



CATALYST

CAPACITY DEVELOPMENT FOR HAZARD RISK
REDUCTION AND ADAPTATION

Urban Vulnerability in Central America and the Caribbean Region

Ebru A. Gencer
FEEM



Theoretical Background:

The Concept of Vulnerability and Urban Vulnerability

Vulnerability (UNISDR 2009): The potential for loss (human, physical, economic, natural, or social) due to a hazardous event.

Urban Vulnerability:

- 1- Dynamics of Urbanization and Hazard Exposure (exposure)
- 2- Characteristics of the Built Environment (physical susceptibility)
- 3- Socio-Economic Composition of Residents and Sectors (social susceptibility)
- 4-Good Urban Governance (institutional capacity)

Gencer, Ebru A. 2013. "An overview of Urban Vulnerability to Natural Disasters and Climate Change in Central America and the Caribbean Region," Note di Lavoro. Venice: FEEM (in preparation).

CAC Vulnerability: Region at a Glance



Fig. Central America and the Caribbean Political Map 2013.

Source: CIA - Central Intelligence Agency. Available at: <http://www.cia.org>

	Drought	Earthquake (seismic activity)	Extreme temperature	Flood	Mass movement dry	Mass movement wet	Storm	Volcano	Wildfire	Total
Central America	29	61	19	178	3	21	152	26	11	500
Caribbean	19	10	n.a	110	n.a	5	230	7	4	385
Total	48	71	19	288	3	26	382	33	15	885

Fig. Number of natural disasters by category in Central America and the Caribbean for the period 1975-2011 (by CATALYST Partners)

Source: : EM-DAT: The OFDA/CRED International Disaster Database <http://www.emdat.be> – Université Catholique de Louvain.

CAC Vulnerability: Institutional Capacity and Risk

Country	HFA Overall average for all priority area (2011)	National Platforms for DRR	WorldRisk Report						Vulnerability Index (preventionWeb)					DRI	Natural Disaster Hotspots Report. Countries with Highest Economic Risk from Multiple Hazards (Top 75)				
			WorldRisk index (%)	Exposure (%)	Vulnerability (%)	Susceptibility (%)	Lack of coping capacities (%)	Lack of adaptive capacities (%)	multiple	cyclone	flood	landslide	earthquake		Rank	total area at risk (%)	population in areas at risk (%)	GDP in areas at risk (%)	
Anguilla	3.7								3	3									
Antigua and Barbuda	2.8								4	4			3	0.68	18	53.4	80.4	80.4	
Aruba																			
Bahamas			4.52	11.80	40.81	15.89	65.39	41.15	4	4				0.43					
Barbados	3.8		2.44	6.87	35.54	15.76	50.34	40.52	3	3				0.63	19	79.9	79.9	79.9	
Belize			5.93	12.59	47.14	28.61	69.04	43.78	6	4	3	10		0.55					
British Virgin Islands	3.9								2	2									
Cayman Islands	3.2								3	3									
Costa Rica	4	yes	16.74	42.39	39.5	27.96	63.39	33.14	5	6	7	8	5	0.59	10	51.9	84.8	86.6	
Cuba	4.2		5.99	15.17	39.49	17.98	69.73	30.76	4	3	8	9	2	0.84	38	22.5	56.7	57.9	
Dominica									7	4		8		0.71	25	68.3	67	68.3	
Dominican Republic	2.9	yes	12	24.91	48.17	30.83	73.55	40.14	5	5	5	9	5	0.75	4	87.2	94.7	95.6	
El Salvador	2.9	yes	16.49	32.18	51.24	30.55	75.35	47.82	6		6	8	6	0.69	2	88.7	95.4	96.4	
Grenada			2.29	4.9	46.71	26.14	68.7	45.29						0.69					
Guadeloupe									3	3			1						
Guatemala	3	yes	20.88	38.42	54.35	35.36	77.83	49.87	6	6	6	7	6	0.69	5	52.7	92.1	92.2	
Haiti			11.45	15.95	71.77	64.03	89.46	61.83	6	5	5	8	4	0.89	41	44.4	47.9	56	
Honduras	3.2		12.1	21.81	55.5	37.61	80.03	48.85	5	5	6	9	5	0.7	40	19	56	56.5	
Jamaica		yes	12.89	28.11	45.85	26.32	71.39	39.83	4	3		9	2	0.75	3	94.9	96.3	96.3	
Martinique									2	2									
Mexico	4	yes	6.53	14.75	44.27	24.52	70.13	38.17	5	4	6	7	4	0.63	23	15.9	68.2	71.1	
Montserrat									4				5		48	50.3	50.3	50.3	
Nicaragua	3.1	yes	15.74	27.64	56.94	41.23	83	46.59	4	6	7	9	2	0.77	26	21.6	68.7	67.9	
Panama	3.2	yes	7.7	17.27	44.56	30.57	67.17	35.94	5		7	8	4	0.34					
Puerto Rico									3	2	6	8							
Saint Kitts and Nevis	3.2								5	5			3	0.65	32	0	52.8	64.9	
Saint Lucia	2.9								6			9		0.69					
Saint Vincent and the Grenadines									5	5				0.68	60	41.6	41.6	41.6	
Trinidad and Tobago			6.7	15.97	41.98	20.1	68.6	37.22	4			9	3	0.57	15	66.7	82.4	83.1	
Turks and Caicos Islands	2.7								3	3									
United States Virgin Islands																			

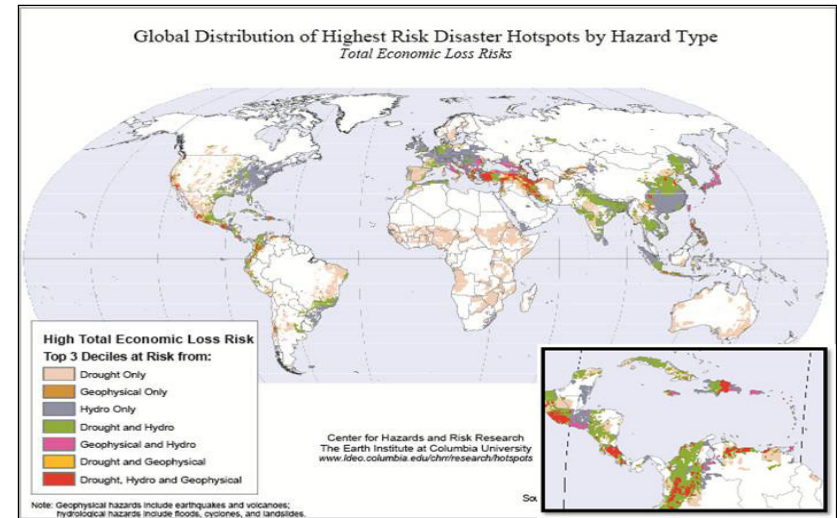


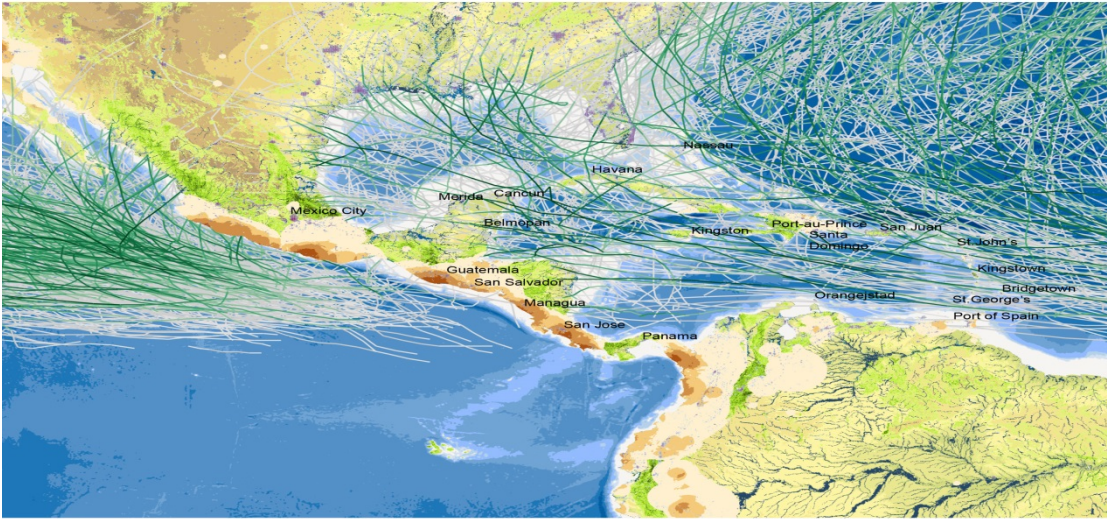
Fig.: Global distribution of economic loss from natural disasters and the CAC Region
Source: Adapted from Dilley et al. 2005. *Natural Disasters Hotspots: A Global Risk Analysis*. Disaster Risk Management Series, No. 5. Washington D.C.: World Bank.

Fig.: Hyogo Framework of Action, Exposure and Risk in CAC (by Elisa Calliari)

Source: Hyogo Framework of Action (UNISDR 2012), World Risk Report (UNU-EHS 2011), Vulnerability Index (UNISDR 2011), Reducing Disaster Risk (UNDP 2004), Natural Disasters Hotspots (Dilley et al. 2005)

CAC Urban Vulnerability: Historical & Geographical Roots

Natural Hazards and Urban Exposure in the Central America and the Caribbean Region



Generated by the Global Risk Data Platform, <http://preview.grid.unep.ch>

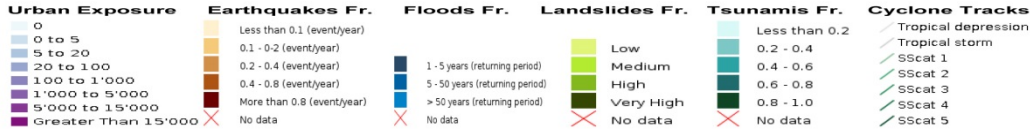


Fig: Natural Hazards and Urban Centers in CAC Region
Source: Author's Adaptation of Map Generated by the Global Risk Data Platform (Courtesy of UNEP/GRID – UNISDR 2013).

Central America
 Colonial era- Law of Indies- Social & spatial segregation, Post independence 1930s – emerging primate cities.

Mexico Massive urbanization by the 1970s and subsequent urban problems

SIDS & The Caribbean

Spanish Colonies (Cuba, Dominican Republic, Puerto Rico)
 Massive protective fortresses – Law of Indies

Other European Colonies (Haiti, Jamaica, and Smaller Islands)
 Slavery, Colonialism and Plantation economy induced inherited inequality

CAC Urban Vulnerability: Urban Dynamics - Projections

Central American and Caribbean Countries	Level of Urbanization (2010)	Rate of Change (2020)	Rate of Change (2030)
Anguilla	100.0	0.00	0.00
Antigua and Barbuda	30.3	0.70	1.67
Aruba	46.9	0.40	0.73
Bahamas	84.1	0.24	0.21
Barbados	44.5	1.38	1.25
Belize	52.2	0.86	0.91
British Virgin Islands	41.0	0.98	1.32
Cayman Islands	100	0.00	0.00
Costa Rica	64.4	0.75	0.63
Cuba	75.2	0.05	0.26
Dominica	67.2	0.32	0.52
Dominican Republic	69.2	0.78	0.52
El Salvador	64.3	0.75	0.62
Grenada	39.3	1.24	1.40
Guadeloupe	98.4	0.01	0.01
Guatemala	49.5	1.00	1.02
Haiti	52.1	2.12	1.06
Honduras	51.6	1.10	0.96
Jamaica	52.0	0.32	0.74
Martinique	89.0	0.01	0.10
Mexico	77.8	0.37	0.32
Montserrat	14.3	1.67	2.45
Nicaragua	57.3	0.63	0.76
Panama	74.8	0.71	0.40
Puerto Rico	98.8	0.07	0.01
Saint Kitts and Nevis	34.2	0.89	1.61
Saint Lucia	28.0	0.89	1.65
Saint Vincent and the Grenadines	49.3	1.02	1.06
Trinidad and Tobago	13.9	2.64	2.70
Turks and Caicos Islands	93.3	0.34	0.09

	World	CAC	Africa	Europe	Asia
Urbanization Levels (%) 2010	57.	61.	43.	70.	56.
Rate of Change (2010-2020)	0.9	0.6	2.2	0.3	0.8
Rate of Change (2020-2030)	8	5	0	5	0

Fig: CAC and World Urbanization Levels and Projections (by author)

Source: Calculated and drawn from raw data in UN-DESA 2010. "World Urbanization Prospects: the 2009 Revisions," New York: United Nations.

Fig: CAC Urbanization Levels and Projections (by author)

Source: UN-DESA 2010. "World Urbanization Prospects: the 2009 Revisions," New York: United Nations.

CAC Urban Vulnerability: Population Exposure

Central American and Caribbean Countries	Population of capital cities (2009)	
	('000)	(%)*
Belize	20.000	6.4
Costa Rica	1.416	30.9
El Salvador	1.534	24.9
Guatemala	1.075	7.7
Honduras	1.000	13.4
Mexico	19.319	17.6
Nicaragua	934.000	16.3
Panama	1.346	39.0
Anguilla	2.000	10.8
Antigua and Barbuda	27.000	30.3
Aruba	33.000	31.1
Bahamas	248.000	72.5
Barbados	112.000	43.8
British Virgin Islands	9.000	40.7
Cayman Islands	32.000	56.5
Cuba	2.140	19.1
Dominica	4.000	21.4
Dominican Republic	2.138	21.2
Grenada	40.000	38.9
Guadeloupe	13.000	2.8
Haiti	2.643	26.3
Jamaica	580.000	21.3
Martinique	89.000	21.9
Montserrat	1.000	13.9
Puerto Rico	2.73.000	68.6
Saint Kitts and Nevis	13.000	24.8
Saint Lucia	15.000	8.9
Saint Vincent and the Grenadines	28.000	25.8
Trinidad and Tobago	57.000	4.3
Turks and Caicos Islands	6.000	18.9
United States Virgin Islands	54.000	48.9

	≥10 Million	5-10 Million	1-5 Million	500 K - 1 Million	<500 K
Caribbean	-	-	32.5	6.3	61.2
Central America	17.7	-	25.1	15.4	41.8
World	9.3	6.7	22.1	10.2	51.6
Africa	3.56	4.08	27.64	8.94	55.74
Asia	9.07	7.5	21.7	9.77	51.97
Europe	3.07	5.37	15.27	9.85	53.18

World	CAC	Africa	Asia	Europe
23.02	26.12	13.96	19.22	23.26

Figs: CAC and World Share of Capital Cities as a Percentage in Total Population and Distribution of Urban Population by Size of Agglomerations (by author)

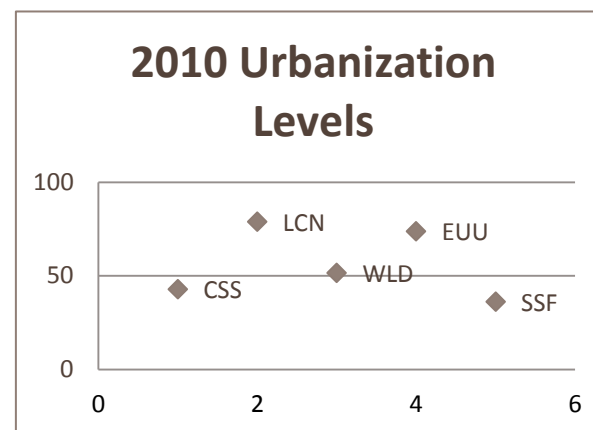
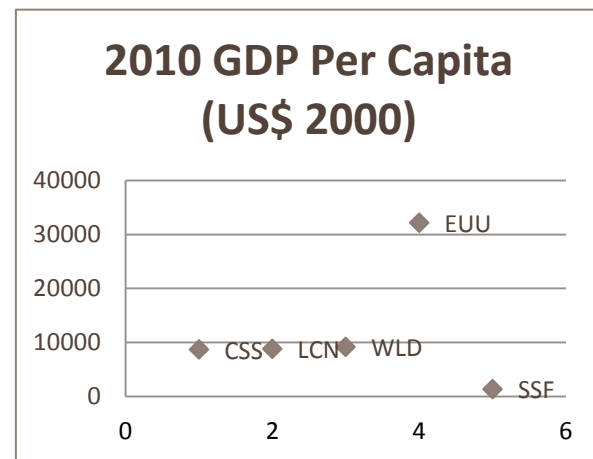
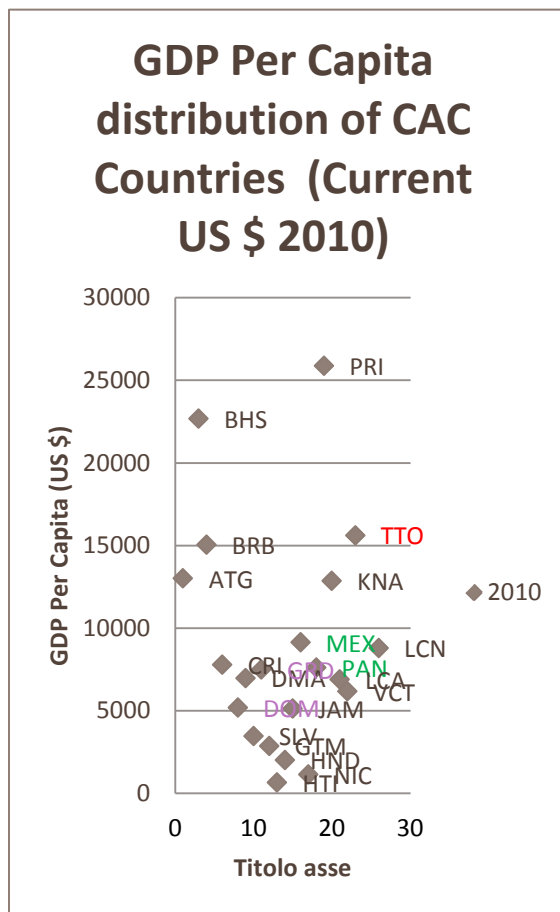
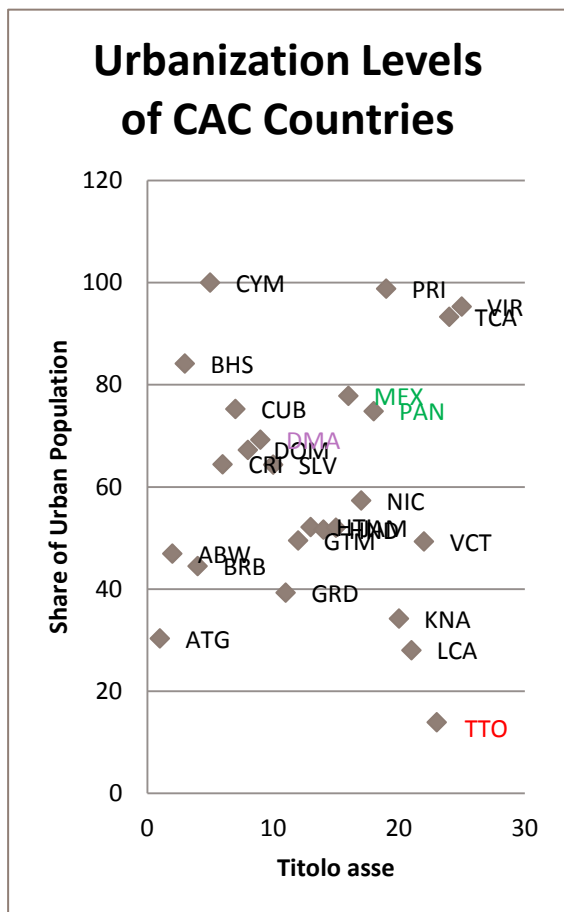
Source: Calculated and drawn from raw data “World Urbanization Prospects: the 2009 Revision” United Nations, New York.

Fig: CAC Population of Capital Cities (by Elisa Calliari)

Source: UN-DESA 2010. “World Urbanization Prospects: the 2009 Revisions,” New York: United Nations.

CAC Urban Vulnerability: Exposure & Social Susceptibility

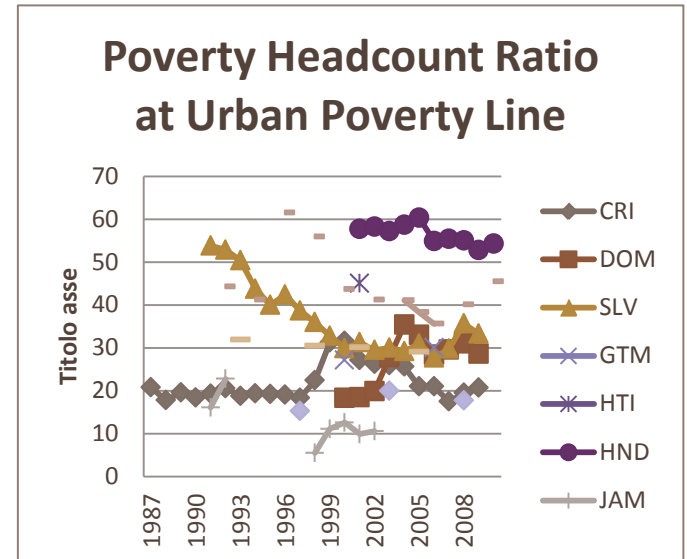
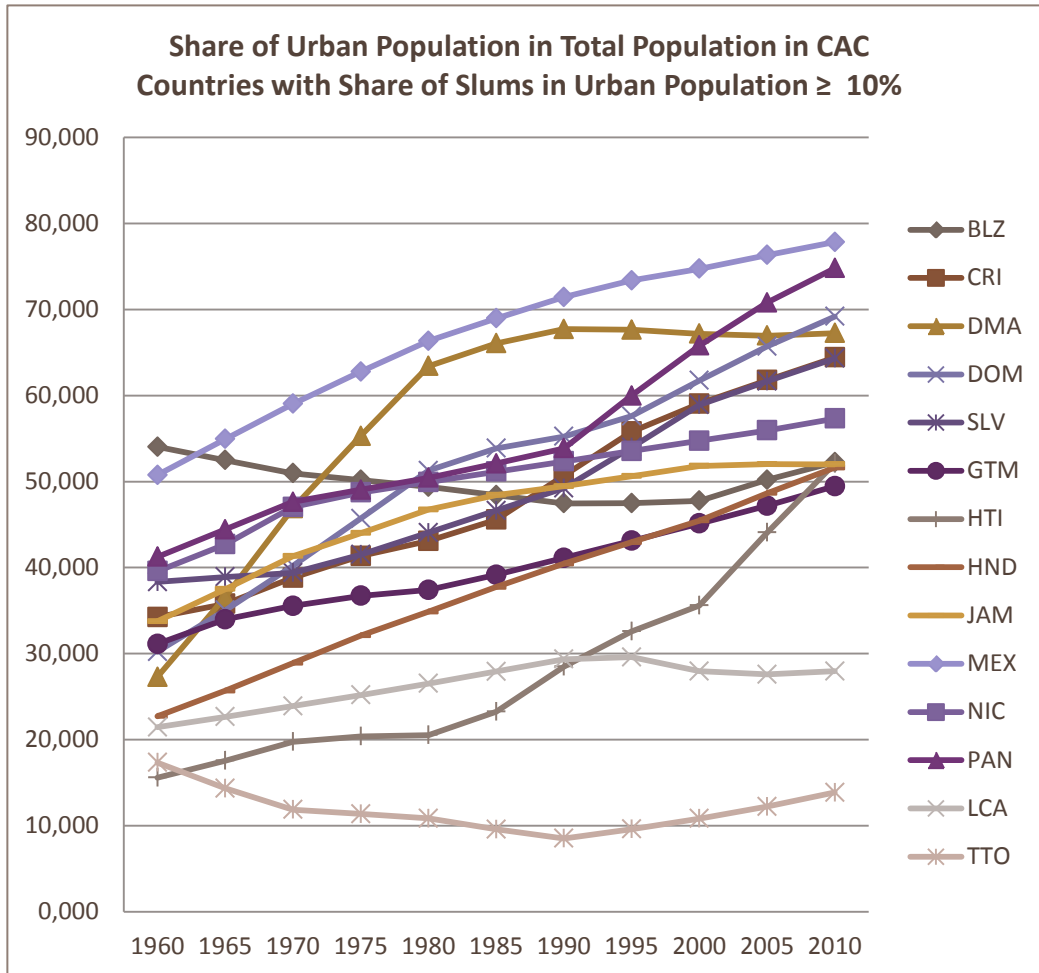
High Urbanization Invert National Poverty Rates?



Figs: Urbanization Levels and GDP Per Capita Distribution of CAC Countries and World Regions (by author)
Source: Drawn from raw data from World Bank, 2012. "World Development Indicators 2012" The World Bank (worldbank.org).

CAC Urban Vulnerability: Social & Physical Susceptibility

Rapid Urbanization, Urban Poverty & Informal Settlements



Figs: Urbanization Levels in CAC Countries with Share of Slums $\geq 10\%$ of their Total Population and Poverty Headcount Ratio at Urban Poverty Line (by author)

Source: Drawn from raw data from World Development Indicators 2012 (worldbank.org) and © SSP Database (Version 0.9.3) (<http://secure.iiasa.ac.at/web-apps/ene/SSPDB>).

CAC Urban Vulnerability: Social & Physical Susceptibility - Institutional Capacity Urban Poverty, Informal Settlements & Corruption

CAC Countries	Share of Slum Population in total Urban Population
Belize	62 (01)/18.7 (07)
Costa Rica	13 (01) /10.9 (05)
El Salvador	35 (01) /28.9 (05)
Guatemala	62 (01) /38.9 (09)
Honduras	18 (01) /34.9 (05)
Mexico	20 (01) /14.4 (07)
Nicaragua	81 (01) /45.5 (05)
Panama	31 (01) /23 (05)
Anguilla	41 (01)
Antigua and Barbuda	7 (01)
Dominica	14 (01)
Dominican Republic	38 (01) /14.8 (09)
Grenada	7 (01) /6 (05)
Guadeloupe	7 (01) /5.4 (05)
Haiti	86 (01) /70.1 (09)
Jamaica	57 (01) /60.5 (05)
Martinique	2 (90)
Saint Lucia	12 (01) /11.9 (05)
Trinidad and Tobago	32 (01) /24.7 (05)

Country	Corruption Rank / 182 Countries	Urban Poverty Headcount
Costa Rica	50	20.7
El Salvador	80	33.3
Guatemala	120	
Honduras	129	54.3
Mexico	100	45.5
Nicaragua	134	
Panama	86	11.1
Bahamas	21	
Barbados	16	
Dominica	44	
Dominican Republic	129	28.6
Haiti	175	
Jamaica	86	
Puerto Rico	39	
Saint Lucia	25	
Saint Vincent	36	
Trinidad and Tobago	91	

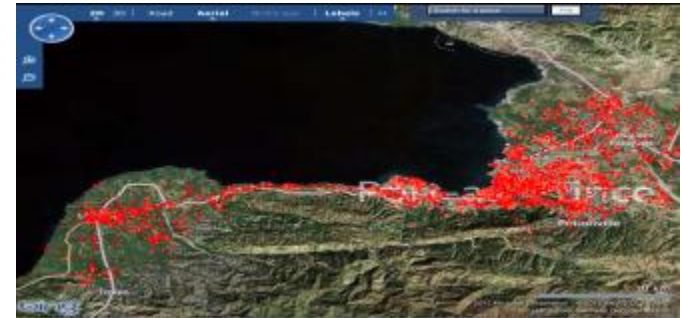
Figs: Share of Slum Population in Total Urban Population and Corruption and Urban Poverty Rates in CAC (by author)

Source: Drawn from raw data from World Development Indicators 2012 (worldbank.org) and the UN-Habitat (unhabitat.org) and Compiled from data in Transparency International. Corruption Index 2011. Available at (transparency.org)

CAC Urban Social & Physical Susceptibility

Informal Settlements, Urban Poverty and Disaster Vulnerability

	Informal Settlements	Formal Housing /Inner Urban Areas
Location	Low-lying floodplains Urban fringes / steep terrain Geologically unstable land	Geologically unstable land
Construction materials / Building typology	Impermanent/recycled materials (boards/sheets of galvanized iron) More permanent cement blocks by time	Poorly detailed modern reinforced/unreinforced concrete frames (post-1950s)
Regulations	Too rigid	No construction enforcement / corruption
Agent	Self-built	Unqualified construction sector
Reason	Necessity	Choice
Infrastructure / Water – Sanitation Public Services/Transportation - Hospitals	Lack or inefficiency	
Land ownership / tenure	Occupied / Illegal –insecure titles Individual occupation in the Caribbean Organized in Central America	
Urban Poverty	Female households in the Caribbean (11.9% Female unemployment rate in the Caribbean States) GINI Index for all Central American states are ≥ 50 Urban Violence	
Assets		Concentration of assets in primary cities / tourism sector



Figs: Haiti Damage Assessment, Hillside Settlements and High School Building

Source: Courtesy of VDV and EERI (Photos by Irfanoglu)