Jamaica’s National Emergency Response GIS Team (NERGIST) -

Leveraging Geospatial Data for Disaster Impact Assessment and Emergency Management

Presented by: Nadine Brown
December 3 – 5, 2012
What is NERGIST

- National Emergency Response Geographic Information Systems Team

- A group of volunteers consisting of technical GIS specialists drawn from multiple state and private sector entities and tertiary education institutions
What is NERGIST

- Dedicated to undertaking damage assessment and analysis prior to and post meteorological and geological events.

- Established by the National Disaster Committee/ Damage Assessment sub-committee, the Office of Disaster Preparedness and Emergency Management (ODPEM) and the National Spatial Data Management Division (NSDMD)
What is NERGIST

- Approved by Cabinet in 2010
- Group consists of 20 volunteer agencies across public and private sector
- The team has been trained in the use of the USAID IDA/DANA methodology for performing initial damage assessment
- The IDA is designed to assess damage to infrastructure – housing, critical facilities
Volunteer Agencies

- Office of Disaster Preparedness and Emergency Management
- Ministry of Water, Land, Environment and Climate Change / National Spatial Data Management Division
- National Land Agency
- Statistical Institute of Jamaica
- National Work Agency
- Urban Development Corporation
- National Housing Trust
- National Water Commission
- Jamaica Bauxite Institute
- Jamaica Defense Force
- Ministry of Transport and Works
- Metrological Service
- National Irrigation Commission Limited
- Jamaica Public Service
- Social Development Commission
- Electoral Office Jamaica
- Ministry of Health
- Planning Institute of Jamaica
Operating Guidelines

- ODPEM/NDC
- NERGIST MANAGER
- PARTNERING GOJ AND OTHER ENTITIES
- GIS VOLUNTEER
Responsibilities of the ODPEM

- Guide and monitor NERGIST
- Supervise and monitor all field work conducted by the NERGIST
- Provide training in damage assessment and the DaLA process and guidelines for data collection
- Defray costs for meals, provide cots and blankets at the operations centre.
Responsibilities of the NSDMD/LICJ

- General management of NERGIST
- Manage the NERGIST operations centre
- Provide and maintain NERGIST OC equipment and software
- Coordinate secondary data collection and analysis
- Post maps and data generated pre and post events on the LICJ geospatial portal or other relevant websites.
- Provide a report on personnel and on the state of items borrowed, at the end of operations
Responsibilities of Partnering GOJ and other Entities

- Release GIS personnel/volunteers
- Determine duration over which Specialist(s) and resources will be made available
- Provide GNSS receivers and cameras (if available)
- Cover subsistence and travel costs of officer(s)
- Provide existing geospatial data if available and required to support planning and recovery analysis exercises.
GIS Volunteers’ Responsibilities

• The team is required to work over a period of 3 to 5 days after major disaster events at the NERGIST Operation Centre.

• In the field: - damage assessment and data collection
  • Collect geo-spatial data using GIS grade GNSS receivers and digital cameras. This includes mapping the spatial extent and location of houses and areas affected by storm surge, flooding and landslides.
GIS Volunteers’ Responsibilities

- In the operation centre: data integration, analysis, and map production
- Create and edit spatial data
- Perform spatial analysis using GIS software
- Produce situation maps from data provided using ArcGIS
- Download and edit GPS data collected in the field
GIS Volunteers’ Responsibilities

- Integrate GPS data with existing data sets
- Perform image analysis
- Produce maps required and requested
- Perform duties professionally
Benefits Gained from Establishing NERGIST

- coordinated, comprehensive and efficient disaster assessment exercises
- accurate data provided to decision makers in a timely manner
- duplication of effort to collect impact data is reduced
Benefits Gained from Establishing NERGIST

- A scientific framework to properly cost reconstruction and recovery exercises is provided.

- Fair distribution of benefits to affected persons. This will enhance the credibility of the recovery exercise and should satisfy the donor organisations.
NERGIST ACTIVITIES

- Tropical Storm Gustav – test run
- Tropical Storm Nicole
- Hurricane Sandy
First Assignment – Tropical Storm Gustav - 2008

- **TS Gustav**
  - Impacted Jamaica between August 28 and 29,
  - Estimate of Damage and Losses - $15.51 billion (US$213.99 million)
  - 12 lives lost
  - 2% of GDP
TS Gustav – IDA Map
TS Gustav – IDA Map
Tropical Storm Nicole - 2010

- Affected the island over a 6-day period (September 26-October 1)
- Approximately 139.54 inches (3,544.4 mm) of rainfall
- 16 lives lost
- Cost - $20.58 billion (US $239.6 million)
- 1.9% GDP
NERGIST – Entities that Provided Equipment and Transportation

**Equipment**
- Office of Disaster Preparedness and Emergency Management (ODPEM)
- Statistical Institute of Jamaica (STATIN)
- National Works Agency (NWA)
- National Housing Trust (NHT)

**Transportation**
- Office of Disaster Preparedness and Emergency Management (ODPEM)
- Land Administration and Management Programme (LAMP)
- Ministry of Agriculture and Fisheries
- National Land Agency (NLA)

**GIS for Blackberry Application**
- GeoTechVision Enterprises Ltd (Private)
NERGIST - Deployment

- Members of NERGIST were notified via SMS and email for response to Tropical Storm Nicole on the directive from ODPEM.

- GNSS/GPS Device were uploaded with Data Dictionary for Initial Damage Assessment.

- Incidence Map was generated in Google maps from information received by ODPEM.
NERGIST- Data Collection

- Initial Damage assessment was done in the following parishes – Westmoreland, Hanover, St. Catherine and St. Elizabeth

Pilot Test

- Point location of damages collected using GIS on Blackberry application – Freearce Mobile
Hurricane Sandy

- October 24-25, 2012
- 1 death
- Preliminary Cost J$ 5 billion
Preparation for Hurricane Sandy

- Risk Assessment Map – ArcGIS Explorer online
- Tools to identify, evaluate and prioritize risks
- Shows path of the storm in relation to critical assets
- Allows NERGIST volunteers to add shapefiles
- Risk Assessment Map is shared with the staff of the Office of Disaster Preparedness and Emergency Management
Regional Initiative – Rapid Needs Assessment Team (RNAT)
Rapid Needs Assessment Team (RNAT)

- Purpose - to conduct a rapid assessment of the impact of an event and identify the emerging needs and recommended actions within 72 hours for key decision making for an effective response.
Rapid Needs Assessment Team (RNAT)

Objectives – Bahamas Mission:

- to conduct a rapid needs assessment of Cat Island, Bahamas after the passage of Hurricane Irene in 2011, to:
  - Assist the Bahamas in linking Damage Assessment to needs articulation and preparing a Priority Needs List immediately after the event.
  - Provide guidance to assist in better articulating requirements for national and external assistance.
Participating Agencies/Organizations

- Jamaica Defence Force,
- National Spatial Data Management Division (Jamaica)
- Coastal Zone Management Unit, Barbados,
- University of the West Indies
- National Environment and Planning Agency, Jamaica
- Caribbean Disaster Management Agency
- Pan American Health Organization
- United Nations Disaster Assessment and Coordination (UNDAC/OCHA),
Population estimate for Cat Island in 2007 was 1,647 which is male 854 and females 793. The number of households are 599. The calculated average person per household is 2.5 persons. This was used to estimate the number of building spread across the island. A sampling method was used to conduct an overall damage assessment of the buildings.

**Damage Analysis Result**

New Bight Settlement had on average level 1 and 2 building damages.

Freetown and surrounding settlements had on average level 1 building damages.
Challenges

- Transportation
- Equipment
- Reaching the affected areas in a timely manner
- Coordinating volunteers after the event
Use of Crowdsourcing Mechanism in Disaster Risk Management in Jamaica

- ODPEM - National Emergency Operation Centre
- ODPEM Damage Assessment Information System
- National Works Agency EOC
- Earthquake Unit
ODPEM INCIDENCE MAP

COMMUNITIES AFFECTED BY TROPICAL STORM NICOLE

Legend
Hazard
- Flooding
- Freak Storm
- Landslide
- Multiple - Landslide/Flooding
- Storm Surge
- Wind damage

0 5 10 20 30 40 Kilometers

St. Andrew
Kingston
NWA EOC EMap
Earthquake Unit - UWI

Quick Information

Frequently Asked Questions | Safety Tips

FREQUENTLY ASKED QUESTIONS

- What is an earthquake?
- What is a fault?
- Where does this energy come from?
- What causes most earthquakes?
EARTHQUAKE REPORT FORM

This form is part of a study of the effects of the earthquake of _____________ (date) which occurred at ______________ (time). If you did not feel the earthquake answer only questions 1, 2 and 5, your information will still be useful. Return completed questionnaire to the address on back.

WHERE WERE YOU

1. Where were you at the time of the earthquake?
   Parish ____________________________________ Town/District ________________________________
   Street Address ________________________________________________________________
   Outdoors [ ] Indoors [ ] Stationary vehicle [ ] Moving vehicle [ ]
   Other [ ] ____________________________________________________________
   1. b) If indoors: Which floor were you on? ______________ Height (number of stories) ______
   Function (house, school, church etc.) ________________________________
   Construction (brick, stone, wood etc.) ________________________________

2. What were you doing?
   Walking [ ] Standing [ ] Sitting [ ] Kneeling [ ]

EARTHQUAKE SHAKING AND SOUND

3. What best describes the shaking you felt?
   No shaking [ ] Trembling [ ] Swaying [ ]
   Rolling motion [ ] Other [ ] ________________________________
   3. b) How strong was the shaking? Weak [ ]
   What best describes any sound you heard?
   No sound [ ] Rumbling [ ] Roaring [ ]

8. Were you frightened? No [ ] Yes [ ]
   8. b) Did anyone run outdoors in fright where you were?
   No [ ] Yes, a few [ ] Yes, many [ ] Yes, most/all [ ] Don’t know [ ]

9. Were any animals nearby frightened?
   No [ ] Yes, pets [ ] Yes, farm animals [ ] Don’t know [ ]

EFFECTS ON OBJECTS, BUILDINGS ETC.

10. Did any of the following things happen?

<table>
<thead>
<tr>
<th>Windows/doors rattled</th>
<th>Crackly, etc. rattled</th>
<th>Hanging objects swung</th>
<th>Pictures moved askew</th>
<th>Small objects shifted or fell</th>
<th>Books or similar objects shifted or fell</th>
<th>Furniture shook visibly</th>
<th>Furniture shifted out of place</th>
<th>Furniture toppled over</th>
<th>Pendulum clock stopped</th>
<th>Plants shook</th>
<th>Liquids splashed or spilled</th>
</tr>
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<tbody>
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</tbody>
</table>

Please give details or state anything else you noticed

______________________________________________________________________________________________________________________________________________________________________________________________________________________________
<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Day</th>
<th>Time (EST)</th>
<th>a.m. / p.m.</th>
<th>Mag., Mt</th>
<th>degrees N</th>
<th>degrees W</th>
<th>depth, km</th>
<th>Sub-area</th>
<th>Sub-area name</th>
<th>Epicentre location</th>
<th>Intensity, EMS</th>
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</thead>
<tbody>
<tr>
<td>2006</td>
<td>February</td>
<td>13</td>
<td>7:30</td>
<td>a.m.</td>
<td>4.3</td>
<td>18.14</td>
<td>78.05</td>
<td>5</td>
<td>14</td>
<td>New Bank Fracture Zone</td>
<td>Offshore south-eastern Westmoreland</td>
<td>Reports from Westmoreland (Savanna-La-Mar)</td>
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<tr>
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<td>March</td>
<td>12</td>
<td>7:23</td>
<td>a.m.</td>
<td>2.9</td>
<td>18.17</td>
<td>77.38</td>
<td>10.5</td>
<td>15</td>
<td>Rio Minho Crawle River Fault Zone</td>
<td>Northern Clarendon</td>
<td>One report from Manchester [Ingleside II]</td>
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<tr>
<td>2006</td>
<td>April</td>
<td>7</td>
<td>6:11</td>
<td>a.m.</td>
<td>3.0</td>
<td>18.1</td>
<td>76.68</td>
<td>10</td>
<td>16</td>
<td>Blue Mountains Block</td>
<td>Near Silver Hill Peak, Portland</td>
<td>It was reportedly felt in Stony Hill, St Andrew with an intensity of III</td>
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<tr>
<td>2006</td>
<td>May</td>
<td>19</td>
<td>11:13</td>
<td>p.m.</td>
<td>3.1</td>
<td>18.08</td>
<td>76.68</td>
<td>10</td>
<td>16</td>
<td>Blue Mountains Block</td>
<td>Near Chestervale, St Andrew</td>
<td>Reports from St Andrew</td>
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<td>16</td>
<td>11:16</td>
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<td>3.4</td>
<td>18.18</td>
<td>77.65</td>
<td>10</td>
<td>15</td>
<td>Rio Minho Crawle River Fault Zone</td>
<td>North-East St Elizabeth</td>
<td>One report from St Elizabeth [Santa Cruz II]</td>
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<tr>
<td>2006</td>
<td>August</td>
<td>1</td>
<td>2:16</td>
<td>p.m.</td>
<td>3.9</td>
<td>18.09</td>
<td>76.52</td>
<td>5</td>
<td>13</td>
<td>Port Antonio</td>
<td>Central Portland</td>
<td>It was reportedly felt in Kingston and St Andrew [Mona III, Hope Pastures</td>
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<td>August</td>
<td>19</td>
<td>11:43</td>
<td>p.m.</td>
<td>3.6</td>
<td>18.06</td>
<td>76.74</td>
<td>15</td>
<td>16</td>
<td>Blue Mountains Block</td>
<td>Near Woodford, St Andrew</td>
<td>It was reportedly felt in Kingston and St Andrew [Red Hills IV, Constant</td>
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<td>20</td>
<td>2:26</td>
<td>a.m.</td>
<td>2.9</td>
<td>18.04</td>
<td>76.83</td>
<td>10</td>
<td>21</td>
<td>Kingston</td>
<td>Near Forest Hills, St Andrew</td>
<td>It was reportedly felt in Kingston and St Andrew [Red Hills IV, Liguanea IV]</td>
</tr>
</tbody>
</table>

Produced by Earthquake Unit, UWI Mona, Jamaica 01/2007
HOW DO WE BRING THESE INITIATIVES TOGETHER?
Future of NERGIST

- True Crowdsourcing mechanism - Equipping persons at the community level to capture IDA data

- Real time upload of damage assessment data into server based multiuser geodatabase environment
Future of NERGIST

- A National Disaster Management Application (NDMA) for use by members of the NEOC
  - Equipping Participating agencies with capabilities and expertise to capture/upload damage assessment data to the NDMA
  - Would be useful especially in addressing the issue of coordinating NERGIST deployment
- Training to assess damage caused by geological and man-made hazards
THE END