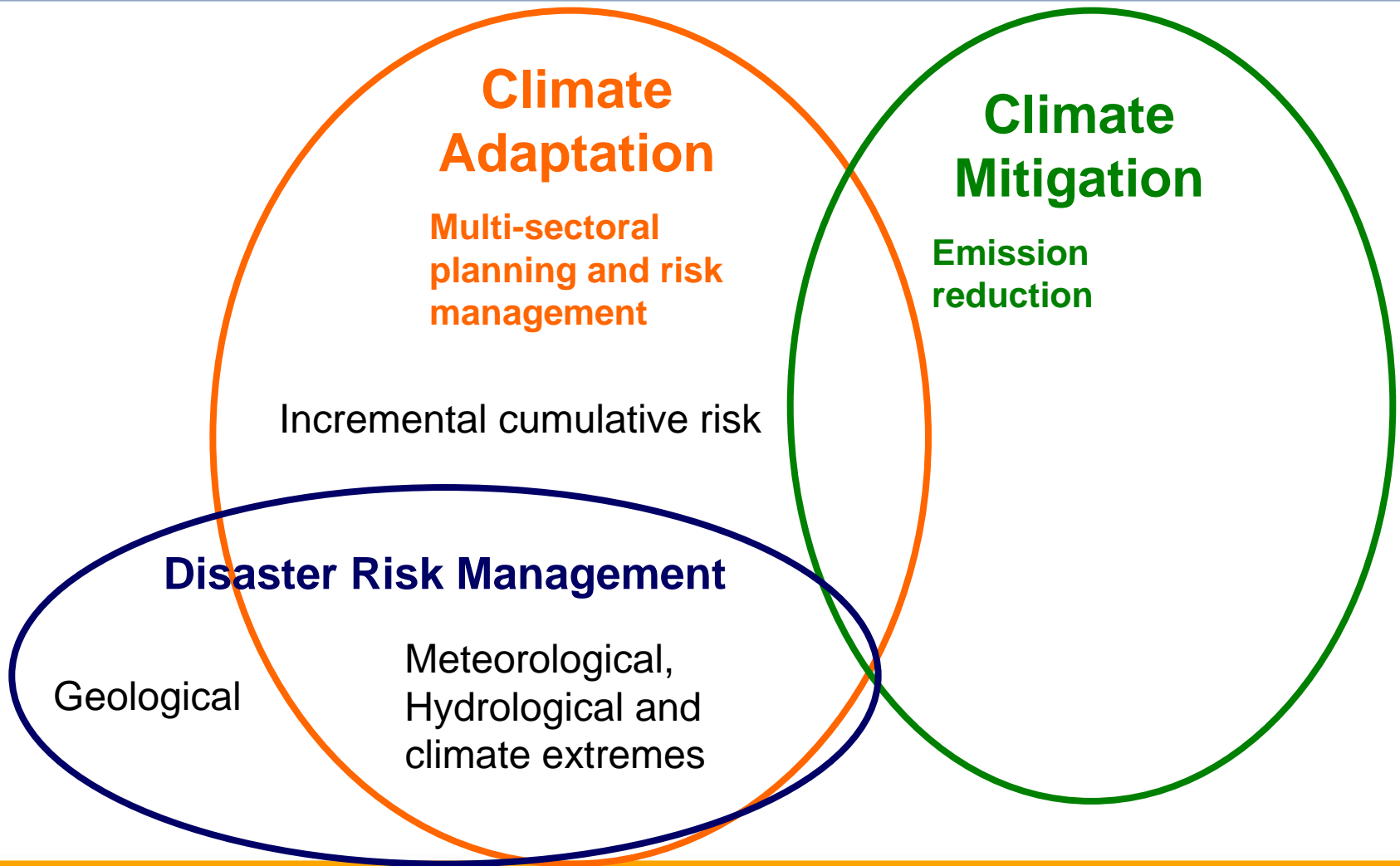
**Dr Maryam Golnaraghi**

**Chief of Disaster Risk Reduction Programme**

**6th December, 2010 Montego Bay, Jamaica**



# Decisions in Climate Mitigation, Adaptation and Disaster Risk Reduction are interlinked





# Comprehensive approach to Disaster Risk Management

1

Alignment of clear policies, legislation, planning, resources at national to local Levels (Multi-sectoral, Multi-agency)

## Risk Assessment

Historical Hazard databases  
Hazard statistics  
Climate forecasting and forward looking hazard trend analysis  
Exposed assets & vulnerability

2

## Risk Reduction

Preparedness (saving lives):  
early warning systems  
emergency planning and response

3

Prevention (Reduction of economic losses):  
Medium to long term sectoral planning (e.g. zoning, infrastructure, agriculture)

4

## Risk Transfer

CATastrophe insurance & bonds  
Weather-indexed insurance and derivatives

5

Information and Knowledge Sharing  
Education and training across agencies

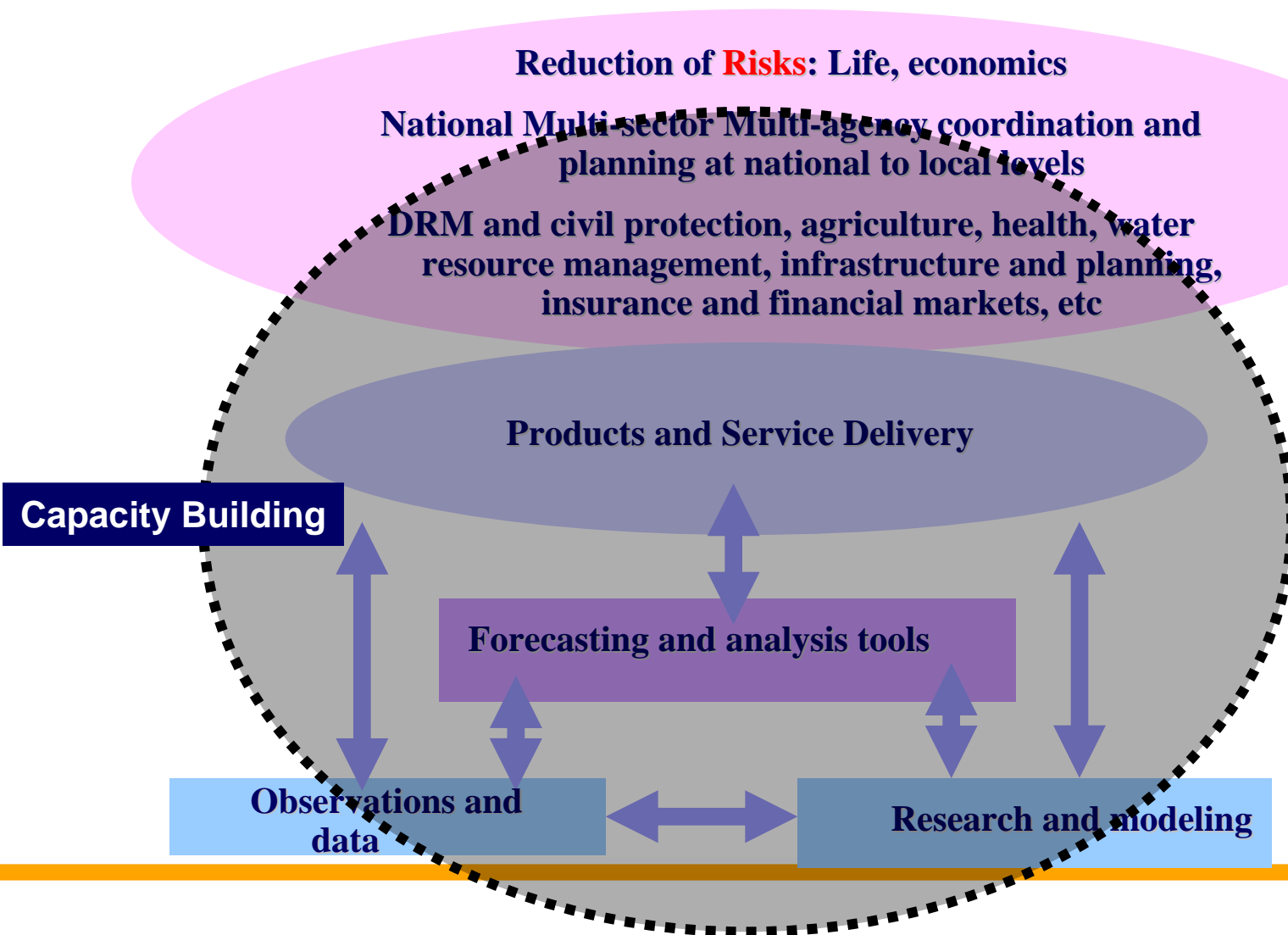
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# Building on National, regional and international cooperation

International aspects

Regional aspects





# Leveraging WMO International and Regional Cooperation to support National Meteorological and Hydrological Services in DRR



## National Meteorological and Hydrological Services

Meteorological, hydrological and climate value-added products and warning advisories

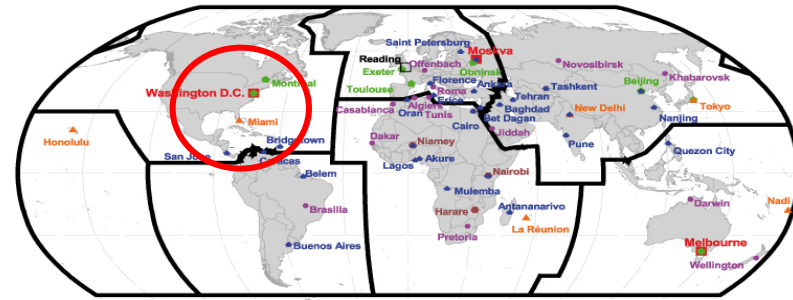
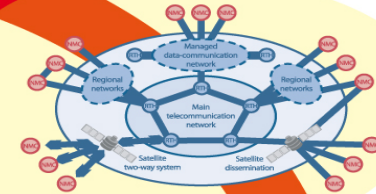
Meteorological, hydrological and climate observations

189 Members

Global Telecommunication System

Data policy and Exchange:

Resolutions 40 and 29



- Regional Meteorological Training Centres
- Drought Monitoring Centres
- Medium Range Forecasting Centre
- ▲ Tropical Cyclone Forecasting Centres
- Environment Emergency Response Centres
- Regional Meteorological and Hydrological Specialised Centres
- World Meteorological Centres

## Global Data Processing and Forecasting System



# Three decades of Regional Cooperation in Tropical Cyclone Warning Systems in the Caribbean and Central America

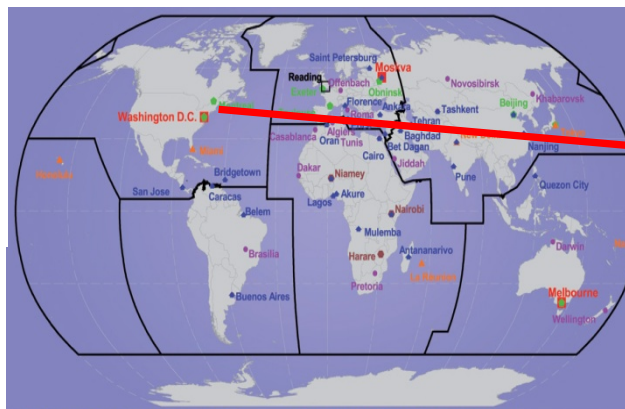
WORLD METEOROLOGICAL ORGANIZATION  
TECHNICAL DOCUMENT

WMO-TD No. 494

TROPICAL  
CYCLONE PROGRAMME

Regional Association IV  
(North America, Central America and the Caribbean)  
Hurricane Operational Plan

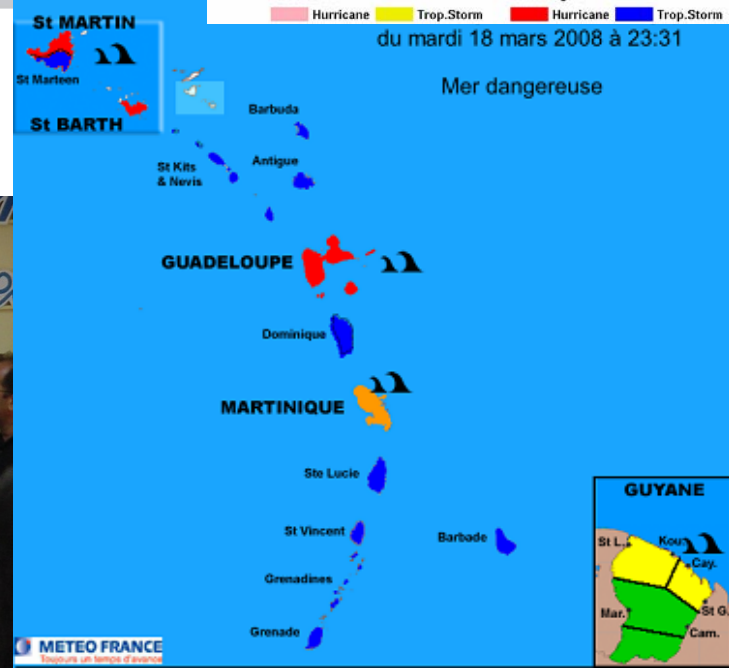
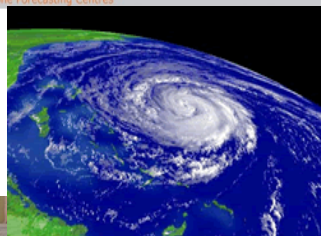
RSMC – Miami Hurricane Center  
RA IV Technical Working Groups



- ◆ Regional Meteorological Training Centres
- Drought Monitoring Centres
- Medium Range Forecasting Centre
- ▲ Tropical Cyclone Forecasting Centres
- Environment Emergency Response Centres
- Regional Meteorological and Hydrological Specialised Centres
- World Meteorological Centres



Current Information:	Forecast Positions:
Center Location 17.2 N 88.4 W	● Tropical Cyclone ○ Post-Tropical
Max Sustained Wind 75 mph	Sustained Winds: D < 38 mph
Movement W at 17 mph	S 39.73 mph H 74-110 mph M > 110mph
<b>Watches:</b>	<b>Warnings:</b>
<div style="display: flex; justify-content: space-around;"> <span>■ Hurricane</span> <span>■ Trop. Storm</span> </div>	<div style="display: flex; justify-content: space-around;"> <span>■ Hurricane</span> <span>■ Trop. Storm</span> </div>





# Goal: Initiative in the Caribbean for Strengthening Multi-Hazard EWS

**Strengthening of Early Warning Systems with a Multi-Hazard Approach building on existing regional capacities, centers, coordination mechanisms and projects:**

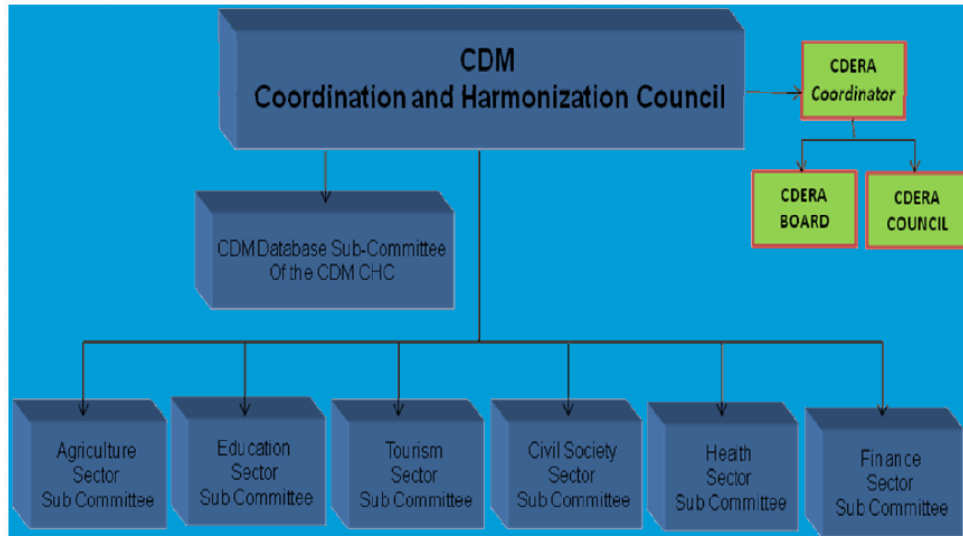
- 1. To strengthen national and regional institutional capacities and cooperation among the National Meteorological and Hydrological Services and Disaster Risk Management stakeholders (multi-agency, multi-sector) for hydro-meteorological hazards**
- 2. To enhance coordination and harmonization among hydro-meteorological warning systems (building on the existing regional coordination for tropical cyclones) and other hazards (e.g., tsunamis)**



# Need to link to Regional Development and Platforms in DRR

- CARICOM
  - CDEMA – Comprehensive Disaster Management (CDM)

## The CDM Governance Structure



Country type	Country name	REGIONAL ARRANGEMENT									
		ACS	OAS	CARICOM	CARIFORUM	OECSS	CDEMA	ALBA	CMO-CINH	CDB	EU
ACP	ANTIGUA & BARBUDA	M	M	M	M	M	M	M	M	M	
ACP	BAHAMAS	M	M	M	M	M	M		M	M	
ACP	BARBADOS	M	M	M	M	M	M		M	M	
ACP	BELIZE	M	M	M	M	M	M		M	M	
ACP	CUBA	M			M			M			
ACP	DOMINICA	M	M	M	M	M	M	M	M	M	
ACP	DOMINICAN REPUBLIC	M	M		M						
ACP	GRENADA	M	M	M	M	M	M		M	M	
ACP	GUYANA	M	M	M	M	M	M		M	M	
ACP	HAITI	M	M	M	M	M	M		M	M	
ACP	JAMAICA	M	M	M	M	M	M		M	M	
ACP	ST KITTS AND NEVIS	M	M	M	M	M	M		M	M	
ACP	ST LUCIA	M	M	M	M	M	M		M	M	
ACP	ST VINCENT AND THE GRENADINES	M	M	M	M	M	M	M	M	M	
ACP	SURINAME	M	M	M	M	M	M		M	M	
ACP	TRINIDAD & TOBAGO	M	M	M	M	M	M		M	M	
FR OR	GUADELOUPE	AM(FR)									M
FR OR	MARTINIQUE	AM(FR)									M
FR OR	ST BARTHELEMY	AM(FR)									M
FR OR	ST MARTIN	AM(FR)									M
NL OCT	ARUBA	AM									
NL OCT*	BONAIRE	AM(NA)									
NL OCT	CURACAO	AM(NA)									
NL OCT*	SABA	AM(NA)									
NL OCT*	ST EUSTASIUS	AM(NA)									
NL OCT	ST MAARTEN	AM(NA)									
BCT	ANGUILLA			AM		AM	M		M	M	
BCT	BERMUDA			AM							
BCT	BVI			AM		AM	M		M	M	
BCT	CAYMAN ISLANDS								M	M	
BCT	MONTSERRAT			AM		M	M		M	M	
BCT	TURKS AND CAICOS ISLANDS	AM		AM			M		M	M	

## Regional arrangements in the Caribbean





# Where ?

**Strengthened coordination and cooperation across British, French, Dutch and Spanish Speaking countries and territories**



Antigua and Barbuda, Aruba, the Bahamas, Barbados, Belize, Bermudas, the British Caribbean Territories, the Caribbean Netherlands, Cuba, Curacao, Dominica, the Dominican Republic, the French West Indies, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint-Marteen, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago.



# Who?

## Key Stakeholders in Multi-Hazard EWS in the Caribbean

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### ✓ **National:**

- National Meteorological and Hydrological Services (NMHS) and Disaster Risk Management (DRM) Agencies and other key ministries of the beneficiary countries.
- Other EWS stakeholders such as media, economic sectors (health, agriculture,) (TBD)

### ✓ **Regional:**

- Regional centers and agencies of CARICOM: CDEMA, CMO and its CIMH;
- WMO RA IV and its DRR Task Team, WMO RA IV Hurricane Committee, the WMO RSMC – Miami Hurricane Center
- Regional agencies and platforms: ACS, OAS, the Eastern Caribbean Donor Group, Caribbean Development Bank (CDB)
- Other regional partners (TBD)

### ✓ **International and donors:**

- UN and International Agencies: WMO, UNESCO-IOC, UN-ISDR, UNDP, IFRC, etc.
  - Bi-lat donors and development banks: IADB, World Bank, USAID/OFDA, Canada (CIDA), Finland (MFA), Spain (ACE), Japan (JICA), UK (DFID), EU, Italy, France, etc.
-



# What?

## Topics for Strengthening Multi-Hazard EWS at National and Regional

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- Policy, legal, legislative issues pertaining to DRR and role of NMHS
  - Risk Assessment and Modeling, including data management and exchange issues
  - Operational Cooperation of National Meteorological and Hydrological Services and Disaster Risk Management Stakeholders (DRM agencies and other ministries and technical agencies)
  - Observing, Monitoring, Forecasting capacities
  - Coordination of Watch and Warning Systems in the region
-



# How?

## Roadmap for the strengthening of Multi-Hazard Early Warning System Capacities

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### **A phased approach with long-term view (6-8 years):**

- **2010-2011:** Development of programmatic and technical aspects and phase-I project
  - **2011:**
    - Phase-I project implementation plan
    - Institutional mapping and partnerships (national and regional)
    - Resource mobilisation strategy and coordination with the donors
    - Regional mechanisms sharing progress, experiences, monitoring and evaluation
  - **2011-2012:** Phase I Project to be Launched
-



# Roadmap for the project design to strengthen Caribbean MHEWS capacities

## Consultations, Major Milestones and Timeline



donors

# Roadmap for the project design to strengthen Caribbean MHEWS capacities

## Outcomes



- Initiative to strengthen MHEWS capacities in the Caribbean
- Roadmap
- Overall objectives

- Technical aspects of regional cooperation in forecasting addressed

- Phase I projects developed
- Funds raised

- Phase I projects launched

2010

2011

2012

- Consultations, review of assessments and projects

- Gaps, needs and priorities documented
- Overall Implementation Plan (timelines, milestones, deliverables)
- Options for Regional Forum for coordination

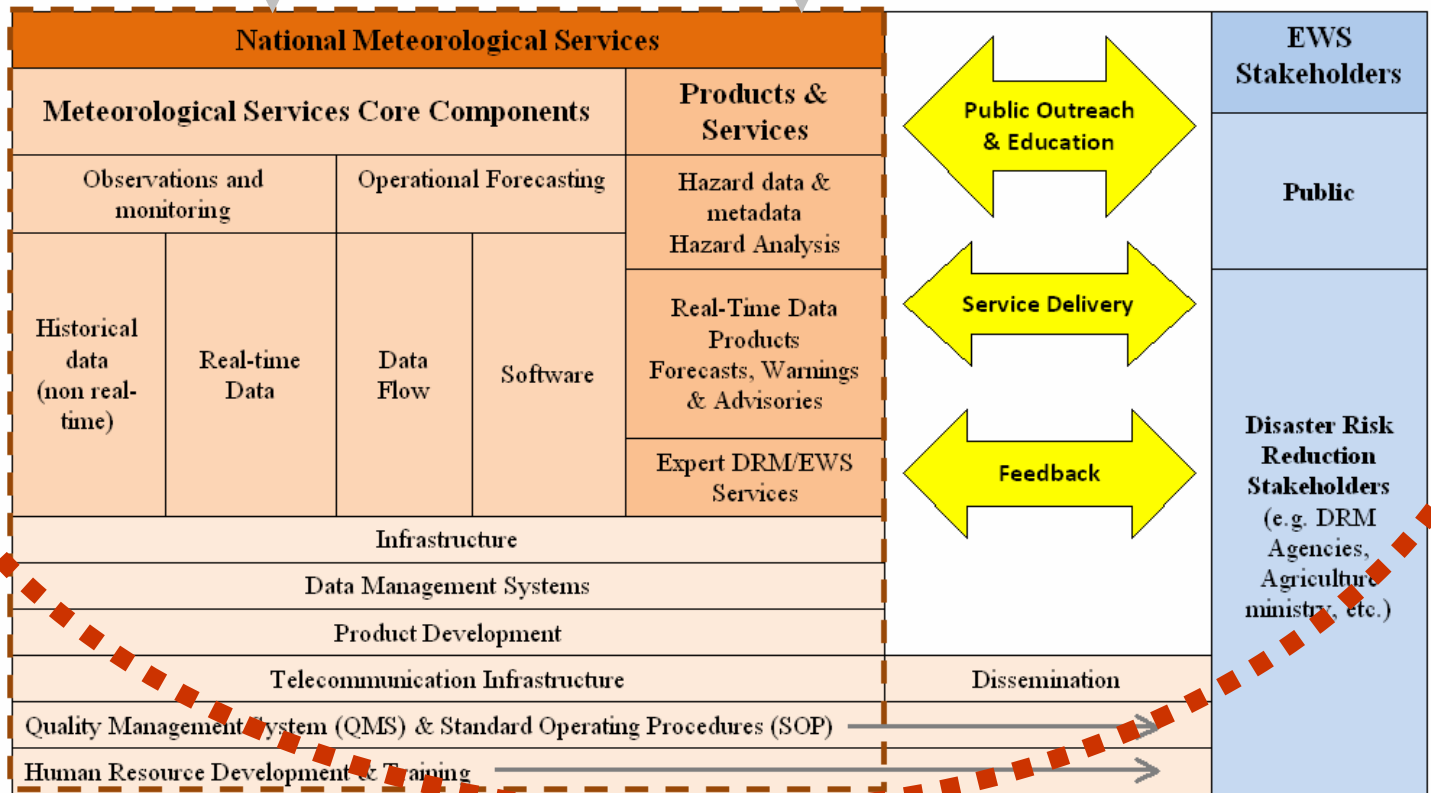
- Phase I projects endorsed





# We have achieved documentation of gaps and needs and priorities

**Other Technical Services Cooperating with NMSs and DRM Stakeholders**  
(e.g. Hydrological Service, Ocean Services)



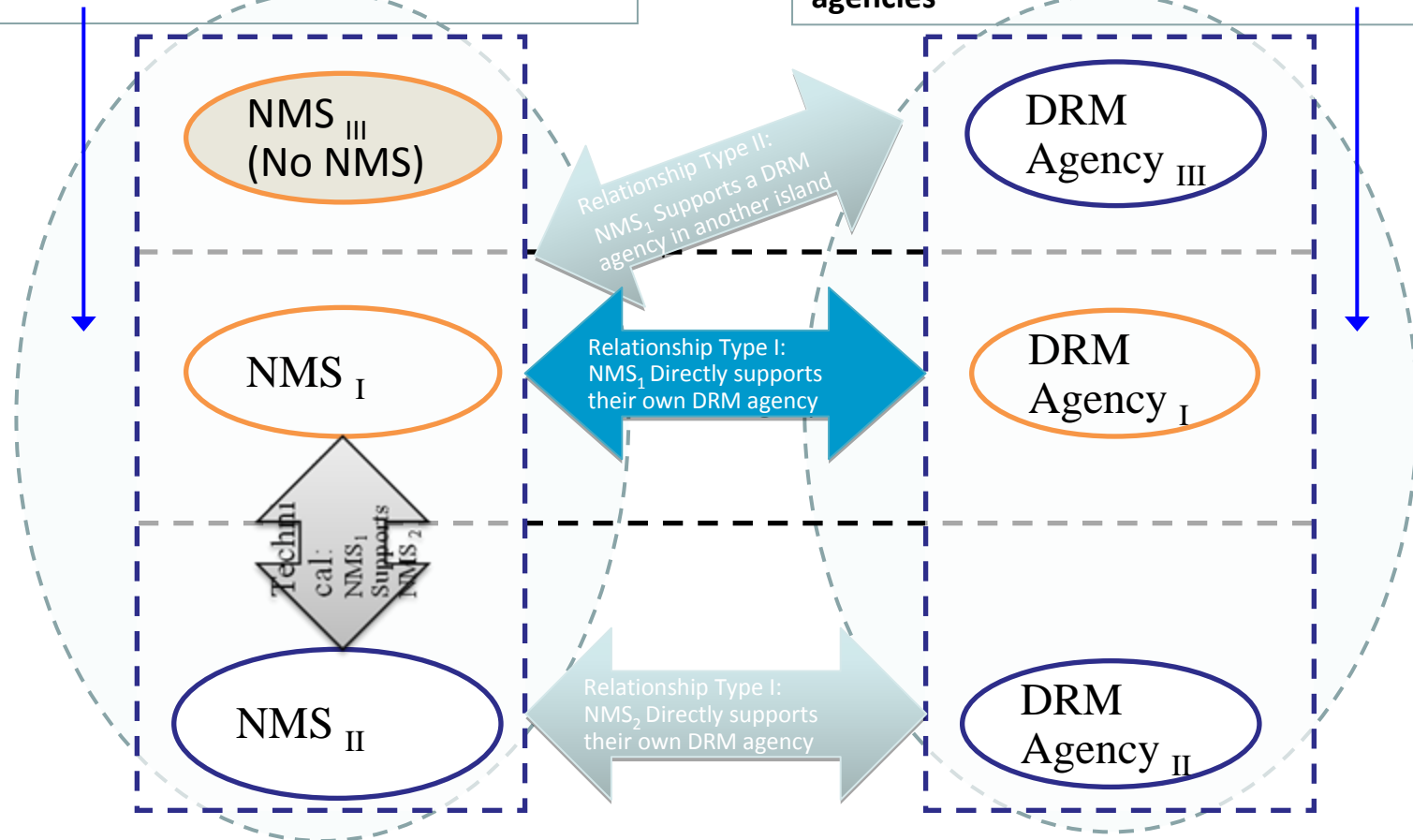




# Different relationships between Disaster Management Agencies and Meteorological Services

Regional agencies and centers such as RSMC-Miami Hurricane Center, CMO/CIMH, etc. supporting NMSs

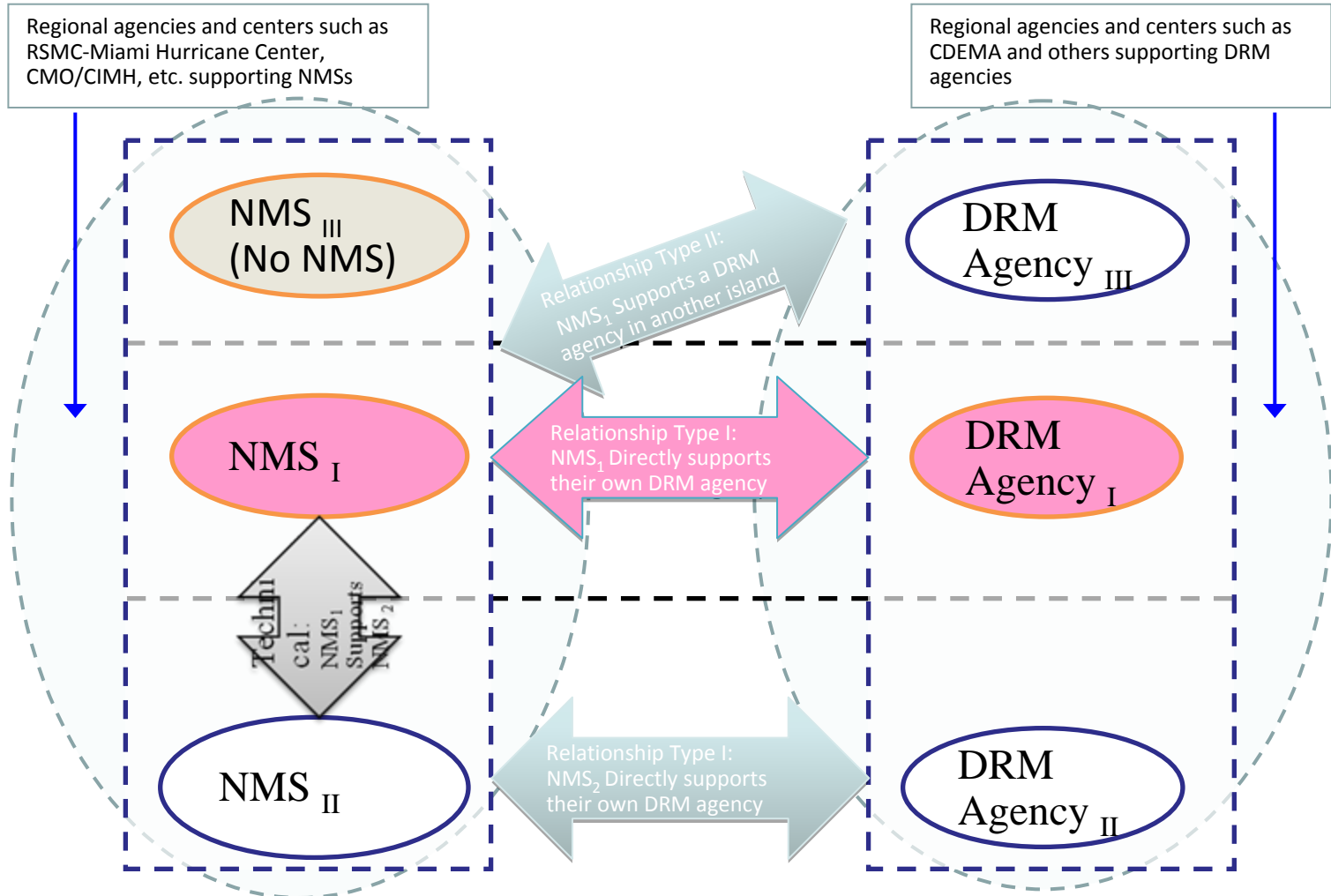
Regional agencies and centers such as CDEMA and others supporting DRM agencies





# Different relationships between Disaster Management Agencies and Meteorological Services

Antigua & B.  
Bahamas  
Barbados  
Belize  
Cayman  
Cuba  
Curaçao  
Dominican Rep.  
Guadeloupe  
Guyana  
Haiti  
Jamaica  
Martinique  
St Lucia  
Suriname  
Trinidad & T.



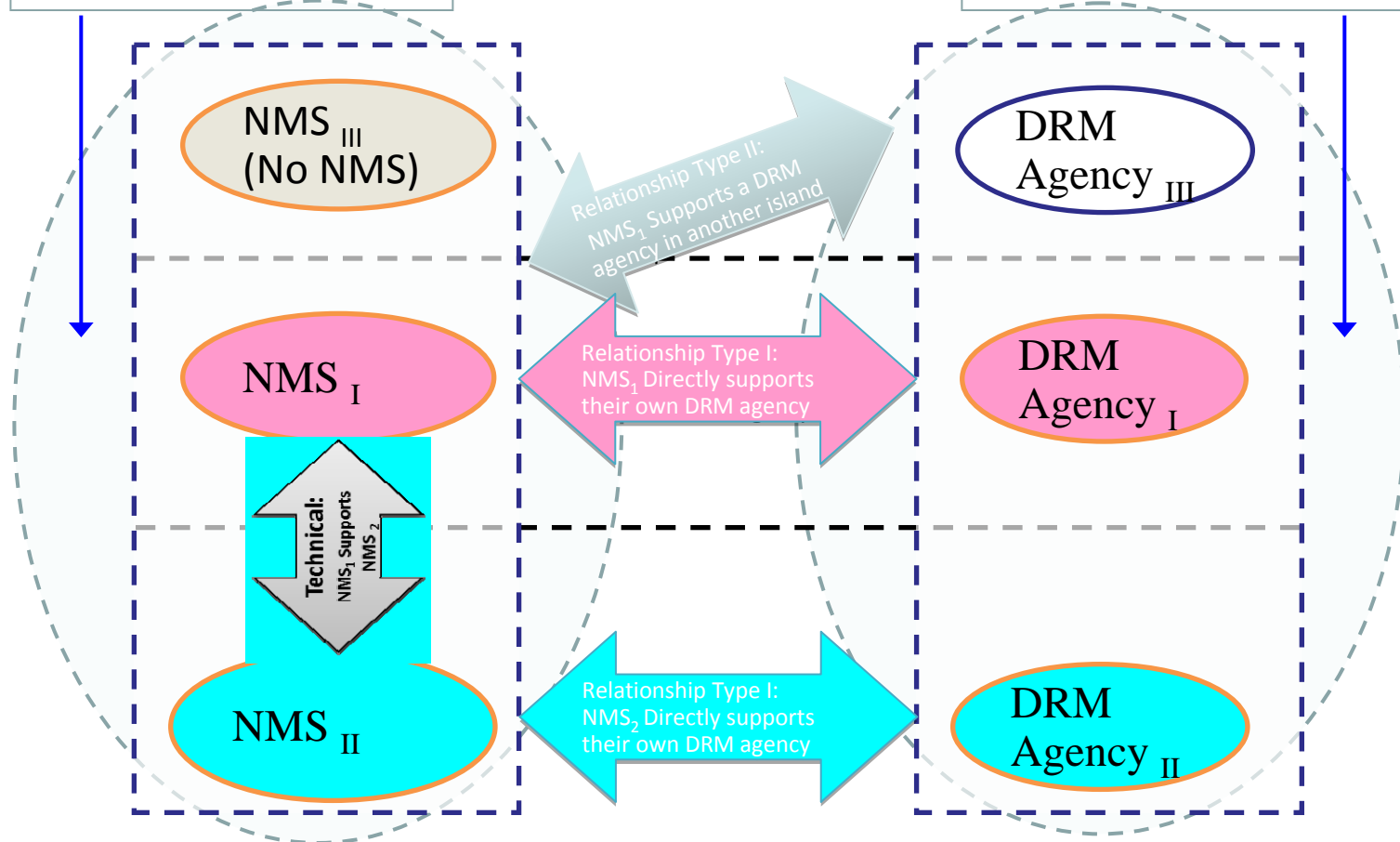


# Different relationships between Disaster Management Agencies and Meteorological Services

Barbados  
Dominica  
St Vincent & G.  
Curaçao  
Aruba  
St Marteen  
Trinidad & T.  
Grenada

Regional agencies and centers such as RSMC-Miami Hurricane Center, CMO/CIMH, etc. supporting NMSs

Regional agencies and centers such as CDEMA and others supporting DRM agencies



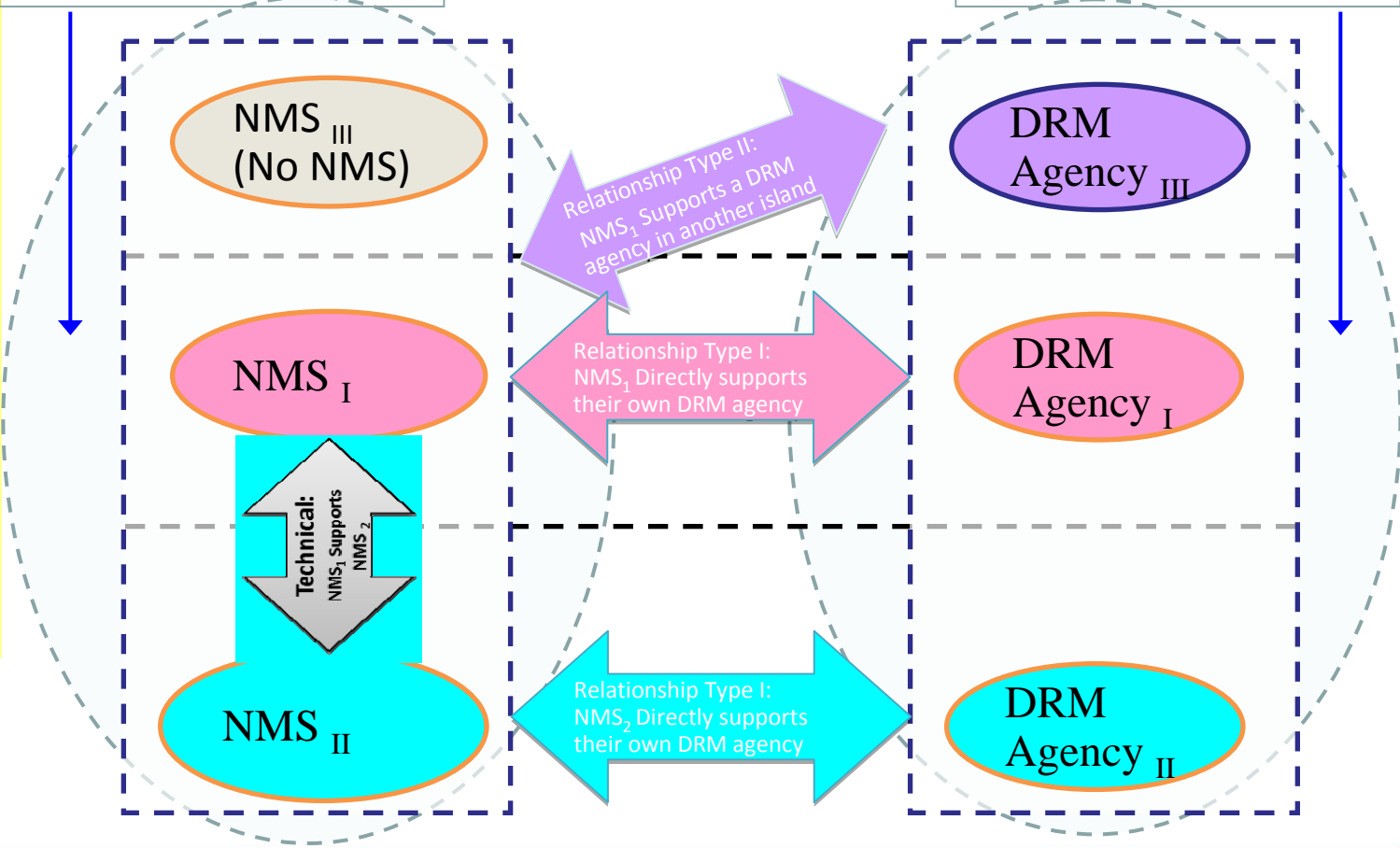


# Different relationships between Disaster Management Agencies and Meteorological Services

Antigua & B.  
Anguilla  
BVI  
Montserrat  
St Kitts & N.  
Bahamas  
Turks and C.  
Curaçao  
Saba/St Eustatius  
Bonaire  
Guadeloupe  
St Martin/St  
Barth

Regional agencies and centers such as RSMC-Miami Hurricane Center, CMO/CIMH, etc. supporting NMSs

Regional agencies and centers such as CDEMA and others supporting DRM agencies





# RECOMMENDATIONS AND NEXT STEPS (1/3)

## Capacity development projects should focus on:

### HAZARD/RISK ASSESSMENT

- National Multi-stakeholder mechanism and mapping
- Data rescue and hazard/risk analysis capacity development (databases, metadata, data rescue, hazard analysis and mapping)

### OPERATIONAL COOPERATION (Multi-sectoral, DRM, NMHS, DRM, other EWS)

- Review & update policies and legal frameworks (linking to CDEMA legislation models)
- Mapping multi-sectoral institution coordination (QMS, SOP)
- Multi-agency mechanisms for needs and requirements identification
- Strengthened communication protocols and mechanisms
- Feedback mechanisms



## RECOMMENDATIONS AND NEXT STEPS (2/3)

### Capacity development projects should focus on:

#### **OBSERVATION MONITORING AND FORECASTING**

- Strengthen observation and monitoring capacities

- Strengthen and expand forecasting capacities - (tropical cyclone, strong winds, heavy rainfall, flashfloods, landslides, coastal surge and inundation, drought) (leveraging with Tsunami)

- Regional coordination mechanisms for monitoring and forecasting (linking to HC, RSMCs, CMO/CIMH, etc)

#### **OVERARCHING CAPACITIES (QMS, Training, Infrastructure, Education )**

- Develop and implement comprehensive QMS and SOPs

- Strengthen communication networks at regional and national levels

- Strengthen training programme supporting EWS

- Develop multimedia educationnal programmes



## **RECOMMENDATIONS AND NEXT STEPS (3/3)**

### **Capacity development projects should focus on:**

#### **WATCH AND WARNING SYSTEMS AND COORDINATION AT NATIONAL AND REGIONAL LEVEL**

- Strengthen real-time coordination among technical agencies
- Strengthen national multi-sectoral and multi-level WWS
- Implement mechanisms and procedures for real-time coordination on warning issuance and dissemination
- Enhance sharing of good practices
- Leverage opportunities accross hydrological, meteorological and tsunami warning systems

**Document of gaps, needs and priorities available for final comments by December 16th 2010**



## NEXT STEPS (2011)

- Overall implementation Plan (timelines, milestones, deliverables)
- Addressing technical challenges for regional cooperation
- Capacity Development Project proposals to address the needs/gaps (National and regional dimensions)
- Identification of annual regional and national multi-stakeholder forums (linked to existing events and platforms)
  - Hurricane Committee, CDEMA meetings, Others
  - Implementation, planning, progress monitoring and evaluation
  - Resources requires for organising these forums
- Linking to institutionalized funding mechanisms and resource mobilization strategy linked to a sustainability model
  - Internal (e.g., government budgeting and cost recovery models)
  - External (e.g. donors, development banks...)





# SPECIFIC LONG TERM OBJECTIVES

## (6-8 years)

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- Established legislation and institutional arrangements
  - Risk assessments capacities developed and applied multi-sectorally for planning
  - QMS and SOPs developed between NMHS and other EWS stakeholders (institutionalizations)
  - Strengthened operational meteorological, hydrological and climate services to support DRM
  - Coordinated multi-Hazards EWS
-



# Phase I projects focus on the basis of consultations and recommendations

- Identify and map national and regional stakeholders and establish national and regional policy dialogues on DRR
  - Country/territory groupings
- Data rescue, data management systems and initiate discussion on data exchange and hazard analysis
- Operational cooperation (NMHS, DRM, other EWS stakeholders) building on QMS development for aeronautical (2012 deadline of ICAO)
  - Coordination of Finish and USA projects
  - Initiate process between NMHS and DRM on QMS and SOPS
- Develop a regional cooperation plan for strengthening of monitoring and forecasting of other hazards (building from cooperation in tropical cyclones)
  - Meeting on March 7 at the Hurricane Committee meeting to discuss the technical and regional cooperation issues and challenges
- Possibilities for leveraging major regional meetings to establish an annual forum for information sharing,
  - Hurricane Committee on technical coordination
  - CDEMA annual meeting
  - Others (?)



# 5<sup>th</sup> Caribbean Conference on Comprehensive Disaster Management Montego Bay, Jamaica

## National Disaster Coordinators and Meteorologists Dialogue: Advancing Multi-Hazard Early Warning Systems in the Caribbean

Monday, 6<sup>th</sup> December, 2010 from 8:30 am to 12 noon

[http://www.wmo.int/pages/prog/drr/events/Jamaica/index\\_en.html](http://www.wmo.int/pages/prog/drr/events/Jamaica/index_en.html)

### Expected outcomes:

- (i) implementation plan for project development and implementation
- (ii) identify regional forums for DRM and NMHS information sharing and planning, building on existing mechanisms and platforms.



# Agenda of the dialogue

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- **Good practices in Multi-Hazard Early Warning Systems in the Caribbean**
    - Cuba, French West Indies
  - **Reflections on existing capacities and challenges in coordination and operational MHEWS capacities in the Caribbean**
    - Jamaica, Bahamas, Antigua and Barbuda., Curacao, Dominica, Anguilla
  - **Panel Discussion: Building on Three Decades of Regional Cooperation for Strengthening of Multi-hazard Early Warning Systems in the Caribbean Region**
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# Key questions

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- Overall implementation Plan (timelines, milestones, deliverables)
  - Phase I projects priorities, linking to existing programming in the region
  - Leveraging of annual regional multi-stakeholder forums (linked to existing events and platforms)
    - Identification of participants
    - Securing funding
    - Issues to be addressed in the dialogue
    - Planning and organisation of the session
-



*Thank You*

