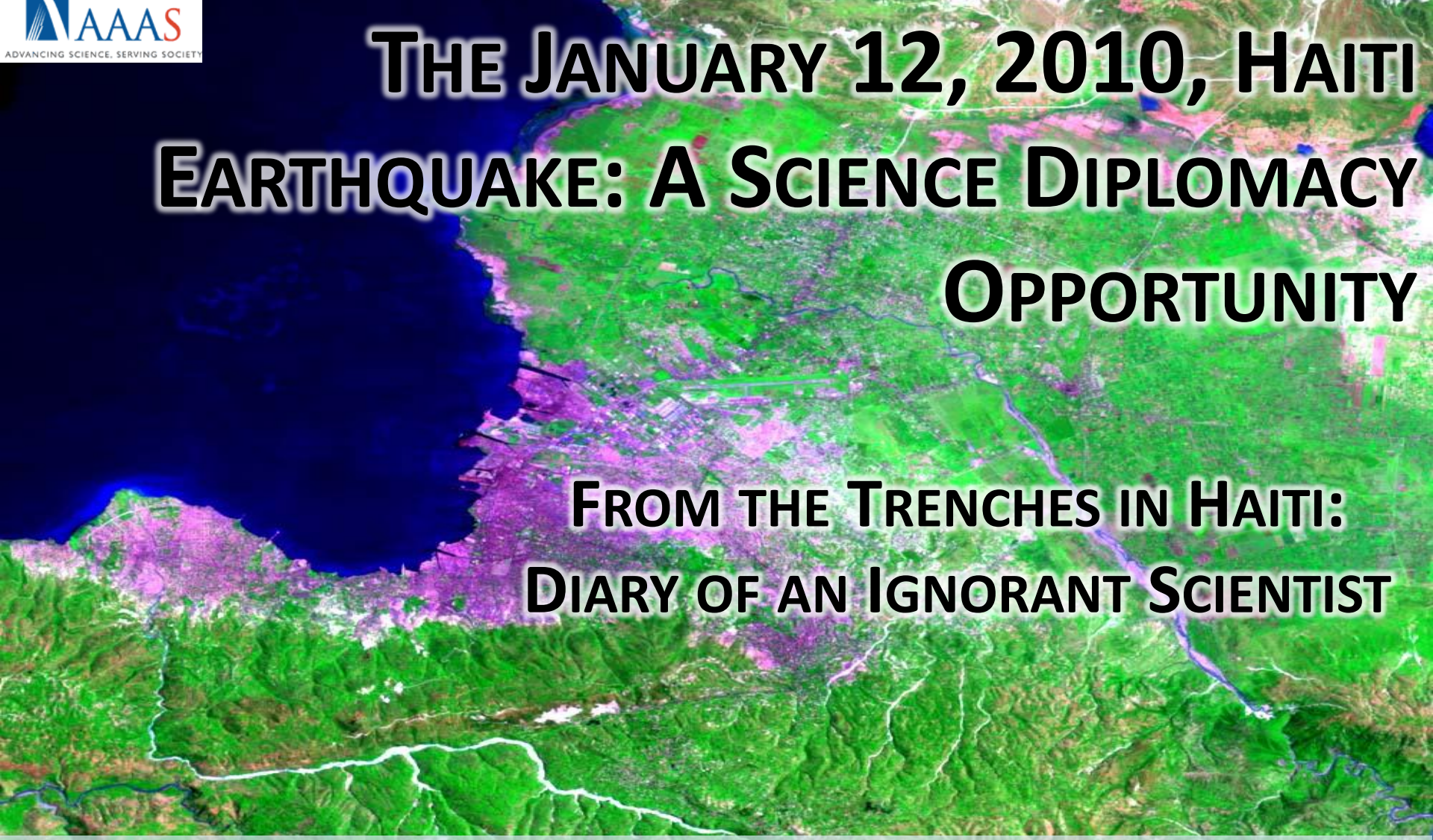

The January 12, 2010, Haiti Earthquake: A Science Diplomacy Opportunity

From the Trenches in Haiti: Diary of an Ignorant Scientist

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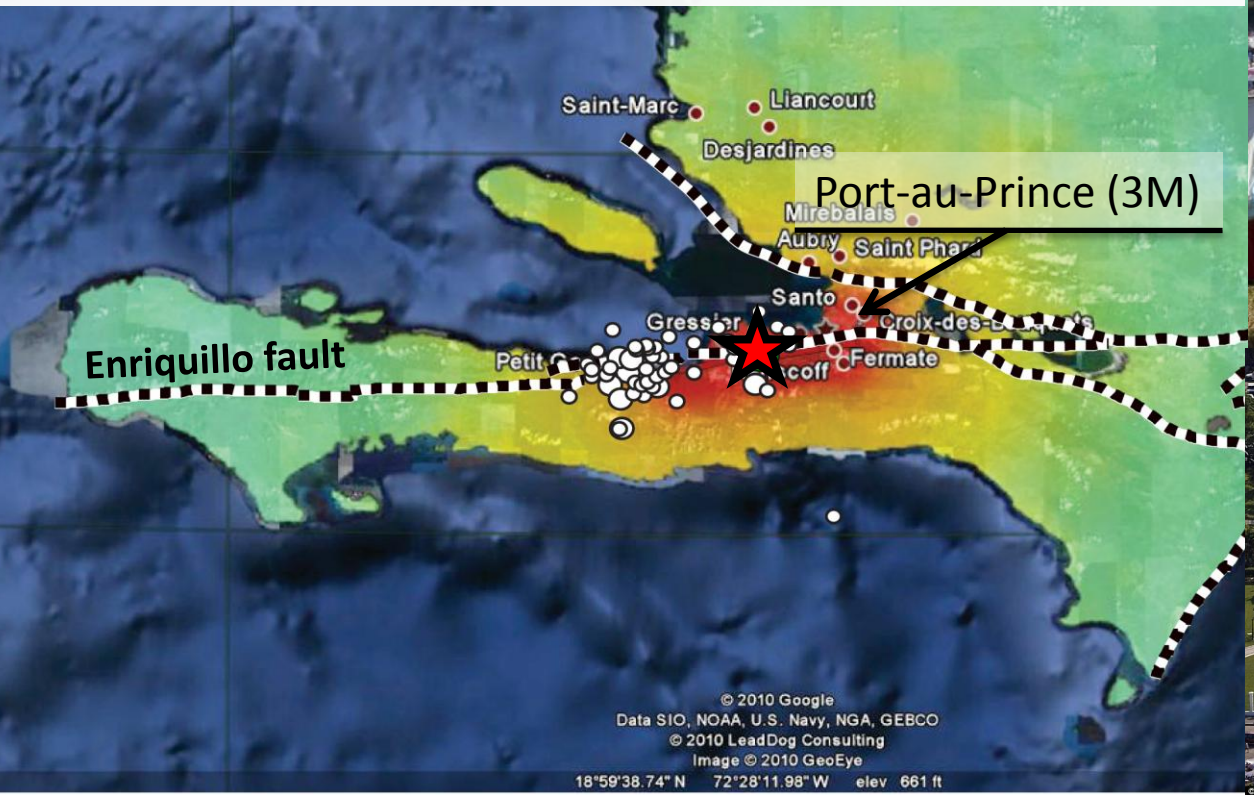
(not talking on behalf or UNDP or of Purdue University)


VULNERABILITY
(3M people, no urban planning, overpopulated, no construction standards, no preparedness)
THREAT (= hazard)
(Enriquillo fault, building up seismic strain at 7 mm/yr, no large earthquake in 250 years)
5 km

The M7.0, January 12, 2010, Haiti earthquake

"…the Enriquillo fault in Haiti is currently capable of a Mw7.2 earthquake if the entire elastic strain accumulated since the last major earthquake was released in a single event today."

Manaker et al., Geophys. J. Int. (2008)



Why did we fail?

Hazard	GDP affected	People affected	Fatalities
2004 hurricane Jeanne	7%	300 000	5 000
2007 hurricanes Dean+Noel	2%	194 000	330
2008 hurricanes FGHI	15%	1 000 000	800
Total		**3 494 000**	**228 600**

Source PDNA, 2010

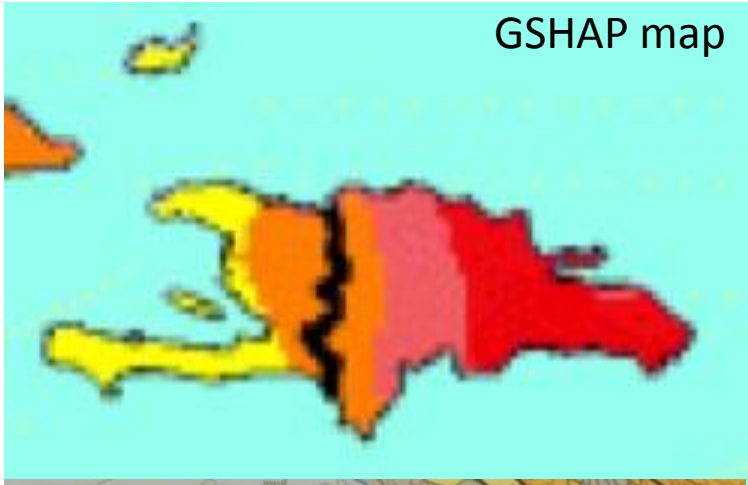
"The most destructive event a country has ever experienced when measured in terms of the number of people killed as a share of the country's population." IDB, 2010

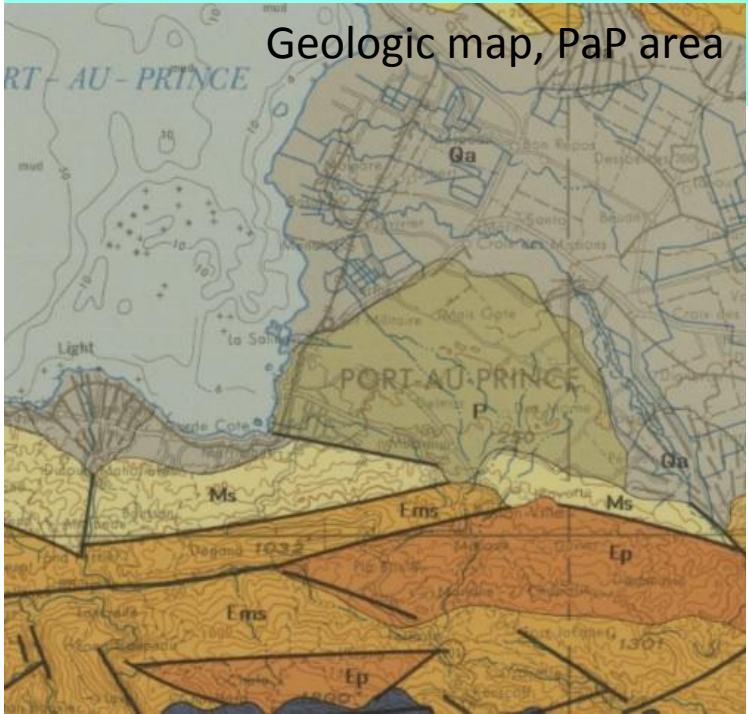
Earthquake S&E before the earthquake

- No seismologist, no seismic monitoring network
- Only hazard map available = GSHAP (1999)
- Best geol. map from 1980, 1/250,000
- No construction code
- No earthquake preparedness or contingency plan
- No geoscience or geohazard curriculum in schools or universities
- 84% of post-high school students leave Haiti and never return
- 76% of population below poverty line (< 2$/day)
- Literacy rate = 53%
- ½ population “food insecure”
- Life expectancy = 44 years

⇒ Priority: reduce poverty via development

⇒ Lack of local capacity to take the lead in earthquake risk reduction


GSHAP map



Geologic map, PaP area

Should international donors invest in seismic risk reduction in Haiti?

Where are the scientists? Why are they not informing the process?

Human Exposure

Modelled number of people present in hazard zones that are thereby subject to potential losses.

Hazard type	Population exposed	Percentage of population (0 5 10 20 40)	Country ranking
Cyclone	246,272		19th out of 89
Drought	997,929		53rd out of 184
Flood	75,554		35th out of 162
Landslide	8,438		23rd out of 162
Earthquake	13,950		97th out of 153
Tsunami	0		0th out of 265

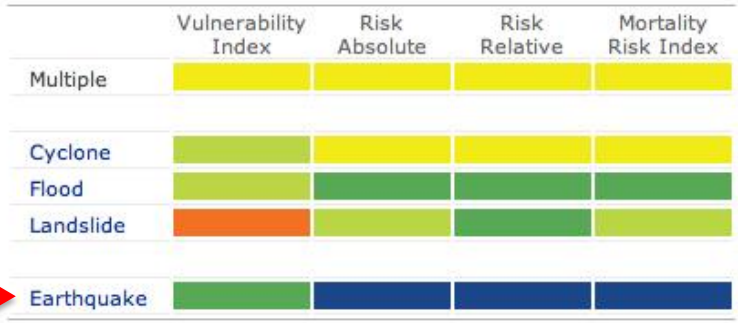
Economic Exposure

Modelled amount of GDP (Gross Domestic Product) present in hazard zones that are thereby subject to potential losses.

Hazard type	GDP exposed (billions-US$)	Percentage of GDP (0 5 10 20 40)	Country ranking
Cyclone	0.11		40th out of 89
Flood	0.02		88th out of 162
Landslide	0.03		61st out of 162
Earthquake	0.04		126th out of 153
Tsunami	0.00		0th out of 265

Vulnerability and Risk

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.



PreventionWeb
Serving the information needs of the disaster reduction community

The natural disaster "Hot Spots"

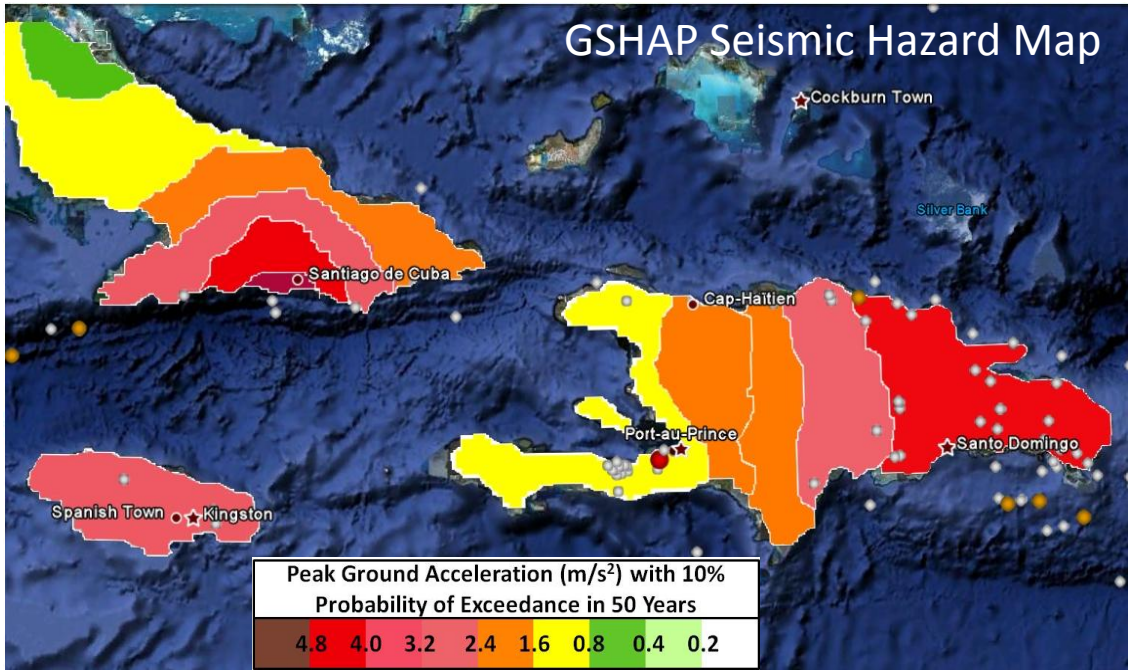
CENTER FOR HAZARDS & RISK RESEARCH AT COLUMBIA UNIVERSITY

THE WORLD BANK · IRI · CIESIN Columbia University · ICG International Centre for Geohazards · NGI · PROVENTION CONSORTIUM · DFID Department for International Development · MINISTRY OF FOREIGN AFFAIRS · USAID

- DRM specialists should take seismology 101…
- Seismologists have not paid attention…

Table 1. Summary of data sources for each hazard.

Hazard	Parameter	Period	Resolution	Source(s)
Cyclones	Frequency by wind strength	1980-2000	30"	UNEP/GRID-Geneva PreView
Drought	Weighted Anomaly of Standardized Precipitation (50% below normal precip. for a 3-month period)	1980-2000	2.5°	IRI Climate Data Library
Floods	Counts of extreme flood events	1985-2003*	1°	Dartmouth Flood Observatory, *World Atlas of Large Flood Events*
Earthquake	Expected pga > 2 m/s^2 (10% probability of exceedance in 50 years)	n/a	sampled at 1'	Global Seismic Hazard Program
	Frequency of earthquakes > 4.5 on Richter Scale	1976-2002	sampled at 2.5'	Advanced National Seismic System Earthquake Catalog
Volcanoes	Counts of volcanic activity	79-2000	Sampled at 2.5'	UNEP/GRID-Geneva and NGDC
Landslides	Index of landslide and snow avalanche hazard	n/a	30"	NGI

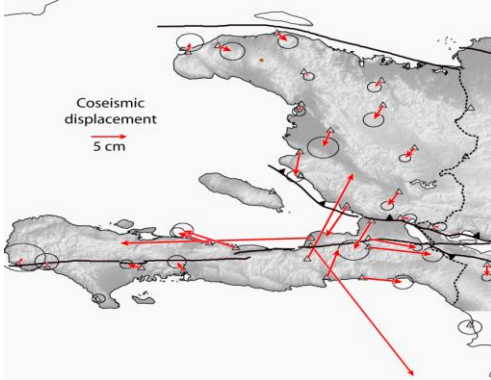


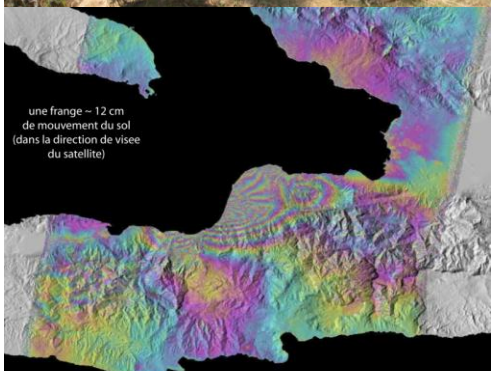
Abbreviated Haiti EQ Timeline

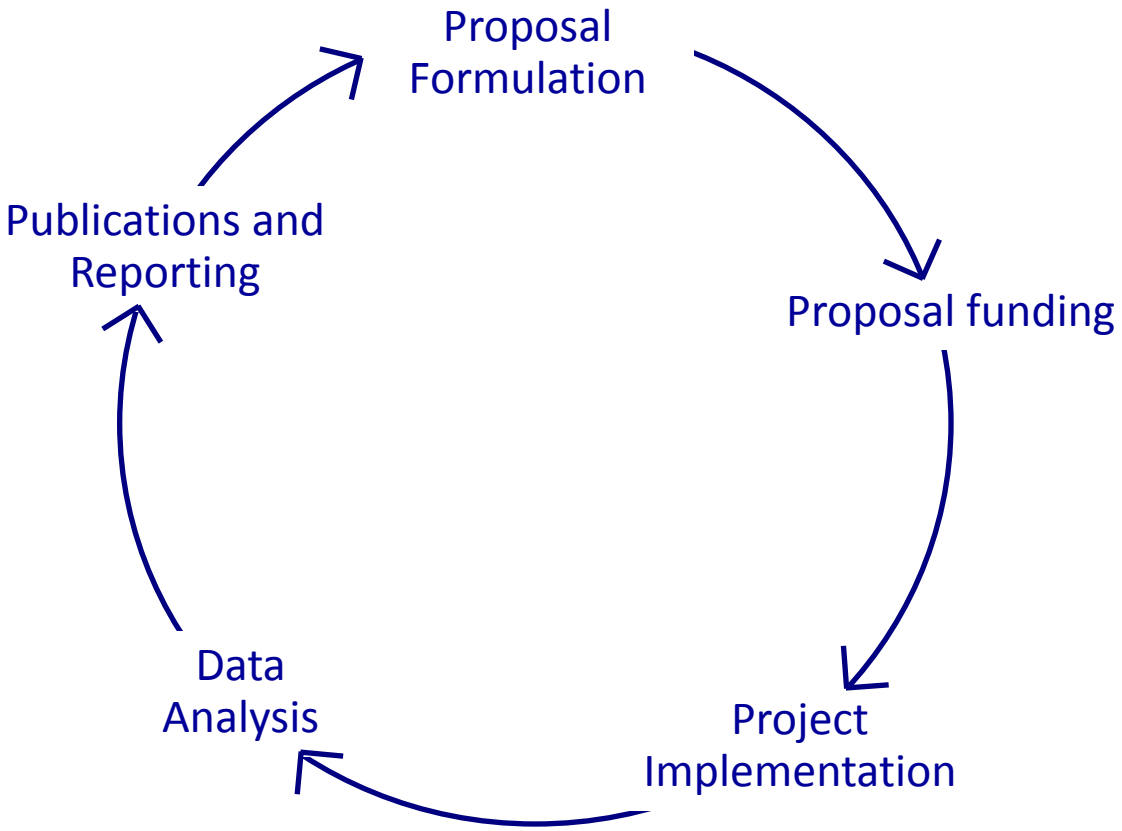
- Event on 12 January 2010, 16:53 local time
- First 2 days: frantic search for source characterization, aftershocks
- First ~three weeks:
  - Preparation for on-site science and engineering surveys
  - Ad hoc “Seismic Task Force” forms, meets, brief UN – leadership A. Morton (UNEP), Dr A. Lerner-Lam (LDEO, Columbia)
  - “Seismic Task Force” briefs GoH
- February-March:
  - WB and UN post-disaster needs assessments
  - Geophysical surveys and analysis performed
- Mid-March: S&E workshop (Miami), vague concept for a national earthquake risk reduction program for Haiti
- April: GoH solicits UN support to define and implement earthquake risk reduction strategy
- August: UN hires science advisor (placed within UNDP)

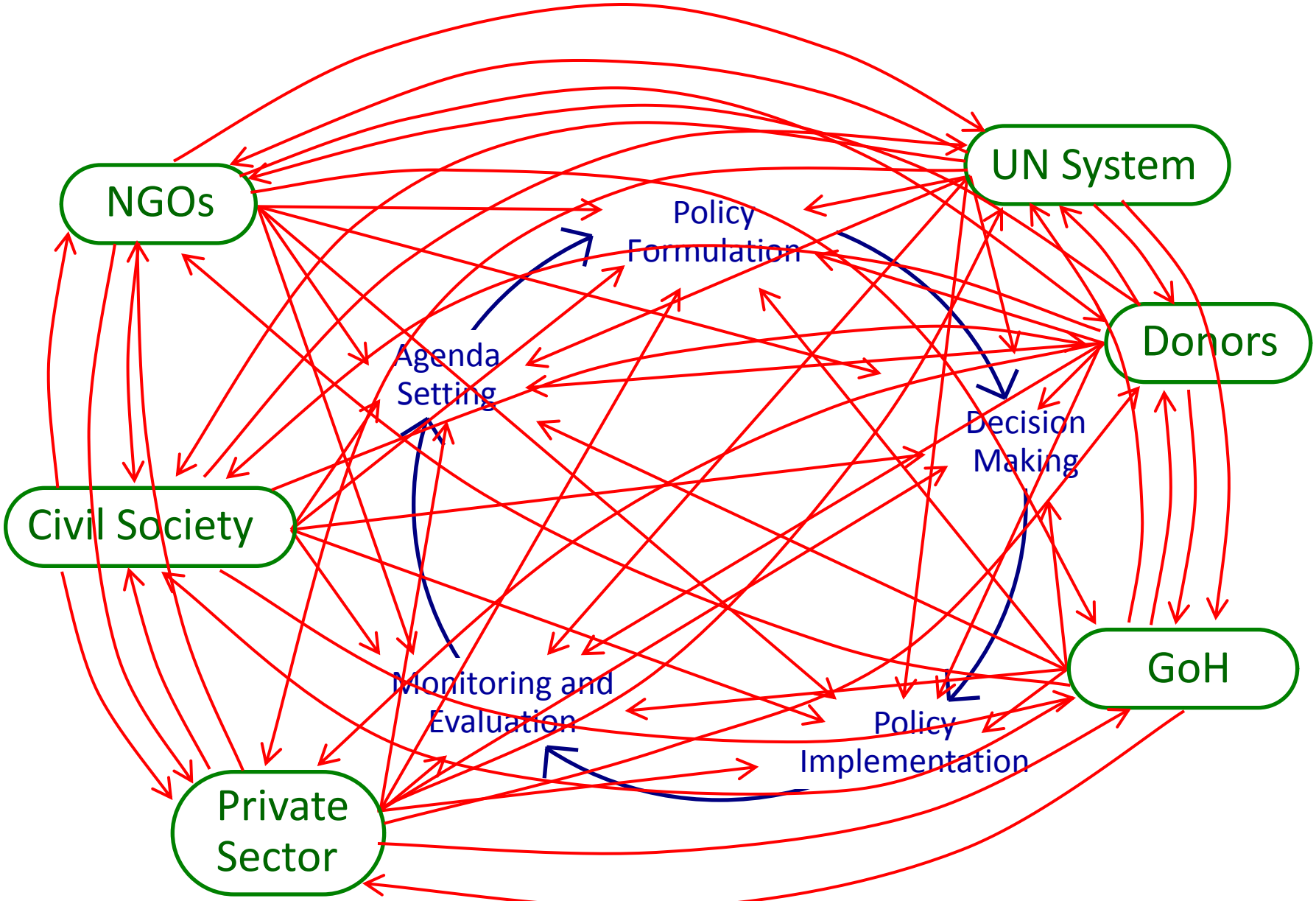
A scientist going to the front line…

- Science?
  - Do science: NO
  - Implement latest results science: NO
  - Make sure the (basic) S&E we know is taken into account
  - Make sure the (basic) S&E Haiti needs will happen
- Matchmaker:
  - Between national institutions and international assistance
  - Making sure that international partners:
    - Work through the local institutional system
    - Do capacity building with local institutions
- Advisor:
  - Authoritative voice for advocating ERR
  - Advise National System for DRM for GoH, and UN System





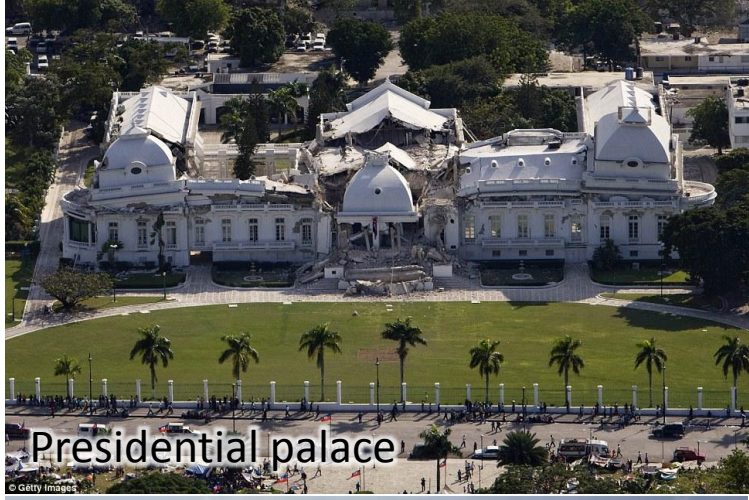

Proposal Formulation
Proposal funding
Project Implementation
Data Analysis
Publications and Reporting

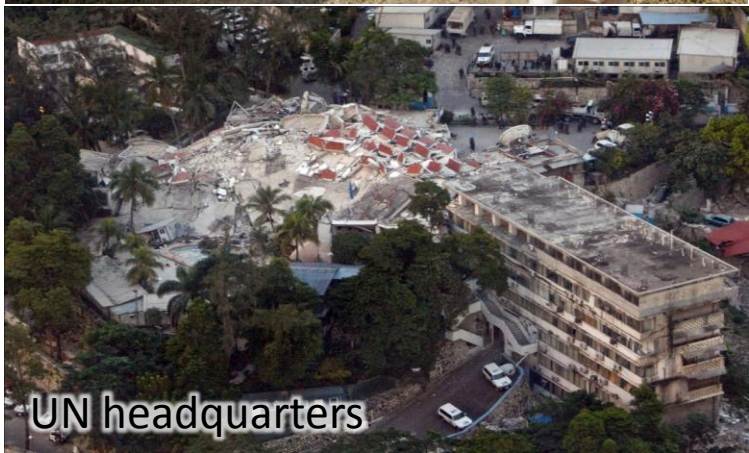


Inspired by John Young, Overseas Development Institute, UK

Urgency needs: Response time frame

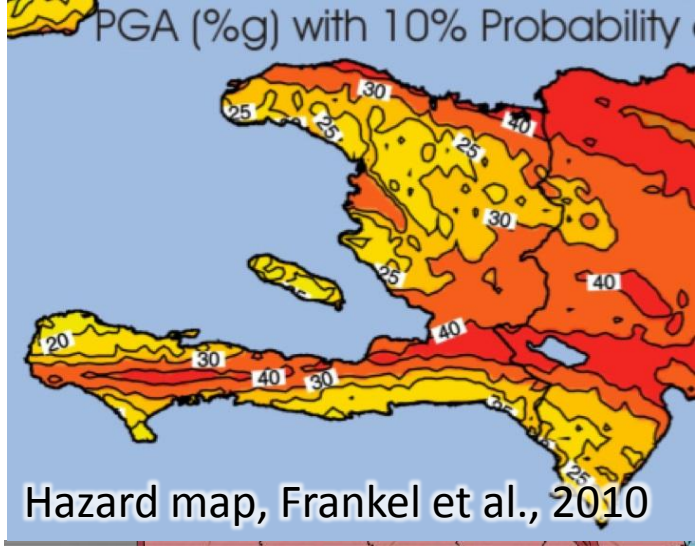
- Resource heterogeneity:
  - Loose federation of seismic resources
  - UNOSAT, data sharing agreements, international agency inputs
  - Surge of academic input and interest
- Filter fast coming information: reality checks and briefings, local expertise overwhelmed
- Pressure from aid agencies: inform on hazard level, relocation and safe heavens
- Pressure from media: explain what happened and why (use the media)



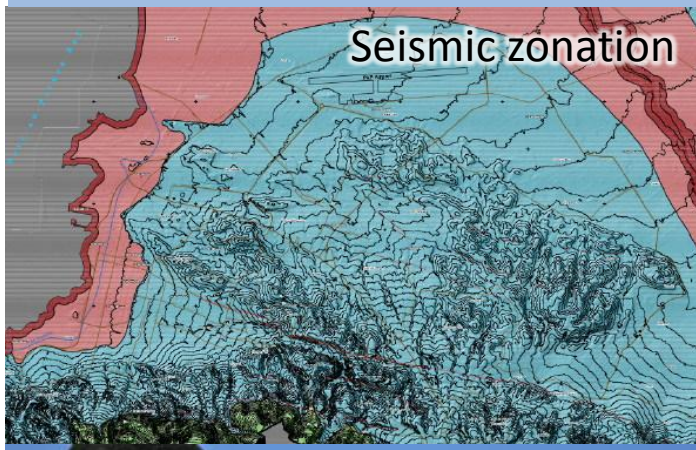


Medium-term needs: Recovery time frame

- Advise on best practices:
  - Private enterprise: building assessment, best practice guidebooks.
  - Driven by academics: seminars for engineers, geotechnical mapping
- Key science products:
  - Haiti seismic hazard maps (USGS)
  - Post-earthquake surveys (geology, geodesy, seismology): what happened?
  - Seismic macrozonation of PaP
  - A seismic monitoring network
- **Initiation of partnerships between Haitian institutions and international S&E community.**



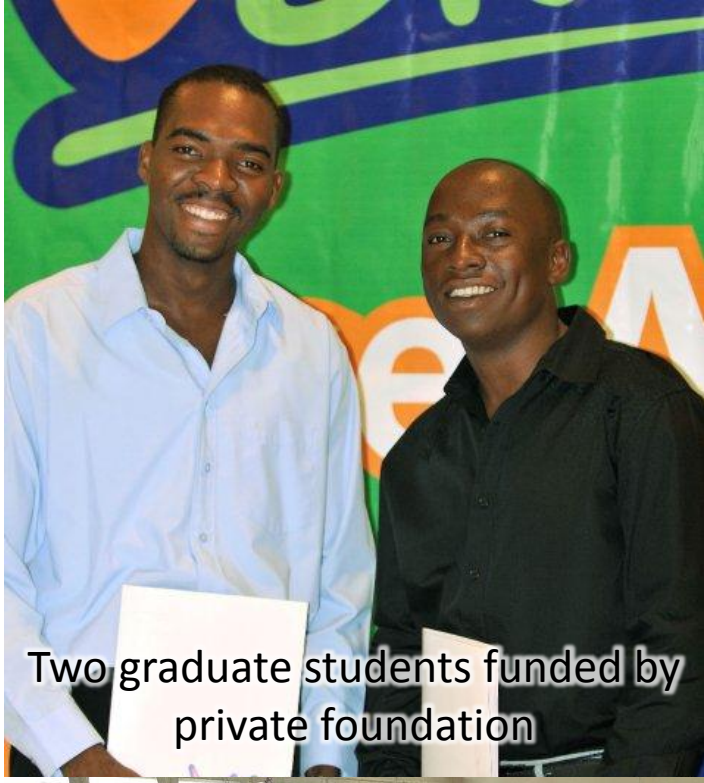
Hazard map, Frankel et al., 2010




Geodetic monitoring

Long-term needs: Reconstruction time frame

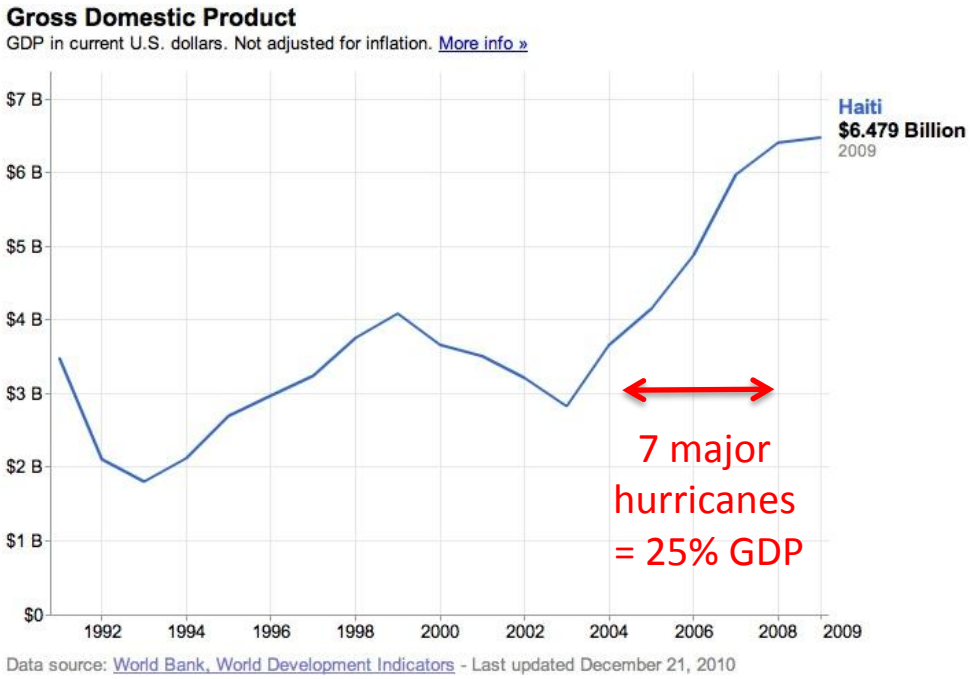
- Conventional recipe is known (HFA):
  1. **Identify** and quantify hazard (seismic monitoring, seismic zoning, etc)
  2. **Train** and educate (construction professionals, public, decision makers, university)
  3. **Use** information for prevention and mitigation measures (construction practice, land use planning, rules and standards)
  4. **Prepare**dness and response
  5. **Mainstream** earthquake risk reduction in policies
- Requires a coordinated framework = a national earthquake risk reduction program
  - One-stop shopping for international assistance and funding
  - National platform to share information, evaluate projects, coordinate actions


Two graduate students funded by private foundation


D. Given (USGS) training staff from Bureau of Mines

Some internal challenges

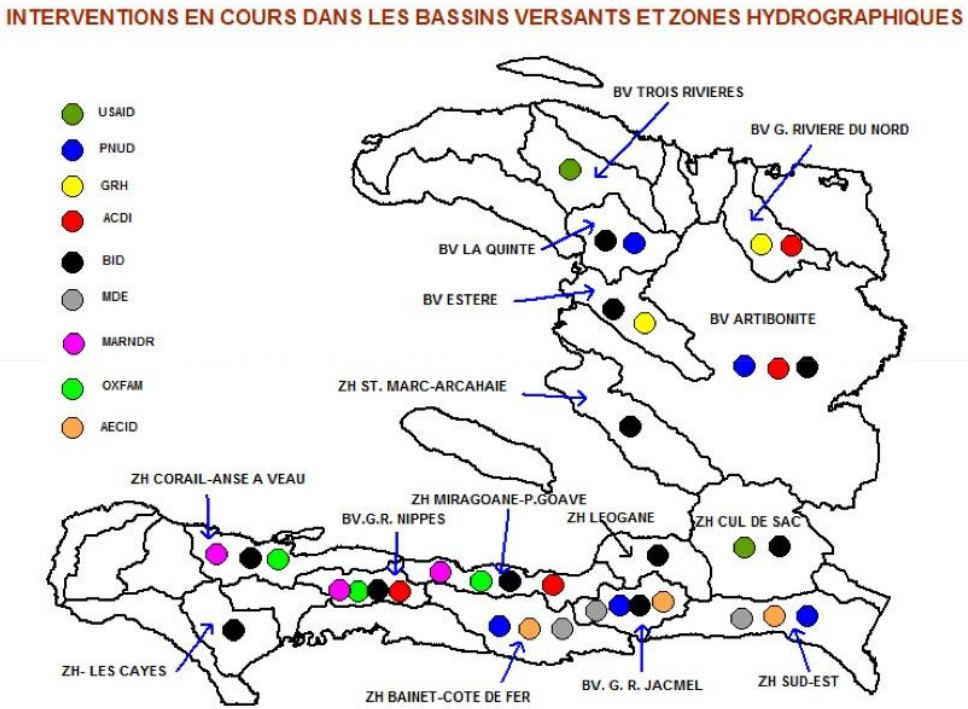
- Economy: GDP function of politics, not natural disasters => why bother?
- Governance:
  - Institutional mandates not respected
  - Chain of commands unclear
- Very low resources:
  - Inter-institution competition…
  - …leading to mission creep
  - Coordination see as a hindrance
- Capacity:
  - No “champion” of earthquake risk reduction
  - “Proposals” never evaluated (“take the money and run” approach)
- Survival mode => vision, planning, follow up, coordination = luxury



1991 - Coup, Aristide ousted
Cedras, embargo
1995 - US intervention
Préval elected
2000 - Aristide re-elected
2004 - Aristide leaves
2004 – UN forces set up
2006 – Préval elected

Some external challenges

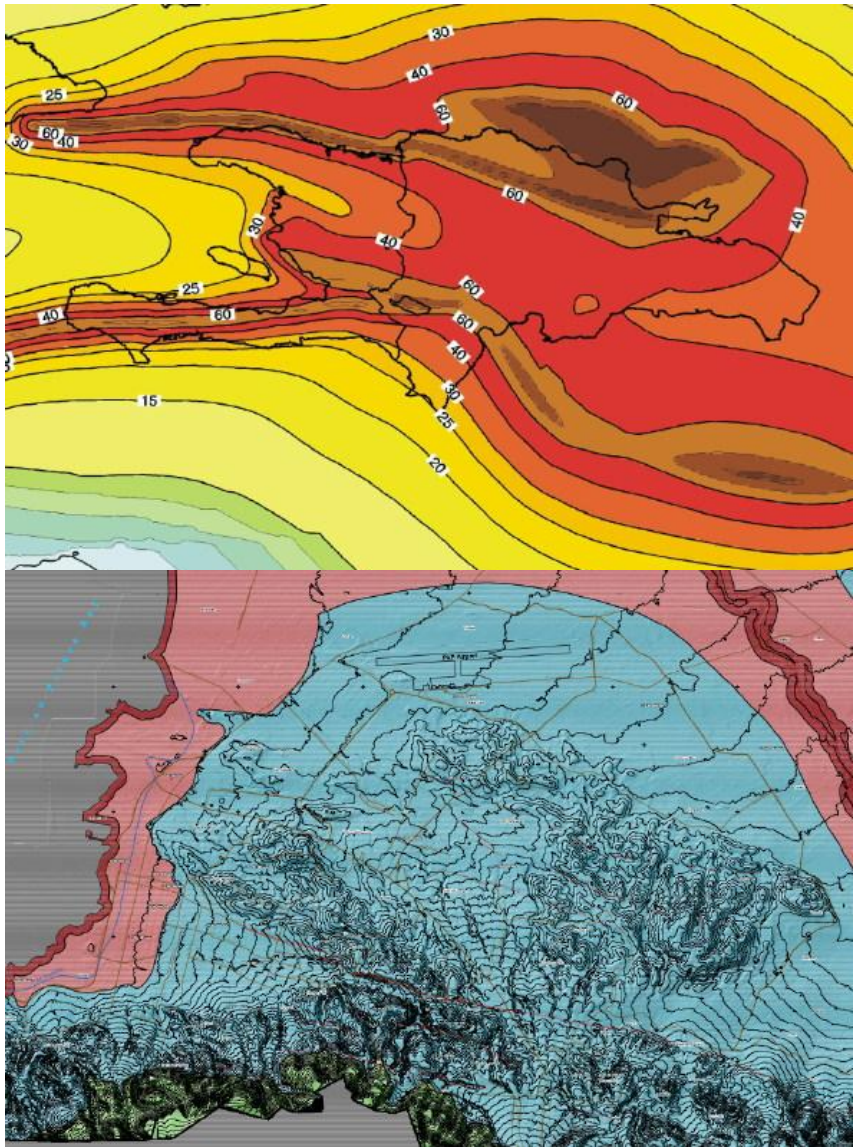
- Many outside actors
- Partners often not working through national institutional system
- Sometimes not even working with national institutions…
- "Culture of projects": bad before 2010, has significantly worsened
- NGOs out of control (some, at least).
- Donors competition/agendas
- International arrogance:
  - "we" know the solution, let's export it.
  - *"We wanted to share this proposal to donor X with our Haitian counterparts, but it is due very soon."*



Current watershed projects in Haiti and their funding agencies
(from J. Harding)

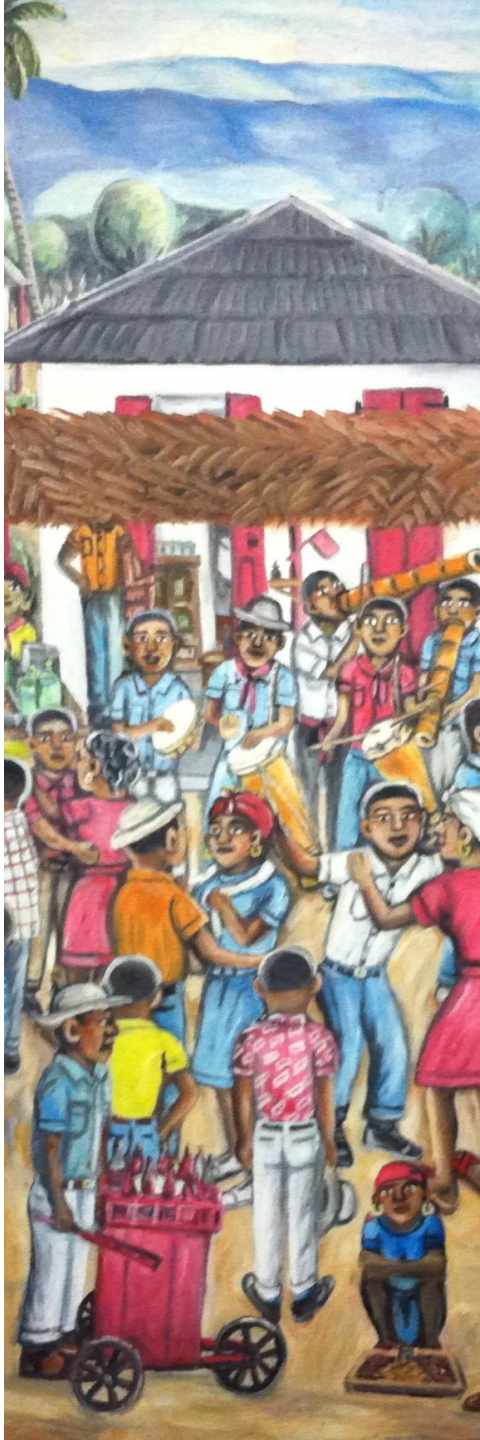
A good example: “seismic microzonation”

- Map of susceptibility to seismic shaking.
- Led by Haitian Ministry for Public Works: no funding, “response spectrum” does not sell…
- Contacted UNDP: some internal thinking… what about “urban planning”… contact with Ministry for Planning… + high-level discussions with PM and Min. Interior
- End-result:
  - Ministry for Planning funds the work
  - Partnership with Min. Public Works (=> technology transfer)
  - International donors now interested in contributing…
- This created a “buzz”:
  - Microzonation is an “alibi”…
  - … to keep eq risk reduction on the agenda



Some positive indicators

- GoH orders “roadmap to seismic safety” – strategic plan for sustainable eq risk reduction
- GoH orders “Earthquake plan for the North”
- GoH orders seismic microzonation + include it in urban and economic planning
- GoH publishes eq-safe construction and repair guides
- GoH ordered a construction code
- GoH initiates a seismic monitoring network
- Interim Commission for the Reconstruction of Haiti (ICRH) works on including risk reduction in lodging projects



Some concerns

- Why does ICRH continues approving project w/o eq-safety as prerequisite?
- Lack of trust persists: some international partners continue to refuse working through institutions as equal partners.
- Resistance to coordination.

- Long-term political will for DRR?
- Societal will for DRR?
- The life of (most) people has not improved since the earthquake => DRR remains a hard sell.

Conclusions

- Overarching problem:
  - Top scientists absent from international DRM scene.
  - International agencies interested in DRM do not understand the value of science.
- Translating (earthquake) science into policy starts with the scientists…
- …willing to "go the extra mile":
  - Capacity building at the core of partnerships
  - Work with and through national institutions
  - Accept that decisions are driven mostly by considerations other than scientific (economy, culture, politics, etc.)
- Science = key to sustainability
  - Cheap…
  - Motivation beyond economical and political hardship
- *"Two Haitian mistakes are worth more than one international truth"* (Haitian PhD geologist)