

Climate Resilience Decision Making Framework in the Caribbean

A case of Spatial Data Management

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Sr. Data Management Specialist
The World Bank



Background

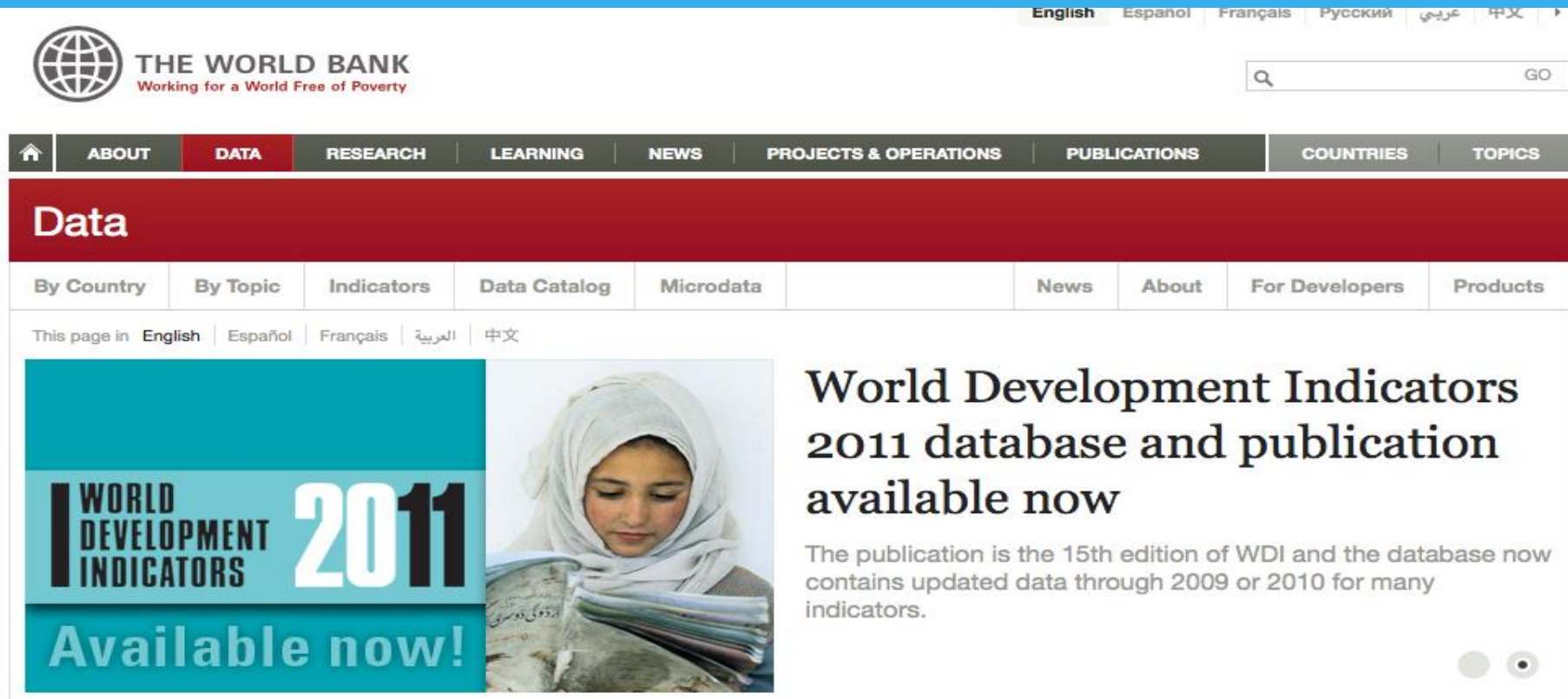
The mission of The World Bank's Latin America and the Caribbean Region (LCR) Disaster Risk Management (DRM) team is to work with national and local governments and with communities to identify hazard risk, assess vulnerability to adverse natural events and mitigate the impact of disaster through structural and non-structural measures, including risk financing and transfer.

Spatial Data is the **key** to the analysis.

Building resilience and better decision-making

- * Latin America and the Caribbean (LAC) region is one of the most vulnerable region with respect to natural disasters
- * 20 countries in LAC region has half of the GDP exposed to natural disasters
- * Damages due to natural hazards happen because of **HOW** and **WHERE** we build
- * The key component in decision making is using (geospatial) data in decision making process

Open Data & the World Bank



The screenshot shows the World Bank's 'Data' section. At the top, there's a navigation bar with links for ABOUT, DATA (highlighted), RESEARCH, LEARNING, NEWS, PROJECTS & OPERATIONS, PUBLICATIONS, COUNTRIES, and TOPICS. Below this is a red banner with the word 'Data'. Under the banner, there are tabs for 'By Country', 'By Topic', 'Indicators', 'Data Catalog', 'Microdata', 'News', 'About', 'For Developers', and 'Products'. The main content area features a large banner for the 'World Development Indicators 2011 database and publication available now'. The banner includes a teal box with the text 'WORLD DEVELOPMENT INDICATORS 2011 Available now!' and a photo of a young girl in a white headscarf reading a book. To the right of the photo, the text reads: 'World Development Indicators 2011 database and publication available now. The publication is the 15th edition of WDI and the database now contains updated data through 2009 or 2010 for many indicators.'

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Data

By Country By Topic Indicators Data Catalog Microdata News About For Developers Products

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WORLD DEVELOPMENT INDICATORS 2011
Available now!



World Development Indicators 2011 database and publication available now

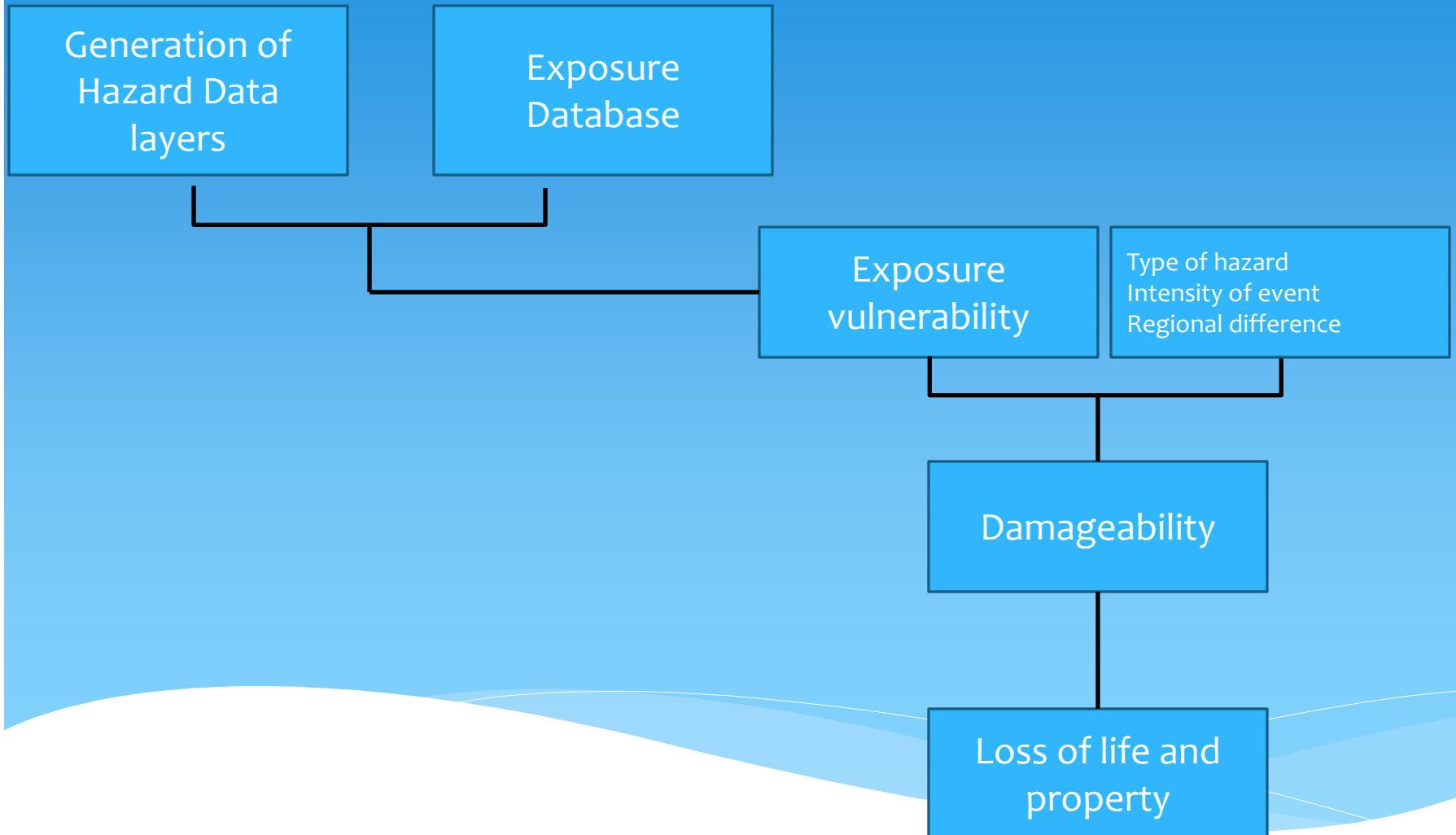
The publication is the 15th edition of WDI and the database now contains updated data through 2009 or 2010 for many indicators.

The World Bank recognizes that transparency and accountability are essential to the development process and central to achieving the Bank's mission to alleviate poverty. As a knowledge institution, the World Bank's first step is to share its knowledge freely and openly.

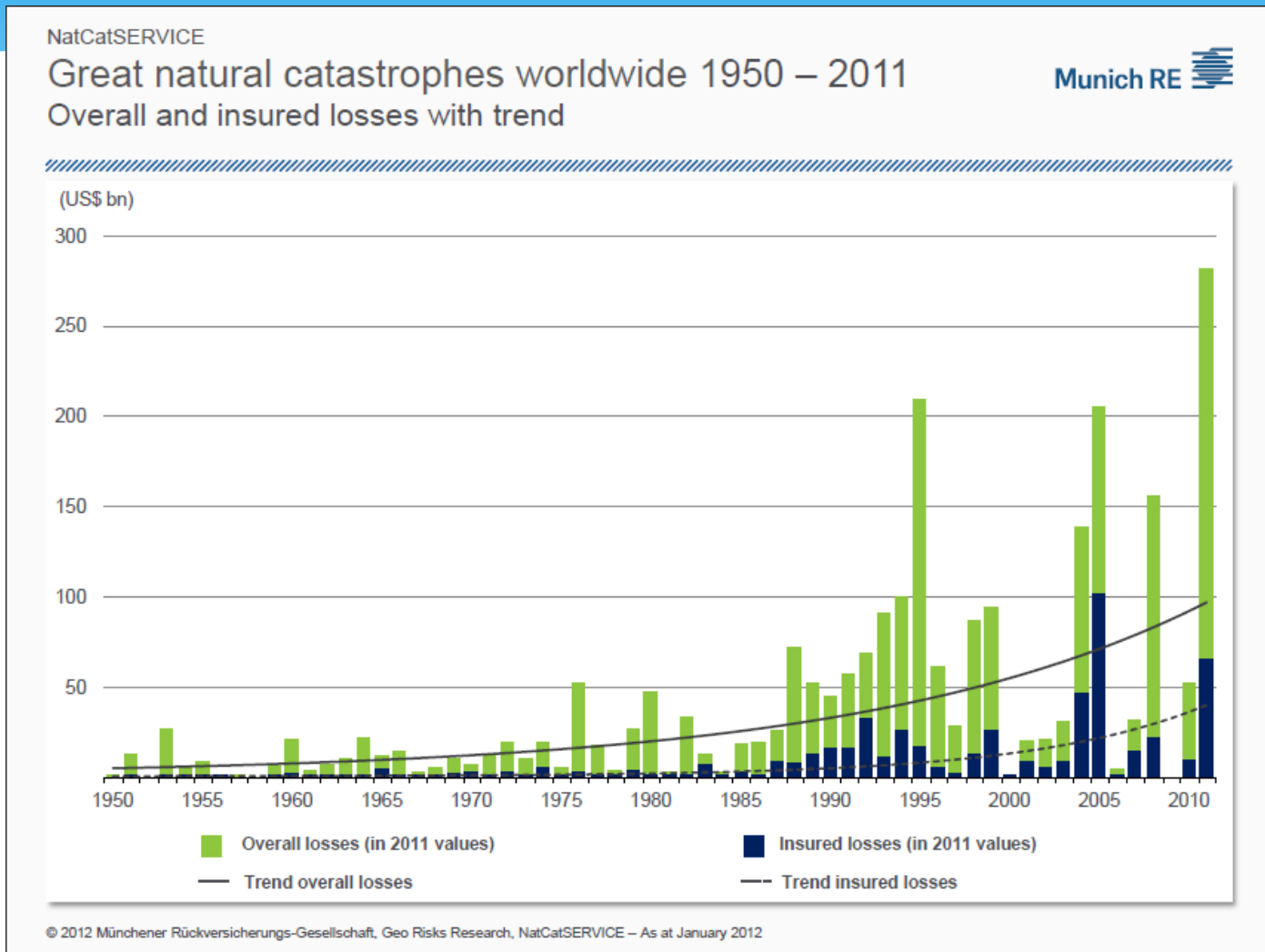
Open Data for Resilience Initiative (OpenDRI)

The Open Data for Resilience Initiative (OpenDRI) is a global partnership that aims to encourage and facilitate the sharing and use of climate, disaster and other geospatial data to enable more effective decision-making by providing the rationale, technical assistance, and tools for data sharing.

Risk Assessment Process



Risk Assessment – Why it matters?



Source: Munich Re

Spatial Data

Data is inherently Multi-dimensional

Attribute

Location

Temporal

Quality

Resolution

Existing Spatial Data Situation

- Not enough data to carry out analysis
- Existing data not readily available
- Numerous data format
- Poor or questionable data quality
- Scale of the data not sufficient
- Metadata non-existent or scant
- Data Vintage
- Data not in digital format or not in raw machine readable format

No comprehensive
Data Sharing
mechanism

Treating Spatial Data as a National Asset

Policy/Guidelines/Standards

National Policy

Belize National Spatial Data Infrastructure (NSDI) Policy

Data Inventory

National Spatial Data Infrastructure (NSDI) Working Committees

Quality

Relevance

Data Gap

Belize

21st August 2012

Approved at meeting of Cabinet held 21st August, 2012

Cabinet-Confidential Memorandum No. 40 of 2012

Data Inventory

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Layer Name	Layer Type	Layer Group	Geographic Coverage	Primary Institution	Contact Person	Phone/Email	Other Institutions	Contact Person	Phone/Email	Data Source	Scale	Vintage	Data Completion Status	Remarks
Roseau, 50cm	Dynamic	Satellite Imagery	Regional	Lands and Surveys						Digitized from 1978 ed	1:30,000	2010	Complete	roads for tsmouth.
Coast	Static	Baseline	National	Lands and Surveys			Physical Planning			Digitized from 1978 ed	1:30,000	1971	Complete	
Dom. Parcels	Dynamic	Landuse	National	Lands and Surveys			Physical Planning			In House	1:30,000	2010	In Progress	whether they have anything.
Roads	Dynamic	Landuse	National	Lands and Surveys			Physical Planning			Digitized from 1978 ed	1:30,000	1978	Complete	up. They
Roads	Dynamic	Landuse	National	Public Works			Physical Planning			In House			In Progress	erns over data
Rainfall and Climate	Dynamic	Hazard	National	Meteorology Office						In House			Incomplete	e location of
Water Mains and Sewage	Dynamic	Landuse	National	DOWASCO						In House			Incomplete	
Electric Lines and Infrastructure	Dynamic	Landuse	National	DOMLEC						In House			In Progress	
Building Polygons	Dynamic	Exposure	National	DOMLEC						In House		2005-Present	Complete	
Community Hazard Mapping	Dynamic	Hazard	Local	Red Cross						In House		2011-2012	In Progress	
Building Locations and Uses from Census	Dynamic	Landuse	National	Statistics						In House		2011	Unknown	
East Coast Satellite Imagery	Dynamic	Satellite Imagery	Regional	Statistics						In House			Unknown	
Forestry Habitat Data and Natural Area	Dynamic	Baseline	Multi-Scale	Forestry Division						In House		Ongoing Collection	In Progress	

Resource/Capacity

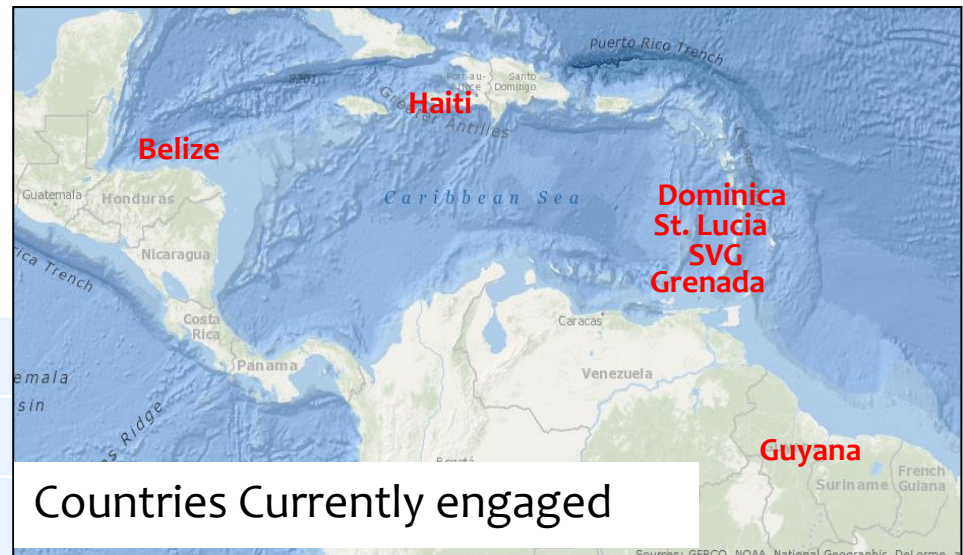
inventory

	Sewer surveys?	information given. Using Carlson Surveys with AutoCAD to transfer data to referenced shapefiles.	required to transfer AutoCAD road surveys to GIS. ArcGIS was given to them. Also, road surveys need to be referenced to the survey grid.
DOWASCO	Water and Sewer lines.	Would need training similar to what public works has in order to reference and transfer their data from AutoCAD to GIS. Would need personnel with training in GIS/AutoCAD. They rely on paper maps from Lands/Surveys. It would be more efficient for them to have geotiffs perhaps.	No effort is being made to put data into a GIS. It is not a priority. They do not have the software or the people. Older maps are on paper, only newer lines are in AutoCAD (not georeferenced).
Met Office	Rainfall, weather and climate.	They claim to have the necessary training but need the software and a system with clear procedures and requirements to upload to. It may be useful to do some geostatistical analysis on the weather data once it is entered to create continuous climate maps for Dominica.	All data is in a tabular format based on weather station locations. They are working actively with Agriculture. They will likely contribute when the geonode is operational.

Spatial Data Management Activities in the Caribbean



One of the largest community of practitioners with over **120 active community members**.



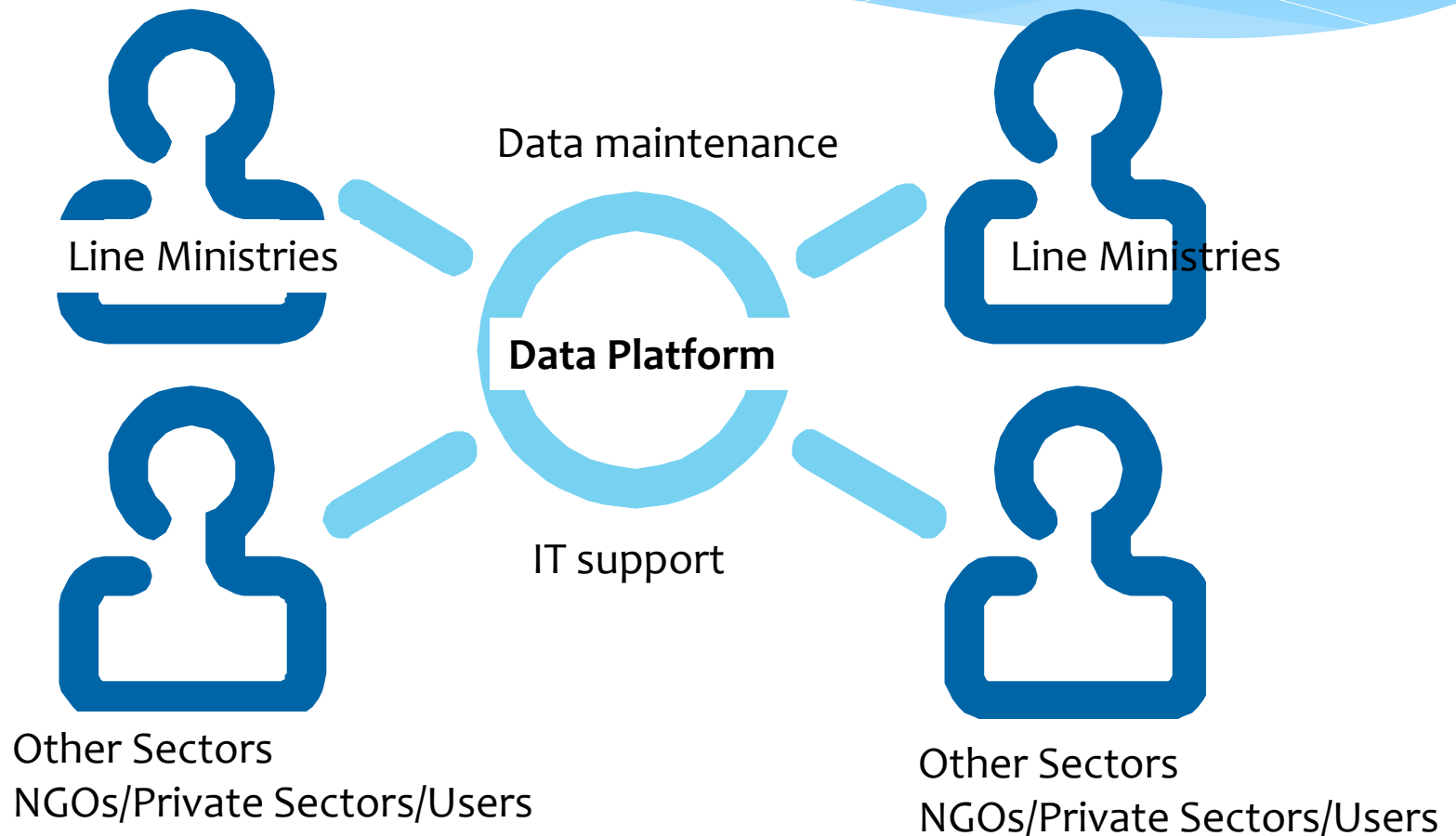
Countries Currently engaged

Haiti	www.haitidata.org
St. Lucia	http://sling.gosl.gov.lc/
SVG	http://geonode.gov.vc/
Dominica	http://dominode.net
Grenada	Intranet version only
Belize	http://geoserver.bnsdi.gov.bz/
Guyana	Intranet version only

Collaboration Framework

Data Provider

End Users



Example from Belize

A national policy on NSDI was approved by Cabinet on Sep., 2012

Sub- committees were formed to design and draft guidelines.

- a. Data Quality and Standards
- b. Network Architecture and Platform Standards
- c. Data Access and Security
- d. Maintenance and oversight



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Dominica moves to improve its data collection capability

Dominica News Online - Wednesday, August 8th, 2012 at 4:10 PM



Dominica is positioning itself to better deal with the problems being faced in data collection.

Individuals from the public and private sectors in Dominica are currently participating in a consultation on Geospatial Data Management.

The initiative is a joint one between the government of Dominica and the World Bank.

Speaking at the consultation, Minister responsible for Physical Planning, Dr. Kenneth Darroux, identified insufficient collaboration and data sharing as Dominica's shortcomings in that area.

He says the lack of data policies is one of the fundamental reasons for this.


"This situation has hindered the growth and development of a vibrant Geospatial data base community in Dominica. Other issues would include a lack of awareness among departments and agencies, duplication of data collection efforts and non development of some critical data bases," he said.

Darroux said the consultation is very timely and paves the way for improving the country's data base collection.

Meantime Darroux says that having been involved in geospatial data collection since the mid 1990's, Dominica is now ready to join the rest of the international community to pursue a more strategic approach to disaster risk management and planning.

He says geospatial data, is critical for informed decision making on climate resilience and reducing risks to the adverse effects of climate change.

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News

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PRESS RELEASE

Caribbean: Data Managers/Developers to use Spatial Data for Disaster Risk Management

February 25, 2013

PORT OF SPAIN, Trinidad and Tobago, February 25, 2013 – More than 40 Caribbean data managers, IT specialists and software developers concluded this weekend at the St. Augustine campus of the University of West Indies a one week long gathering where they learned how to manage, share, and increase the use of spatial data to reduce disaster risk in the Caribbean.

Participants were trained on the use of GeoNode, an open-source geospatial data sharing and management platform, which allows national ministries and agencies to populate, catalog, view, and share data on a central repository to increase the access and use of data to inform decision-makers.

The training was sponsored by the World Bank, the University of West Indies, and the African Caribbean Pacific-European Union Natural Disaster Risk Reduction Program (ACP-EU NDRR), which is funded by the European Union and managed by the Global Facility for Disaster Risk Reduction (GFDRR).

"By promoting open data and making use of spatial data and analysis, the region is likely to benefit from better decision-making processes to improve resilience to current and future climate impacts," said Bishwa Pandey, World Bank Senior Data Management Specialist.

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tel : (868) 662-2002 x. 82108

PRESS RELEASE NO:
2013/005/CAR

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- World Bank Group Scales Up Support for Global Nutrition Programs in Response to Stunting Crisis, Food Price Volatility



Emerging Technologies

GeoNode - Spatial Data Management Platform Technology

GeoNode

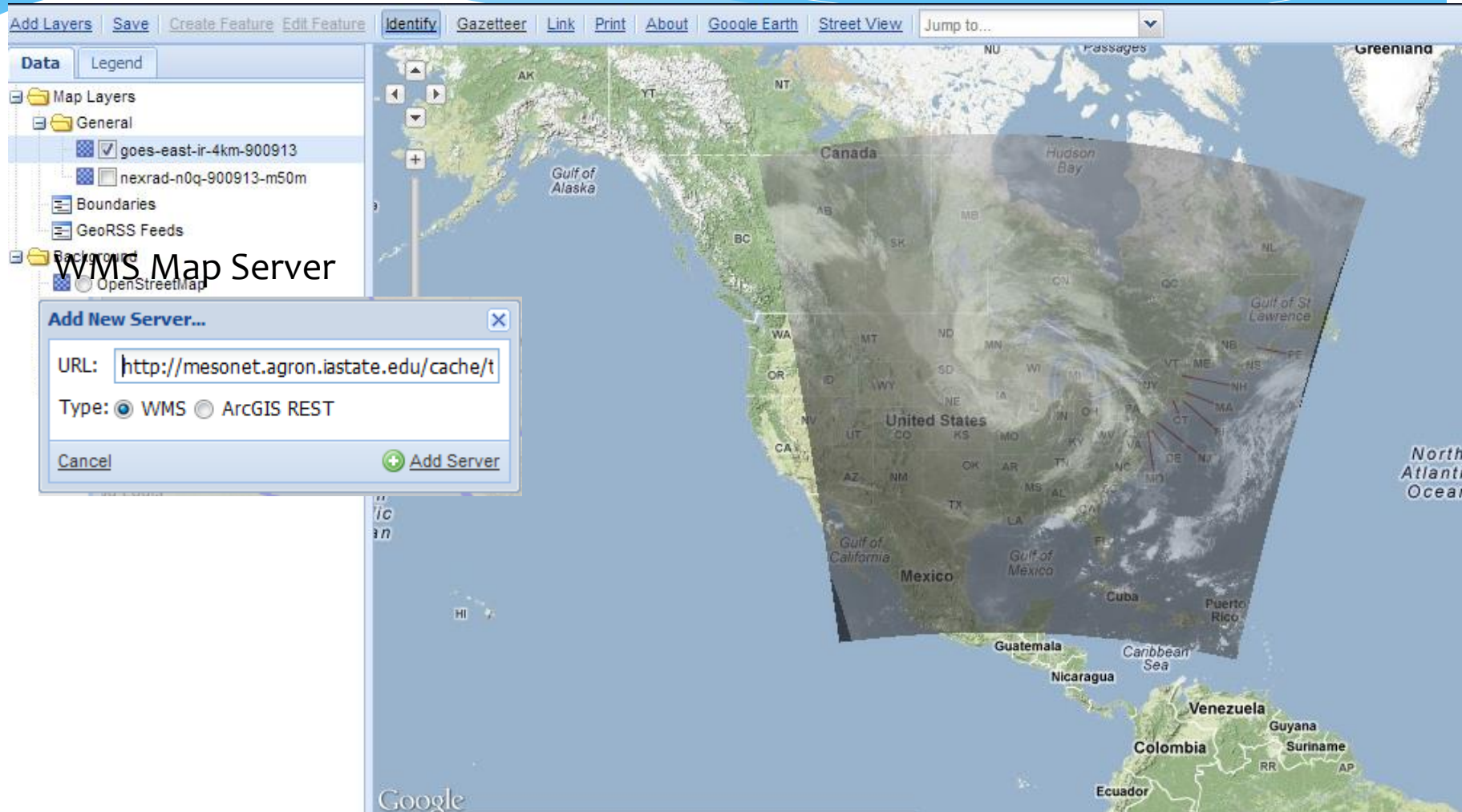
A new approach to spatial data infrastructure focused around users and collaboration

Simple web-based tools

- Edit metadata in the same place
- Privacy controls to restrict access as needed



Add Data From External Source



Add Data From External Source

GeoRSS Feed

Add a GeoRSS Feed

Type: ☐ Picasa Photos ☐ YouTube Videos ☐ Harvard Geospatial Library ☒ Other GeoRSS Feed

Feed Title:

URL:

Symbol:

Size:

☒ Fill

Color:

Opacity:

☒ Stroke

Style:

Color:

Width:

Opacity:

Map Interface:

Map Layers:

- General
 - goes-east-ir
 - nexrad-n0q-s
- Boundaries
- GeoRSS Feeds
 - ☒ Earthquake -
- Background
 - OpenStreetMap
 - Google Hybrid
 - Google Roadmap
 - Google Terrain
 - Google Satellite

Map Data: ©2012 Google, INEGI, MapLink, Tele Atlas - Terms of Use

Map Features:

- Canada
- United States
- Mexico
- Central America
- South America
- Europe
- Africa

Pop-up Information:

- M 4.7, Dominican Republic
- October 17, 2012 03:30:47 GMT

Add Data From External Source

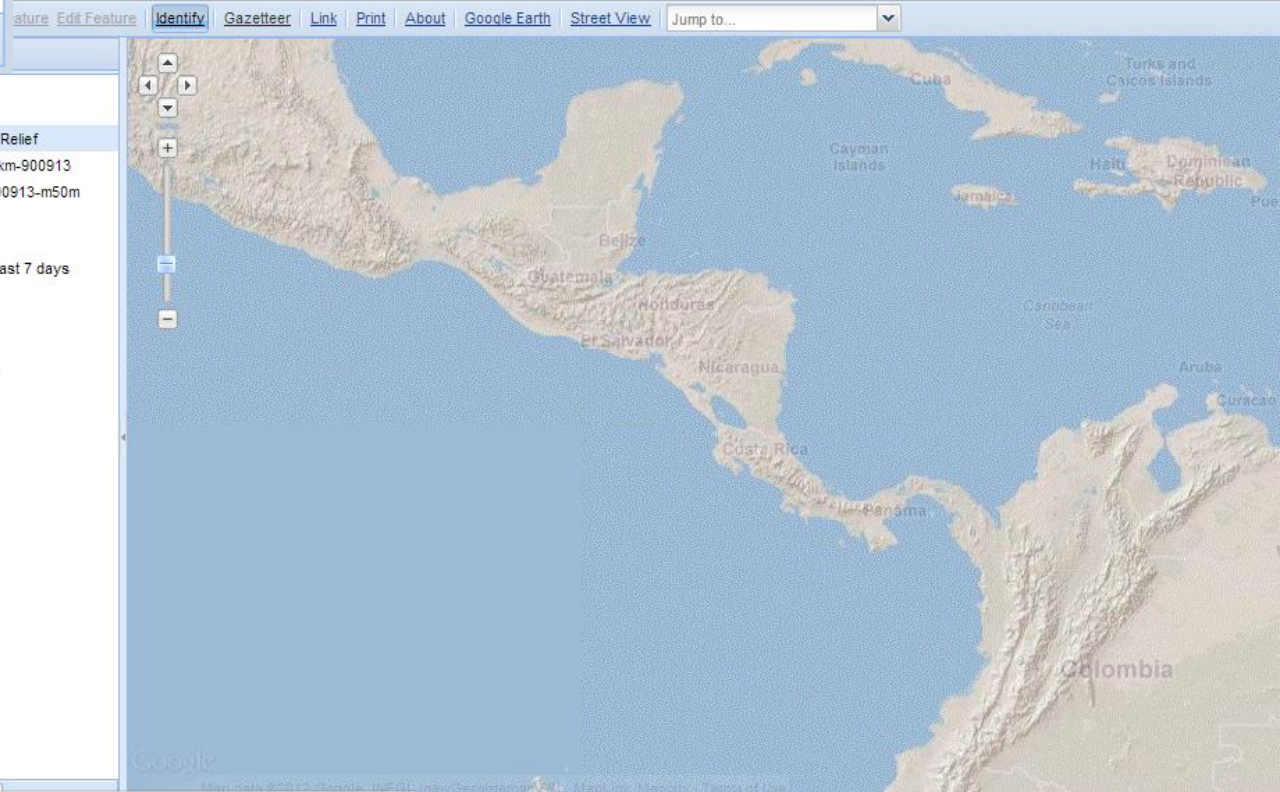
ArcGIS Server

Add New Server...

URL:

Type: ☐ WMS ☒ ArcGIS REST

- Map Layers
 - General
 - ☒ World Shaded Relief
 - ☒ goes-east-ir-4km-900913
 - ☒ nexrad-n0q-900913-m50m
 - Boundaries
 - GeoRSS Feeds
 - ☒ Earthquake - Last 7 days
 - Background
 - ☒ OpenStreetMap
 - ☒ Google Hybrid
 - ☒ Google Roadmap
 - ☒ Google Terrain
 - ☒ Google Satellite



Share Map

Copy the html code

Paste the html code in your web application

```
<h1>Earthquake with Magnitude of 2.5 or more in past 7 days </h1>
```

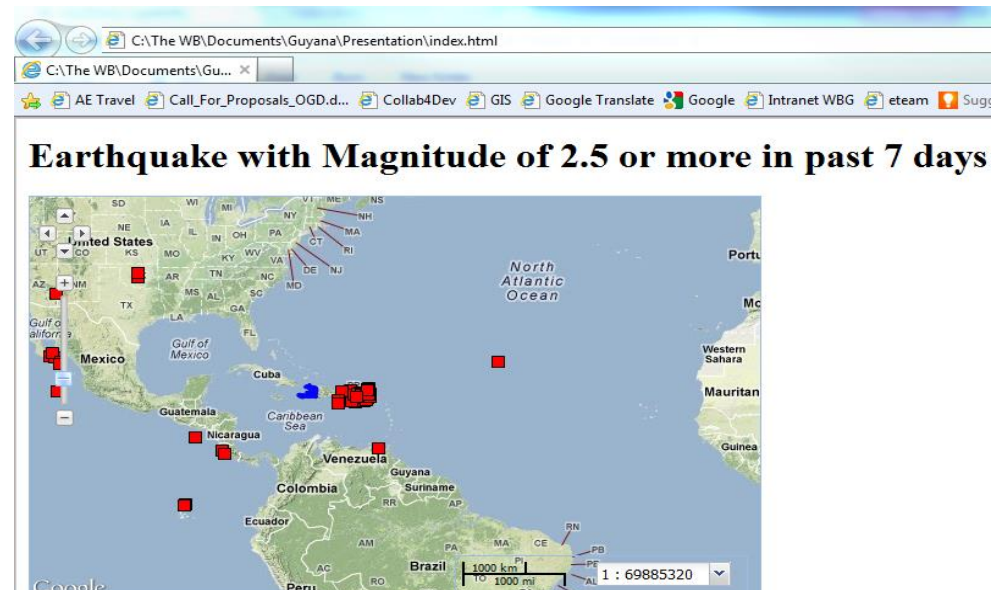
```
<iframe height="400" width="600"
src="http://worldmap.harvard.edu/maps/2265/Ehc/embed"></iframe>
```

Link to Map

Paste link in email or IM:
<http://worldmap.harvard.edu/maps/2265/Ehc>

Paste HTML to embed in website:
`<iframe height="400" width="600"
src="http://worldmap.harvard.edu/maps/2265/Ehc/embed">
</iframe>`

Map Size Height Width



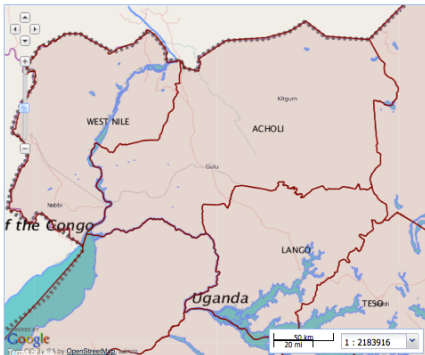
Map is embedded in the Web Application

Designed for Customization

Regional Drought Response Plan

East Africa Droughts

The Horn of Africa is suffering from severe drought, with estimates of 8.8 million people currently suffering from acute livelihood crisis (UN-OCHA). This drought, exacerbated by the ongoing food crisis is expected to worsen in the coming 3 to 4 months.



Survey of the water sources in the affected areas of Uganda OCHA COD [2011]

Maps

- Survey of the water sources in the affected areas of Uganda OCHA COD [2011]
- Affected Areas and World Bank Projects
- Drought mortality in the affected areas
- Affected areas and livestock production system
- Affected areas and population density
- Affected areas in Ethiopia vs population census OCHA COD

Data

- Uganda Sub-Counties OCHA COD [2010]
- Tanzania Drought Affected Regions [6/28/11]
- AFRICA SUDAN Airfields OCHA COD [6/28/11]
- Uganda Drought Affected Regions [6/28/11]
- Uganda Parish OCHA COD [2010]
- AFRICA SUDAN Lakes OCHA COD [2005]
- Uganda Land Use OCHA COD [2006]
- EAST AFR Bank Projects MPM EA [2010]
- National Capitals - Affected Countries (Eastern Africa - Drought) [2011]
- AFRICA SUDAN Lakes OCHA COD [2005]
- Burundi Drought Affected Regions [6/28/11]
- AFR SUDAN Admin Boundaries Level 1 OCHA COD [2010]
- Rural Population Density FGSD (persons per sqkm) [2000]
- Ethiopia Drought Affected Regions

Haiti Data

Sign in for extra features

Home Data Maps Partners

English

Explore Maps

Explore pre-made maps, and those made by website users, on such things as earthquake intensity, flood hazards, topography, road networks, current refugee shelters, health facilities, and much more.

Explore Maps

Create Maps

Using the same raw data used to create other maps on the site, Haiti Data lets you compose and share your own maps. Create a map with our cartography tool to develop new insights and track changes overtime. Save, print and share these maps if you wish!

Create Map

Search for Data

Haiti Data lets you search for a number of geospatial data sets.

View All



Home Data Maps

Welcome to Geonode St. Vincent & the Grenadines

GeoNode is an open source platform for sharing geospatial data and maps.

Maps

GeoNode lets you compose and share maps. Create a map with our cartography tool, or explore maps shared by others.

Explore Maps

Create Map

Data

GeoNode lets you upload, manage, and browse data. Search for data that is valuable to you, or upload your own data.

Search

Advanced Search

Upload data

Powered by [GeoNode](#) | [Need Help?](#) [Help](#) | [For Developers](#)

SLiNG

Saint Lucia Integrated National GeoNode

Sign in for extra features

Home Data Maps

English

Castries, Saint Lucia



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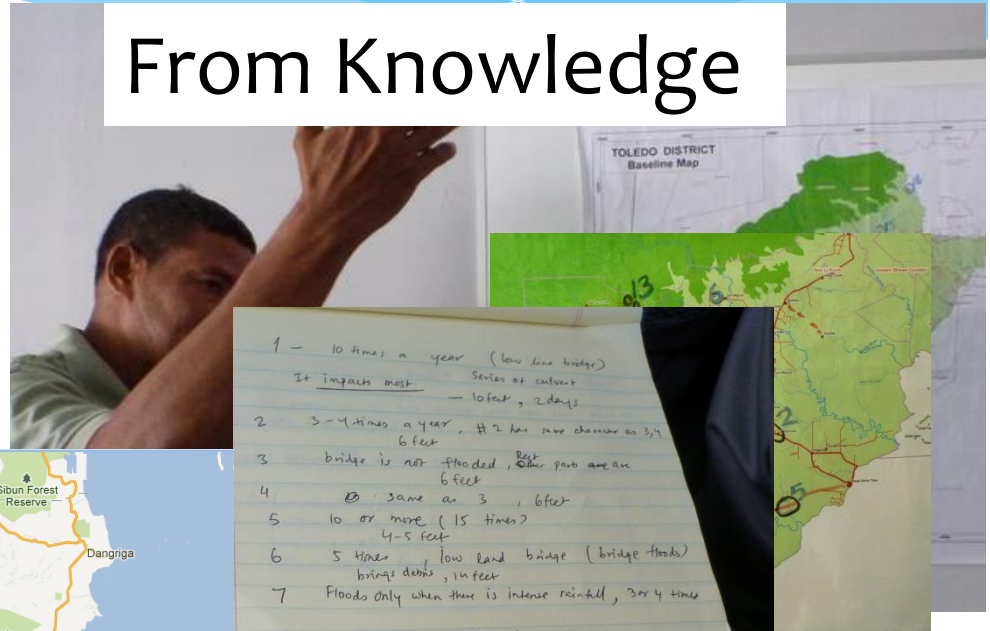
Community Based Mapping

Collective Knowledge of the People

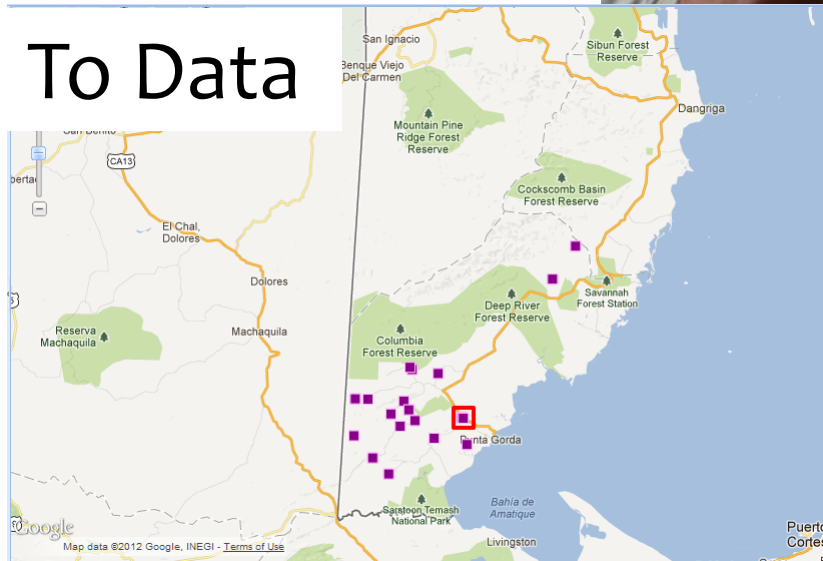
Wikipedia

Open Street Map

From Knowledge



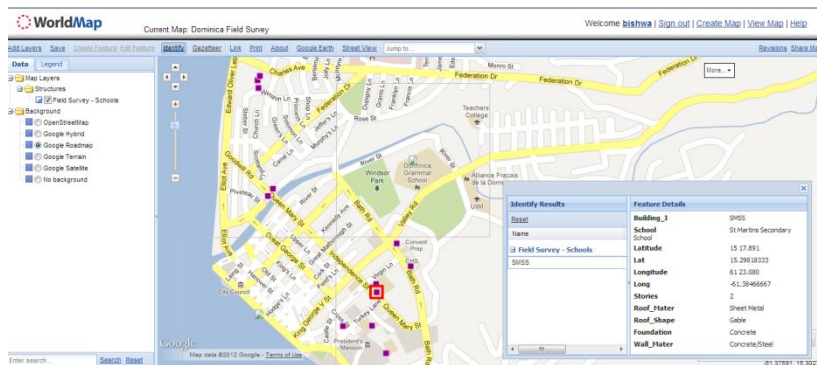
To Data



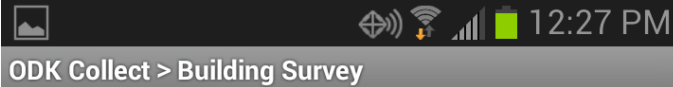
- 1 - 10 times a year (low line bridge)
It impacts most Series of culvert
- 10 feet, 2 days
- 2 3-4 times a year, #2 has more channels as 3, 4
6 feet
- 3 bridge is not flooded, Best other parts are an
6 feet
- 4 10 or more (15 times?)
4-5 feet
- 5 5 times low land bridge (bridge floods)
brings debris, 10 feet
- 6 Floods only when there is intense rainfall, 3 or 4 times
- 8 Small Creek 1 or 2 times a year
- 9 low land bridge, 4 times a year - brings lots of debris
- 10 Not much information
- 11 Floods weeks at a time
low land, section of road is being upgraded
- 12 Road is being upgraded 4-6 times a year - brings debris
- 13 Small bridges 1 or 2 times a year - brings debris
- 14 Couple of small streams
- 15 Floods some time - 2 or 3 times
- 16 1 in 5 year
- 17 Does not flood but brings debris

Community Based Mapping

Students learning on use of mobile mapping technology in Dominica



Mobile Mapping

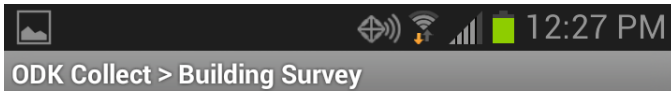
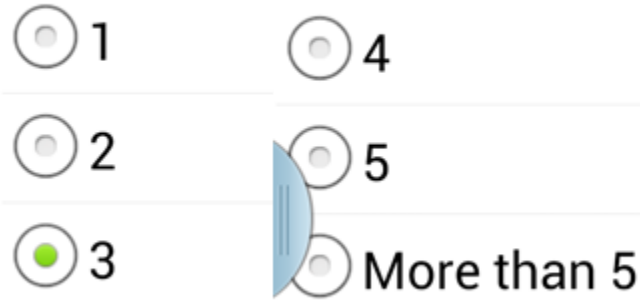


Location

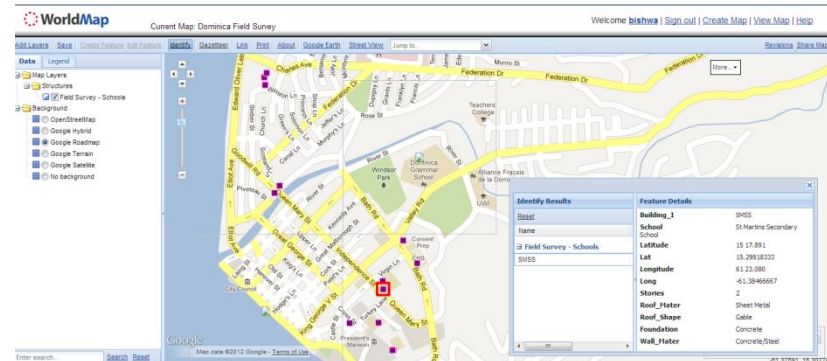
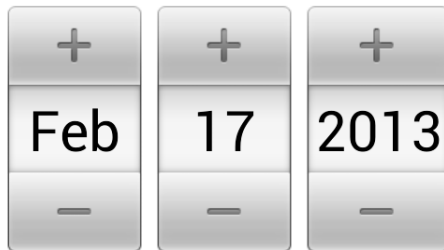
Replace Location

Latitude: N 38°52'54"
Longitude: W 77°24'9"
Altitude: 85m
Accuracy: 5m

Number of Stories



Today's Date

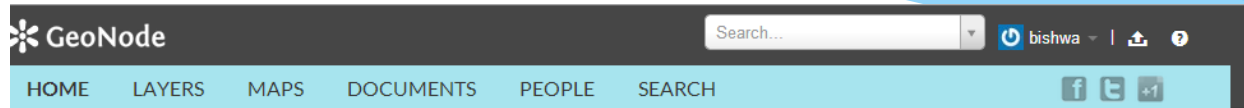


Use of Smartphone in capturing real time data

From Data to Decision

- Belize Climate Resilience Infrastructure Project
- Dominica Shelter Vulnerability Assessment

From Data to Decision



WELCOME

GeoNode is an open source platform for sharing geospatial data and maps. If you have any questions about the software or service, join our [mailing list](#).

Need help [Getting Started?](#)

LATEST LAYERS

Total: 16

Layer



Roads

from [admin](#), 1 day, 16 hours ago

Roads layer provided by the Department of Lands and Surveys. Based on existing topographic maps (1:30,000 scale). Data may be outdated (1970s-1980s).

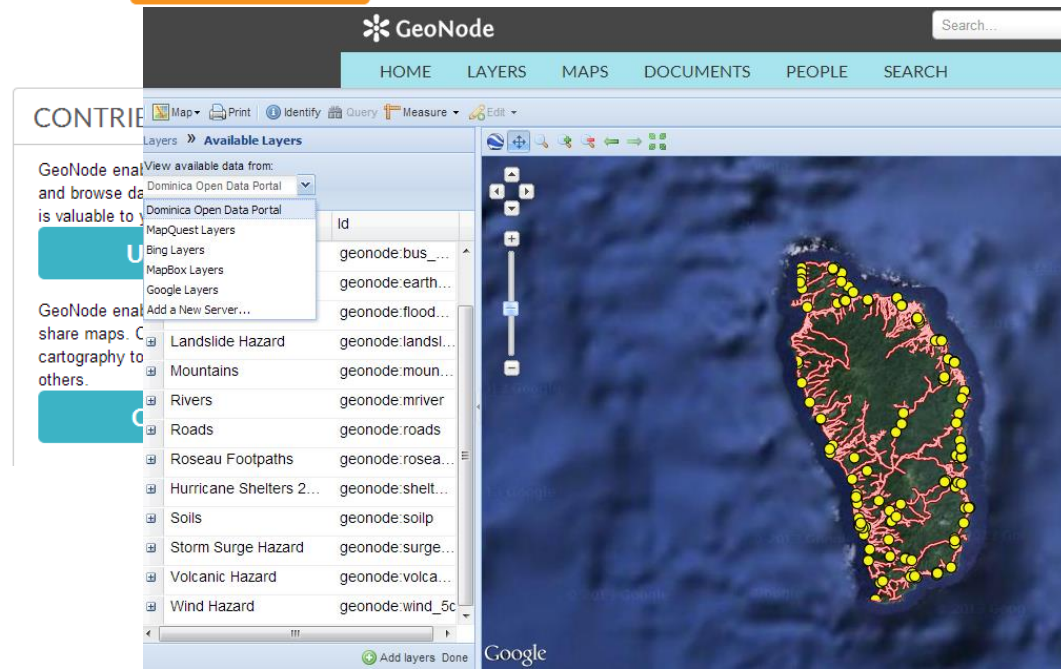
0 views | Average rating ☆☆☆☆ (0)

[Download](#)

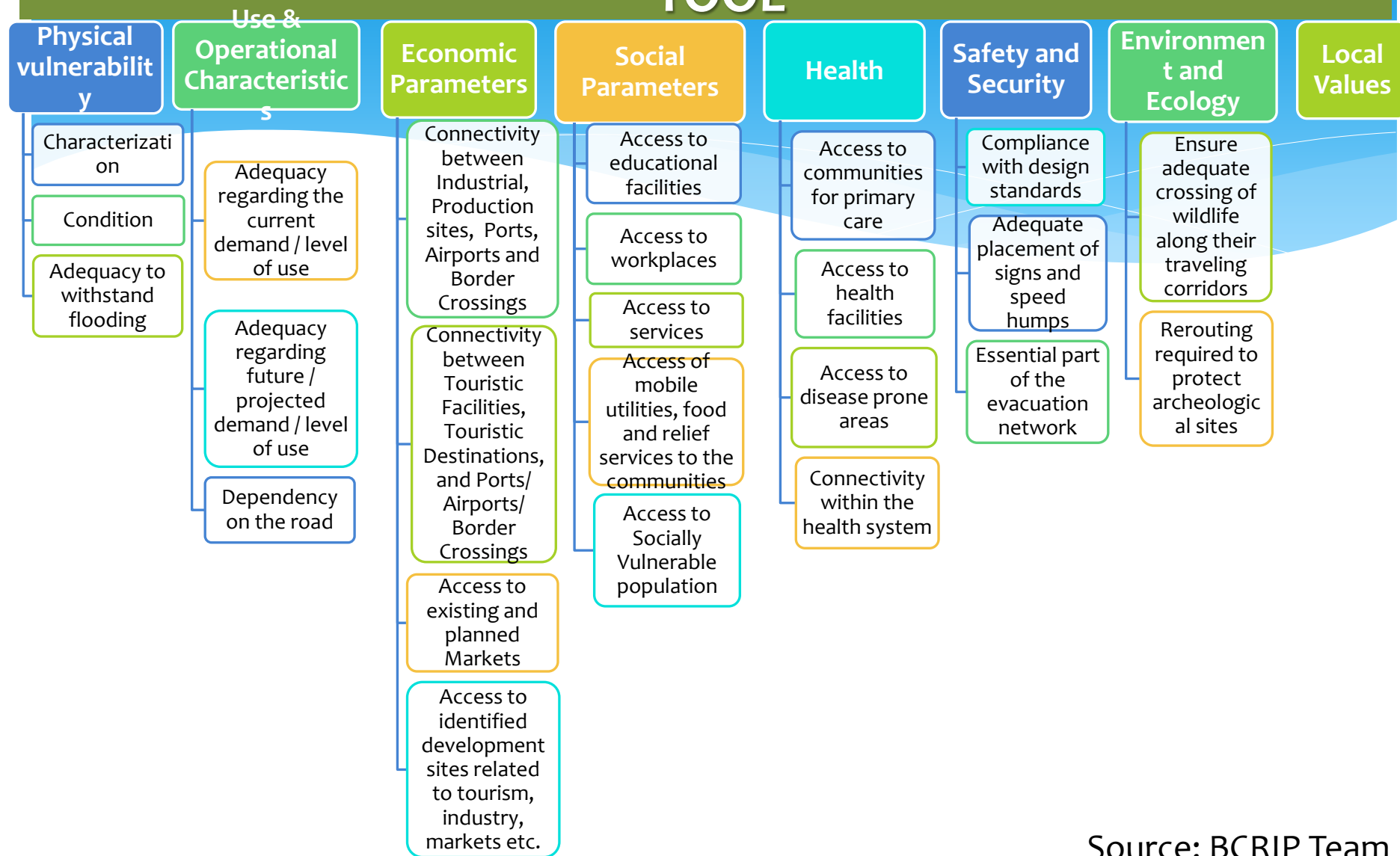
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[Explore Layers](#)

[Explore Maps](#)



CLIMATE CHANGE ADAPTATION DECISION SUPPORT TOOL



Source: BCRIP Team

CLIMATE CHANGE ADAPTATION DECISION SUPPORT TOOL

INFRASTRUCTURE CRITICALITY

Driven by Belize key stakeholders
(Ministries, Agencies)

MCE
RANKING OF ROAD SEGMENTS

HAZARDS EVALUATION

WB driven
(Hazard Analysis based on
occurrence of past events,
probabilistic assessments, etc)

HAZARD ANALYSIS:
HAZARD LEVELS

INTEGRATION
HAZARD & CRITICALITY



INFORMED DECISION
MAKING

Source: BCRIP Team