Caribbean Risk Information Program
Caribbean Handbook on Risk Information Management (CHARIM)

CHARIM

What was done?
What are the results?

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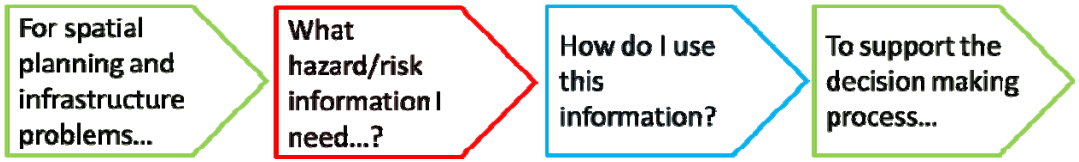
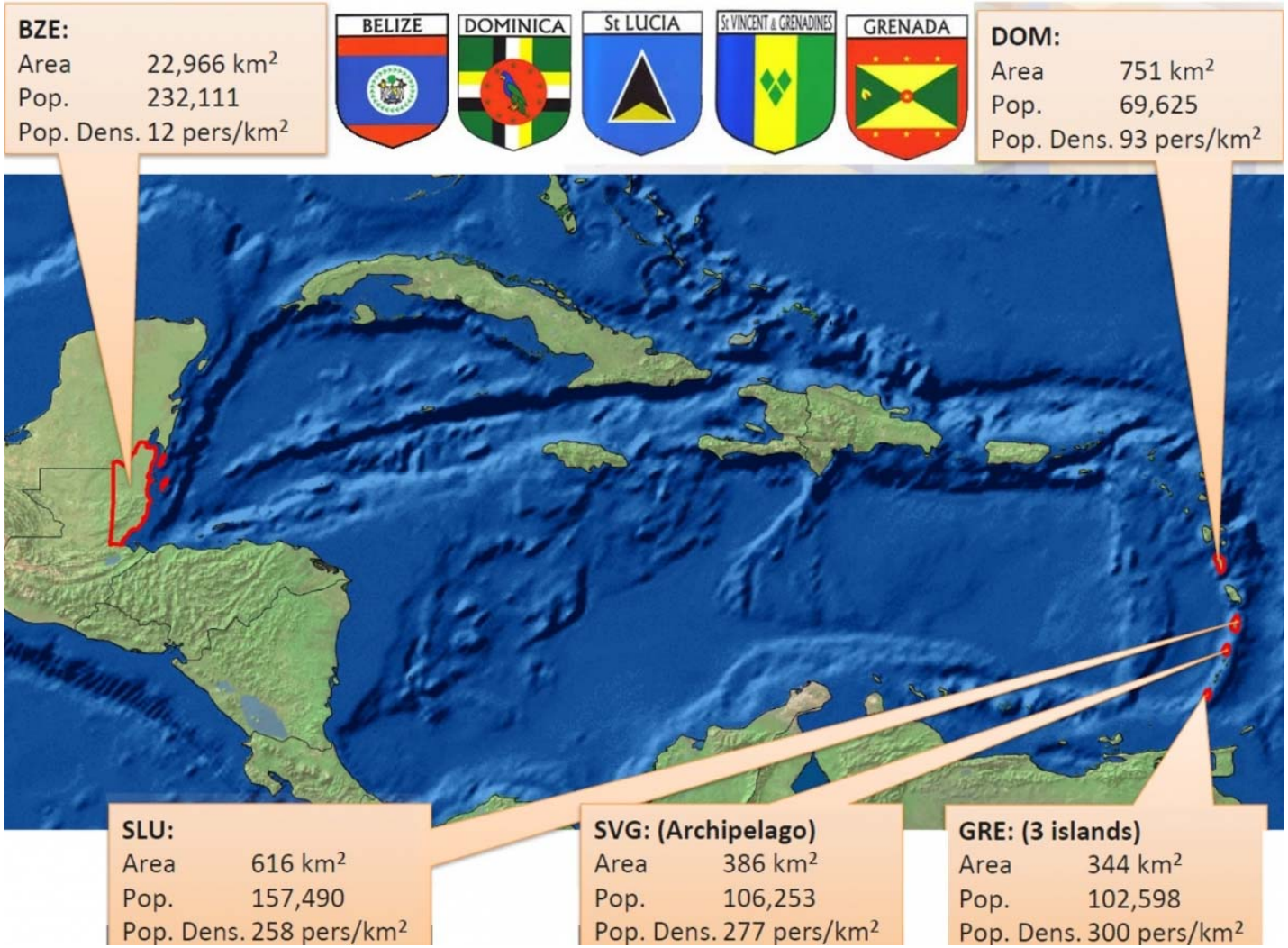
Objective

To support government organizations in the Caribbean region in applying risk information in planning and infrastructure development. This is done by:

- Generating (national scale) landslide and flood hazard maps;
- Development of a handbook with numerous (practical and Caribbean focussed) use cases, with methodological background information and guidance for spatial data management;
- Strengthening geo-data sharing through the geonodes;
- A medium term plan to overcome spatial data gaps and quality.



The target countries



The consortium

- Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, The Netherlands.
- University of the West Indies, Trinidad and Tobago.
- Asian Institute of Technology (AIT), Bangkok, Thailand
- University of Bristol, SSBN, United Kingdom
- Envirosense, Enschede, The Netherlands

Activities done:

- To develop a theoretical framework for landslide and flood hazards and risks assessments, based on the review of existing quantitative and qualitative assessment methods and their appropriate use;
- To develop nine national hazard mapping studies in the five target countries. One in Belize related to floods and two on each island for landslides and floods;

Activities done:

- To develop a number of use cases of the application of hazard and risk information to inform projects and programs of planning and infrastructure sectors.
- To develop an on-line handbook with the use cases on the application of landslide and flood hazard and risk information at its core supported by a methodology book and a data management book;
- Set-up a (temporary?) geonode to share all newly developed and improved (geo-hazard – related) spatial data.

Activities done:

- To organize workshops and trainings to develop the concepts, to provide training and to collaborate on the development of the use cases;
- To contribute to knowledge exchange between the target countries as well as to the regional and international expert community – CDEMA
- To carry out field data collection surveys (with ITC students) and image analysis to collect new data and to improve, update and complement existing data

So what did we do

1. Preliminary assessment report (July 2014)
2. Workshops in the 5 countries (July 2014)
3. Development of Table of Contents
4. Data collection and analysis (June - December 2014)
5. Report on methodologies for hazard mapping (Febr. 2015)
6. Workshop/training in Enschede (March 2015)
7. Finalizing the hazard maps (May 2015)
8. Development of Use Cases (June 2015 – March 2016)

So what did we do

9. Development of the Handbook (Nov. 2015 – April 2016)
10. Development of the geonode (Nov. 2015 – April 2016)
11. Development of 1 super use case (Febr. 2016)
12. The Medium Term Plan (April 2016)
13. Final workshops (April – May 2016)

Kick-off workshops

- May 19-20: Saint Lucia
- May 22-23: Saint Vincent
- May 26-27: Dominica
- May 29-30: Grenada
- June 24-25: Belize.

- Presentations
- Questionnaires
- Discussions
- Field visits

Data collection

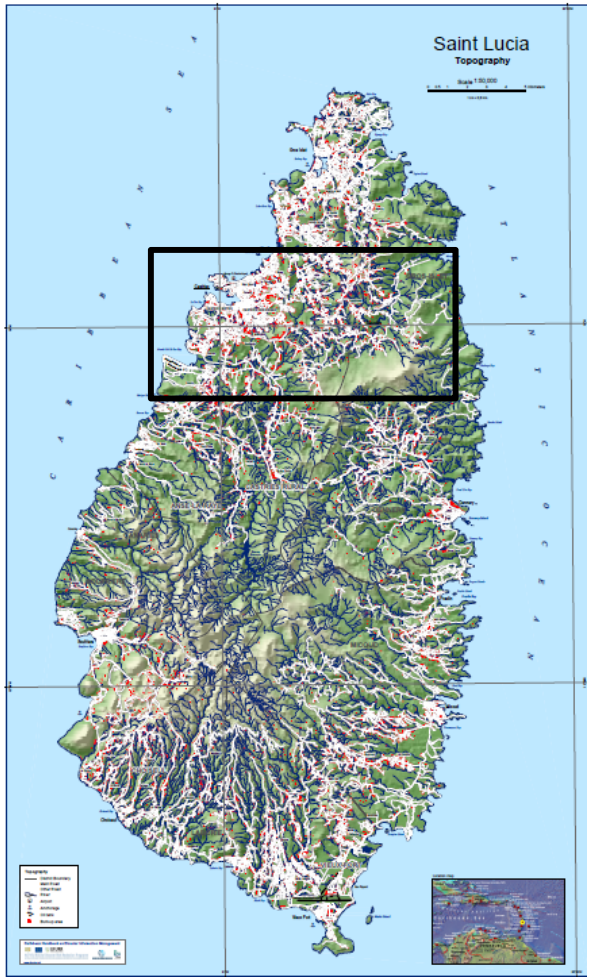
- British Geological Survey:
- Landslide inventory maps & land cover maps for Grenada and Saint Lucia
- Digital Elevation Model for part of Belize.
- MSc students
- Data collection from departments
- Data collection from World Bank
- Data collection from GeoNodes

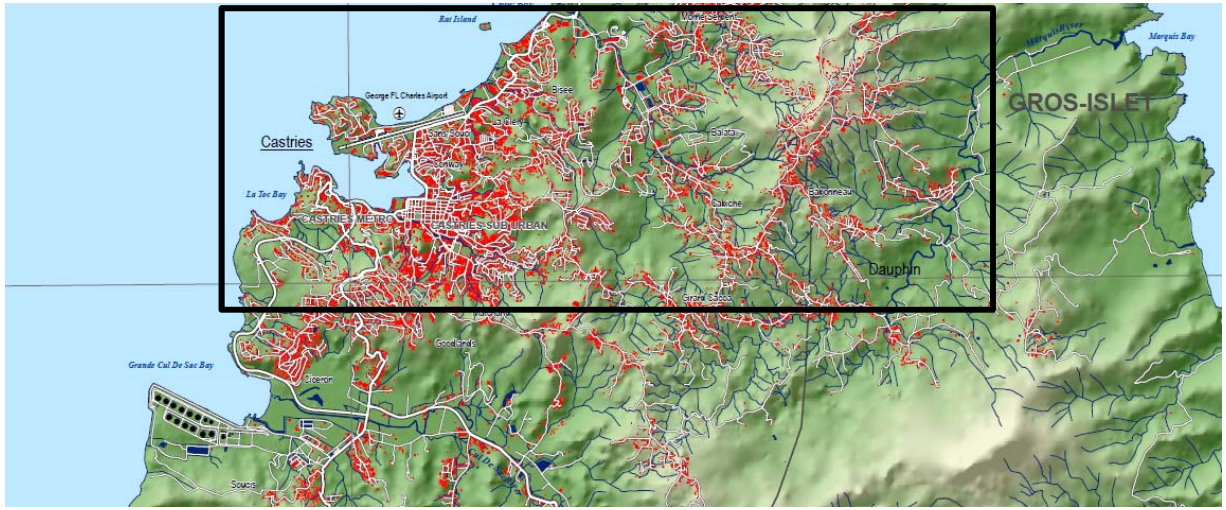
Data collection: MSc students

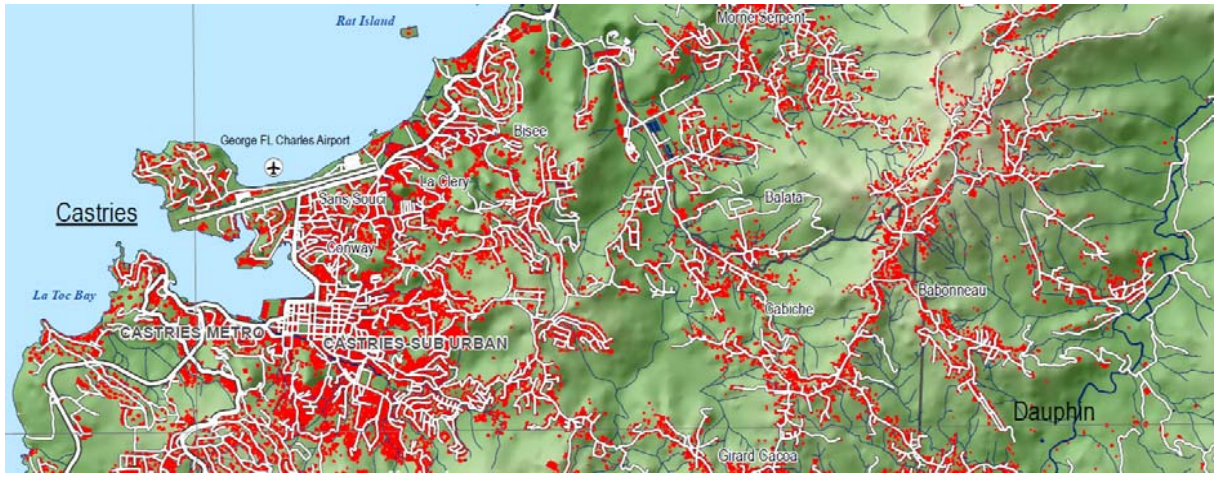
Student	Countries	MSc topic
Diana Patricia Lozano Zafra (Female. Colombia) d.p.lozanozafra@student.utwente.nl	Saint Vincent Dominica	National scale landslide susceptibility and hazard maps for the Caribbean Island of Dominica and Saint Vincent, what can be done with incomplete data?
Andreas Christoffer Lundegaard (Male, Denmark) a.c.lundegaard@student.utwente.nl	Saint Lucia Grenada	Flood hazard assessment and transport network vulnerability on St. Vincent and Grenada
Jovani Yifru Bogale (Male, Ethiopia) jovaniyifrubogale@student.utwente.nl	Saint Lucia Dominica	National Scale Landslide Hazard Assessment Along the Road Corridors of Dominica and St. Lucia
Chishala Mulenga (Male, Zambia) c.mulenga@student.utwente.nl	Saint Vincent Saint Lucia	Influence of weathering on geotechnical properties of road-cut slope mass and embankment fill in Saint Lucia and Saint Vincent
Anne Chinyere Uwakwe (Female, Nigeria) a.c.uwakwe@student.utwente.nl	Saint Lucia	Methodology for the characterization of elements-at-risk for physical vulnerability to natural hazards and exposure analysis in Saint Lucia. Case study: Castries City
Mujeeb Alam (Male, Pakistan) m.alam@student.utwente.nl	Grenada 5 countries	Application of hazard and risk information in spatial planning in Grenada
Xsa Anacio Cabria (Female, Philippines) x.a.cabria@student.utwente.nl	Saint Vincent Dominica	Weathering and its contribution to rock falls in the pyroclastic rock masses along coastal road cuts in Dominica and Saint Vincent
Rahmat Aris Rratomo (Male, Indonesia) r.a.pratomo@student.utwente.nl	Grenada	Response of Flash Flood Behaviour to Hazard Reduction in a Small Island: a Case Study in Grenada

Data collected/improved for St Lucia

Topographic map (1:50.000)

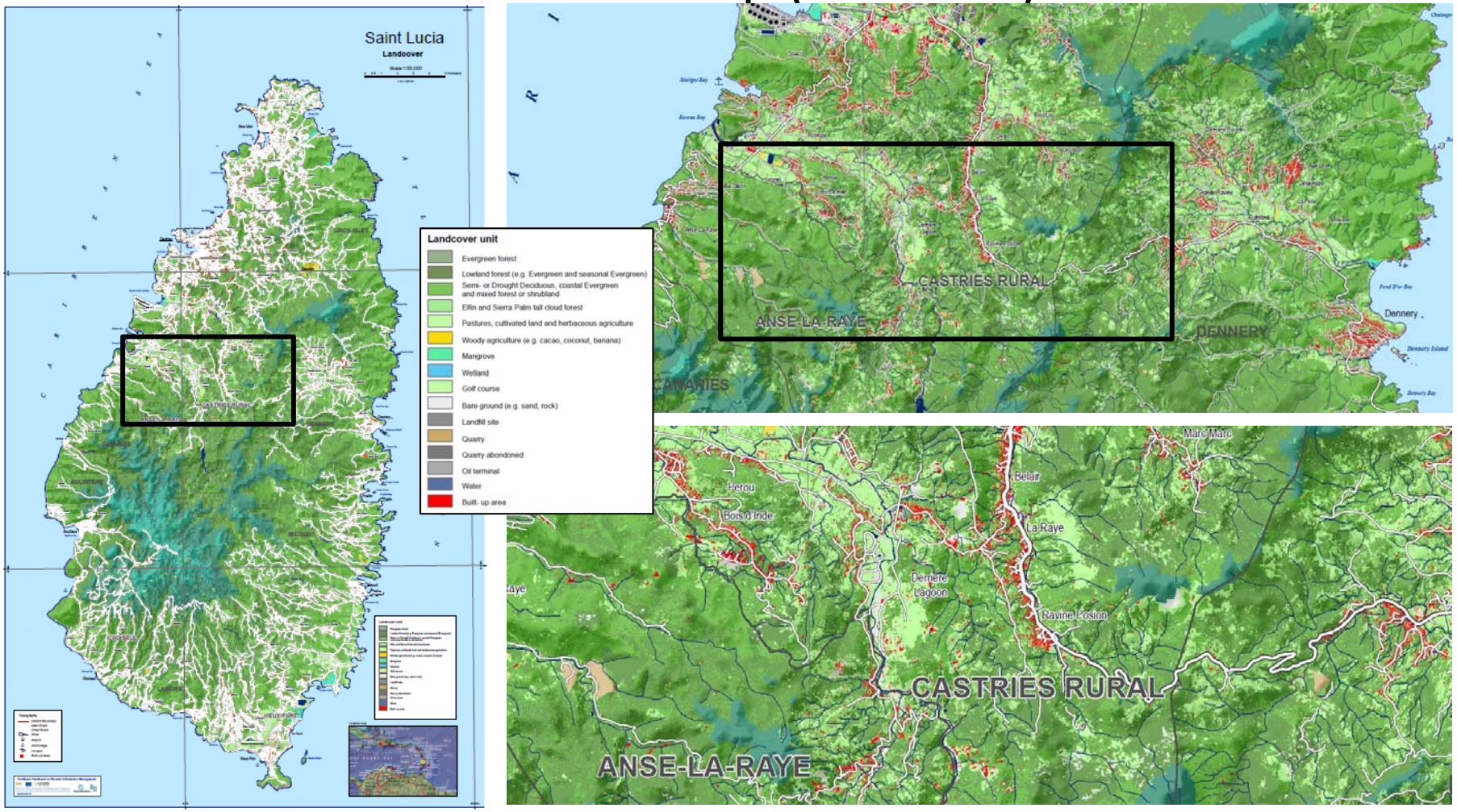






Data collected/improved for St Lucia

Land Cover map (1:50.000)

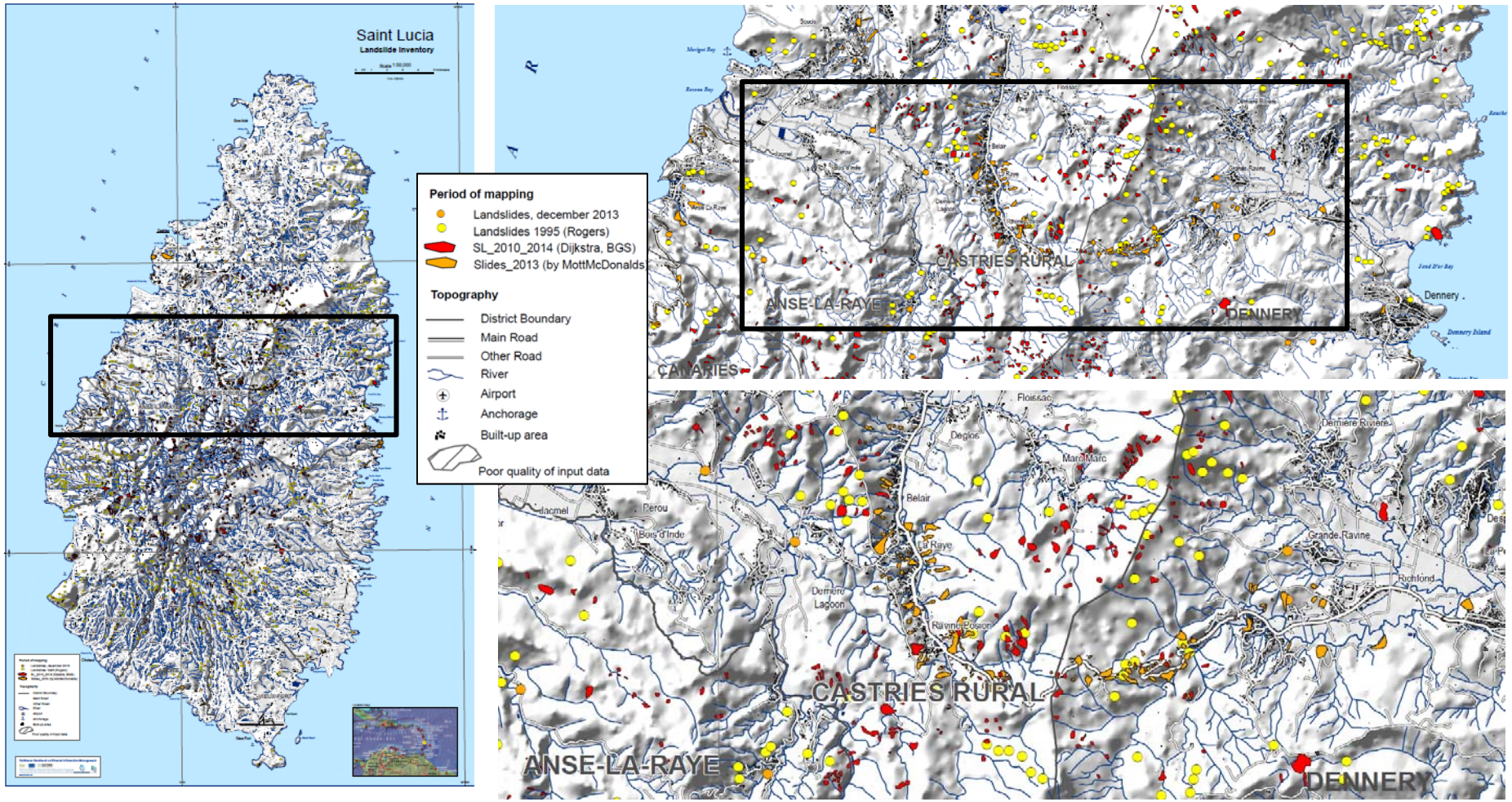


Workshop Caribbean Handbook on Risk Information Management

ACP-EU Natural Disaster Risk Reduction Program
An initiative of the African, Caribbean and Pacific Group, funded by the European Union and managed by GFDRR

Data collected/improved for St Lucia

Landslide inventory map (1:50.000)



Workshop Caribbean Handbook on Risk Information Management

ACP-EU Natural Disaster Risk Reduction Program

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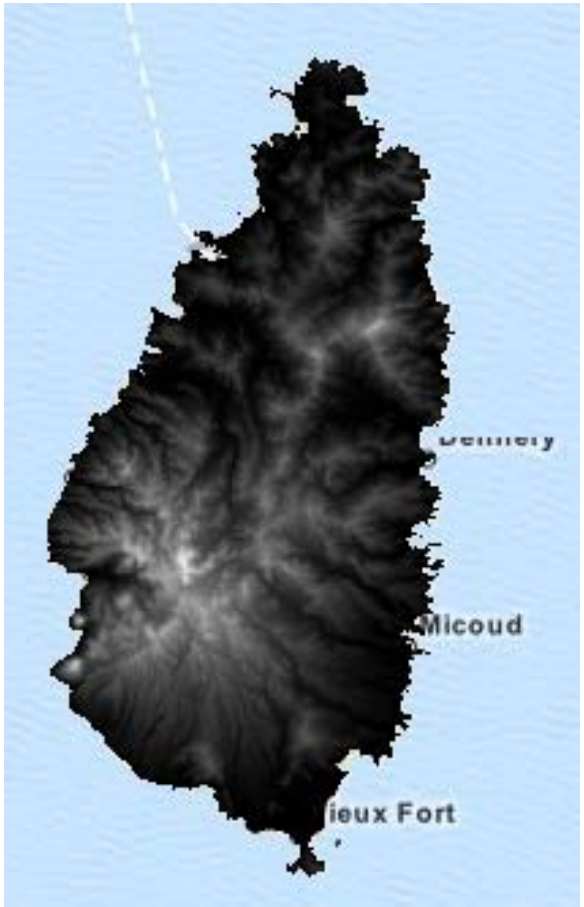
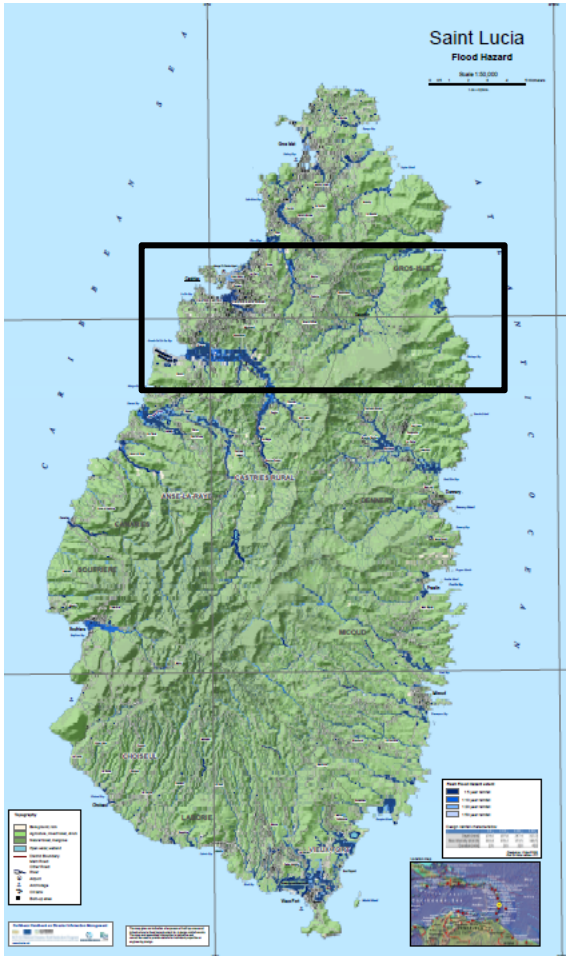
Data collected/improved for St. Lucia

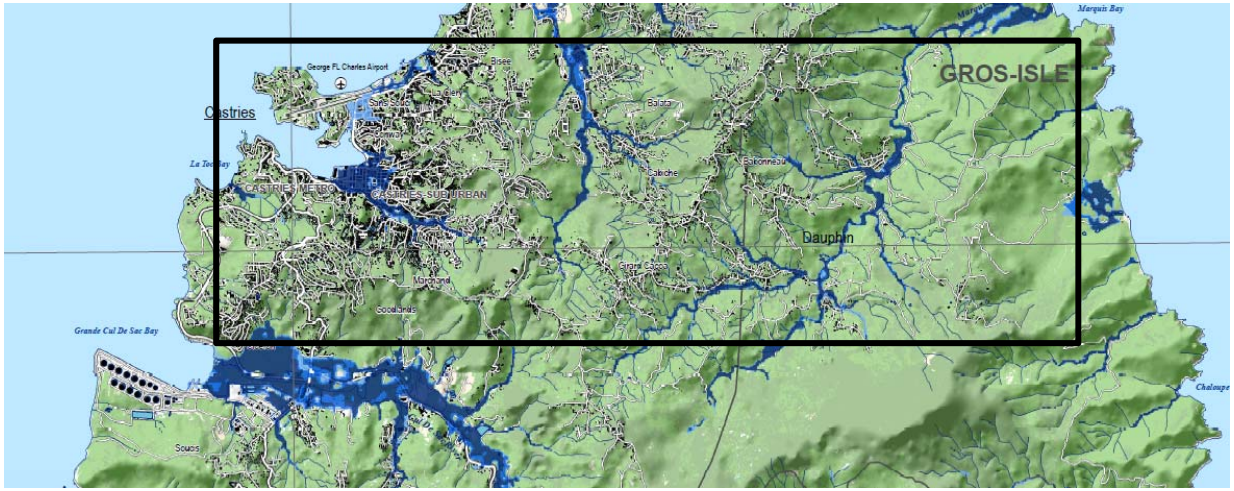
Hydrologically improved Digital Elevation Model (20m)

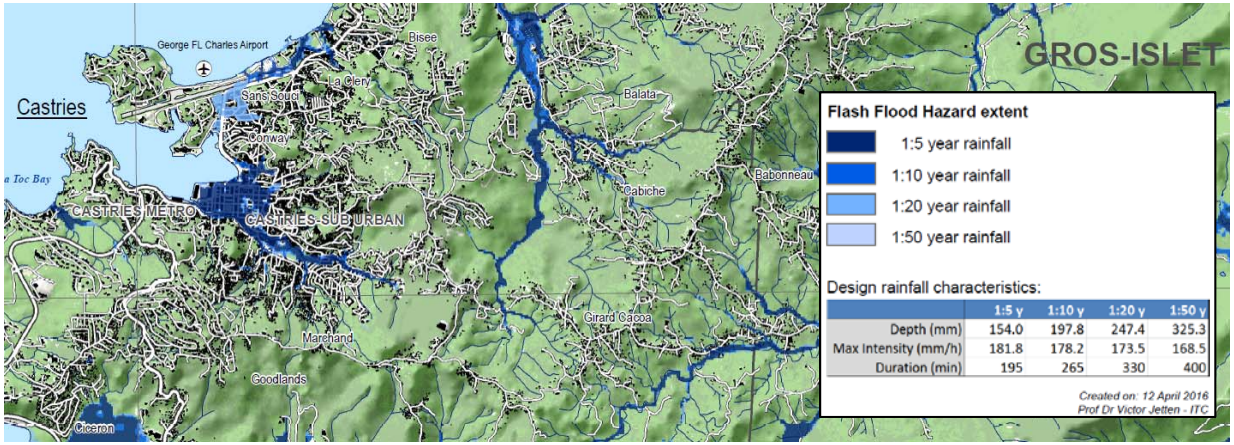


Results produced

National scale flood hazard map (1:50.000)



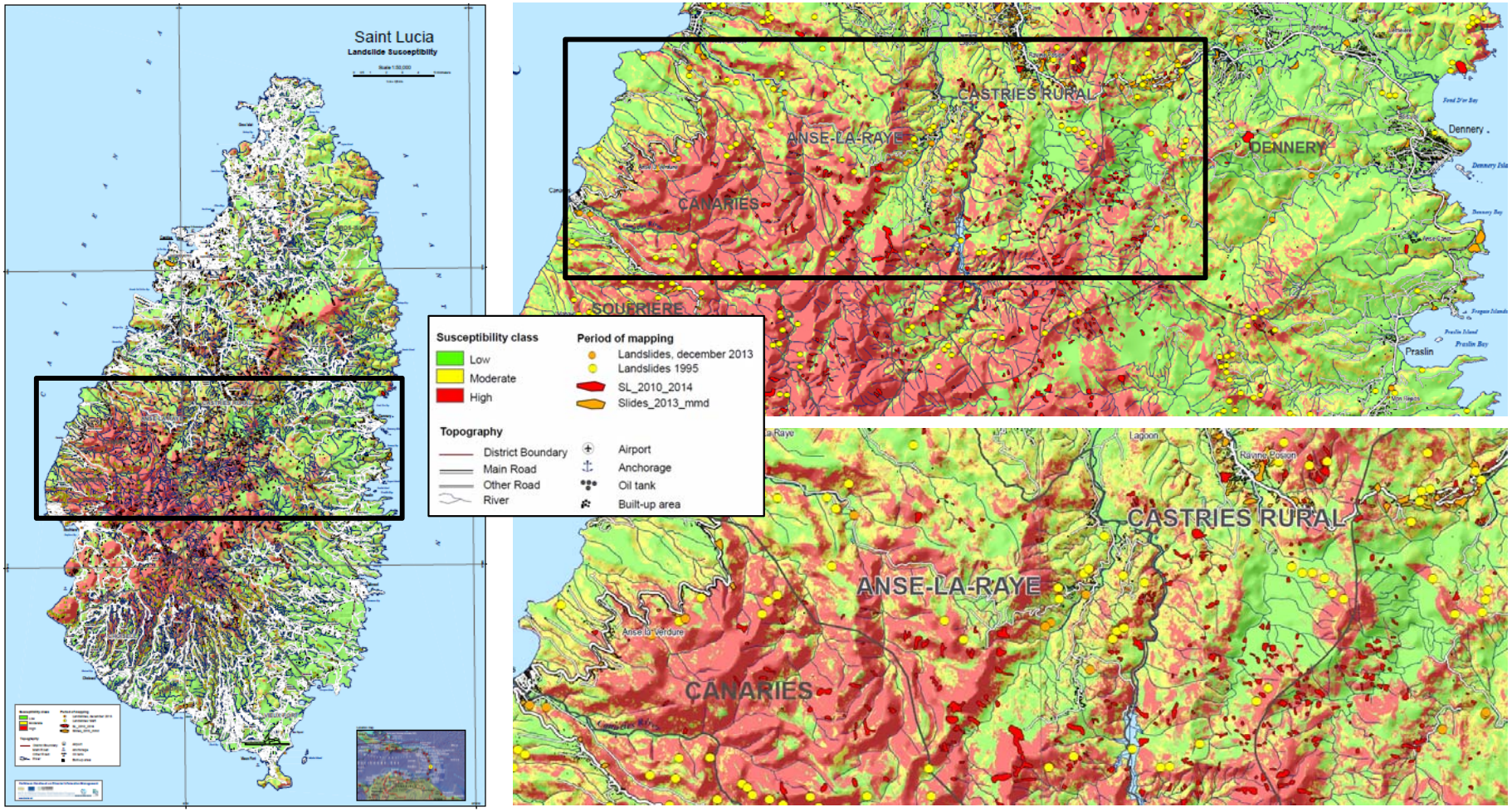




	1:5 y	1:10 y	1:20 y	1:50 y
Depth (mm)	154.0	197.8	247.4	325.3
Max Intensity (mm/h)	181.8	178.2	173.5	168.5
Duration (min)	195	265	330	400

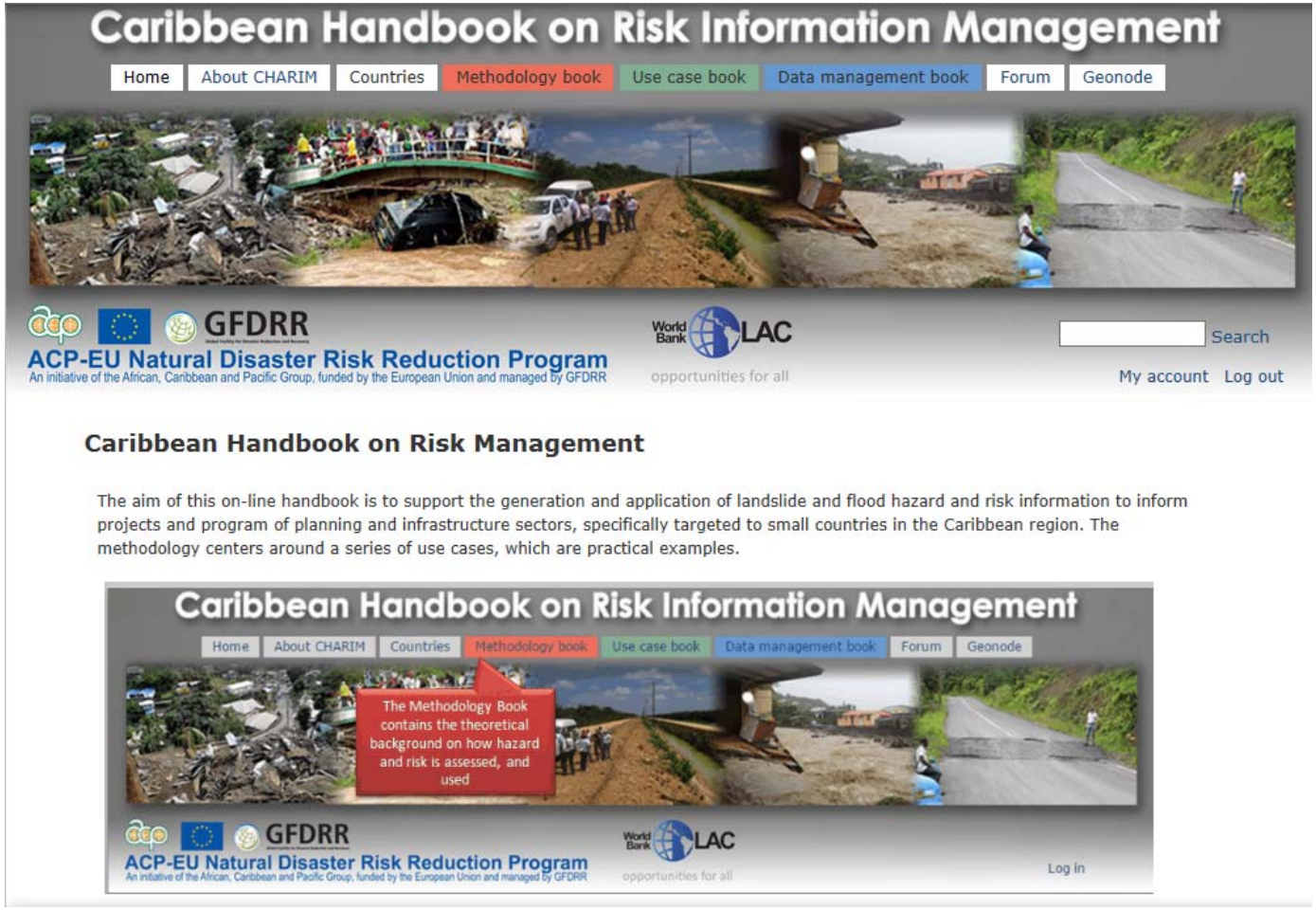
Results produced

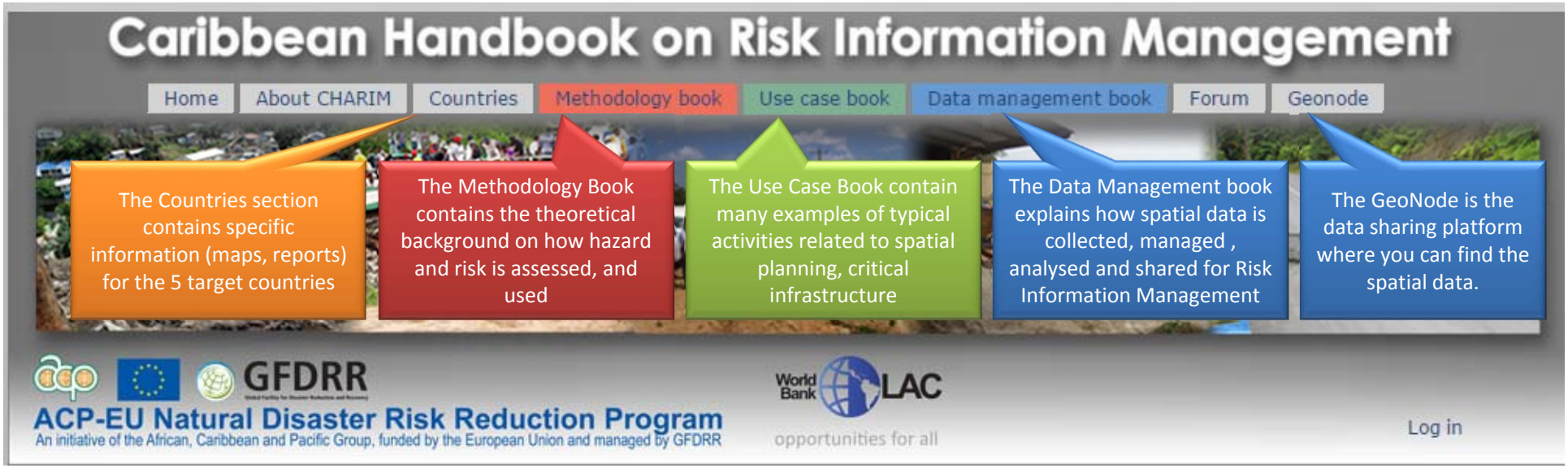
National scale landslide susceptibility map (1:50.000)

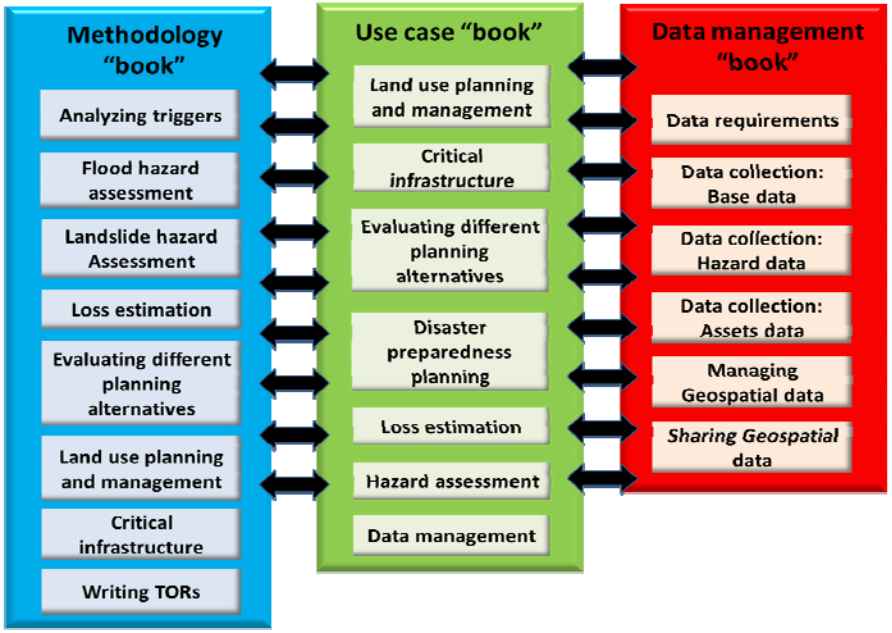


The On-Line Handbook

www.charim.net




Caribbean Handbook on Risk Information Management
Home
About CHARIM
Countries
Methodology book
Use case book
Data management book
Forum
Geonode
The Countries section contains specific information (maps, reports) for the 5 target countries
The Methodology Book contains the theoretical background on how hazard and risk is assessed, and used
The Use Case Book contain many examples of typical activities related to spatial planning, critical infrastructure
The Data Management book explains how spatial data is collected, managed , analysed and shared for Risk Information Management
The GeoNode is the data sharing platform where you can find the spatial data.
GFDRR
ACP-EU Natural Disaster Risk Reduction Program
An initiative of the African, Caribbean and Pacific Group, funded by the European Union and managed by GFDRR
World Bank LAC
opportunities for all
Log in


Methodology "book"
Analyzing triggers
Flood hazard assessment
Landslide hazard Assessment
Loss estimation
Evaluating different planning alternatives
Land use planning and management
Critical infrastructure
Writing TORs
Use case "book"
Land use planning and management
Critical infrastructure
Evaluating different planning alternatives
Disaster preparedness planning
Loss estimation
Hazard assessment
Data management
Data management "book"
Data requirements
Data collection: Base data
Data collection: Hazard data
Data collection: Assets data
Managing Geospatial data
Sharing Geospatial data

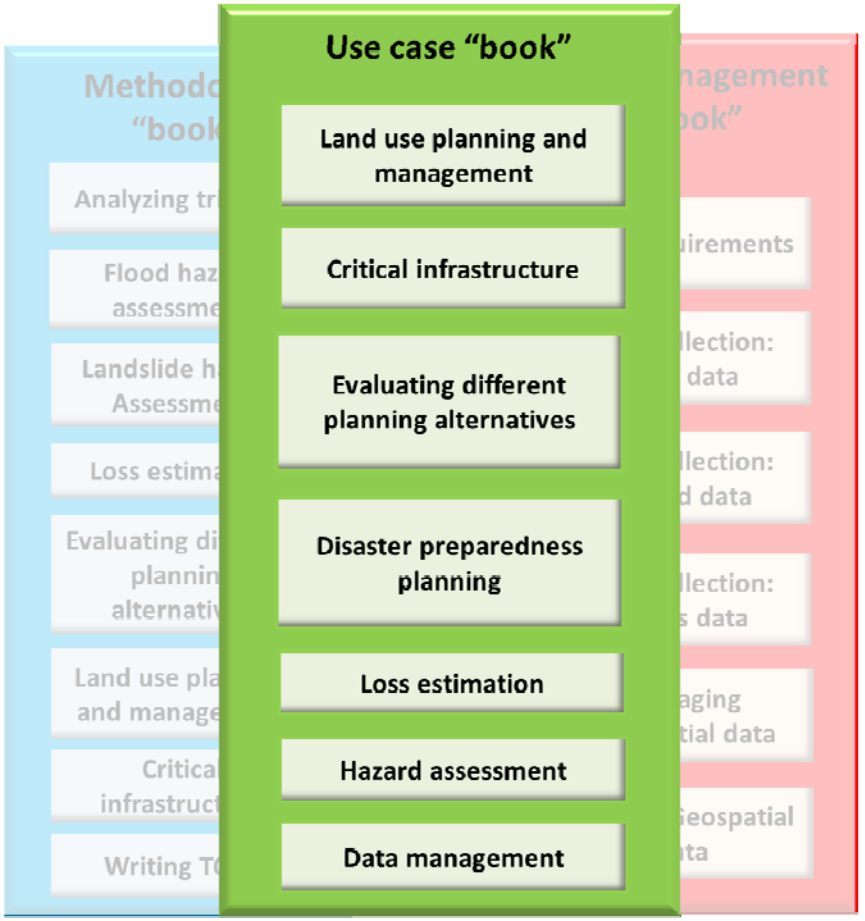
The Use Case Book

How to solve specific problems

Serves to illustrate the steps required to use the hazard and risk information in so-called use cases

Application for planning of infrastructure, planning of risk reduction measures, emergency preparedness and emergency response.

Consist of a conceptual framework and a practical example while some additionally contain actual step-by-step exercises which also contain data, and can be carried out with Open source GIS software.



The Use Case Book

Approximately 48 use cases on-line

1. INTRODUCTION
1.1 Objectives of this book
1.3 How to use this book

2. LAND USE PLANNING
2.1 National land use plan
2.2 Local land use planning
2.3 Building construction
2.4 Relocation planning
2.5 Building control
2.6 Land subdivision process

3A. CRITICAL INFRASTRUCTURE
3.1 Planning (re)location
3.1.1 Buildings
3.1.2 Roads
3.1.3 Other critical infrastructure
3.2 Design guidelines
3.2.1 Buildings
3.2.2 Roads in flood areas
3.2.3 Roads in landslide areas

3B. CRITICAL INFRASTRUCTURE
3.3 Structural measures
3.3.1 Buildings & landslides
3.3.2 Buildings & floods
3.3.3 Roads & landslides
3.3.4 Roads & floods
3.3.5 Other critical infrastructure
3.4 Non-structural measures
3.4.1 Watershed management
3.4.2 Multi-functional use of space

4. PLANNING ALTERNATIVES
4.1 Introduction
4.2 Analyze current risk
4.3 Planning alternatives
4.4 Future scenarios
4.5 Alternatives & scenarios
4.6 Decision Support System

5. PREPAREDNESS PLANNING
5.1 Flood Early Warning
5.2 Shelter planning

6. RISK ASSESSMENT
6.1 National multi-hazard exposure analysis
6.2 National flood exposure analysis
6.3 Local coastal flood risk assessment
6.4 Local flashflood risk assessment

7. EXPOSURE AND VULNERABILITY
7.1 National vulnerability assessment
7.2 Generating physical vulnerability curves
7.3 Using land use maps
7.4 Mapping buildings from satellite images
7.5 Census data for elements-at-risk
7.6 Local level elements-at-risk mapping

8. HAZARD ASSESSMENT
8.1 Analysing historical data of hazard events
8.2 Analysing rainfall
8.3 National scale landslide susceptibility
8.4 National landslide susceptibility for roads
8.5 National scale multi-hazard map
8.6 National flood hazard assessment
8.7 National flash flood hazard assessment

9. DATA MANAGEMENT
9.1 Homogenize data
9.2 Digital Elevation Models
9.3 Landslide mapping
9.4 Damage from images
9.5 Hazard & loss database
9.6 Data sharing

The Methodology Book

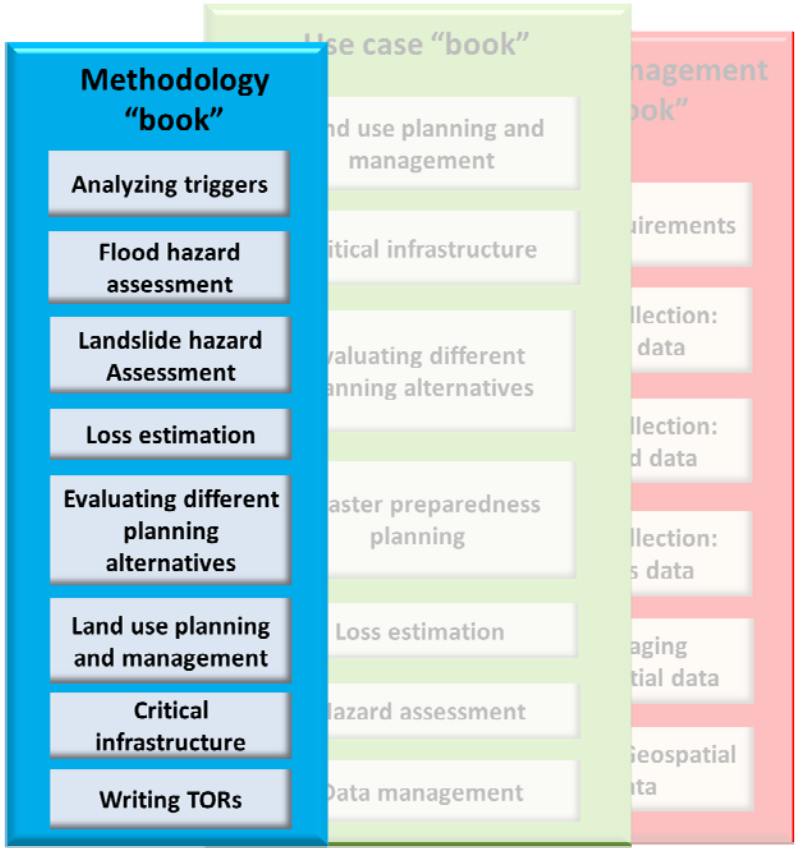
Methods used in hazard and risk assessment

Focuses on the methods for generating hazard and risk information

Applications on landslide and flood hazard and risk information

Different scales (nationwide, local and for detailed areas)

Considering different situations of data availability.



Methodology Book

Approximately 37 chapters on-line

1 INTRODUCTION
1.1 Objectives of this book
1.2 How to use this book

2 ANALYSING HAZARDS
2.1 Introduction to hazards
2.2 Historical events
2.3 Rainfall analysis

3 FLOOD HAZARDS
3.1 Introduction
3.2 Scales of analysis
3.3 Flash flood modelling
3.4 Fluvial flood modelling

4 LANDSLIDE HAZARDS
4.1 Introduction
4.2 Scales of Analysis
4.3 Landslide susceptibility at the national scale
4.4 Landslide hazard at local and site investigation scale

5 RISK ASSESSMENT
5.1 Introduction
5.2 Characterization of assets
5.3 Vulnerability
5.4 Multi-hazards risk
5.5 Risk assessment methods

6 RISK REDUCTION PLANNING
6.1 Introduction
6.2 Evaluation of risk
6.3 Cost-benefit analysis
6.4 Spatial Multi-Criteria Evaluation

7 LAND USE PLANNING
7.1 Spatial planning
7.2 Comparing legislation and planning frameworks
7.3 Building control
7.4 Conclusions

8 CRITICAL INFRASTRUCTURE
8.1 Introduction
8.2 (re)location planning
8.3 Hazards & infrastructure
8.4 Structural measures
8.5 Non-structural measures

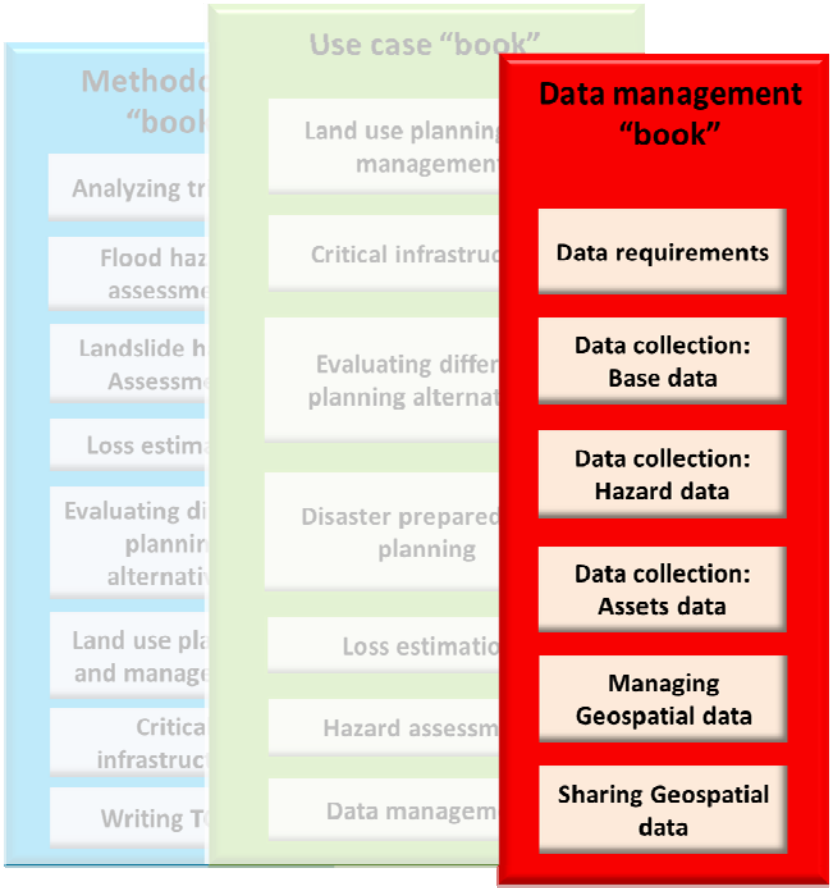
9 PREPAREDNESS PLANNING
9.1 Introduction
9.2 Early Warning Systems
9.3 Shelter planning

10 REQUIREMENTS FOR TORS
10.1 Introduction
10.2 Composition of a TOR
10.3 Hazard & risk info

Data Management Book

Spatial data for hazard and risk assessment

Describes data requirements for landslide and flood hazard and risk assessment;
Suggests methods for data collection and sources of spatial data;
Deals with data quality and meta-data, data sharing, limitations of data and data management.



ACP-EU Natural Disaster Risk Reduction Program
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Data Management Book

Approximately 34 chapters on-line

1 INTRODUCTION
- 1.1 Objectives of this book
- 1.2 How to use this book

2 DATA REQUIREMENTS
- 2.1 Introduction
- 2.2 Flood data
- 2.3 Landslide data
- 2.4 Risk data

3 BASE DATA COLLECTION
- 3.1 Introduction
- 3.2 Digital Elevation Models
- 3.3 Satellite data
- 3.4 Land cover maps
- 3.5 Geological maps
- 3.6 Soil maps

4 HAZARD RELATED DATA
- 4.1 Hydro Met data
- 4.2 Disaster databases
- 4.3 Landslide inventories
- 4.4 Flood specific information

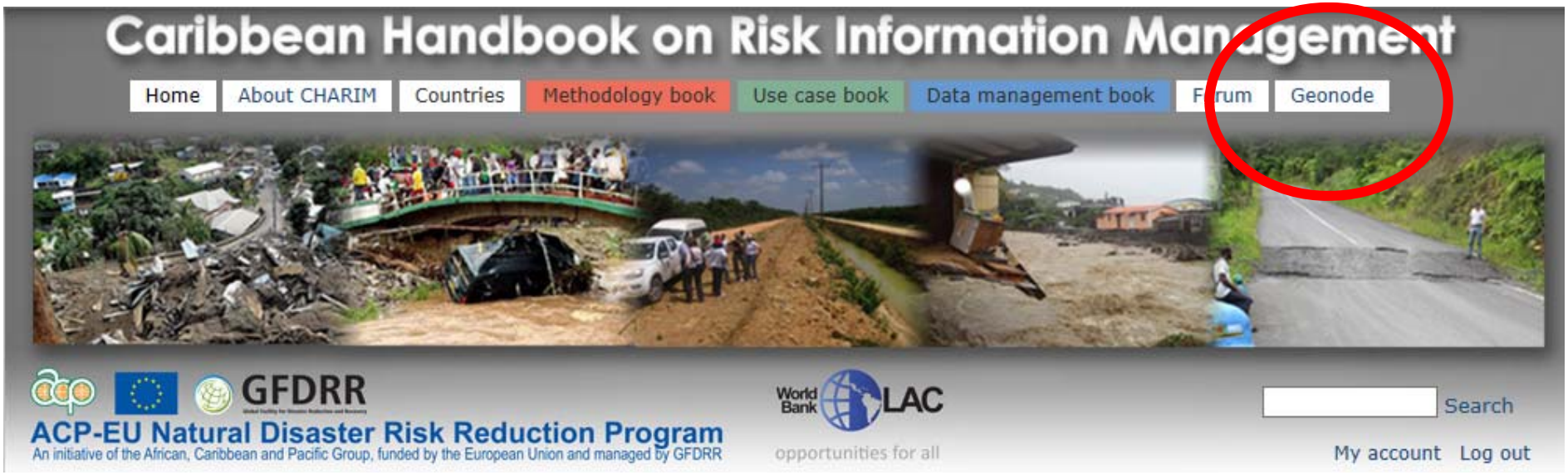
5 ELEMENTS-AT-RISK DATA
- 5.1 Introduction
- 5.2 Building footprint maps
- 5.3 Population data
- 5.4 Road maps
- 5.5 Other critical infrastructure data

6 MANAGING GEOSPATIAL DATA
- 6.1 Introduction
- 6.2 Data projections
- 6.3 Data homogenization
- 6.4 Accuracy and precision
- 6.5 Metadata requirements
- 6.6 Data formats
- 6.7 Data analysis tools

7 SHARING GEOSPATIAL DATA
- 7.1 Introduction
- 7.2 Collaboration framework
- 7.3 Open data policies
- 7.4 Data standards
- 7.5 Technical tool: GeoNode
- 7.6 Other tools

CHARIM Geonode

http://charim-geonode.net



Geonode website

Characteristics

- 1 Geonode for the 5 countries
- Externally hosted on a dedicated geo-server
- 160 data layers and 28 maps from the 5 countries

St. Lucia:

- 29 data layers,
- 7 maps,
- 6 documents