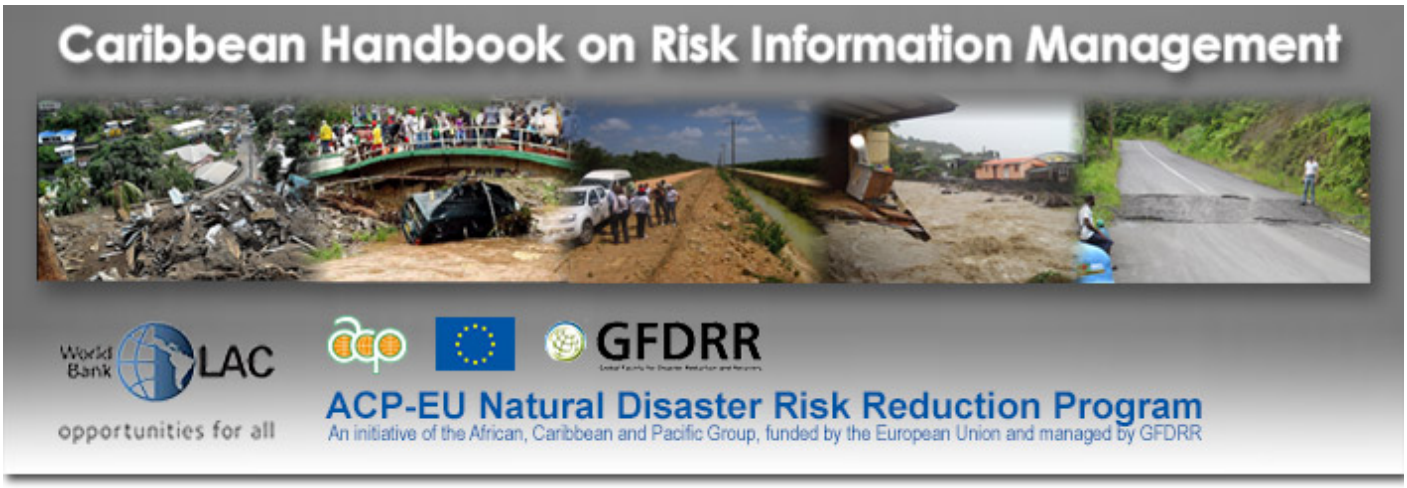
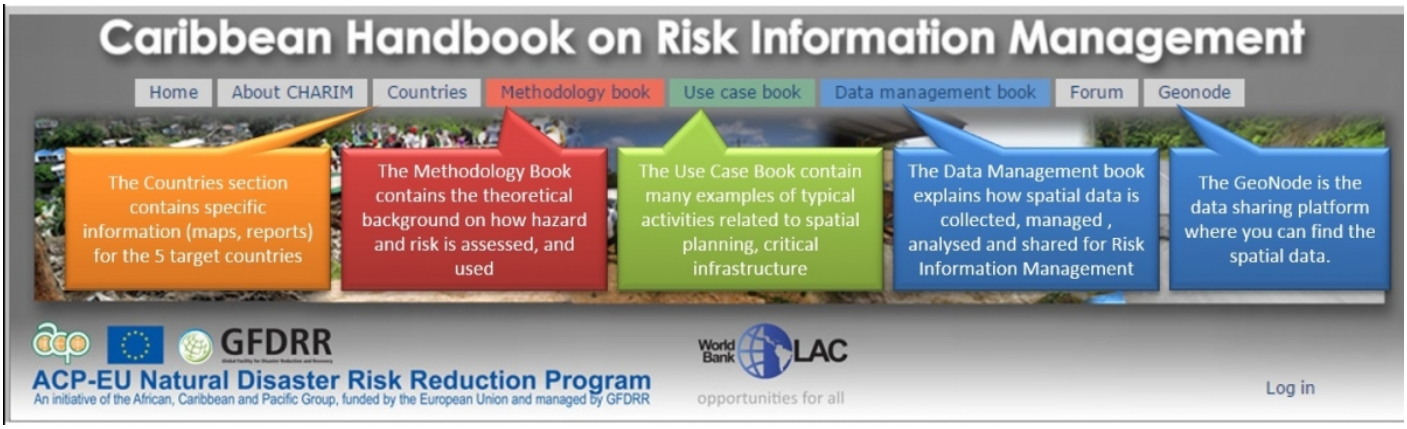


1.1 Objectives of this book

The Data Management Book is one opf the components of the Caribbean Handbook for Risk Information Management (CHARIM), together with the Use Case Book, the Methodology book, the Country information and the CHARIM GeoNode. The Use Case Book is the central component and contains a number of example applications of tasks of spatial planners, Engineers and Geo-Information specialist within the Caribbean countries that requires natural hazard and risk information. This book addresses the various issues related to geospatial data. Data required for flood and landslide hazards from national level to local scale are discussed.



Main Intended Users

The main intended users are **Spatial Analysts from different government organizations**. There are relatively few experts on collecting and managing spatial data in the target countries. They need to work on the development of a geospatial framework, addressing data availability, challenges in use and interoperability, current use and collaborations, gaps and areas of improvements and the status of the national GeoNode. Whereas they are the main target users for the Data Management book, also they need to know how landslide and flood susceptibility, hazard and risk maps are made and what the data requirement are.

Other intended users are:

Engineers from the Public Works Departments

> They require flood and landslide information to better identify the most vulnerable sections of the road network, plan for road clearance after the occurrence of triggering events, to plan remedial measures for impacted road sectors, and for planning new roads, and alternative routes. They would require digital information on the road network in the form of a road database, which stores information for each segment of the road network. These

segments should be based on the specific characteristics of the road and the terrain through which the road passes.

Planners from the Physical Planning Departments

They need landslide information to better include unsuitable areas for development in national and local level land use plans. They also need to include this information in the building permit issuing and in land subdivision process. They need landslide and flood susceptibility maps for national scale planning, or hazard maps for the larger scales. These should be integrated with other natural hazard maps in a multi-hazard restriction map that should have a legal status and serves as base data for planning. After a landslide event has taken place, they need to know the characteristics of the affected area, in order to develop reconstruction plans.

Staff of the National Emergency Management Organisations (NEMO) / Office of Disaster Management (ODM)

It is very important for the disaster response organisations to learn from past events, in order to better prepare for future ones. A good knowledge on the location of historical floods and landslides, and the characteristics related to blockage of roads, destruction of buildings, electricity networks, telecommunication facilities, and the number and type of casualties is very important. Specific emphasis should be given to hazard assessment of the shelters, and other critical facilities, and to shelter planning. Also Early Warning is an important issue. This requires good spatial information. As the NEMO's/ODM's are also playing the role of first responders (911 centers) they receive a lot of direct information on hazardous events

Staff from Forestry Department

Floods and landslides may impact forests substantially, and for forest management it is important to take into these into account, and how vegetation regrowth takes place in areas affected. It is also very important to rapidly map affected forested areas after a major triggering event, as the debrisflows and flashfloods that may follow from these events can have a large impact on downstream areas. From previous events, such as hurricane Tomas in Saint Lucia, we have also learned the importance to monitor the areas affected by landslides and floods during a large triggering event, as they may slowly recover, but could be reactivated if a new event occurs (e.g. the Christmas eve trough in 2013).

Water Resources department

For watershed management purposes it is very important to know the location of historical landslides, and to estimate the discharge, amount of sediments, and treetrunks that may be transported through the drainage channel in case of strong rainfall events. Similar data requirements as indicated for the forestry department can be outlined for the water resources department, although the interaction of landslides with the drainage network (e.g. in terms of sediment delivery but also in terms of potential blocking sites) is of large importance.

Overview of content

Chapter 2 focuses on the base data required for the flood and landslide hazard and risk assessment . For flood hazard assessment the LISEM model is used, which use input data directly to determine the hydrological processes that it simulates. LISEM requires five basic data layers, namely, rainfall, Digital Elevation Model (DEM), soil, landuse/cover, and infrastructure. Sources of all these input data, their characteristics, and the methods for generating each of them have been explained in this chapter. This chapter also provides an overview of the data requirements for landslide hazard and risk assessment at national scale (1:50,000), local scale (1:10,000) and site investigation scale (1:1,000) for the Caribbean island countries. Three main data types, namely landslide inventory, environmental factors, and triggering factors are discussed in details in terms of their frequency of updating, source, scale, and their usefulness to different types of landslide models.

Chapter 3 lists the base data collection, which includes Digital Elevation Model (DEM), land cover, geology, and soil. DEM is the most fundamental data required for flood hazard and risk assessment and its quality and accuracy affects the subsequent analysis. Various sources of the DEM such as topographic maps, aerial photographs, satellite images (optical and Radar), and LiDAR have been explained. Satellite images now-a-days are an important source of data for hazard monitoring and post disaster damage mapping. An introduction to various types of satellite data has been given. Landcover maps are important for hazard and risk assessment at various scales (national, local and site investigation level). Satellite images are the one of the most important source of updated landcover maps and in this chapter various landcover mapping efforts in the Caribbean region during the recent years have been discussed. Geological maps are important for the landslide hazard assessment, which are usually available at a coarse scale. The available geological maps in the Caribbean region and their qualities have been discussed in this chapter. Soil maps are important for hazard and risk analysis. An introduction to soil and soil mapping is given in this chapter along with examples of soil maps

available in the Caribbean region. Hydrological and geotechnical parameters of soils are important for floods and landslides and this chapter highlights the all important soil properties relevant to floods and landslides.

Chapter 4 describes the collection of hazard related data such as hydro-met data, disaster databases, landslide inventory, and flood specific information. Hydro-met data are the most basic data for flood and landslide hazard analysis. The characteristics of the available hydro-met data in the region are discussed. The available disaster databases such as EM-DAT and DesInventar are discussed in this chapter along with their applications. Landslide inventory data is essential for estimating the frequency of landslides. Methods for landslide inventory mapping have been described in this chapter. Flood specific information such as historical river discharges and floods are very important for hydrological modeling, while river cross-sections, surface roughness etc. are important for hydraulic modelling. In this chapter all such data and information necessary for flood modelling (hydrological and hydraulic modeling) are explained.

Chapter 5 focuses on elements-at-risk such building, assets, population and infrastructures (roads, water/sewage, hospitals and schools). The first Chapter focuses on generation of building footprints from high-resolution satellite images or air-photos, as well as other sources such as LiDAR. Attribute information of buildings is required to collect as per hazards and this chapter provides a comprehensive list of building characteristics. High resolution and spatially accurate data on population distribution are very important for population risk assessment. This chapter describes available spatially distributed population data such as Gridded Rural-Urban Mapping Project (GRUMP), LandScan, and WorldPop. Accessibility to disaster-affected areas through roads is a very important from disaster management point of view. At the time of a disaster, accessibility plays a critical role in evacuation, rescue and relief activities and this chapter also provide an overview of information required on roads at the time of disaster, particularly those being used by the UN's logistics cluster. Information on water and sanitation is quite critical and this chapter provides an overview of water tanks, pipes, sewage system, wastewater treatment etc. Dealing with mass injuries and casualties at the time of a disaster, represents a formidable challenge and the data to be gathered include information on the residual capacity of existing health facilities, and the hour-by-hour monitoring of the availability (beds, supplies, services and so on) of additional medical care services. In this chapter the availability of such information from various sources are described. Among other public facilities, schools with inadequacies in structure and lack of preparedness measures can have disastrous consequences in the event of a catastrophic disaster event. This chapter also take stock of the data and information to be collected for better disaster management point of view.

Chapter 6 discusses about the management of the geospatial data. The chapter covers data projections, data homogenization, data accuracy and precision, metadata requirements, data formats, and data analysis tools. The map projection system varies from country to country in the Caribbean region and this chapter describes the basics of map projections, datum, etc. and provides some guidelines for adopting a suitable projection system for analysing and storing the available spatial data. Data homogenization among the various countries is also one of the very challenging tasks and this chapter will also provides some guideline in this regard. For any analysis, data accuracy and precision is very important and chapter 6 describes the positional accuracy, temporal accuracy, thematic accuracy, and completeness of data. It is often found that metadata is missing from the data and the metadata standards are explained in this chapter, including the core metadata elements. Data formats plays an important role in their applicability and the raster and the vector data formats, which are most common formats for the spatial data are described in this chapter. An effective disaster management requires geospatial data from a variety of sources and the data need to be gathered, organized, analysed, and visualised to provide useful and accurate information. In this chapter an overview of some geospatial data analysis tools is given along with comparison of available commercial and open-source geospatial data analysis software.

Chapter 7 provides an overview of sharing the geo-spatial data, covering framework for institutional collaboration, open data policies/data ownership, data standards, data sharing platforms, and tools for specific applications. For institutional framework, the National spatial data infrastructure (NSDI) has been explained in details which consists of 1) stakeholders from organizations and agencies and coordination among them, 2) a supportive environment for the sharing and utilization of geospatial data, 3) technology and infrastructure, and 4) human resources involving academic, experts and entities. The status of NSDI in Belize, Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines has been explained in this chapter. Open data is getting attention in recent years and at the time of a disaster, open data allows for a collaborated approach increasing response efficiency with that includes citizen driven crisis mapping on open mapping platforms such as OpenStreetMap (OSM). This chapter provides an overview on open data and relevant initiatives. Data standard is a very critical issue while coming to data sharing and applications, and the data standards provide a method to codify valid, meaningful, comprehensive, and actionable ways the information captured in the course of doing business. In this chapter the Open Geospatial Consortium (OGC) standards and the INSPIRE data standards are described. Storing and sharing of geospatial data is an important aspect of data management system and the GeoNode is becoming popular as a geospatial data management system as it provides a consistent and easy-to-use interface allowing non-specialized users to share data and create interactive maps. A detail overview of GeoNode is given in this chapter. A few additional tools related to the GeoNode have been also provided.

How to use this Book?

Source URL: http://charim.net/datamanagement/11