Open Data for Resilience in Latin America and the Caribbean

Vivien Deparday
GFDRR Labs / World Bank
Open Data for Resilience Technical Lead

10th United Nations Regional Cartographic Conference for the Americas
Great natural catastrophes worldwide 1950 – 2011
Overall and insured losses with trend

Why it matters?
Latin America and the Caribbean (LAC) region is one of the most vulnerable region with respect to natural disasters.

20 countries in LAC region have half of the GDP exposed to natural disasters.

Damages due to natural hazards happen because of how and where we build.

The key is using (geospatial) data in decision making process.
Data about **hazard** and **exposure** are key for:

- Investments for disaster risk reduction, mitigation and prevention (i.e. school retrofitting, dredging)
- Emergency preparedness
- Real time impact assessment to guide response
- Disaster Risk Financing
- Post Disaster Needs Assessment (PDNA)
- Recovery

The *Natural Hazards, Unnatural Disasters* report highlights the importance of information sharing in effective Disaster Risk Management.
OpenDRI in the Carribean (video)
The Open Data for Resilience Initiative (OpenDRI) encourages and facilitates the sharing of climate and disaster data to enable more effective decision-making by providing the rationale, technical assistance, and tools for data sharing.

OpenDRI has programs in more than 20 countries around the world.

1. Institutional support
2. Technical support
3. Innovation through open source software and collaboration with international communities
4. Capacity building
5. Knowledge management and exchange
6. Local and international partnerships
OpenDRI Overview

Community Mapping

Government, Agencies Data

Data Sharing and Data Dissemination

Decision Making and analysis

New information
Community Mapping
OpenStreetMap (OSM) is a collaborative project to create a free and open digital map of the world.

Thanks to the collaborative efforts of participants from all over the world (individuals, public agencies, private companies, NGOs...)

Data collected include streets, footpaths, parks, rivers, buildings, shops and other point of interests...
- Ongoing exposure data survey using OSM in Indonesia, Nepal and Sri Lanka, Philippines using remote tracing and field papers.
- In Dominica, mobile exposure data collection initiative with smartphones and the Open Data Kit
Data Sharing and Dissemination
Challenges with the Spatial Data Sharing

- 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
Search, Catalog and Manage Geographic Data

GeoNode

An approach to spatial data infrastructure focused around users and collaboration

Simple web-based tools:
- Search data catalog
- Metadata management
- User and permission management
- Standards compliant (OGC)
Create and Share Interactive Map

Title: Haiti Administrative Boundaries Admin Level1 (Department), CHGIS - polygons
File name: Hi_boundaries_departements_admin1_map_polygons
Download raw data
Other formats: Shapefile (DBF, SHAPE, 3.1.1 City Base Geosrv RUS PDF PDF)
Layers: Haiti in CHGIS Data
Metadata language: eng
Map date: May 9, 2012, 12:49 a.m. Data type: publication: edition:
Type: vector
Update frequency: unknown
Point of Contact: data@chgis.org
Country and Region: Haiti
Use Constraints: as is and as available: copyright
Topic Category: boundaries
Manage
- Update the description of this data
- License terms of use of this data
- Remarks

openDRI | GFDRR Labs
Countries currently engaged:

<table>
<thead>
<tr>
<th>Country</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haiti</td>
<td><a href="http://www.haitidata.org">www.haitidata.org</a></td>
</tr>
<tr>
<td>St Lucia</td>
<td><a href="http://sling.gosl.gov.lc/">http://sling.gosl.gov.lc/</a></td>
</tr>
<tr>
<td>SVG</td>
<td><a href="http://geonode.gov.vc/">http://geonode.gov.vc/</a></td>
</tr>
<tr>
<td>Dominica</td>
<td><a href="http://www.dominode.net">www.dominode.net</a></td>
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<tr>
<td>Grenada</td>
<td>Intranet version only</td>
</tr>
<tr>
<td>Belize</td>
<td><a href="http://geoserver.bnsdi.gov.bz/">http://geoserver.bnsdi.gov.bz/</a></td>
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<tr>
<td>Cariska</td>
<td><a href="http://cariska.mona.uwi.edu/">http://cariska.mona.uwi.edu/</a></td>
</tr>
<tr>
<td>Guyana</td>
<td>Coming soon</td>
</tr>
<tr>
<td>Bolivia</td>
<td><a href="http://geosinager.defensacivil.gob.bo/">http://geosinager.defensacivil.gob.bo/</a></td>
</tr>
</tbody>
</table>

Current Activities to promote OpenDRI

- Institutional Support
- Technical Support
- Innovation
- Capacity Building
- Knowledge Exchange
- Partnership
Disaster Risk Management
Decision support
Analysis
InaSAFE is a free software tool that produces realistic natural hazard impact scenarios for better planning, preparedness and response activities.

Easy to use tool to empower local government to make informed decision:

• Uses exposure, hazard and vulnerability to calculate risk
• Risk information is classified to facilitate decision support
• Desktop tools (QGIS plugin), web-based (GeoNode plugin)
InaSafe

Perhitungan
Skala terakhir
Sebahu terenggahnya banjir Jakarta 2007
Bentuk banjir
Penduduk Jakarta
Yang terjadi
Perlu Evaluasi
Hasil

Apabila terjadi "sebahu terenggahnya banjir Jakarta 2007" perhitungan dampak terhadap "Penduduk Jakarta" kemungkinan yang terjadi:

Perlu Evaluasi (x 1,000):

<table>
<thead>
<tr>
<th>Bantuan</th>
<th>Jumlah</th>
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<tbody>
<tr>
<td>Beras [kg]</td>
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</tr>
<tr>
<td>Air Minum [l]</td>
<td>9862</td>
</tr>
<tr>
<td>Air Bersih [l]</td>
<td>22445</td>
</tr>
<tr>
<td>Kit Kesejahteraan</td>
<td>67</td>
</tr>
<tr>
<td>Jamban Keluarga</td>
<td>10</td>
</tr>
</tbody>
</table>

Catatan:
- Jumlah penduduk Jakarta 6378
- Jumlah dalam ribuan
- Pendarat perlu dierkasi ketika banjir lebih dari 1 m.
- Minimum Bantuan per minggu (BNPB Perda 7/2008)

Didampingi oleh AusAID dan Bank Dunia

OpenDRI
GFDRR Labs
Capacity building, knowledge exchange and partnerships
Capacity Building and Knowledge Exchange

<table>
<thead>
<tr>
<th>Training/Workshop</th>
<th>Date</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>Spatial Data Management Training</td>
<td>January, 2013</td>
<td>Belize</td>
</tr>
<tr>
<td>Advanced Training on spatial data management</td>
<td>Feb. 18-23, 2013</td>
<td>UWI - Trinidad</td>
</tr>
<tr>
<td>Training on Exposure and Hazard Risk Mapping</td>
<td>April 2013</td>
<td>SVG</td>
</tr>
<tr>
<td>DVRP Data Management Workshop</td>
<td>Fall 2013</td>
<td>SVG</td>
</tr>
<tr>
<td>Regional Workshop on Guyana- Conservancy Adaptation Project</td>
<td>Late 2013</td>
<td>Guyana</td>
</tr>
<tr>
<td>Caribbean Risk Information Program - Kickoff</td>
<td>Late 2013</td>
<td>TBD</td>
</tr>
</tbody>
</table>

- Strong community of practitioners - about 80 active participants
- Monthly Webinar
- Continuous engagement with community of practitioners
Partnerships on local projects

- Partnership with local entities (government agencies)
- Local tech companies and communities
- Local universities (e.g. University of West Indies)
- The Nature Conservancy
- Caribbean Community Climate Change Center
- USAID
- OCHA, UNDP
- Humanitarian OpenStreetMap Team
- MapAction
- NASA
Open Source Communities

And more…
Thank You

Vivien Deparday
Technical Lead – Open Data for Resilience
Global Facility for Disaster Reduction and Recovery
vdeparday@worldbank.org

Bishwa Pandey
Senior Data Management Specialist
The World Bank – Latin America and Caribbean
bpandey@worldbank.org
OpenDRI Field Guide

- Based on 2 years of GFDRR experience and input from a variety of other groups working (OCHA, USAID, …) on the issue
- To make the practices of the open data movement relevant to disaster risk management work
- Practical guide on designing, piloting, scaling and sustaining an OpenDRI project
- Will launch in November
InaSafe

In case of "Sumatran fault magnitude 7.8 scenario" the estimated impact to "OSM building footprints" is:

- Buildings (Total): 46895
  - No damage (<10%): 3269
  - Low damage (10-33%): 2807
  - Medium damage (33-66%): 4176
  - High damage (66-100%): 36584

Assumption:
- Levels of impact are defined by post 2009 Padang earthquake survey conducted by Geoscience Australia and Institut of Technology Bandung.
- Unreinforced masonry is assumed where no structural information is available.
Mobile Data Collection - Structural Survey

ODK Collect 1.2.2 (1023)
Data collection made easier...

Fill Blank Form

ODK Collect > Building Survey

Today's Date

+ + +
Feb 17 2013

- - -

Number of Stories

1 4
2 5
3 More than 5

Open Data Kit in Dominica

- Custom survey forms can be developed for any type of data collection
- Smartphones has mobile application (app) development platform
- Has GPS, digital compass
- Camera/voice recorder/barcode reader
- Real time data
GeoNode Bolivia – Federation Model

Health
http://geosnis.sns.gob.bo/

Geology
http://georiesgos.sergeotecmin.gob.bo/

Civil Defense
http://geosinager.defensacivil.gob.bo/

Hydromet
http://mapas.senamhi.gob.bo/

Military Geography Institute
http://geonode.igmbolivia.gob.bo/
Example: Risk Assessments
A critical step toward understanding risk and building resilience

Hazard (i.e. earthquake)  Exposure (i.e. houses)  Vulnerability function (of house to quake)  Impact estimate to manage risk (i.e. probable loss)

Answers questions such as:
• How should we target retrofitting projects towards most at-risk infrastructure?
• What is the likely impact of an earthquake of a given magnitude on housing stock?
• Where should disaster management agencies preposition response assets in order to best respond to an event?
Examples of use

- Simple data export for further use
- Creation of nice base maps: MapBox, Stamen
- Routing applications: OpenTripPlanner
- Thematic maps: accessibility, conservation, leisure, etc…
- Disaster risk management: inaSAFE
- Update of national datasets: Indonesian Mapping Agency (BIG), South Africa (NGI)
1. Helping ensure that data created by GFDRR-funded projects is made available to the public

2. Partnering with ministries to help establish better institutions for managing and sharing risk information

3. Facilitating partnerships with international organizations to help them release their data

4. Engaging Communities in Participatory Mapping

5. Designing tools and building capacity to help decision-makers take better advantage of their risk information
OpenDRI Tools

- **OpenStreetMap**
  - Discussion with ministries, government agencies and other organizations to share data

- **GeoNode**

- **CAPRA** (for expert)
  - inaSafe (for non-expert)
    - desktop
    - web

- Other decision support tools

Data collection / gathering → Data sharing → Decision making
Why OSM?

- possibility to get richer and more detailed data
- data can get corrected and be kept up to date
- open source tools for online or offline mapping
- a common platform for uploading and hosting data with free and open access
- an active global community of users
- resources for growing your community: training materials, communication platforms
In 14 months:

25+ training workshops

5 Universities: Universitas Indonesia, Institut Teknologi Sepuluh November, Institut Teknologi Bandung, Universitas Gadjah Mada, Universitas Andalas

500+ people trained

200,000+ buildings mapped

http://id.openstreetmap.or.id/
Map production process

Collect data

Upload and edit the data

See the live map and use the data
Data collection

- Tracing available imageries

- Field survey with: GPS, annotations on Walking Papers, mapping parties / workshop, phone applications...

- Bulk import from existing large datasets
Java OpenStreetMap Editor (JOSM)
Open source desktop software
fungsi bangunan: hunian (residential)
struktur bangunan:
tipe dinding: papan kayu (wood)
tipe atap: seng (tin)
jumlah tingkat: 1
Global Data Collection

Videos of the evolution of OpenStreetMap around the world

Source: ITO World
Leveraging the online data catalog
Visualizing critical infrastructure data

HOSPITALS (OSM)

MAPS USING THIS LAYER
This layer is not currently used in any maps.
Jakarta flood prone areas and hospitals
Result: Number of hospitals potentially flooded

Action Checklist
- Are the critical facilities still open?
- Which structures have warning capacity (e.g., sirens, speakers, etc.)?
- Which buildings will be evacuation centres?

32 buildings would have to be closed from a total of 96

SAFE
Scenario Assessment
For Emergencies

Ask again