MODULE 8.2: VULNERABILITY INDICES

Food and Agriculture Organization of the United Nations

UNDP

Empowered lives.
Resilient nations.

Supported by:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the German Bundestag

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Objectives

Present worldwide used hazards, vulnerability and risk datasets

- University of Notre Dame Global Adaptation Indexes (ND GAIN)
- German Watch Global Climate Risk Index
- Index for Risk Management (INFORM)

University of Notre Dame Global Adaptation Index (ND GAIN)

ND-GAIN Country Index is composed of two dimensions:

1. Vulnerability Index measures a country's exposure, sensitivity and ability to adapt to the impact of climate change. ND-GAIN measures the overall vulnerability by considering six life-supporting sectors – food, water, health, ecosystem service, human habitat and infrastructure.

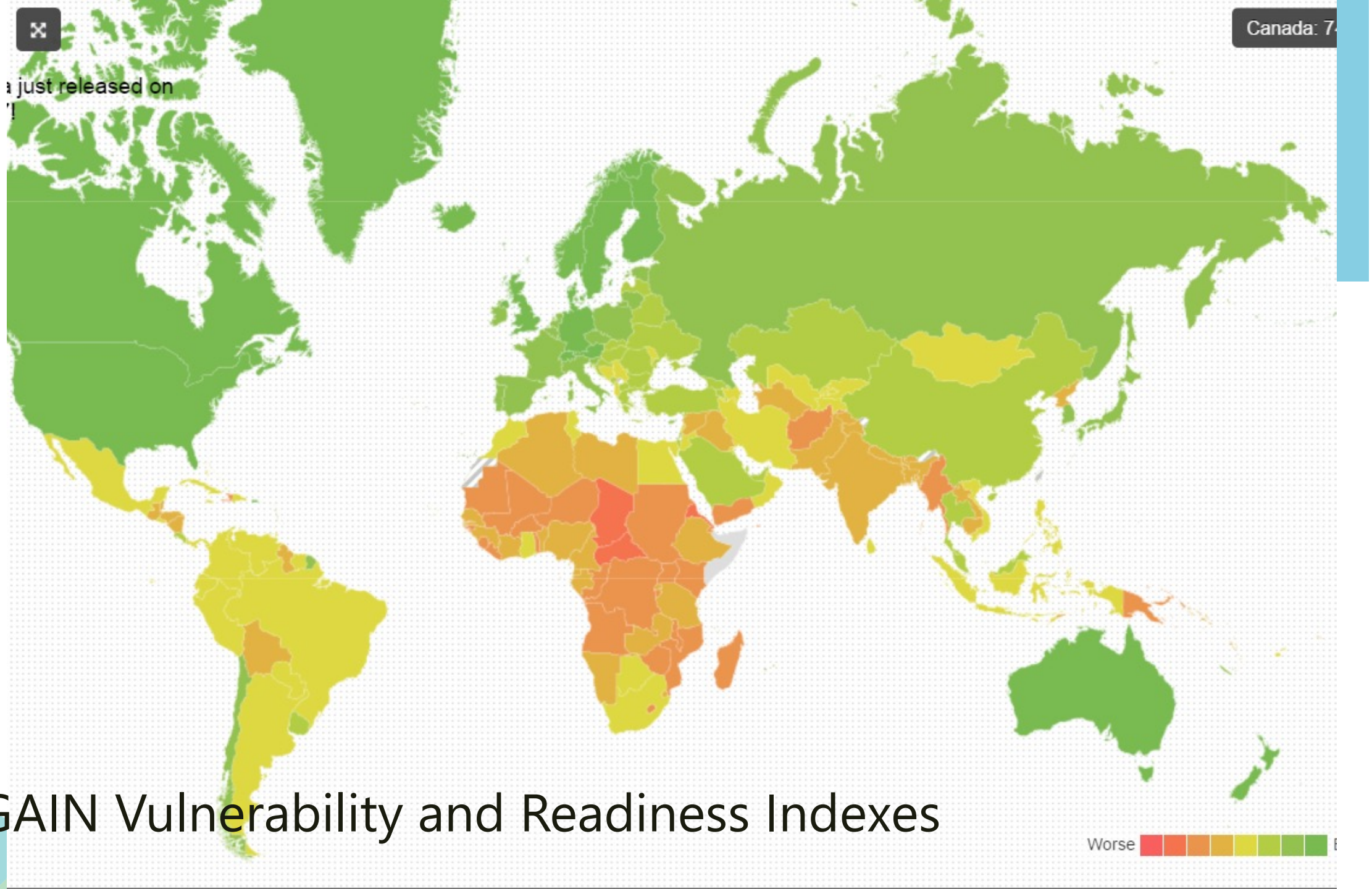
2. Readiness Index measures a country's ability to leverage investments and convert them to adaptation actions. ND-GAIN measures overall readiness by considering three components – economic readiness, governance readiness and social readiness.

http://index.gain.org/ data available online

Sector	Exposure component	Sensitivity component	Adaptive Capacity component
Food	Projected change of cereal yields	Food import dependency	Agriculture capacity (Fertilizer, Irrigation, Pesticide, Tractor use)
	Projected population change	Rural Population	Child malnutrition
Water	Projected change of annual runoff	Fresh water withdrawal rate	Access to reliable drinking water
	Projected change of annual groundwater recharge	Water dependency ratio	Dam capacity
Health	Projected change of deaths from climate change induced diseases	Slum population	Medical staffs (physicians, nurses and midwives)
	Projected change of length of transmission season of vector-borne diseases	Dependency on external resource for health services	Access to improved sanitation facilities

Sector	Exposure component	Sensitivity component	Adaptive Capacity component
Ecosystem services	Projected change of biome distribution	Dependency on natural capital	Protected biomes
	Projected change of marine biodiversity	Ecological footprint	Engagement in International environmental conventions
Human Habitat	Projected change of warm period	Urban concentration	Quality of trade and transport-related infrastructure
	Projected change of flood hazard	Age dependency ratio	Paved roads
Infrastructure	Projected change of hydropower generation capacity	Dependency on imported energy	Electricity access
	Projection of Sea Level Rise impacts	Population living under 5m above sea level	Disaster preparedness

Component	Indicators			
Economic Readiness	Doing business[2]			
Governance Readiness	Political stability and non-violence	Control of corruption	Rule of law	Regulatory quality
Social Readiness	Social inequality	ICT infrastructure	Education	Innovation



ND GAIN Vulnerability and Readiness Indexes

German Watch Global Climate Risk Index

The index measures the impacts of weather-related events and climatological events both in terms of direct economic losses and fatalities.

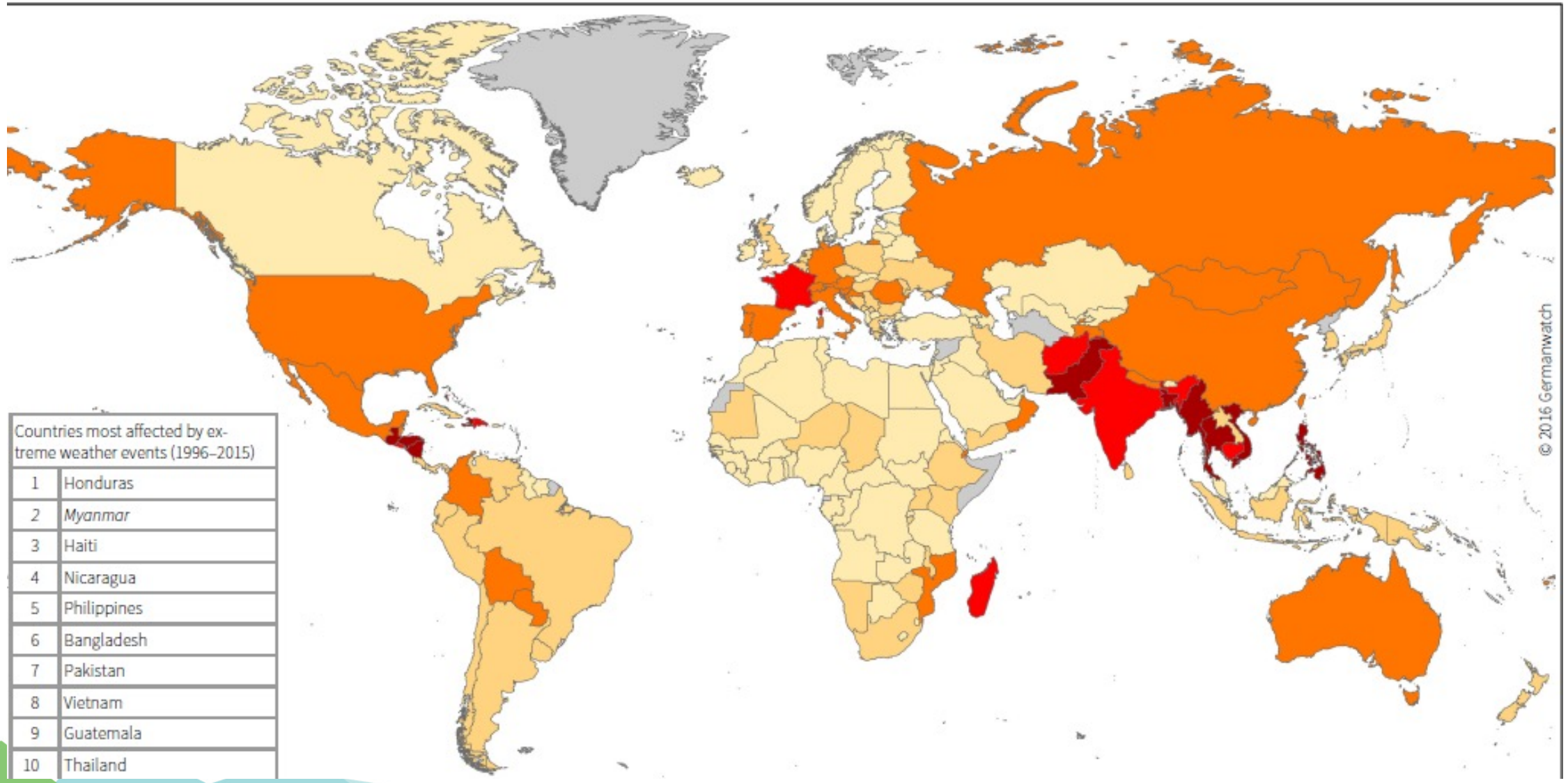
The CRI is calculated as an average ranking of countries in four categories:
- Death toll,
- Deaths per 100 000 inhabitants,
- Total losses in million US$,
- Losses per unit GDP in %

The Long-Term Climate Risk Index measures the degree of exposure which is calculated on annual average data.

https://germanwatch.org/en/12978

Note: Data are not directly available online, would need to be retrieved from German Watch
Source of data: *Munich RE* NatCatSERVICE

Countries most affected by weather events



Countries most affected by extreme weather events (1996–2015)	
1	Honduras
2	*Myanmar*
3	Haiti
4	Nicaragua
5	Philippines
6	Bangladesh
7	Pakistan
8	Vietnam
9	Guatemala
10	Thailand

Table 4: The 10 African countries most affected in 1996–2015 (annual averages)

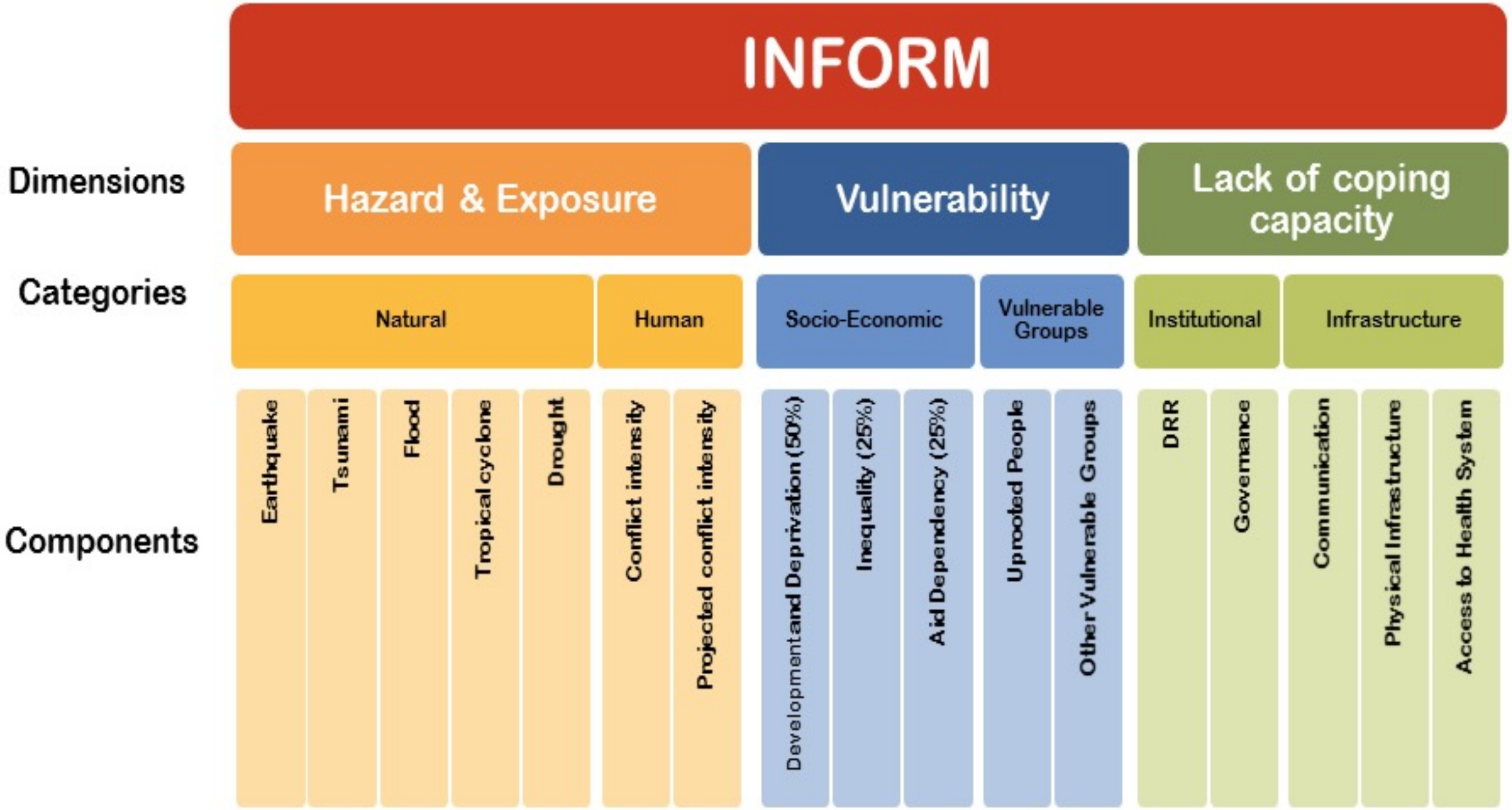
Ranking CRI	Country	CRI score	Death toll	Deaths per 100 000 inhab-itants	Absolute losses (in US$ PPP)	Losses per unit GDP in %
19	Madagascar	42.50	78.80	0.42	160.88	0.634
22	Mozambique	43.33	101.80	0.47	94.40	0.584
38	Djibouti	54.17	3.50	0.47	33.60	1.803
63	Namibia	69.50	11.25	0.57	26.11	0.160
66	Ethiopia	70.33	88.35	0.12	153.93	0.199
74	The Gambia	76.67	4.90	0.32	7.09	0.339
80	Malawi	79.00	11.55	0.08	56.97	0.487
80	Niger	79.00	12.40	0.09	49.09	0.426
80	Zimbabwe	79.00	17.40	0.14	46.21	0.206
83	Mauritania	79.17	4.35	0.14	40.52	0.384

Index for Risk Management (INFORM)

INFORM is dataset to assess crisis and disasters, the probability of their occurrence and their likely impact. It measures 3 dimensions: 1. Vulnerability, 2. Hazards and Exposure, 3. Coping Capacity.

Example of indicators:
Physical exposure to flood, tropical cyclone and drought
People affected by drought
Frequency of drought events
Agricultural drought probability
Food security
Child mortality
Human development

http://www.inform-index.org/, data available online
Source of data: synthesize data from FAO, EM-DAT CRED, GSHAP, UNISDR Global Risk Assessment, JRC, UNDP Human Development Report, WB, OECD DAC, WHO, etc.


INFORM
Dimensions
Hazard & Exposure
Vulnerability
Lack of coping capacity
Categories
Natural
Human
Socio-Economic
Vulnerable Groups
Institutional
Infrastructure
Components
Earthquake
Tsunami
Flood
Tropical cyclone
Drought
Conflict intensity
Projected conflict intensity
Development and Deprivation (50%)
Inequality (25%)
Aid Dependency (25%)
Uprooted People
Other Vulnerable Groups
DRR
Governance
Communication
Physical Infrastructure
Access to Health System

Vulnerability

Hazard and Exposure to climate-related events

Hazard specific vulnerability index used by Cambodia's National M&E framework for Climate Change

Impact Indicators

Indicator 1: Percentages of communes vulnerable to climate change

Indicator 2: Families affected due to floods, storms and droughts

Indicator 4: GHG emissions per capita

+

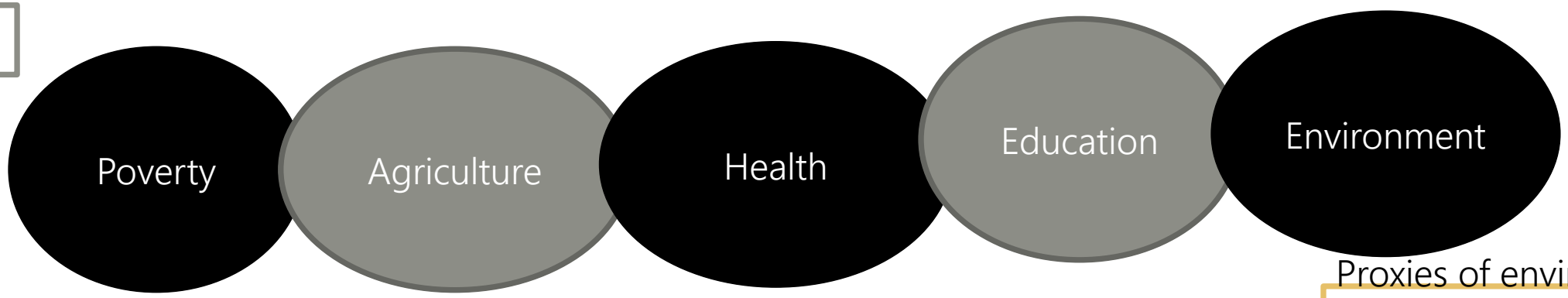
2-3 indicators per sector

Indicators of Outcomes or impacts

Resilience/vulnerability Indicator

% of communes vulnerable to climate change

Composed of



Proxies of poverty include
- % families with motors
- % houses with electricity
- % families with water less than 150m from house

Proxies of Agri include
- % of irrigated rice farms
- Number of tractors per 1,000 families

Proxies of Health include
- Dengue deaths per 100,000

Proxies of education
- Average distance to school
- Number of primary schools with access to water

Proxies of environment include
- % families with access to garbage collection
- % families exposed to pollution

Well being or loss & damage indicator

Percentage of families affected by storms/ floods and droughts .

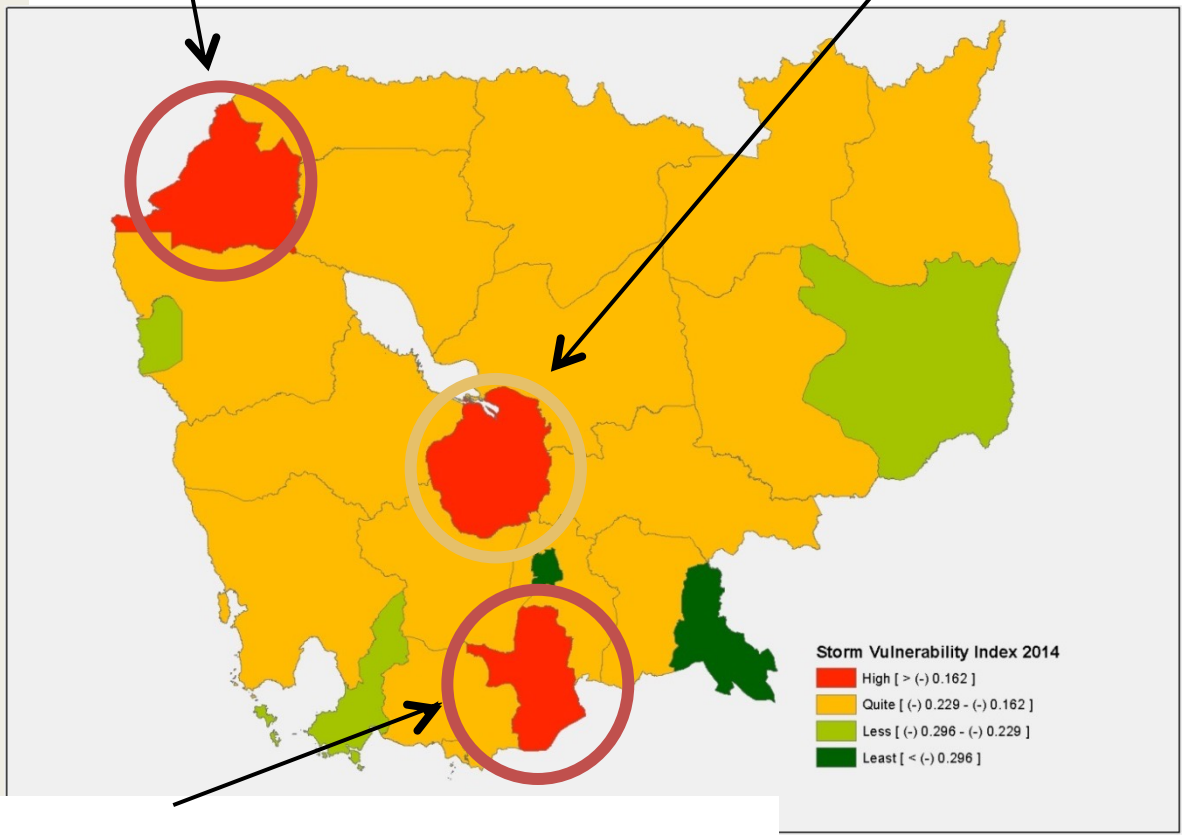
Communes vulnerable to storms

- Percentage of communes vulnerable to storms in 2014 = 64%

- *31% : Highly vulnerable*
- *32.5%: Quite vulnerable*

Banteay Meanchey
% of highly vulnerable communes: 63%
% of quite vulnerable communes: 10%

Kampong Chhnang
% of highly vulnerable communes: 45%
% of quite vulnerable communes: 13%



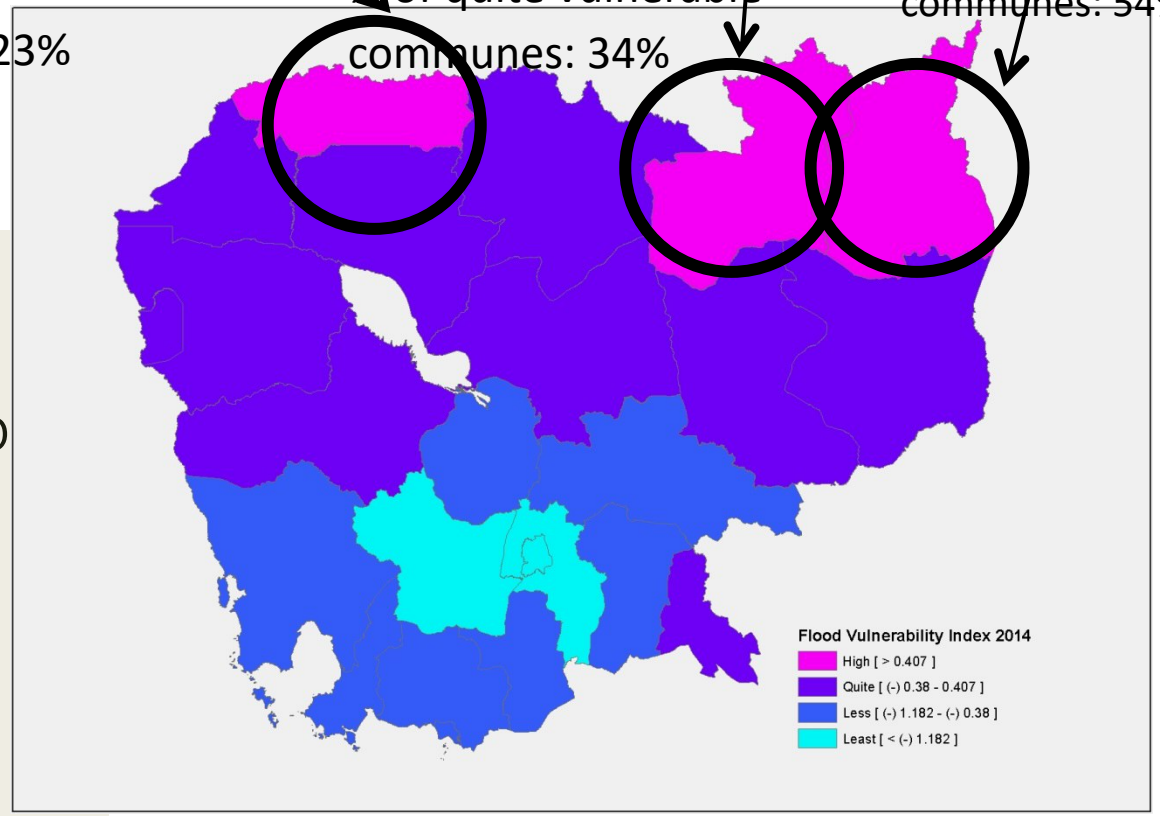
Takeo
% of highly vulnerable communes: 14%
% of quite vulnerable communes: 17%

Communes vulnerable to Floods

Otdar Meanchey
% of highly vulnerable communes: 55%
% of quite vulnerable communes: 23%

Stung Treng
% of highly vulnerable communes: 24%
% of quite vulnerable communes: 34%

Ratnakiri
% of highly vulnerable communes: 29%
% of quite vulnerable communes: 54%



- Percentage of communes vulnerable to floo in 2014 = 56%
- *15% : Highly vulnerable*
- *41%: Quite vulnerable*

Methods and steps used in developing the hazard specific VI

1. **Step 1: Develop a list of predictive indicators** (data points) of Vulnerability from the national database*. E.g. socio economic indicators

2. **Step 2: Identify appropriate climate sensitive vulnerability indicators** based on their ability to predict climate impacts. E.g. Based on co-relations between socio-economic indicators and losses due to floods, droughts or storms.

3. **Step 3: Assigning weights to indicators**

4. **Step 4: Discarding indicators and adding new ones.** Any indicators that did not convincingly link vulnerability to impacts in the context of specific climate hazards were discarded.

5. **Step 5: Constructing a vulnerability index by hazard type.**

Food and Agriculture Organization of the United Nations

THANK YOU

FAO and the Enhanced Transparency Framework: https://www.fao.org/climate-change/our-work/what-we-do/transparency/en/

FAO SCALA: https://www.fao.org/in-action/scala/en
UNDP SCALA: https://www.adaptation-undp.org/scala

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