STATUS OF HAZARD MAPS VULNERABILITY ASSESSMENTS AND DIGITAL MAPS

JAMAICA COUNTRY REPORT

THE CARIBBEAN DISASTER EMERGENCY RESPONSE AGENCY (CDERA)

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Preface

From 2002 – 2005, the Caribbean Disaster Emergency Response Agency (CDERA) is implementing two major regional initiatives which are designed to reduce vulnerability to natural and technological hazards. These are the Japanese International Cooperation Agency (JICA) supported Caribbean Disaster Management (CADM) Project and the Canadian International Development Agency (CIDA) supported and Organization of American States executed Caribbean Hazard Mitigation Capacity Building Programme (CHAMP). The hazard mitigation planning component of the latter is being implemented in close collaboration with the Caribbean Development Bank's Disaster Mitigation Facility for the Caribbean. Hazard maps, vulnerability assessment studies, and digital maps are critical inputs to both initiatives.

This survey reviewed the status of these thematic activities in sixteen (16) CDERA Participating States, Haiti, Martinique, Suriname and Puerto Rico over the period August – October 2003. The objectives of the Survey were as follows:

1. To determine the status of hazard maps and vulnerability assessment studies and their use in the socio-economic planning and management of the Caribbean.
2. To determine critical success factors, gaps and best practices in the preparation and use of hazard maps and vulnerability assessment studies in the Caribbean.
3. To compile a database of hazard maps, vulnerability assessment reports, and digital maps available in the Caribbean.

Hazards considered under the survey included natural hazards such as floods, hurricanes, landslides, coastal disasters (surge, wave, and erosion), earthquakes, and volcanic eruptions as well as technological hazards. The types of vulnerability assessment considered were structural, economic, and human assessments.

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Status of Hazard Map, Vulnerability Assessments and Digital Maps in the Caribbean: Jamaica

1.0 Introduction

1.1 Physical and socio-economic background

Jamaica is an island located in the Caribbean Sea just south of Cuba. Its geographic coordinates are 18˚ 15´N, 77˚ 30´W. The Blue Mountain Peak, 2256m, is the highest point in the island.

The country has a tropical climate with a temperate interior. Its terrain is mostly mountainous with a narrow, discontinuous coastal plain. The country's natural resources include bauxite, gypsum and limestone.

Jamaica's coral reefs have been studied extensively. This country possesses fringing reefs scattered about its Northern and Southern borders. The reefs face the struggle for survival against nature and man-made circumstances. Natural threats come mainly in the form of hurricanes. Man-made threats include over-fishing and increased sediment and pollution runoff.

The key income-earners are bauxite and tourism. The sectors are of tremendous importance to its Gross Domestic Product (GDP). The industry sector ranks second to the services sector. Agriculture makes the weakest contribution the GDP. In Jamaica, 16.07% of the lands are arable land, permanent crops are planted on 9.23% and 74.8% is used for other purposes according to estimates done for 1998.

The labour force comprises approximately 1.13 million persons in 1998. The services sector accounts for 60%, agriculture 21% and industry 19% of the labour force in the same year. The island is faced with 34.2% of its people living below the poverty line. Its unemployment rate is also high at 15.4% according to 1992 estimates.

1.2 Major disaster issues confronting the country

Jamaica is prone to a number of natural hazards. The island is located within the hurricane belt and has experienced many hurricanes. Hurricane Gilbert in 1988 caused 45 deaths and affected 500,000 persons. Jamaica has a history of seismic activity. Major earthquakes affected Montego Bay and Kingston in 1958, and Kingston in1993. Kingston, the most densely populated area is also the most active seismic zone. Landslides have resulted in deaths and disrupted major transportation networks. The island has experienced periodic drought with the most recent occurrences being in 1994 and 2000. In 2000 drought resulted in estimated losses of Jam$250 million in crops and livestock.

Jamaica is also at risk to man made hazards including oil spills and fires. Environmental issues include deforestation and environmental pollution. Jamaica has experienced heavy rates of deforestation. Coastal waters are polluted by industrial waste and sewage and some damage to coral reefs has been noted. .Air pollution in Kingston from vehicle emissions is also an environmental issue. http://www.cdera.org/pdfs/CDMBaseline%20FDFa.pdf

2.0 Hazard Mapping Initiatives

Table 1 provides the particulars of hazard maps that have been produced for Jamaica.

Table 1 – Hazard Mapping in Jamaica

Type	Purpose	Coverage	Scale	Date produced	Primary sources	Author
Deep & Shallow Landslides	Part of a landslide hazard assessment component	Kingston Metropolitan Area	1:50,000	1996-1998	www.oas.org/en/cdmp	Rafi Ahmad & James P. McCalpin CDMP/USAID
Landslide	To highlight degrees of landslide susceptibility	Rio Minho Watershed, Central Jamaica	1:50,000	1990	Main Library, The University of the West Indies [UWI], Mona	Aedan Earle
Landslide	Landslide susceptibility investigation	Upper St. Andrew Area	1:10,000	1992	UWI Mona	Russel Maharaj
Landslide and Flood	Identifying critical hazard areas	Buff Bay-Pencar Watershed	1:25,000	2001	Forestry Department	Forestry Department
Landslide	Provide information for planners, developers, local authorities	Rio Grande Area	1:50,000	2001	Mines and Geology Division	N. Harris, S. Miller, & L. Williams
Flood	Planning, insurance, disaster mitigation	Rio Cobre (Gordon Pen-Hunts Bay)	1:4,000	1994	Water Resources Authority	Herbert Thomas
Flood	Planning, insurance, disaster mitigation	Hope River	1:5,000	1994	Water Resources Authority	Herbert Thomas
Flood[1]	***Unknown***	Yallahs River Valley	1:10,000	1988	ODPEM	ODPEM/WMO
Flood & Landslide[1]	***unknown***	Hope River Valley	1:5,000	1987	Geological Survey Division	M. Rammelaere

Landslide	Landslide susceptibility for areas in Portland	Portland	1:50,000	February, 2000	Ministry of Energy, Geology Division	S. Miller; N. Harris
Earthquake	To identify areas prone to earthquakes	Kingston Metropolitan Area	***unknown***	July 1999	The University of the West Indies [UWI], Mona.	Natural Disaster Research Inc., UWI
Flood	To identify evacuation routes & traffic control points for flood prone areas	Portmore	1:22,500	***unknown***	Office of Disaster Preparedness and Emergency Management [ODPEM]	Newlen Productions Limited
Flood	Disaster mitigation, and planning	Rio Grande, Portland	1:5,000	***unknown***	Water Resources Authority	Mr. Laurence Barrete
Flood	Disaster mitigation & management	Part of Rio Minho	1:5,000	Completed By 2004	Water Resources Authority	Herbert Thomas
Multiple: [Flood, Landslide, & Soil erosion]	Mapping areas prone to landslides & floods	National	1:250,000	***unknown***	ODPEM	***unknown***
Storm wind	To identify areas most likely to be affected by storm winds	Kingston	***unknown***	June 1999	Natural Resources Conservation Authority [NRCA]	NRCA
Flood	To show flood plains areas	Hope River	1:5,000	May 1994	Underground Water Authority	Herbert Thomas
Flood	To show flood plains associated with rivers	Rio Cobre Flood Plain	1:4,000	May 1994	Underground Water Authority	H. Thomas
Landslide[1]	***unknown***	Rio Minho	1:75,000	2002	Office of Disaster Preparedness and Emergency Management	K. J. Northmore et al
Storm Surge	To show wave heights 100-yr return period	Kingston	***unknown***	June 1999	Natural Resources Conservation Authority	Natural Resources Conservation Authority

Flood	To define water levels in the Morass Area	Black River Upper Morass	1:4,800	April, 2002	National Irrigation Commission	Water Resource Authority
Flood	To model flood frequency and rainfall/runoff	Wagwater Basin	1:50,000	***unknown***	Underground Water Authority	Underground Water Authority
Storm Surge	To estimate the level of surge for any given return period and produce flood return period maps	Montego Bay	***unknown***	1997	www.oas.org/en/cdmp	USAID/CDMP
Flood, Earthquake, landslide	To guide land use planning and development	South coast of Jamaica	1:500,000	1998	***unknown***	Halcrow
Flood and Storm[1]	Preliminary hazard assessment	National	From 1:250,00	1987	Mines and Geology Division	O'Hara
Earthquake[1]	Preliminary hazard assessment	National	From 1:250,00	1987	Mines and Geology Division	O'Hara

1. Extracted from Rafi Ahmad "Natural Hazard Maps in Jamaica: Foundations for Sustainable Development"

List of abbreviation: UWI: The University of the West Indies; ODPEM: Office of Disaster Preparedness and Emergency Management; WMO: World Meteorological Organization; USAID: United States Agency for International Development; CDMP: Caribbean Disaster Mitigation Project

2.1 Methods of Preparation and Distribution

2.1.1 The Landslide Susceptibility Study for the Kingston Metropolitan Area

The study was prepared by the creation of factor maps and simplification of lithology groups along with data analysis using GIS. The DeGraff analysis of landslide susceptibility was also done. This map was distributed in the form of digital copies. The following categories of susceptibilities were used in the map: "none", "low"," moderate", "high", and "very high".

2.1.2 The Landslide Susceptibility Study for the Upper Rio Minho Watershed

This study was prepared using qualitative measures and manual cartographic overlaying techniques. The map was distributed to end-users in the form of photocopies. The following categories of susceptibilities were used in the map: “none”, “low”, “moderate”, “high”, and “very high”.

2.1.3 The Landslide Susceptibility Map for the Upper St. Andrew area

The map was arranged using terrain evaluation procedures and multiple factor assessment using multivariate statistics. Photocopies of the maps were distributed to end-users. The extent and density of landslides were shown on the map.

2.1.4 Multiple Natural Hazards Map

The Natural Hazards Map was divided into three categories, Landslide, Flood and Soil Erosion. The map shows areas that are prone to these three hazards. The Landslide aspect was prepared by overlaying geology and slope data to extract the three relevant formations. The Flooding aspect was prepared by extracting the stated area from the contours that are less than 40m high. Soil Erosion was dealt with by overlaying soils and slope data in order to extract slope more than or equal to 30° and soil depth of less than 50 cm. The maps were distributed using digital copies.

2.1.5 The Landslide Susceptibility Map of Rio Grande Valley, Portland

This was prepared using aerial photo-interpretation, base maps, field checks, data compilation and tabulation and preparation of other maps. Consequently, the maps were distributed as published copies and digital copies. The following categories of susceptibilities were used in the map: “none”, “low”, “moderate”, “high”, and “very high”.

2.1.6 The Rio Cobre Flood Plain Map

This map was prepared by creating cross sections along the river, exporting the cross section information to HEC-RAS and performing hydraulic analysis and generating flood boundaries in HEC-RAS. The maps were distributed in the form of published and digital copies. The map shows years of inundation, discharge, and surface water elevation.

2.1.7 The Hope River Flood Plain Map

The preparation process began by generating cross sections in ArcView, exporting the cross section information to HEC-RAS, performing hydraulic analysis and generating flood boundaries in HEC-RAS. The maps were distributed in the form of published copies and digital copies. The map contained information on 100 years inundation and 100 years return period.

2.1.8 The Landslide Susceptibility Map of Rio Grande

This study was prepared by using the bivariate statistical analysis and applying GIS methods. The following categories of landslide susceptibilities were used in the map: “none”, “low”, “moderate”, “high”, and “very high”.

2.1.9 The Portmore Evacuation Map was distributed in the form of photocopies. The map shows flood-prone areas, shelters, and assembling points.

2.1.10 The Rio Grande Flood Plain Map

The Rio Grande Flood Plain Map was prepared by creating a digital elevation model (DEM) in ArcView and digitizing the cross-section. The cross-section was then exported to HEC-RAS when a hydraulic analysis was done. The flood boundaries were generated in HEC-RAS and imported into ArcView. The hazard map was distributed via published copies and digital copies to end-users. The map shows the return periods of flood.

2.1.11 The Rio Minho Floodplain Map

This map was prepared in the same manner as the Rio Grande Flood Plan Map. The hazard map was also distributed to end users in the form of published copies and digital copies. The map shows the return periods of flood.

2.1.12 The Kingston Storm Hazard Map

This map was distributed to end users in the form of published and digital copies. The map shows 100-year return periods of storm and wind speed.

2.1.13 The Hope River Flood Plain Map

The map shows the 100-year return periods of flood. This map was distributed to end users in the form of published and digital copies.

2.1.14 The Flood Plain Map – Rio Cobre.

The map was prepared using HEC-2 model. It shows flood boundaries for the following periods: 10, 25, 50, 100 years. It is distributed in the form of published copies.

2.2 Users and Uses

Table 2 provides the users and uses of some of the hazard maps that have been produced for Jamaica.

Table 2 – Users and Uses of Hazard Mapping in Jamaica

Hazard map	Users	Uses
Landslide Susceptibility Study for the Kingston Metropolitan Area	ODPEM; Mines and Geology; Department of Geology, UWI and National Environmental and Planning Agency (NEPA)	• to identify the possibility of future landslides and landuse constraints • to assess the scale of landslide problems • to plan controls and development regulation.
Landslide Susceptibility Map of Upper Rio Minho Watershed	Students, researchers and geologists	• Educational
Landslide Susceptibility Map of Rio Grande Valley, Portland	The Planning Institute of Jamaica, ODPEM, and Parish Councils	• development planning, disaster planning coordination and mitigation and the enforcement of laws
Rio Cobre Flood Plain Map	ODPEM, National Works Agency and Water Resource Authority	• disaster management, part of the process of building bridges and road works, and disaster mitigation planning
Hope River Flood Plain Map	ODPEM, National Works Agency and Water Resource Authority	• disaster management, part of the process of building bridges and road works, and disaster mitigation planning
Landslide Susceptibility Map of Rio Grande	Planners and the Local Planning Authority	• Disaster management and land use planning
Kingston Metropolitan Area Seismic Hazard Zonation hazard map	Students and planners	• Educational and development planning
Portmore Evacuation Map	Developers, planners, and citizens	• Disaster management • to increase the awareness disaster preparedness techniques
Rio Grande Flood Plan Map	Water Resources Authority; National Works Agency, the Parish Council and ODPEM	• Planning, roads and bridges planning, disaster management and disaster mitigation purposes
Rio Minho Floodplain Map	Water Resources Authority; National Works Agency, the Parish Council and ODPEM	• Planning, roads and bridges planning, disaster management and disaster mitigation purposes

Flood and Landslide Prone Areas Map	Planners and developers, and geographers	• increasing knowledge of flooding, to show areas which are vulnerable to flooding and landslides

2.3 Current condition and limitations

The hazard map done for the Kingston Metropolitan Area had data deficiencies with respect to closer contours. A contour interval was desired for slope angles and curvatures; surrogate variables, and deficiencies in the DeGraff method.

One major weakness of the Landslide Susceptibility Map for the Upper St. Andrew area was the small scale of aerial photos which obscured small slides in the analysis.

The limitation of the Landslide Susceptibility Map of Rio Grande hazard map was the arbitrary distance between the hazard zones. However, they were chosen in order to highlight areas most prone to landslides in the Rio Grande Valley. Secondly, the hazard zones indicated an area's susceptibility to landslides. The prediction was based on the analyses of previous landslide occurrences and other related factors, for example, geology and slope. The zones studied were not an ideal indication of the size, type of landslide or the distance that it may travel.

An indication of the limitations of the others maps was not provided by the respondents.

2.4 Respondents

The list of respondents is as follows:

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3.0 Vulnerability Assessment Studies

Table 3 shows details of vulnerability assessment study undertaken in Jamaica

Table 3 – Vulnerability Assessment in Jamaica

Type	Purpose	Coverage	Date Produced	Primary Source	Author
Flood & landslide	To examine locational feasibility of National Park	***Unknown***	2001	Dolphin Head Trust	Ravidya Maharaj, Simon Mitchell, and Sherene James
Coastal Erosion	To gain more insight into coastal erosion	Negril	***Unknown***	UWI/USAID	Prof. E. Robinson, Dr. S. Mitchell, Dr. P. Maharaj, and S. Khan
Hurricane	For river & Harbour Engineering Flood Control	Montego Bay	1996	Urban Development Corporation	Louis Berger International & Environment Solutions
Flood	For hydrologic & hydraulic analysis	Milk river	1996	Water Resources Authority	ODPEM, UNDP, and WMO
Flood	For flood rain damage appraisal	Western Jamaica	***Unknown***	Water Resources Authority	L. A. Donaldson and M.O. Walters
Flood	To determine causes of	Mount Pleasant	June 1993	Water Resources	B. Fernandez

	Flood run-off			Authority	
Flood	To determine Solutions to the flooding problem	Nightingale Grove	1997	Office of Disaster Preparedness	***Unknown***

List of abbreviation: UWI: The University of the West Indies; ODPEM: Office of Disaster Preparedness and Emergency Management; WMO: World Meteorological Organization; USAID: United States Agency for International Development; UNDP: United Nations Development Programme

3.1 Methods of Preparation and Distribution

The Hazard and Fluvial Assessment study was conducted using field analysis.

The Assessment of beach erosion at Negril was prepared by using a historical analysis of beach erosion and an analysis of grain types at the beaches.

The Nightingale Grove Vulnerability Assessment study was prepared using primary and secondary research techniques.

3.2 Users and Uses

Table 4 provides the users and uses of some of the vulnerability assessment studies that have been conducted for Jamaica.

Table 4 – Users and Uses of Vulnerability Assessment Studies in Jamaica

Hazard map	Users	Uses
Hazard and Fluvial Assessment study	DHT	• Planning
Assessment of Beach Erosion at Negril	USAID and Negril Environmental Protection Agency	• In support of their functions
Montego Bay 100-year Hurricane Coastal Flooding study	WRA, ODPEM, UDC	• Planning and flood mitigation
Milk River Flood Plan Mapping (Hydrologic and Hydraulic Analysis)	WRA, ODPEM	• Planning and flood warning
Hydrological Appraisal of Damage in Western Jamaica study	WRA, ODPEM	• Hydrological Appraisal, flood control
The Flooding at Mount Pleasant study	WRA, ODPEM	• Monitoring flood run-off, flood plain mapping, and assessment for flood control
Nightingale Grove Vulnerability Assessment	Researchers and the general public	• Educational purposes

3.3 Current condition and limitations

The coastal erosion vulnerability assessment's limitation took the form of an insufficient time frame. The limitations of other studies were not noted.

3.4 Respondents

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4.0 Digital Maps

Digital Map Data in Jamaica

Data Theme	Scale of Input map	Year Input map was produced	Area Covered	Primary Source	Digital File format	Datum	Projection
Hazards							
Landslide	1:12,000		St. Mary,St.Thomas	Mines & Geology	AutoCAD		
Flood, landslide, Faults, and Tsuanamis	1:250,000	1997	Entire island	ODPEM	ArcInfo E00		Clarke1866
Contours	1:50,000	1986	Entire island	Survey Department	ArcView Shapefile	Ft. Charles	Lambert Conformal Conic
Contours	1:50,000		Central Jamaica	Geology Dept,UWI	Canvas file		
	1:12,500		Entire island	National Lanad Agency	dxf	Clarke1880	Lambert Conic Orthomorphic
Social facilities							
Schools	GPS survey	GPS survey	Entire island	Ministry of Education	ArcView shapefile	JAD69	Lambert Conformal Conic
Police Stations	1:50,000		Entire island	Jamaica Constabulary Force	ArcView shapefile	JAD69	Lambert Conformal Conic
Police Divisions	1:10,000		Corporate Area	Jamaica Constabulary Force	ArcView shapefile	JAD69	Lambert Conformal Conic
Fire Stations	1:50,000		entire island	PIJ/Ministry of Health	ArcView shapefile - points	JAD69	Lambert Conformal Conic
Telecommunications							
Cabinet Area	1:50,000		Entire island	Cable&Wireless Jamaica	ArcView shapefile	JAD69	Lambert Conformal Conic
Exchange Area	1:50,000		Entire island	Cable&Wireless Jamaica	ArcView shapefile	JAD69	Lambert Conformal Conic
Economic Facilities							
Hospitals& Clinics	1:50,000		Entire island	PIOJ/Ministry of Health	ArcView shapefile	JAD69	Lambert Conformal Conic
Day Care Centres/Nurseries	1:12,500		Kingston Metropolitan Area	PIOJ/Ministry of Health	ArcView shapefile	JAD69	Lambert Conformal Conic
Landuse							
Landuse	1:250,000		Entire island	Forestry Department	Grass raster file	WGS84	Lambert Conformal Conic
Landuse	1:50,000	2000	Entire island	Forestry Department	ArcView Shapefile	Ft. Charles	Lambert Conformal Conic
Land Use \ Land Cover	1:250,000	1996 & 1998	island	Forestry Department	Arcview shapefile - polygons		

Vegetation	1:12,500		Entire island	National Land Agency	dxf	Clarke 1880	Lambert Conic Orthomorphic
Soils	1:250,000		Entire island	Ministry of Agriculture	Grass raster file	WGS84	WGS84
Soils	1:50,000		Entire island	Rural Physical Planning Unit	ArcView shapefile	Ft. Charles	Lambert Conformal Conic
Geology							
Geology	1:250,000		Entire island	Mines & Geology	Grass raster file	WGS84	WGS84
Geology	1:50,000		Entire island	Mines & Geology	AutoCAD, .shp	Ft. Charles	
	1:250,000		Entire island	Mines & Geology	ArcInfo E00	MSL	Clarke1866
	1:12,500		Central Jamaica	UWI	Canvas file		
Hydrostratigraphic Map	1:250,000	1990		Water Resources Authority	Arcview shapefile - polygons	JAD2001	Lambert Conformal Conic
Roads							
Street Centerlines	1:12,500		Kingston Metropolitan Area	Ministry of Health	ArcView shapefile	JAD69	Lambert Conformal Conic
Roads	1:50,000	1986	Entie island	Survey Department	ArcView shapefile	Ft.Charles	Lambert Conformal Conic
Roads	1:12,500	1971	Central Jamaica	Geology Dept, UWI	Canvas file		
Roads	1:12,500		Entire island	National Land Agency	dxf	Clarke 1880	Lambert Conic Orthomorphic
River	1:50,000	1986	Entire island	Survey Department	ArcView shapefile	Ft. Charles	Lambert Conformal Conic
	1:25,500	1971	Central Jamaica	Geology Dept,UWI	Canvas file		
Rainfalls	1:250,000	1997	Entire island	Met. Office	ArcInfo E00	MSL	Clarke 1886
Buildings	1:12,500		Entire island	National Land Agency	dxf	Clarke 1880	Lambert Conic Orthomorphic
Bridges/Culverts	1:12,500		Entire island	National Land Agency	dxf	Clarke 1880	Lambert Conic Orthomorphic
Electricity lines	1:2,000		Kgn & St. Andrew	National Land Agency	dxf	JAD69	Lambert Conic Orthomorphic
Drill Maps	1:2, 000		South Manchester	Jamaica Bauxite Institute	CAD	JAD69	Lambert Conformal Conic
Drill Maps	1:2, 000		Trewlawny	Jamaica Bauxite Institute	CAD	JAD69	Lambert Conformal Conic
Bauxite idex map	1:50,000		Entire island	Jamaica Bauxite Institute	ArcView shapefile	JAD2001	Lambert Conformal Conic
Property Map	1:25,000		South Manchester	Jamaica Bauxite Institute	CAD	JAD69	Lambert Conformal Conic
Property Map	1:25,000		Trewlawny	Jamaica Bauxite Institute	CAD	JAD69	Lambert Conformal Conic
Ore Body Maps	1:25,000		South Manchester	Jamaica Bauxite Institute	CAD	JAD69	Lambert Conformal Conic
Ore Body Maps	1:25,000		Trewlawny	Jamaica Bauxite Institute	CAD	JAD69	Lambert Conformal Conic

IKONOS Map	1:4,000	2001	Entire island	Ministry of Land and Environment	TIFF	JA2001	Lambert Conformal Conic
Orthophotos	1:2,000	2001	Kingston,SpanishTown, Portmore, Montego Bay	Ministry of Land and Environment	IMG	JAD2001	Lambert Conformal Conic
Bottom Quality Data	1:50,000		Portland Bight Area	Caribbean Coastal Area Management	ArcView shapefile	JAD2001	Lambert Conformal Conic
Conservation Management	1:50,000		Portland Bight Area	""	ArcView shapefile	JAD2001	Lambert Conformal Conic
Cultural	1:50,000		Portland Bight Area	""	ArcView shapefile	JAD2001	Lambert Conformal Conic
Utilities	1:50,000		Portland Bight Area	""	ArcView shapefile	JAD2001	Lambert Conformal Conic
Physical Infrastructure	1:50,000		Portland Bight Area	""	ArcView shapefile	JAD2001	Lambert Conformal Conic
Poverty map (1991)	1:50,000		Entire island	Planning Institute of Jamaica (PIOJ)	ArcView shapefile	JAD69	Lambert Conformal Conic
Geochemistry of soils	1:50,000		Entire island	ICENS	Grass raster files	WGS84	WGS84
Water Supply Network	GPS survey	2002	St. Catherine	National Water Commission	ESRI geo, .shp	JAD2001	Lambert Conformal Conic
Kingston Metropolitan Area Community Boundaries	1:50,000	1980	Kingston Metropolitan Area	Ministry of Health/PIOJ	Arcview shapefile - polygons	JAD69	Lambert Conformal Conic
Mandeville Community Boundaries	1:50,000	1980	Mandeville	Ministry of Health	""	JAD69	Lambert Conformal Conic
Montego Bay Community Boundaries	1:50,000	1980	Montego Bay	Ministry of Health	""		
Parish map		1971	island	National Land Agency	""	JAD69	Lambert Conformal Conic
Portmore Community Boundaries	1:50,000	1980	Portmore	Ministry of Health	""	JAD69	Lambert Conformal Conic
Spanish Town Community Boundaries	1:50,000	1980	Spanish Town	Ministry of Health	""	JAD69	Lambert Conformal Conic
Settlements	1:50,000	1980	island	Spatial Innovison Ltd.	ArcView shapefile - points	JAD69	Lambert Conformal Conic
Poverty map (1991)	1:50,000		island	Planning Institute of Jamaica	Arcview shapefile - polygons	JAD69	Lambert Conformal Conic
Population and Boundary of Health Districts	1:250,000	1971	island	Ministry of Health	""	JAD69	Lambert Conformal Conic
Postal Codes - Kingston Metropolitan Area	1:250,000	1971	Kingston Metropolitan Area	Ministry of Health	""	JAD69	Lambert Conformal Conic

5.0 Conclusions and Remarks

Relatively speaking, a lot of work has been done in terms of hazard mapping, vulnerability assessment studies, and production of digital maps. The high number of natural disasters that the country has experienced may be a contributing factor. The number of users and uses is also large compared to other Caribbean countries included in this survey. Another striking note is the high involvement of local resources persons in particular the staff of the Water Resources Authority. This agency has been in the fore front of hazard mapping and vulnerability assessment in the country. Efforts should be made to export the experience of the personnel of this agency to other Caribbean states. On the downside is the lack of standards and documented procedure for undertaking hazard mapping and vulnerability assessment. It is important that standards and procedures be developed such that future activities will be informed and according improved.

The long list of GIS digital maps available in Jamaica provides the environment for digital processing of hazard mapping and vulnerability assessment. This is however possible if these datasets are made available for disaster related activities.

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