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x-events: aspects of vulnerability in latin america & the caribbean

Sergio Miranda-da-Cruz
'MdC Institute of Advanced Studies'

Global X-Network Conference

X-Center USA – Hoboken – NJ – 12-13 April – 2016

outline

1. IMdC – location;
   - south-america/brazil/state of sao paulo;
2. objectives;
   i. resilience of countries/productive sectors
   ii. role of science & technology;
   iii. applied mathematics (investments/pension funds)
3. x-events: latin america & the caribbean
4. the way forward

1. IMdC – location;

- south-america/brazil/state of sao paulo;

Latin America & the Caribbean

33 countries;
pop: 595 million;
p/c inc.> **$5,000**.

(*IFAD & WB, 2014*)

Brazil: 206 million (35%)

▲ system analysis & comp. science

State of Sao Paulo

Pop.: 44.4 million;

32% of Brazil's GDP

Southeast:

55% of GDP

…Ribeirão Preto: a city of 660,000 people – focus on education, biomedical & agro industries…

2. objectives;

i. resilience of countries/productive sectors
ii. role of science & technology;
iii. applied mathematics (investments & pension funds)

…three main objectives…

i. resilience of countries & productive sectors using a system analysis (SA) perspective;

a. *agents* in countries & productive sectors show: diversity; connectedness; interdependence & adaptation;

b. difficult to control: possible to harness them;

ii. role of science & technology

a. technology transfer as an engine of growth (**15/200**);

b. fundamental for sustainable industrial development & growth;

iii. applied mathematics

a. sectors/regions with highest probability of growth;

b. increase rate of return of **investment banks** & **pension funds**.

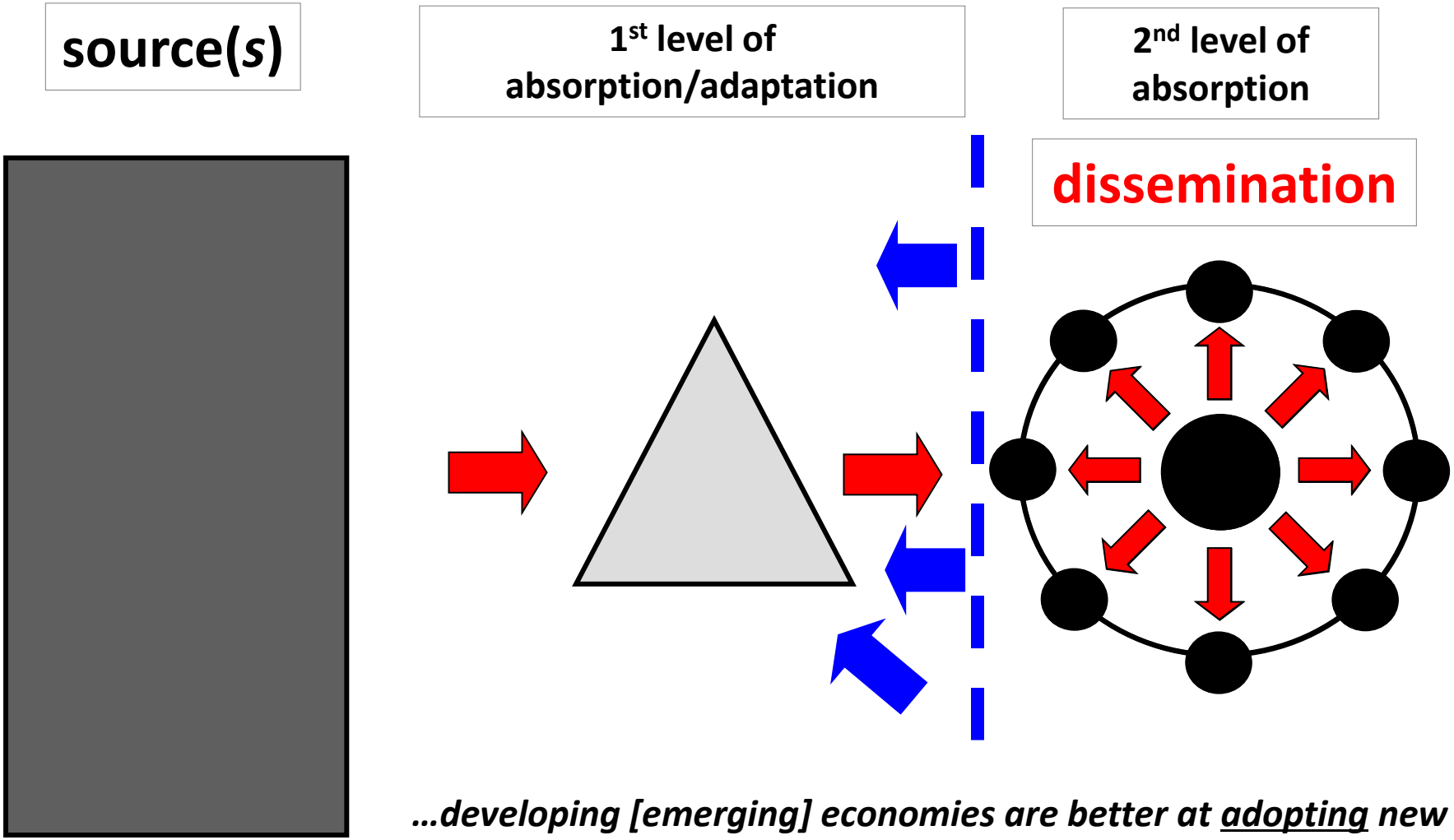
…our experience involves the work with 15 areas of science & technology considered essential for sustainable industrial development (updated every 18-24 months)…

1. aerospace/satellite
2. biotechnology
   - synthetic biology
3. energy management
4. environmental mgt.
5. fine chemistry
6. fine mechanics
7. information technology
   - telecommunication
   - software
   - hardware
8. manufacturing processes
9. medical instrumentation
10. microelectronics
11. nano-technology
12. new materials
    - ceramics/metals/fibres
13. nutraceuticals (*health*)
    - biotech. + F. Chemistry
14. optics
15. robotics
    - microelect. + fine Mech. + optics

…how to work with them…

…& we have <u>modelled</u> tech-knowledge transfer…

…05 variables (4+time) – but integrated rather than as isolated activities…



…developing [emerging] economies are better at <u>adopting</u> new technologies than at putting them onto widespread use…

3. x-events: latin america & the caribbean

…consequences of a country as a complex system…

1. unpredictable
2. prod. large events
3. robustness
4. emergence
   - (bottom-up phenomena)
5. novelty

1. environmental
2. health - (epidemics)
3. financial & political-economic

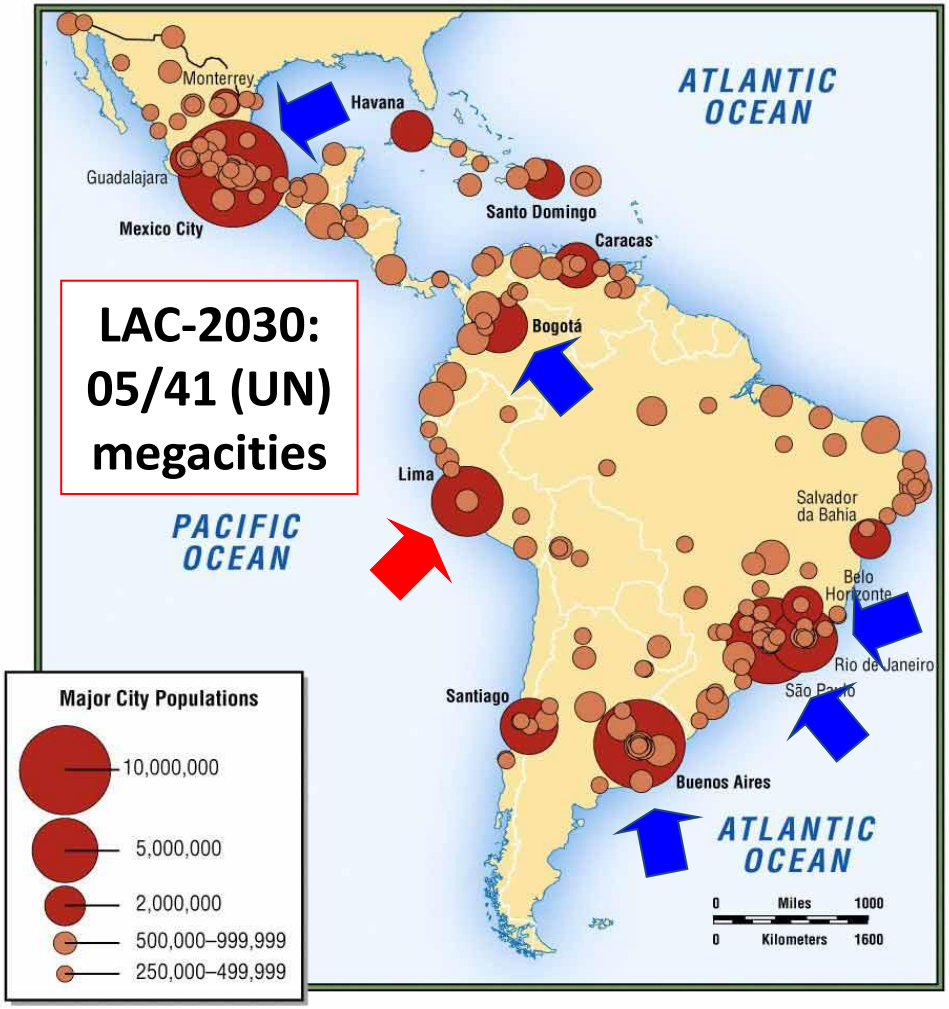
latin america & the caribbean

Geopolitical

Geophysical

…we saw already some geopolitical characteristics…

…population density in LAC – pop: 595 million, 33 countries + 13 non-ind. territories…



Source: IMdC Survey – UN-(Maps from Internet) *…lets us take a look in **epidemics**…*

List of Epidemics (LAC 23/202 episodes – 10 worldwide)

~ 5%

1. Mexico	1545-1548	hemorrhagic fever (viral)	13. worldwide	1968–1969	influenza
2. Mexico	1576	hemorrhagic fever (viral)	14. S. America	1990s	cholera
3. S. America	1600–1650	malaria	15. C. America	2000	dengue fever
4. S. America	1648	yellow fever	16. D. Republic, P. Rico, Mexico	2007	dengue fever
5. N. America & W. Indies	1761	influenza	17. Brazil	2008	dengue fever
6. worldwide	1847–1848	influenza	18. Bolivia	2009	dengue fever
7. Europe, N. & S. America	1857–1859	influenza	19. worldwide	2009	influenza
8. Argentina	1852–1871	yellow fever	20. Hispaniola	2010–date	cholera
9. worldwide	1889–1890	influenza	21. worldwide	2012–date	M. East resp. syndrome
10. worldwide	1918–1920	influenza	22. Americas	2013–2015	Chikungunya
11. worldwide	1957–1958	influenza	23. Americas	2015–date	Zika virus
12. worldwide	1961–date	cholera			

Source: IMdC based on Wikipedia & 19 other sources

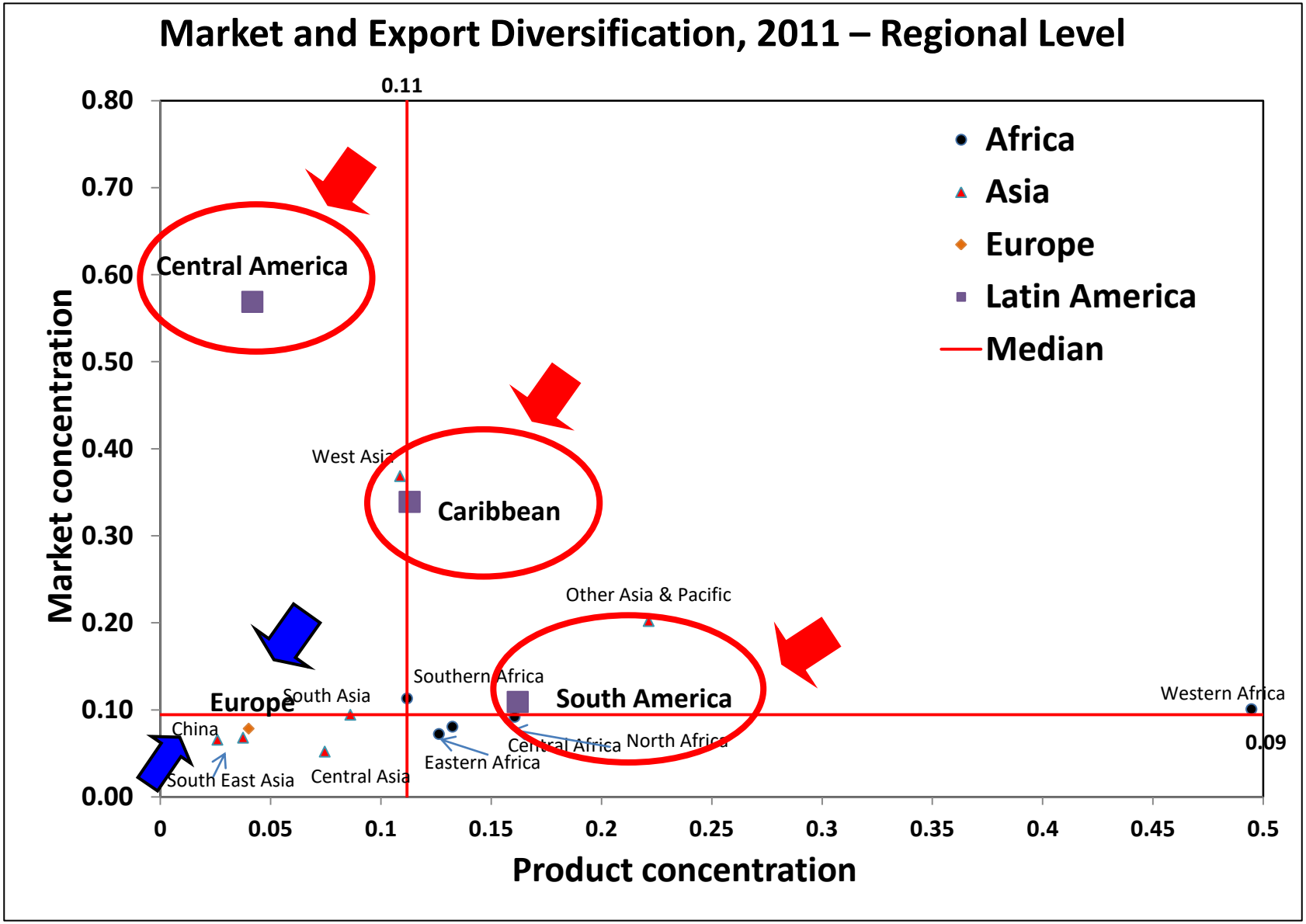
...& financial crisis...

past 40 years in financial crises

25%

financial crisis (region/countries)	origin
1. Latin America sovereign debt crisis – 1982 (Argentina; Brazil & Mexico)	**LAC**
2. savings and loans crisis (1980s)	US
3. stock market crash (1987)	US
4. junk bond crash (1989)	US
5. tequila crisis (1994)	**Mexico → LAC**
6. Asia crisis (1997–1998)	Asia → LAC
7. dotcom bubble (1999–2000)	US
8. global financial crisis (2007–2008)	US → LAC

Source: IMdC, based on W. Rhodes, Banker to the World: Leadership Lessons…, 2011



Source: Moll de Alba, J. UNIDO – Working Paper 03/2014, with data from UN Statistical Division (UNSD)

geophysical

natural disasters	parameters EM-DAT[(*)]
1. flood	1) 10 or more deaths
2. volcanic	2) 100 plus affected
3. windstorm[(a)]	3) call for int'l assistance
4. drought	4) nat'l state of emergency
5. landslide	
6. earthquake[(b)] & wave	

[(*)] EM-DAT: The OFDA/CRED International Disaster Database: Brussels, Belgium, Université Catholique de Louvain, available online at http://www.emdat.be;

[(a)] cyclone, hurricane, storm, tornado, tropical storm, typhoon, & winter storm;

[(b)] active fault lines where the Cocos and Nazca plates converge with the South American plate on the western coasts of South and Central America.

Source: Maynard-Ford, M. C., et al., 2008, Mapping vulnerability to disasters in LAC, 1900–2007: **U.S. Geological Survey** (2008–1294). http://pubs.usgs.gov/of/2008/1294.

LAC – natural disasters & population data (1900-2007)

country	disaster/ km^2	population/ km^2	country	disaster/ km^2	population/ km^2
1. Anguilla	7.843	138	13. Martinique	1.132	422
2. Montserrat	6.863	94	14. US Virgin Is.	0.867	313
3. St. Vincent & Grenadines	3.856	304	15. Turks & Caicos Is.	0.698	52
4. St. Kitts & Nevis	3.448	152	16. Netherlands Antilles	0.417	235
5. Antigua & Barbuda	2.259	158	17. Jamaica	0.397	259
6. St. Lucia	2.145	285	18. Haiti	0.258	324
7. Barbados	2.088	654	19. Puerto Rico	0.237	446
8. Guadeloupe	2.067	634	20. T. & Tobago	0.234	204
9. Grenada	2.035	263	21. El Salvador – CA	0.174	341
10. Brit. Virgin Is.	1.961	157	22. Bahamas	0.169	31
11. Dominique	1.592	96	23. Costa Rica – CA	0.091	83
12. Cayman Is.	1.527	183	24. D. Republic	0.076	197

24/44 natural disasters

Source: Maynard-Ford, M. C., et al., 2008, Mapping vulnerability to disasters in LAC, 1900–2007: **U.S. Geological Survey** (2008–1294). http://pubs.usgs.gov/of/2008/1294.

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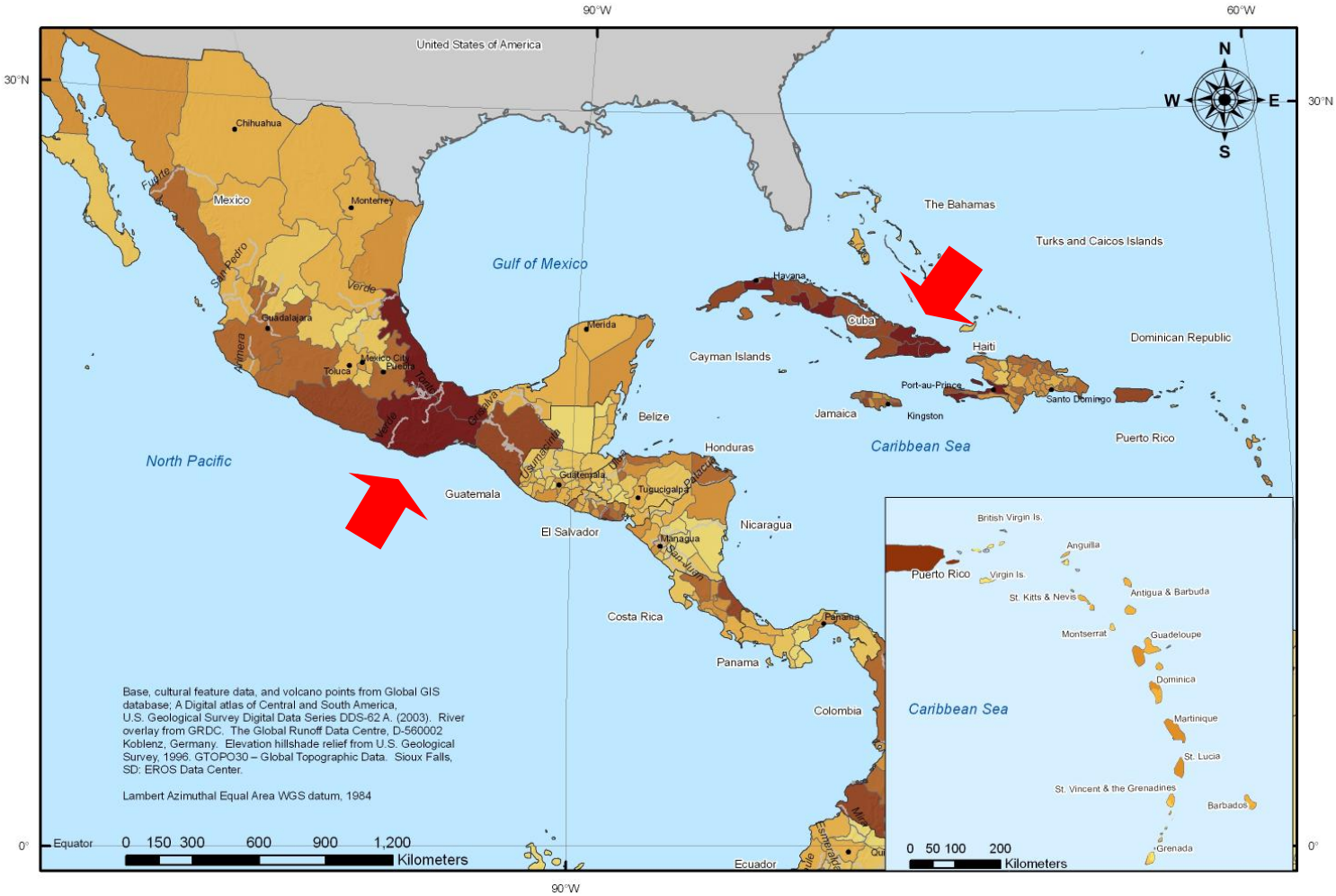


EXPLANATION

Disasters per District

0	4-7	12-15	20-25
1-3	8-11	16-19	26-31

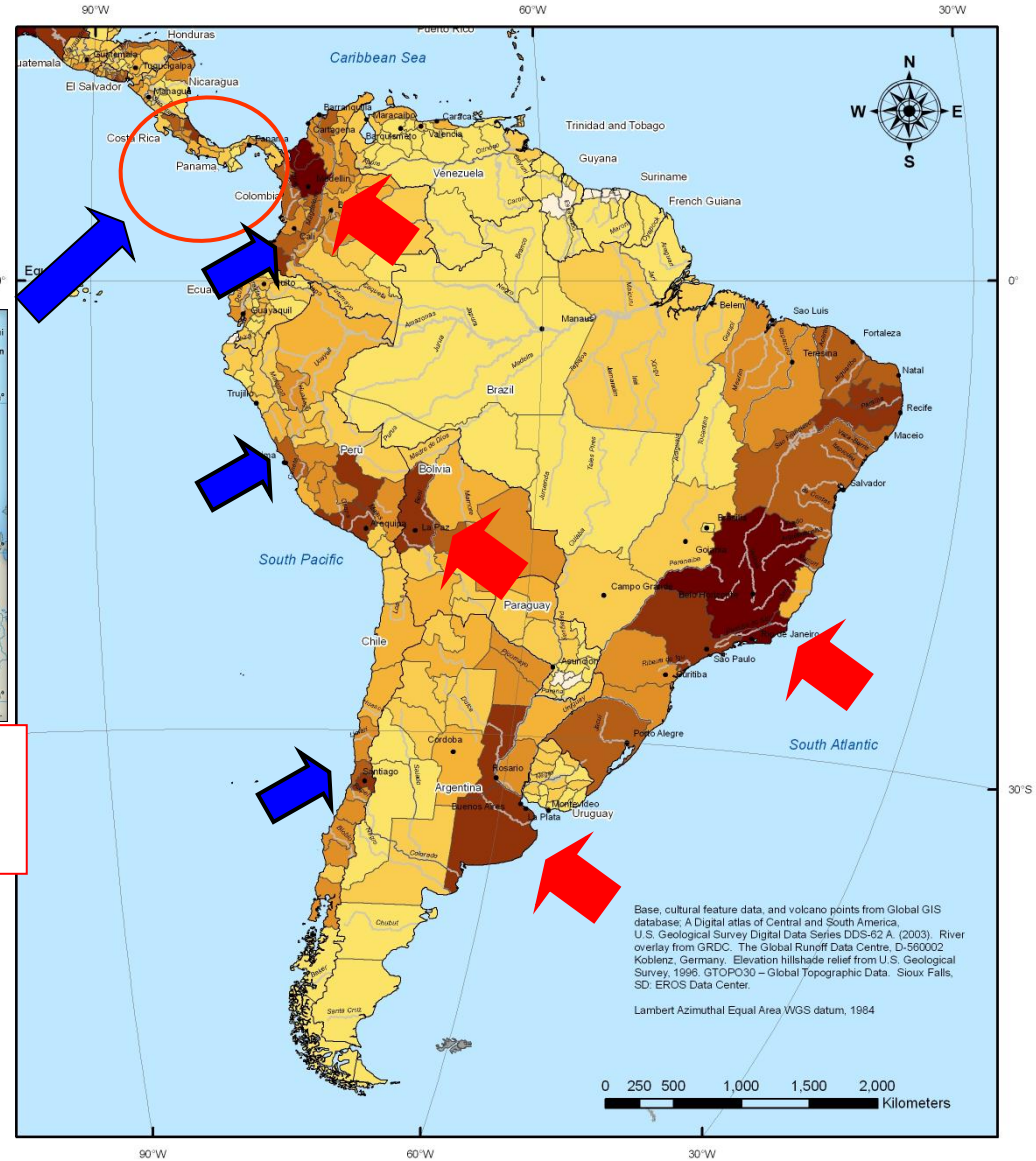
Major Cities (Population >500,000)

Major Rivers

Source: Maynard-Ford, M. C., et al., 2008, Mapping vulnerability to disasters in LAC, 1900–2007: **U.S. Geological Survey** (2008–1294). http://pubs.usgs.gov/of/2008/1294.

app. 400 million tonnes/year

disruption of production & transportation systems



EXPLANATION

Disasters per District

- 0
- 1-3
- 4-7
- 8-11
- 12-15
- 16-19
- 20-25
- 26-31

- Major Cities (Population >500,000)
- Major Rivers

4. the way forward

…many challenges but positive perspective…

1. strengthen linkage with selected institutions

DRC Development Research Center of the State Council of the People's Republic of China

IIASA

Global X Network

2. continue assessment of inst. w/ similar objectives

ex: lessons from environmental sciences → financial crises

3. funding (consultancy work + investment fund)

thank you