Using EM-DAT for Localized Disaster Risk Awareness

Understanding the past to anticipate future risks

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Introduction

- I have been using EM-DAT in courses on emergency management and disaster risk reduction, all using a geo-centric approach where location (through GIS) is the common framework used to enhance understanding of all aspects and phases
- In general, EM-DAT is very useful to understanding risk due to its rigor and time span
- While greater precision would be useful, it is no simple task and would have some limitations in its utility

About the Academic Offerings

- 7 years of GIS for Emergency Management at George Washington University (2010-2016)
- Developed online GIS4DRR course for Florida International University's Extreme Events Institute (FIU-EEI) and conducted Implementation Workshops to help turn the lessons into action. Translated to Spanish and offered 4 times so far.

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FIU GIS4DRR

- Embraces the full process of planning and implementing a Geo-Centric DRR program
- Leverages open source approach to allow advancement regardless of resourcing levels
- EM-DAT is a key input to Hazard Profiling stage

Ups and Downs of Using EM-DAT as a Primary Data Source for *Localized* Analysis

- **Pros**
- Can help counter “Recency Bias” by identifying hazards that occur infrequently.
- Directly relates consequences to hazard helping with advocacy and planning
- Highly efficient, complete and curated source
- Disno! Unique ID allows for linking to other data.

- **Cons**
- Past patterns may not reflect those of the future due to:
  - land use change,
  - population growth
  - changes in behavior of hazard mechanism
  - events whose return period exceeds EM-DAT’s history
- Lagging indicator of risk. Consequences must be actualized for inclusion.
- Spatial detail is lacking and what is provided may not be that meaningful…

Approaches to Leveraging EM-DAT for Local Risk Reduction

- Conventional Research Approaches: Use EM-DAT as one of several sources (Google, Wikipedia, local experts\survivors, etc…) to initiate the efforts to map the impacted areas as an indicator of continued risk. This brings more realism through the connection to recorded and observed impacts and may help enhance modeling of future events.
- Risk Characterization Sampling: Consider these events as a sample rather than an anecdote. Deconstruct disaster causality to combination of hazard, terrain and vulnerabilities and match those parameters throughout your community

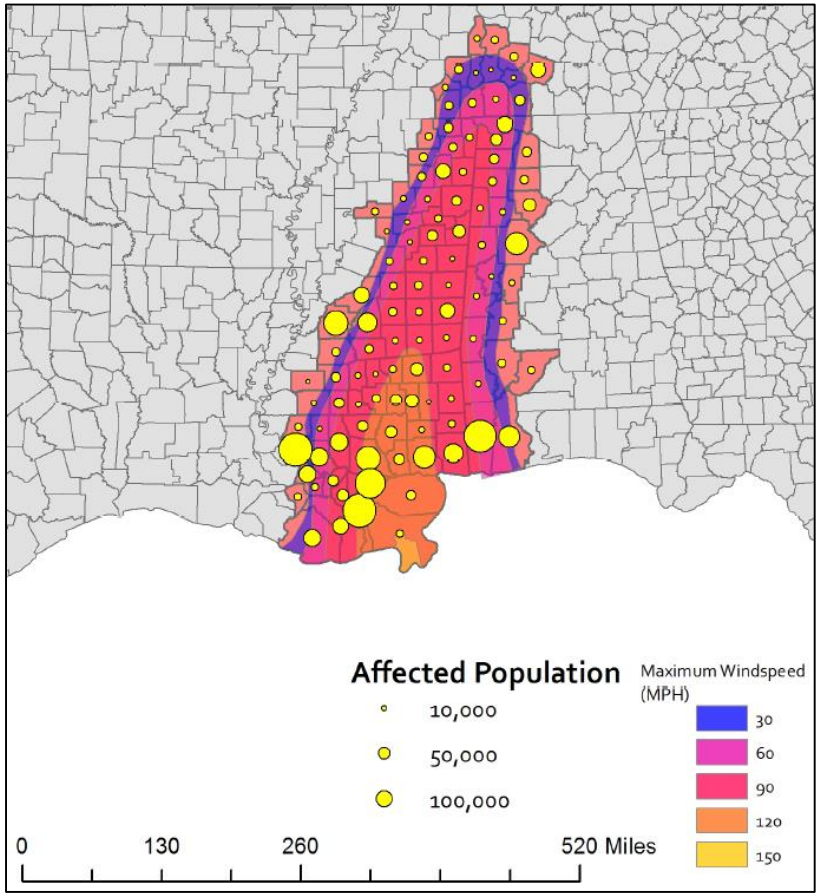
Conventional Delineation Exercise

- In 2016 I challenged my GWU students to map the footprint of a specific hazard and I provided each student one event to map.
- I asked each to provide a hazard footprint, disaster footprint and justification for their approach.
- I intentionally did not prescribe an approach in the written instruction, but I did suggest one or more in my lecture.

Country	Hazard	Year	GLIDE Number	Number
Myanmar (Burma)	Cyclone	2008	TC-2008-000057-MMR	1
Iran	Earthquake	2003	EQ-2003-000630-IRN	2
Sri Lanka	Tsunami	2004	TS-2004-000147-LKA	3
Indonesia	Volcano	2010	VO-2010-000214-IDN	4
Bosnia Herzegovina	Flood	2014	FL-2014-000069-BIH	5
United States	Hurricane	2005	TC-2005-000144-USA	6
Nepal	Flash Flood	2012	FL-2012-000071-NPL	7
Grenada	Hurricane	2004	TC-2004-000089-GRD	8
Pakistan	Flood	2010	FL-2010-000141-PAK	9
Greece	Wildfire	2007	WF-2007-000148-GRC	10
American Samoa	Tsunami	2009	TS-2009-000209-ASM	11

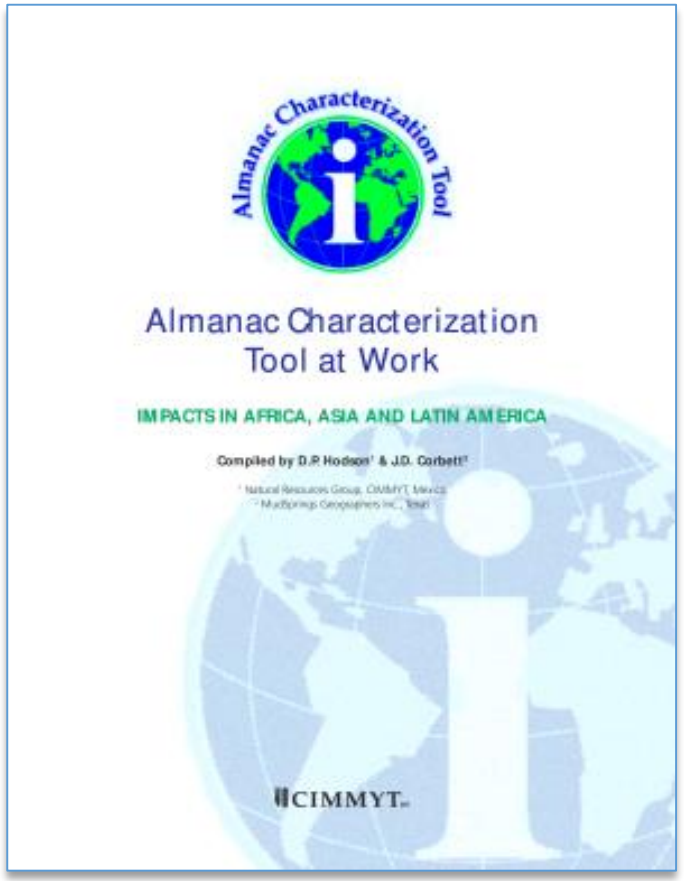
Disaster\Hazard Mapping Exercise: Findings

- Findings:
  - Students had uneven mastery of GIS and this task exposed that dramatically.
  - The range of countries and hazards made for a data acquisition challenge for many
  - Without explicit guidance, many students struggled
  - I think some actively avoided the verbal instructions to experiment, which was useful as they went outside the box.
- Conclusion
  - Distributing this work would present challenges without strict procedures, strong quality control and standardized global data sets.
  - In hindsight, events selected were not transnational, thus avoiding what would have been even a greater challenge



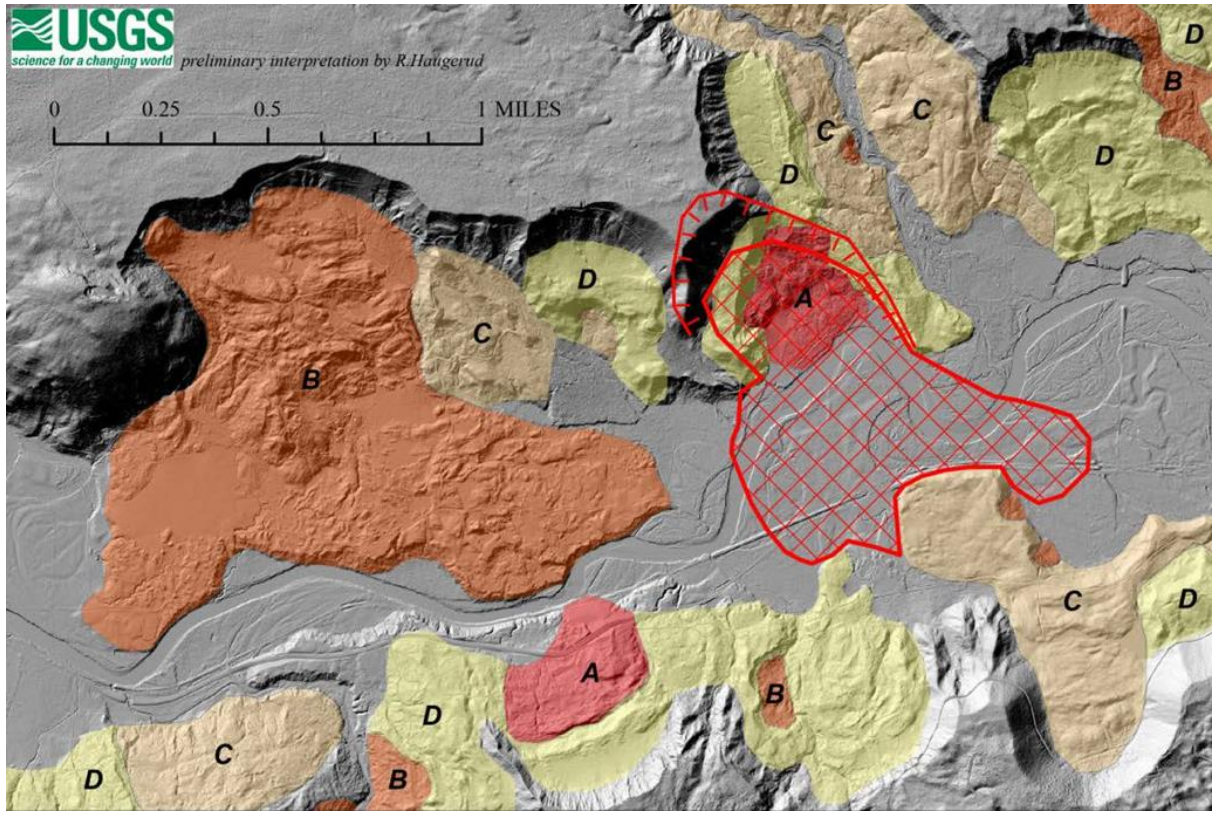
Risk Characterization Sampling

- By understanding the mechanisms of the event, if not the precise footprint, one can generally identify the terrain, land use and general settlement pattern that relate to the risk
- Research opportunities exist to relate EM-DAT events to similar physical, climatalogical and demographic zones (rather than political delineations) through geospatial models



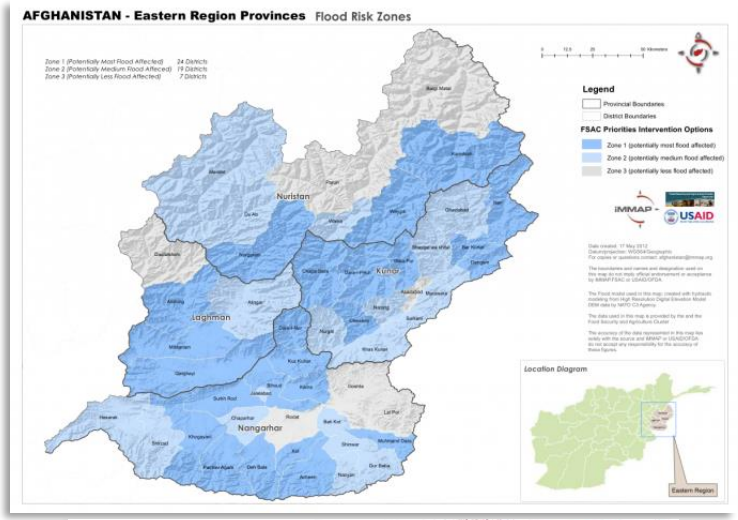
Risk Characterization Sampling (Cont.)

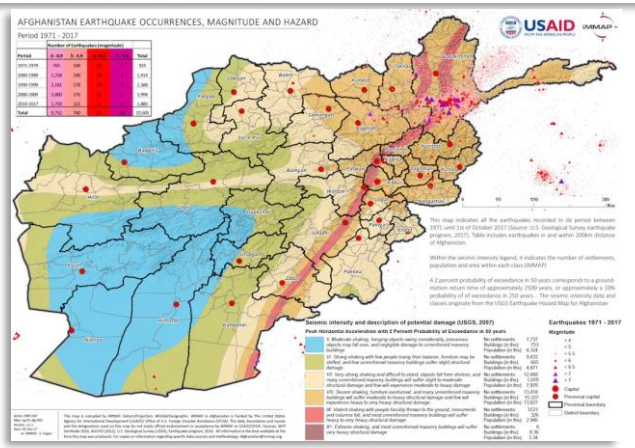
- For natural hazards, all roads lead to DEMS (Digital Elevation Models)
- Many hydro-met and geophysical types of hazards relate to the terrain or their past manifestations can be observed in the terrain
- In summary: If it happened near your community on similar terrain, you likely have a reasonable risk of it visiting you!



Risk Characterization Sampling: Next Steps?

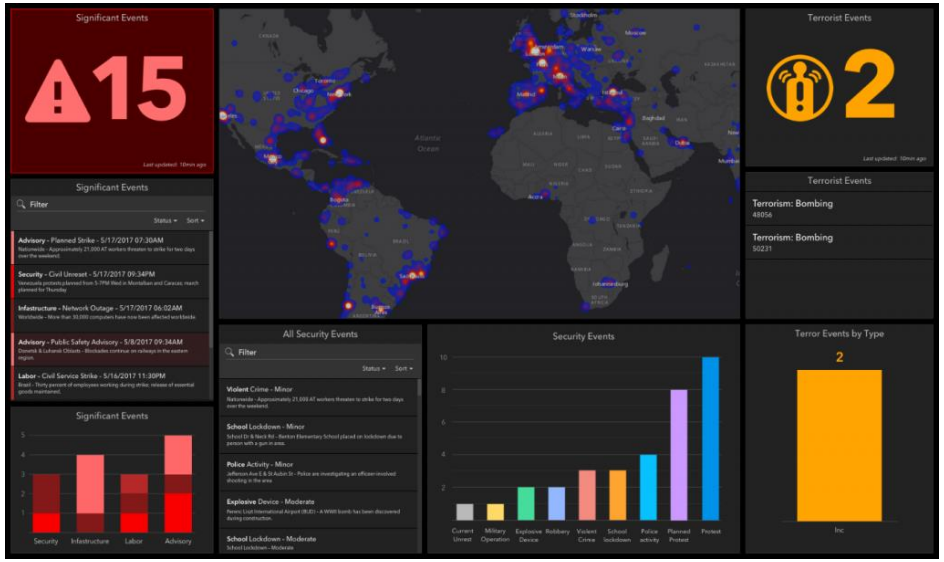
- Consider simple sub-national geolocation approaches (point or buffered point)
- Explore methods for event causality analysis based upon available data sets:
  - Terrain Models interpolated for slope
  - Global Population Distribution (GRUMP, Landscan, etc…)
  - Land Use (minimum Urban\Rural split)
  - Climate Zones
  - GeoHazard Zones
- Establish meaningful thresholds in the above
- Generate models to assign risk based upon those thresholds





Risk Characterization Sampling: Next Next Steps?

- A modeling approach would allow for interaction with dynamic data sets to show risk as a living, dynamic condition. For example, elevating risk as a result of extreme rainfall events or temporary populations shifts.
- Linking EM-DAT to risk related analysis and platforms would allow for greater integration between emergency management disciplines (i.e. Preparedness, Mitigation, Response) and greater utility and relevance to all data sets used in advancing this approach.



Thank you?

Questions?

Keep in touch! nate@gis4drr.org

Geographic Information Systems for Disaster Risk Reduction (GIS4DRR)

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