



**OCTs Regional Risk Reduction Initiative (R3i):
Provision of Services to Caribbean OCTs
Lot 1: GIS and Vulnerability Assessment**



Overview of Methodology



Aruba; May 4-6, 2011

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Provision of Services to Caribbean OCTs; Lot 1: GIS and Vulnerability Assessment

Our current challenges

- Sea-level rise**
- Warmer temperatures**
- More frequent and damaging hurricane storms**
- Increase in coastal flooding**
- Higher rates of coastal erosion**
- Flash flood**
- Higher rainfall in dry seasons**
- Lower rainfall in wet seasons**
- Threats of earthquake and tsunami**
- Oil spills and other technological hazards**

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CARIBBEAN VULNERABILITY

Small land mass.

Intensive land development

High population density in coastal zones

Single facilities

Single economy

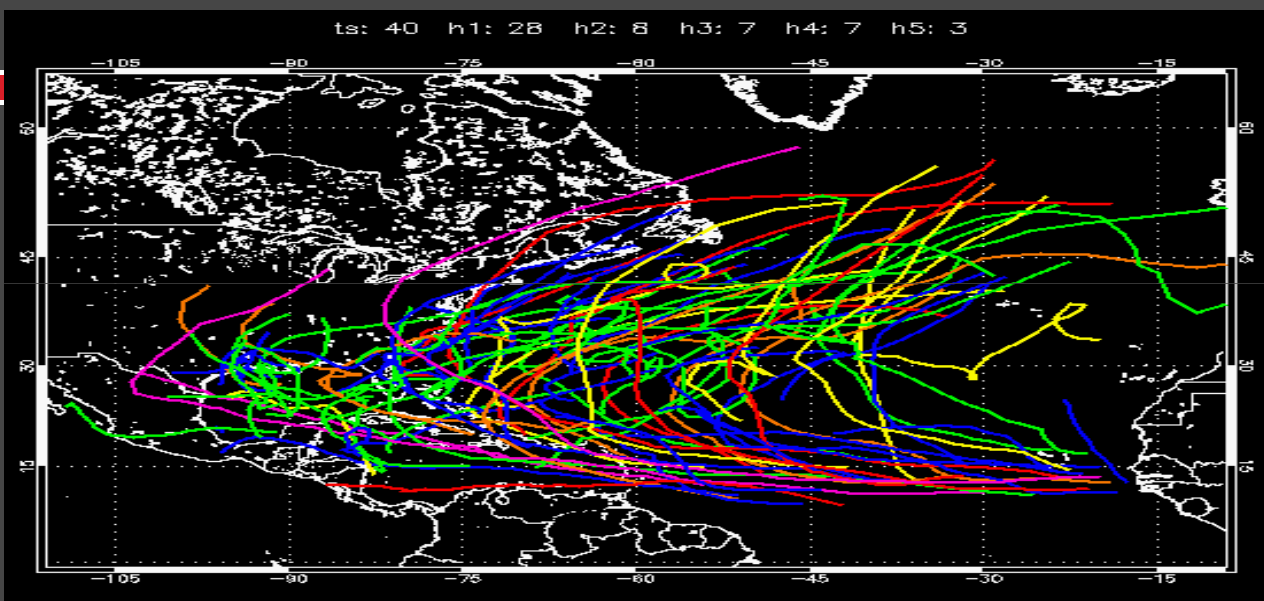
Poorly developed coastal infrastructure.

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Atlantic Tropical Storms/Hurricanes 1980-1989.

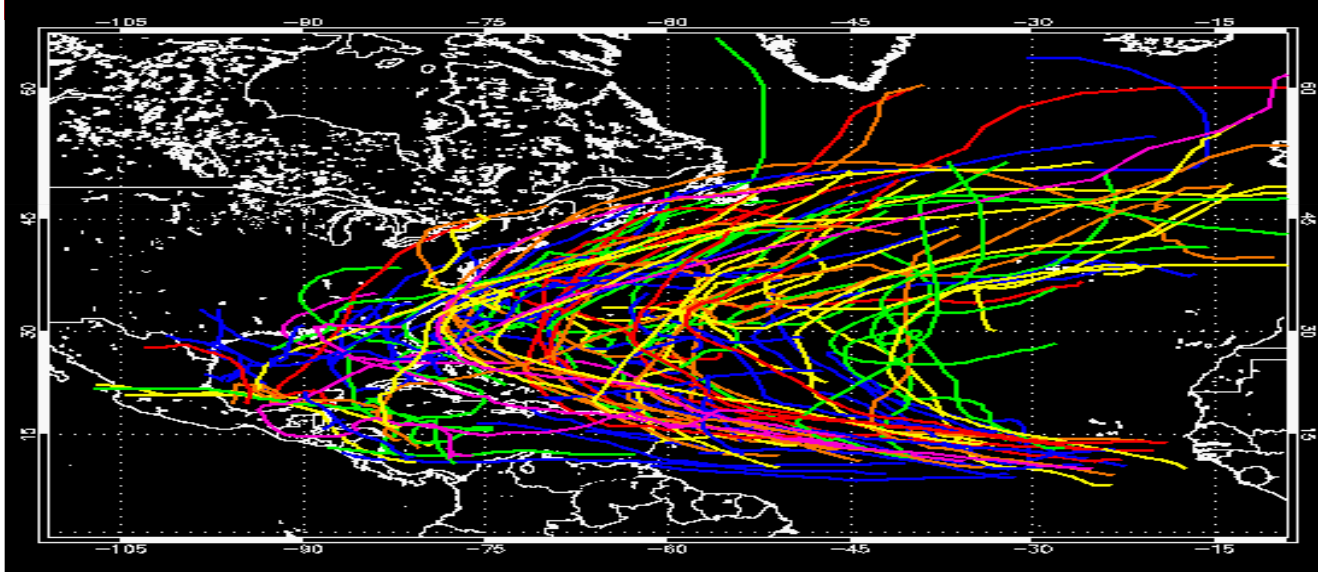
Source: Caribbean Hurricane Network: Climatology of Caribbean Hurricanes. www.stormCARIB.com 2006



Atlantic Tropical Storm/Hurricane Track 1990-1999

Source: Caribbean Hurricane Network: Climatology of Caribbean Hurricanes. www.stormCARIB.com

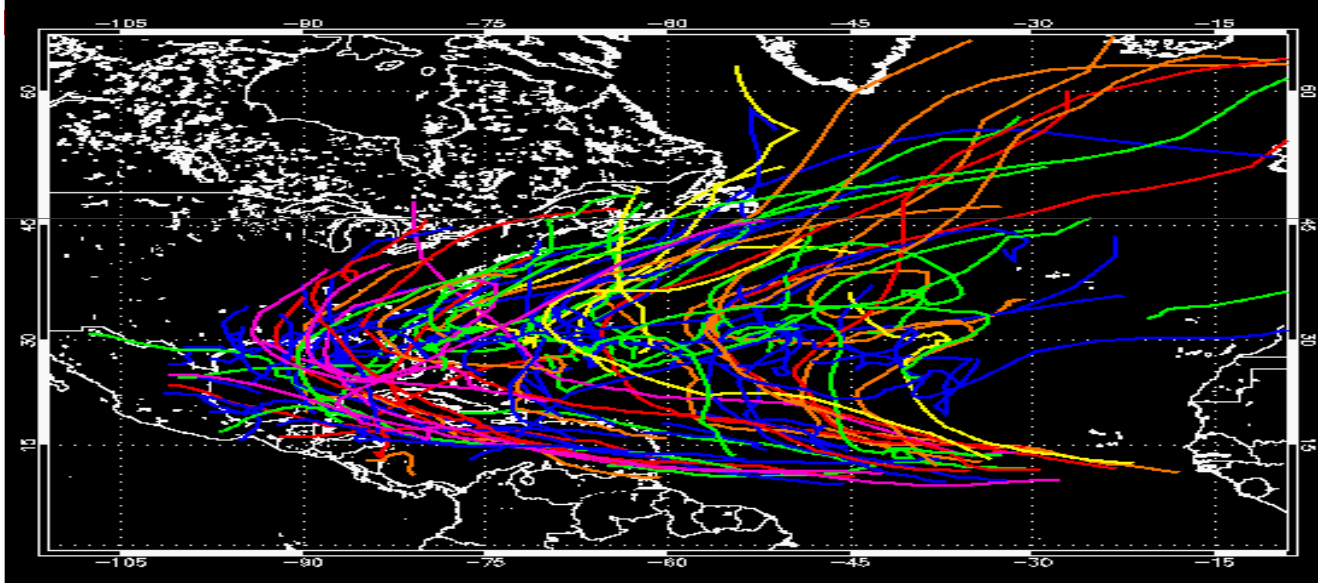
ts: 46 h1: 23 h2: 16 h3: 11 h4: 9 h5: 5

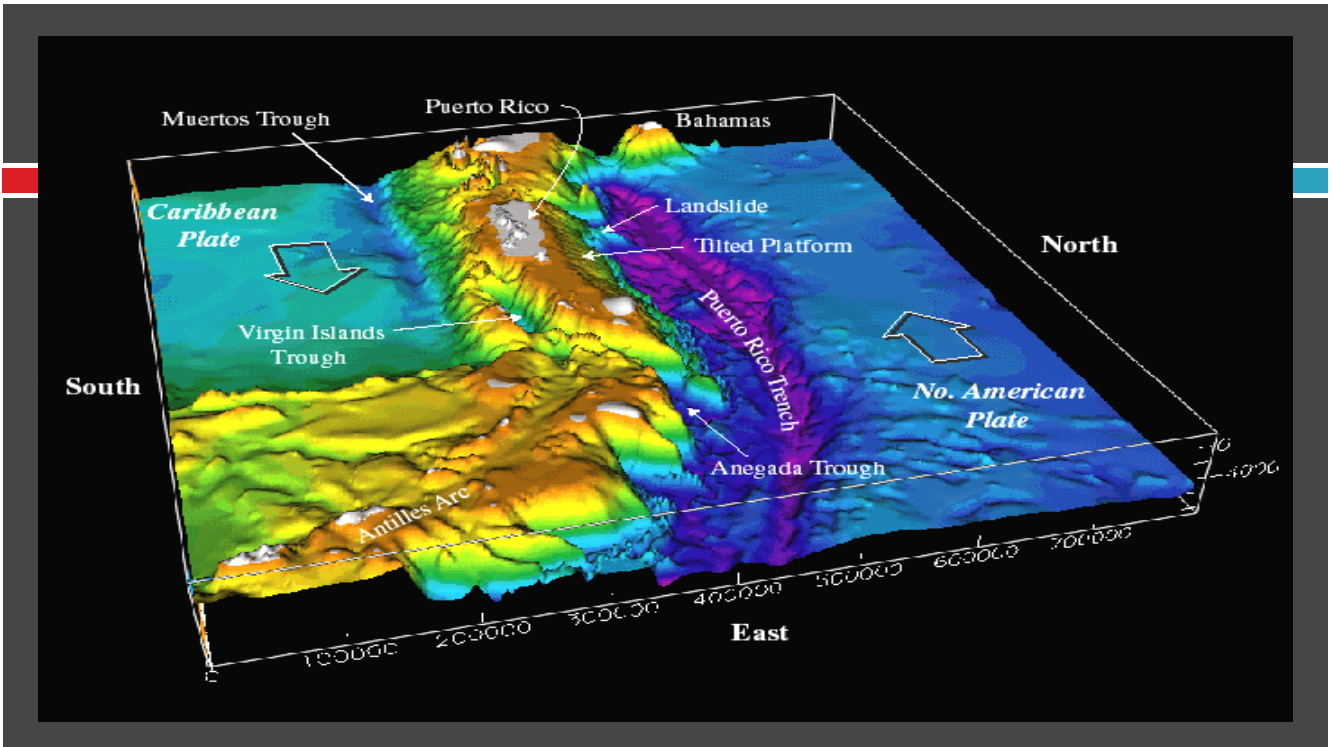


Atlantic Tropical Storm/Hurricane Paths: 2000-2005

Source: Caribbean Hurricane Network: Climatology of Caribbean Hurricanes. www.stormCARIB.com

ts: 49 h1: 21 h2: 6 h3: 9 h4: 10 h5: 6





The Impact: Damage to Buildings in Haiti due to the Earthquake of 2010



THE IMPACT

Country	Year	Event	Housing loss/damage(%)
Dominica	1979	Hurricane David	60
St. Lucia	1980	Hurricane Allen	30
Jamaica	1988	Hurricane Gilbert	25
Montserrat	1989	Hurricane Hugo	90
Anguilla	1995	Hurricane Luis	41
St.Kitts & Nevis	1998	Hurricane Georges	85
Jamaica	2004	Hurricane Ivan	14
Grenada	2004	Hurricane Ivan	90
Cayman Islands	2004	Hurricane Ivan	50 (estimated)

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Project Goal and Objectives

The Goal

To address the risk and exposure of OCTs by providing a network of regional infrastructure, programmes, policies and protocols to strengthen their capacity to predict and prepare for natural and human-induced hazards, and thus improve resilience and reduce risk and subsequent loss.

Overall objectives

To characterise the natural and human-induced hazards to which the OCTs are exposed and identify geographic and socioeconomic areas of vulnerability.

Local capacities to develop and implement mitigation strategies will then be strengthened through the provision of tools (spatial data infrastructure and models) and best practices to support comprehensive disaster risk management.

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Project Purposes and Expected Result

Purposes

- To provide relevant national agencies with responsibilities for disaster risk management with risk information tools and data and a GIS framework for use in their daily work, and develop their capacity to manage risk information data.
- To collect and, in some instances, produce accurate vulnerability assessments and hazard maps on which early warning systems and response and contingency plans can be based.
- To strengthen the use of harmonised risk information at country level by all disaster management stakeholders including decision makers and the public.
- To help the countries to integrate their vulnerability assessments and hazard maps into a regional context.

The Expected Result

- Increased capacity in hazard mapping and vulnerability assessments, to further incorporate these into spatial information systems to inform planning and development processes.

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Uses of Hazard Maps

- Development control and planning
- Disaster mitigation planning
- Disaster management
- Policy formulation
- Law reforms
- Site analysis
- Review of insurance premium
- Review of loan applications
- Assessment of public facilities
- Vulnerability assessments
- Research
- Public awareness and education
- Evacuation and response planning
- Development of early warning systems
- Law enforcement
- Hazard prevention
- Development of building codes
- Siting of infrastructure

Users of hazard maps in the Caribbean

- Physical Planning Offices
- Non-Governmental Organizations
- Environmental Agencies
- Agricultural Departments
- Works Departments
- Utility Companies
- Insurance Agencies
- National Disaster Offices
- National Disaster Offices
- Security and Protective Services
- Lending Agencies
- Meteorology and Hydrology Departments
- Educational Institutions
- Land Developers
- General Public
- Foreign Investors
- Public Health Departments

Phase I: Hazard mapping and vulnerability assessment capacity building

Capacity and Data Needs Assessment Study

Inception Meetings

Collection of Existing Data

Phase II: Data and equipment acquisition

TOR: Data Acquisition

TOR: Equipment Acquisition

Data Preparation and processing

Phase IV: Vulnerability assessment and quantitative risk assessment

Preliminary vulnerability assessment

Structural vulnerability

Operational vulnerability assessment

Loss estimation studies & vulnerability curves

Social vulnerability assessment

Environmental vulnerability assessment

Proposition and estimation of mitigation measures

Technical review panel and public outreach

Phase V: Vulnerability assessment and hazard mapping applications

Hazard Database Development

Disaster Management Application

Inputs for Early Warning Systems

Adaptation of tools and products for decision makers and public awareness

Phase I - Hazard mapping and Vulnerability capacity assessment [CI, TCI, MNT, ARU, CUR, BON, STX, SAB]

The 3 sub-tasks:

- I-a: Review of hazard mapping and vulnerability capacities
- I-b: Data collection and data needs assessment
- I-c: Recommendations, planning and strategy development

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I-a: Review of Hazard Mapping & Vulnerability Capacities

Expected Results:

- A synthesis of all surveys relevant to disaster management in the OCTs or broader groups of countries
- An analysis of each country's capacity in terms of GIS software, hardware, and human resources
- Evaluation of access to regional or national capacities (e.g. CDEMA, UK or Netherlands).

Methods

- Literature review
- In-country interviews and discussion with key stakeholders
- Preparation of draft report
- Review of draft report
- Finalization of draft report

I-b: Data collection and data needs assessment

Expected Results:

- Existing data relevant to Disaster Risk Reduction for each island is collected
- Quality analysis of existing data undertaken
- Collected data is pre-processed for future spatial analysis

Methods

Internet search for sources of extra-regional data
In-country collection of data from local key stakeholders
Quality analysis of data collected
Editing, transformation, and conversion of data collected
Creation of metadata
Preparation of folders of cleaned data
Preparation of activity report.

I-c: Recommendations, planning and strategy development

Expected Results:

Long term strategy for HM/VA capacity development

- Human and material resources
- Training and skills continuity
- Sustainable investment and operational budget
- Medium and long term objectives

Short term planning and implementation planning

- Detailed work plan for the immediate development capacities of the disaster offices.
- Plan should focus on:
 - Partnership with disaster management offices
 - Transfer of skills through training applied to the real exercise of HM/VA

Legal context

A synthesis of all relevant national laws and regulations to ensure that strategies and plans are coherent with the legal context.

Deliverables: Phase I

<i>Phases</i>	<i>Deliverables</i>
Phase 1-a	<ul style="list-style-type: none"> • Approved capacity assessment report • Approved data needs, data gap, and data quality assessment report
Phase 1-b	<ul style="list-style-type: none"> • Regional Training workshop1 report • Delivery of “Indexed Spatial & Document Repository WEB-GIS” (draft) containing compiled pre-processed GIS existing data for each island
Phase 1-c	<ul style="list-style-type: none"> • Stakeholder consultation report • Approved long and short term developmental strategies report • Approved short-term implementation plan

Phase II - Base data and equipment acquisition

Expected Results:

- New datasets are collected (where needed)
- New geoinformatics equipments acquired

Methods

Data gaps analysis

Procurement assistance with drafting of bidding documents, tendering process, and delivery management

Pre-processing of raw data and their transformation into an harmonized database system

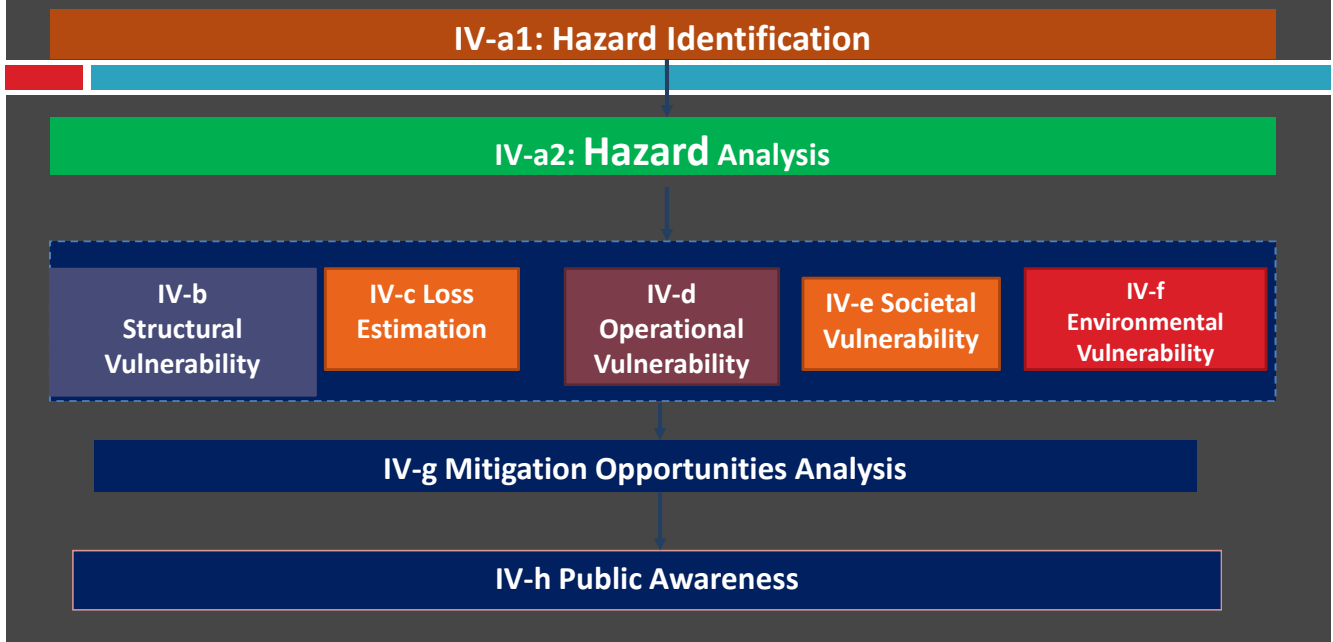
Deliverables: Phase II

<i>Phases</i>	<i>Deliverables</i>
Phase II-a	<ul style="list-style-type: none"> • List of equipment and data required by each of the island. • Approved TOR for data and equipment procurement. • Approved Request for Proposals or Request for Quotations • Approved data quality assurance instruments • Approved data and equipment delivery reports • Report on Module II sub-regional GIS training course
Phase II-b	<ul style="list-style-type: none"> • Report on Module III sub-regional GIS training course • Indexed Spatial & Document Repository WEB-GIS update with compiled pre-processed GIS new data collected for each island

Phase IV – Vulnerability assessment & quantitative risk assessment

[CI, TCI, MNT, ARU, CUR, BON]

Overview of Sub-tasks



IV-a: Preliminary vulnerability assessment [ARU, CUR, BON, TCI, MNT]

Objectives

Hazard Identification: To determine which hazards will be evaluated in vulnerability assessment and establish relative priorities for dealing with hazards.

Hazard Analysis: To identify risk consideration areas and prioritize them.

Phase IV-b: Structural vulnerability (critical buildings, facilities and infrastructure) [ARU, CUR, BON, CI, TCI, MNT]

Objectives

To identify critical facilities and collect data relevant to their vulnerability

To assess their vulnerability to hazard impacts.

Phase IV-c: Loss estimation studies and vulnerability curves [CI]

Objectives

Develop damageability/vulnerability curves to allow the determination of estimated loss for the category at different hazard magnitudes To assess their vulnerability to hazard impacts.

Calculate the expected loss for each scenario, based on the vulnerability to that hazard (as expressed in the vulnerability curves) and the building/infrastructure replacement cost.

Phase IV-d: Operational vulnerability assessment (CI)

Objectives

To define the potential operational impact on each critical facility from each hazard.

To provide operational guidelines (or a Standard Operating Procedures template), easily adaptable by each facility concerned to build operational resilience to hazards.

Phase IVe: Social vulnerability assessment (CI)

Objectives

To identify where high-need neighborhoods are and assess their vulnerability to hazard impacts.

General Activities

Identify areas of special consideration.

Identify special consideration areas that are located in high risk areas.

Conduct a general inventory of special consideration/high risk locations /
Inventory of structures in the special consideration/high risk intersections.

Phase IVf: Environmental vulnerability assessment (CI)

Objectives

- To identify hazardous materials located in the community and assess their vulnerability.
- To assess vulnerability of critical natural resources to secondary hazard impacts.

General Activities

- Identify secondary hazard risk consideration sites and key environmental resource sites.
- Identify intersections of secondary risk sites, environmentally sensitive areas, and natural hazard risk consideration areas.
- Identify key environmental resource locations and their proximity to secondary risk sites.
- Conduct vulnerability analysis on priority critical facilities.
- Provide guidelines for conducting detailed assessments of vulnerability on these environmental resource sites.

Phase IVg: Proposition and estimation of mitigation measures [ARU, CUR, BON, CI, TCI, MNT, BVI]

Objectives

To determine the best opportunities for changes in mitigation policy that will have significant impacts on future hazard vulnerability.

General Activities

Review current national policies that may contribute to the vulnerability and recommend changes

Phase IVh: Technical Review and Public Outreach [ARU, CUR, BON, CI, TCI, MNT, BVI]

Objectives

To share the results with stakeholders, solicit feedback, and update results

Purpose of technical review workshops

- Evaluate the quality of the work provided by the consultant and provide them with necessary feedback
- Provide the stakeholders with a good understanding of the factors affecting their vulnerability, the indices used and the suggested work plan for strengthening their resilience.
- Develop a long term strategy in a view to monitor and update the vulnerability indices.

Deliverables: Phase IV

- Approved final technical reports
- Approved public awareness messages
- DVD of GIS data, maps, photos, and other graphical resources compiled

Phase V - Vulnerability assessment and hazard mapping applications [CI, TCI, MNT, ARU, CUR, BON, STX, SAB]

Objectives

To achieve effective and sustainable use of the project products.

Activities

- Development of products
- Capacity building activities, performed mainly through partnership and training
- Adaptation of products to specific purposes

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Phase V - Vulnerability assessment and hazard mapping applications [CI, TCI, MNT, ARU, CUR, BON, STX, SAB]

V-a Hazard database

- Multi-hazard risk map
- GIS database
- Customized GIS graphic user interface
- Hazard atlas

V-b Disaster management applications

- Use of GIS for hazard mapping and vulnerability assessment
- Use of GIS for contingency and logistical planning and emergency management operations and coordination

V-c Input for early warning systems

- Point map of the components of the national warning system
- Public warning zoning adapted to scenarios

V-d Adaptation of tool and products for decision makers and public awareness

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Phase V - Vulnerability assessment and hazard mapping applications
[CI, TCI, MNT, ARU, CUR, BON, STX, SAB]

<i>Phases</i>	<i>Deliverables</i>
Va	• Database design technical reports with data dictionary
	• Regional training workshop reports
	• User manuals
	• Stakeholders reports
	• Hazard risk maps and atlases
V-b	• Applications technical reports
	• Application user manuals
	• Regional training workshop reports
	• In-country training workshop reports
	• Stakeholder reports

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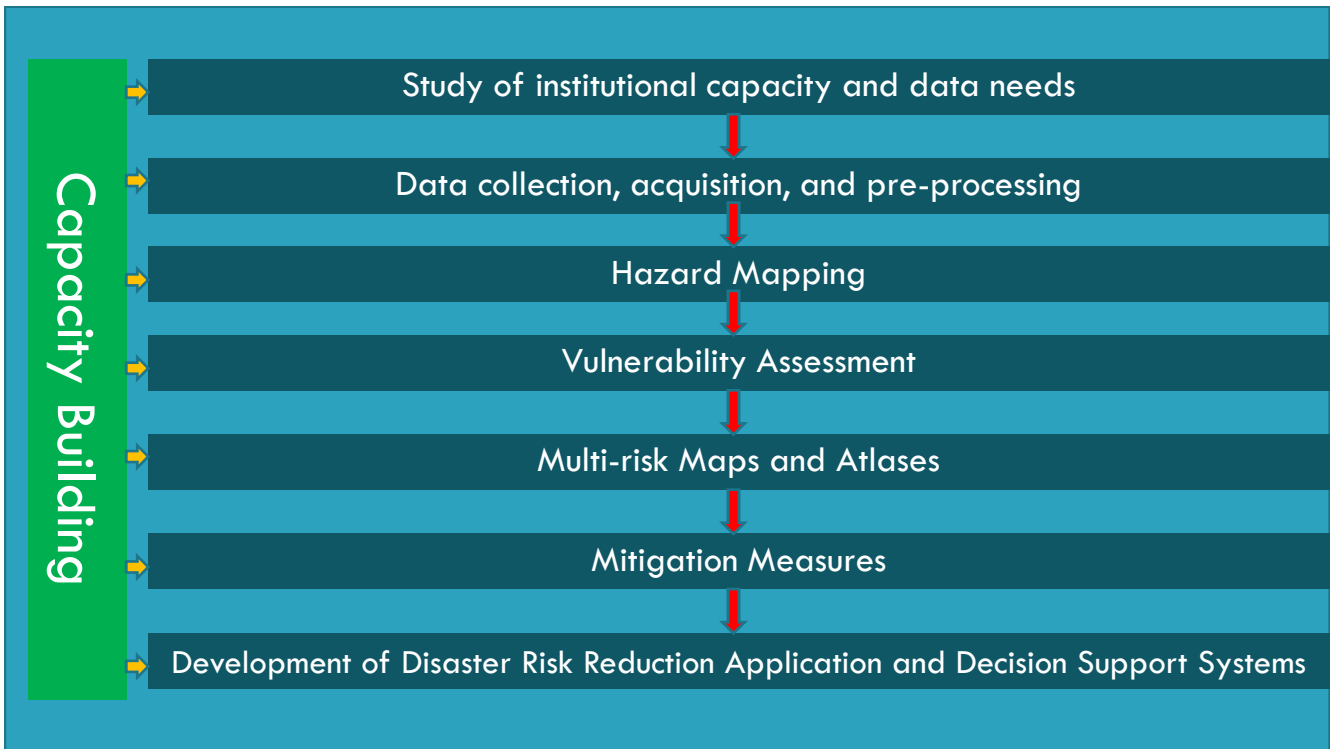
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Phase V - Vulnerability assessment and hazard mapping applications
[CI, TCI, MNT, ARU, CUR, BON, STX, SAB]

<i>Phases</i>	<i>Deliverables</i>
V-c	• GIS-EWS applications technical reports
	• Application user manuals
	• In-country training workshop reports
V-d	• Applications technical reports
	• Application user manuals
	• Stakeholder reports

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Thank you and we look forward to your kind support

