Changing Disaster Risk Scenario
Need for Investment in Disaster Resilient Infrastructure

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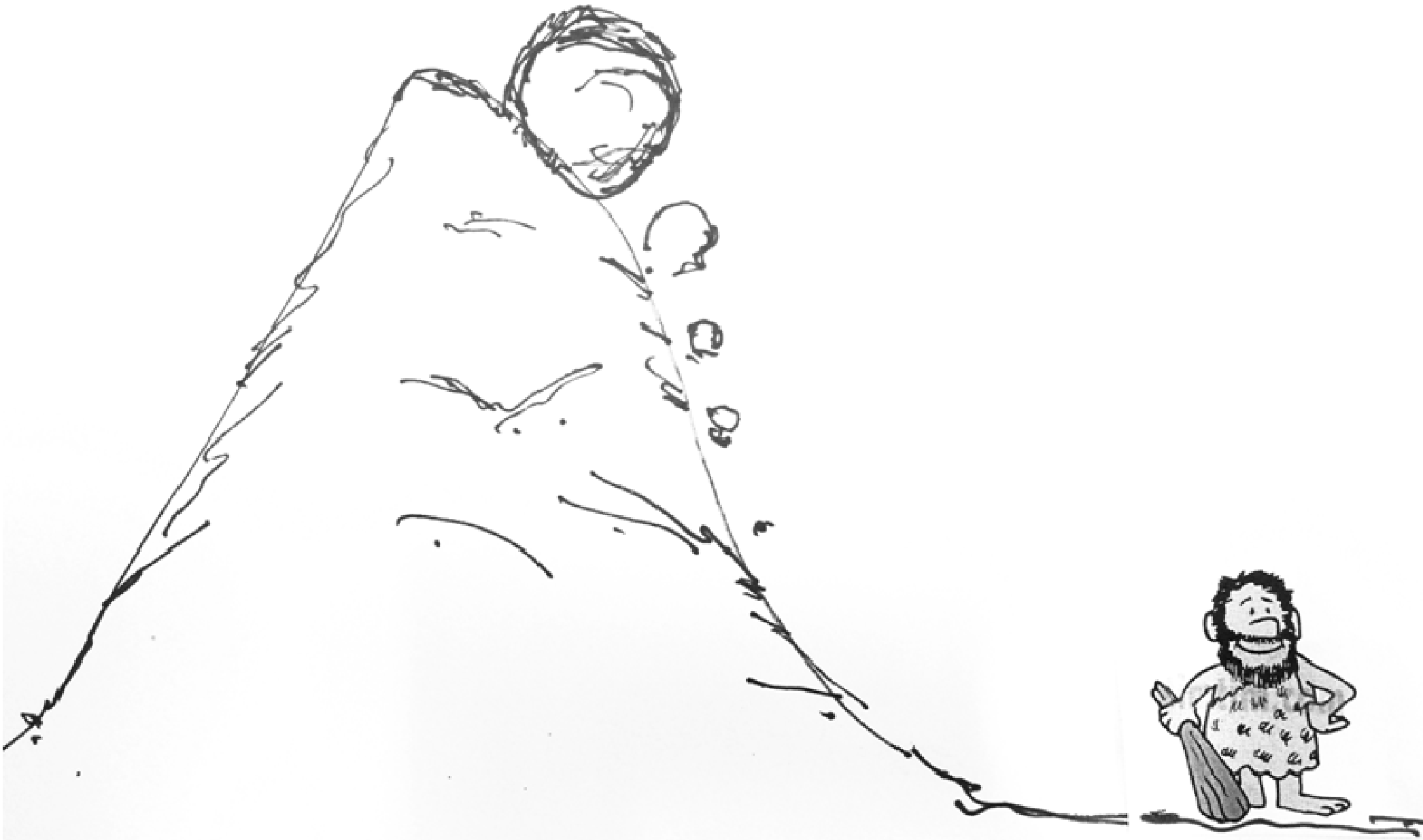
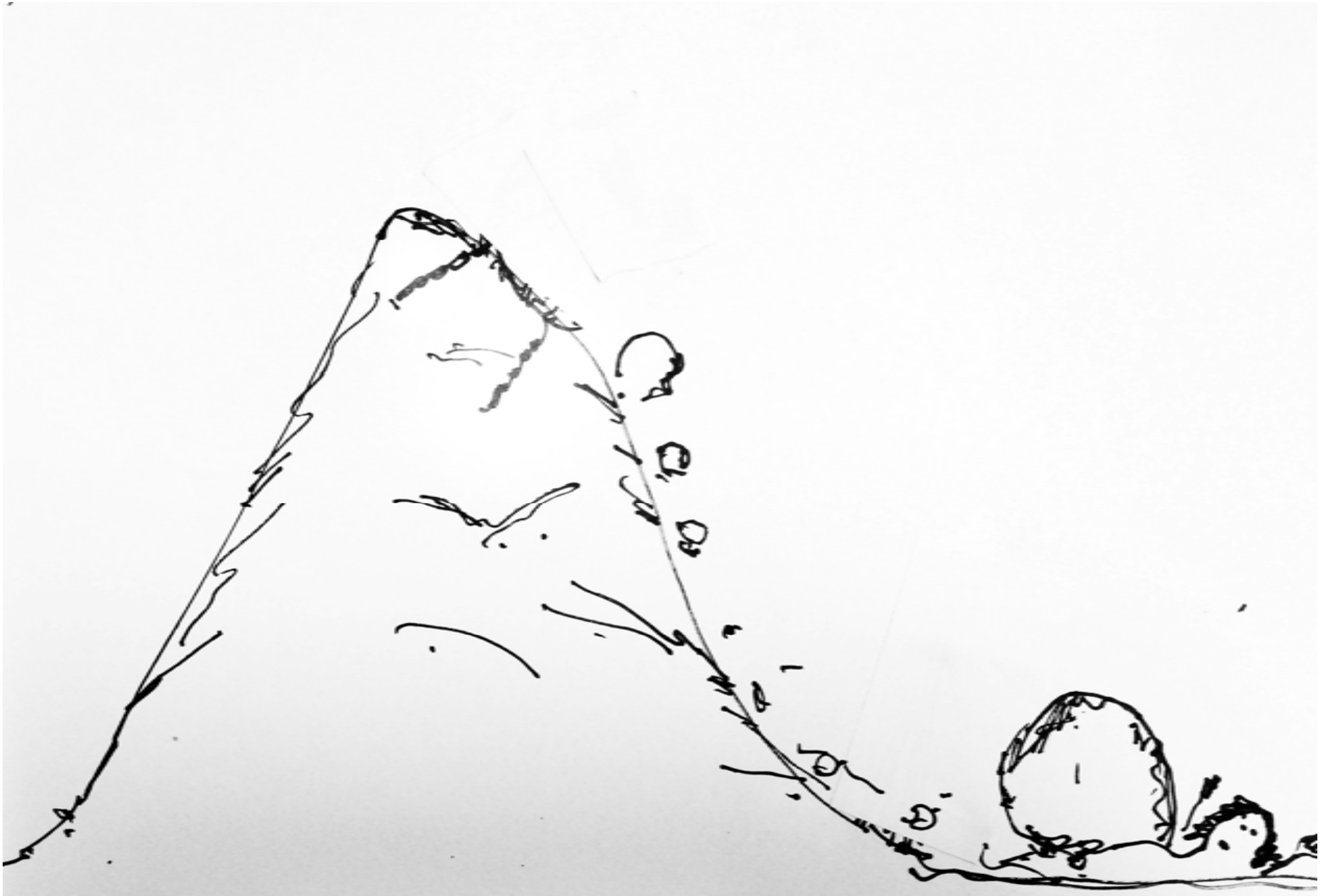
New Delhi, 20 September 2017

Hazard, Exposure and Vulnerability

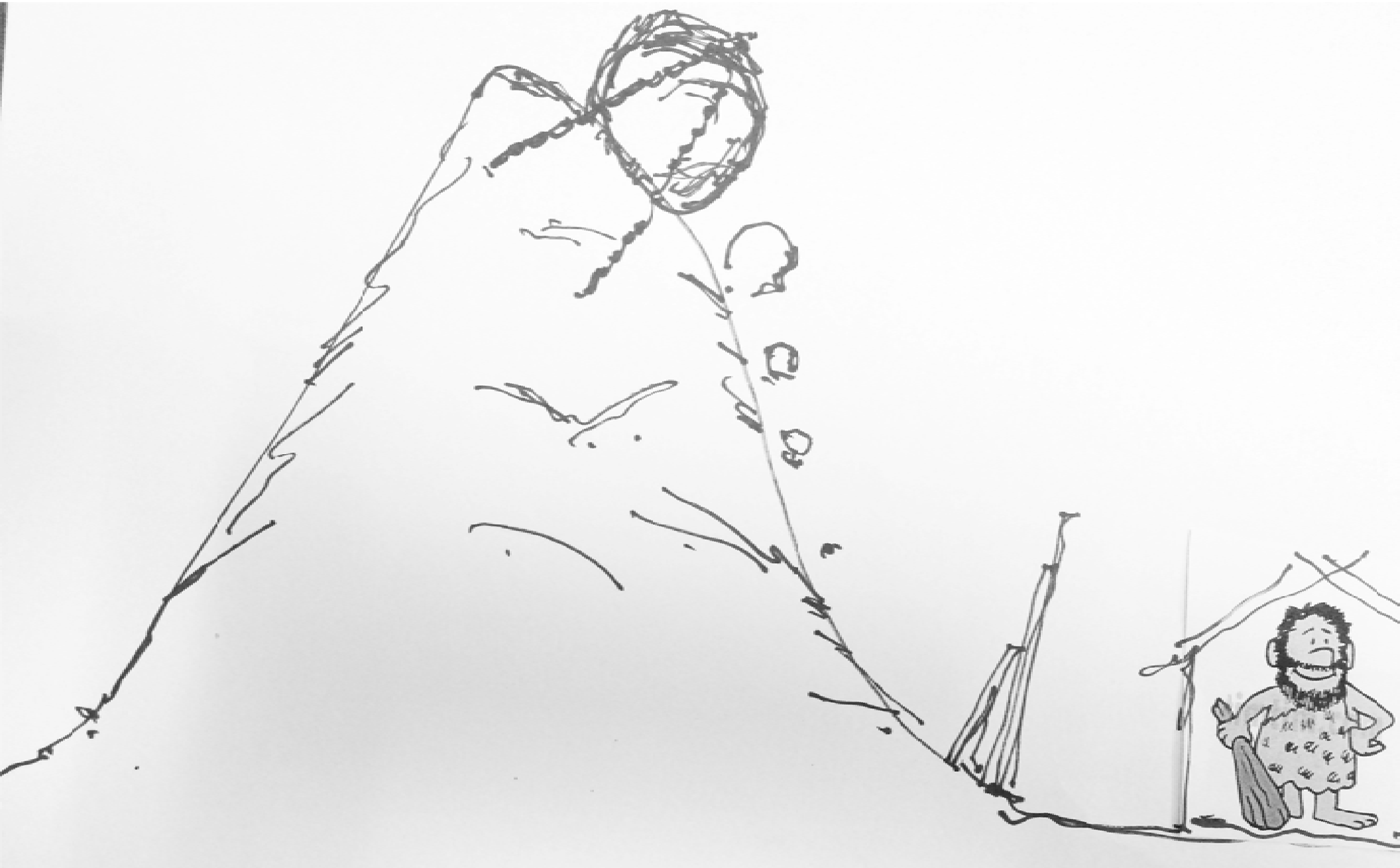


Disaster



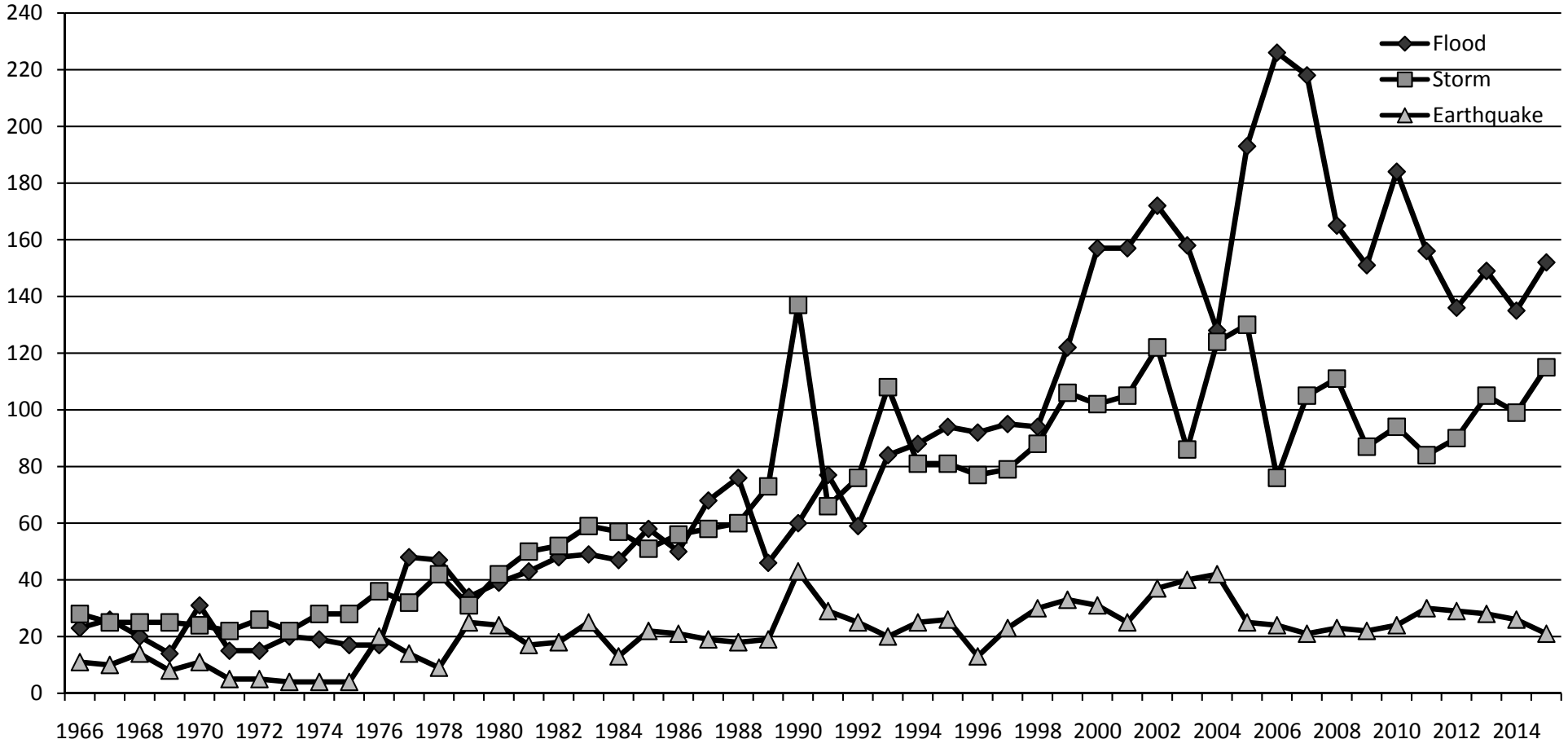
Prevention

Mitigation



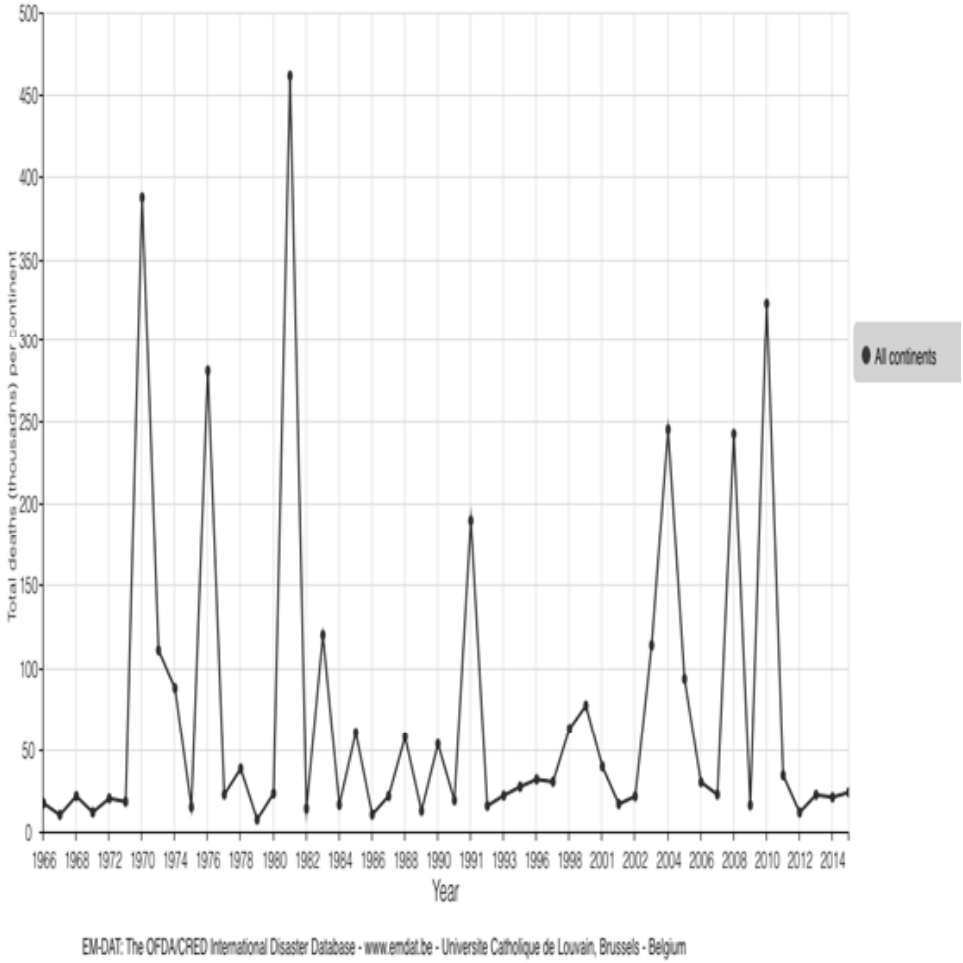
Global Scenario

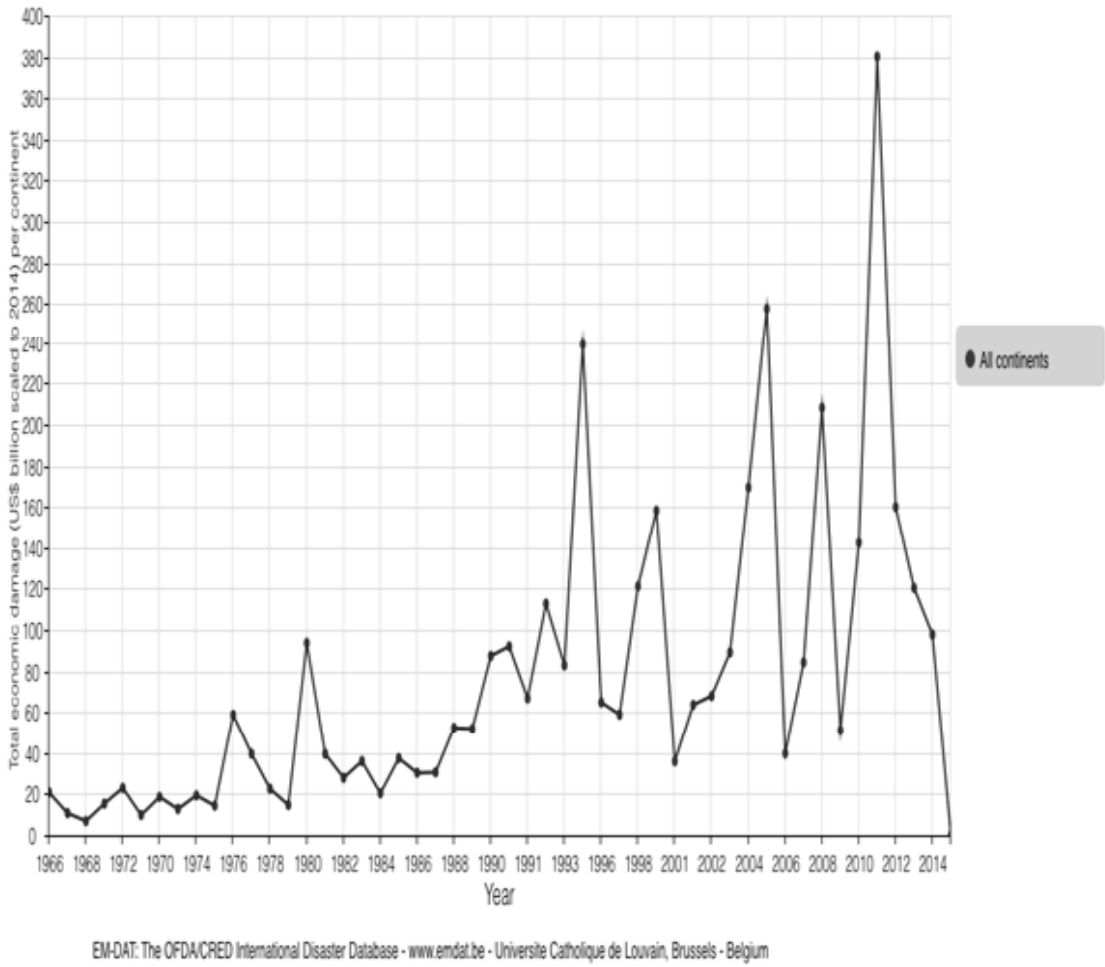
- Increasing trend of hydro-meteorological disasters
- Climate change induced extreme weather events



Global Scenario

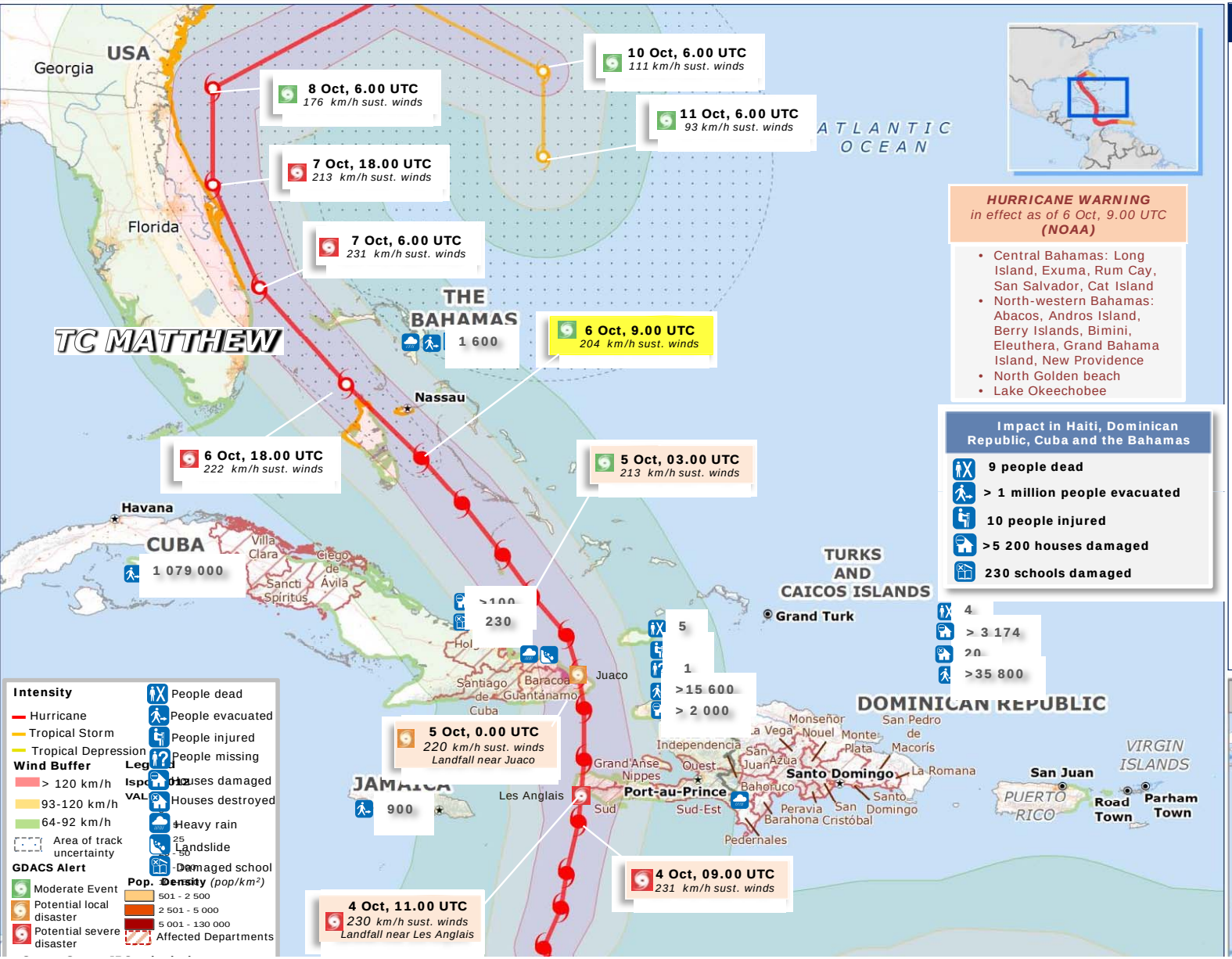
- Mortality is trending down
- Economic losses rising





Hurricane Matthew: Cuba & Haiti

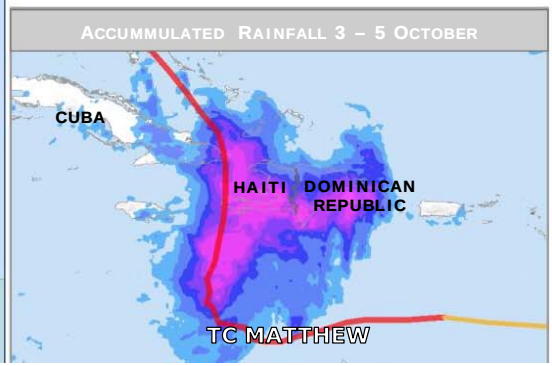
Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 06/10/2016
Haiti, Dominican Republic, Cuba, USA – Tropical Cyclone MATTHEW



SITUATION

- Tropical Cyclone MATTHEW continued moving north-west, passing through The Bahamas islands as a Category 3 Hurricane. On 6 October at 9.00 UTC, its centre was located 95 km south south-east of Nassau (The Bahamas) and 410 km south-east of west Palm Beach (Florida State, USA) and it had max. sustained winds speed of 205 km/h (Category 3 Hurricane).
- Over the next 24 h, it is forecast to continue moving north-west, strengthening. Its centre may pass near or over Andros Island and New Providence on 6 October afternoon and Gran Bahama island (The Bahamas) in the evening of the same date possibly as a Category 3 Hurricane. It then may pass near the eastern coast of the Florida peninsula on 7 October possibly as a Category 4 Hurricane. Heavy rain, strong winds and storm surge may affect the areas along its path. JRC calculations estimated a storm surge of 2.8 m in Red Bay (The Bahamas) on 6 October at 17.00 UTC.
- As of 6 October 9:00 UTC, Hurricane and Tropical Storm Warnings and Watches are in effect for several parts of the Bahamas, as well as several parts of Florida and South Carolina states (USA).
- Civil Protection Haiti is reporting 5 dead and over 2 000 houses damaged. OCHA reports 10 people injured and over 15 600 evacuated in the Departments of Grand'Anse, Nippes, West, Centre, South and Southeast (Haiti). However, due to lack of access to many affected areas a full picture of the situation is not yet available. Authorities in the Dominican Republic report 35 019 displaced in family houses and 794 in official shelters with 3 174 houses partially damaged and 20 destroyed. Hundreds of houses have also been damaged in Baracoa (Guantanamo province, Cuba). According to official reports, more than 1 million are estimated to be evacuated throughout the region.

Sources: ECHO, GDACS, NOAA, Meteo-Haiti, OCHA, UN, Cuba Gov., COGIC, Local Media



Differential Impacts

Cuba

Deaths: 0

Evacuated: 70,000

Population of most affected municipalities: 300,000

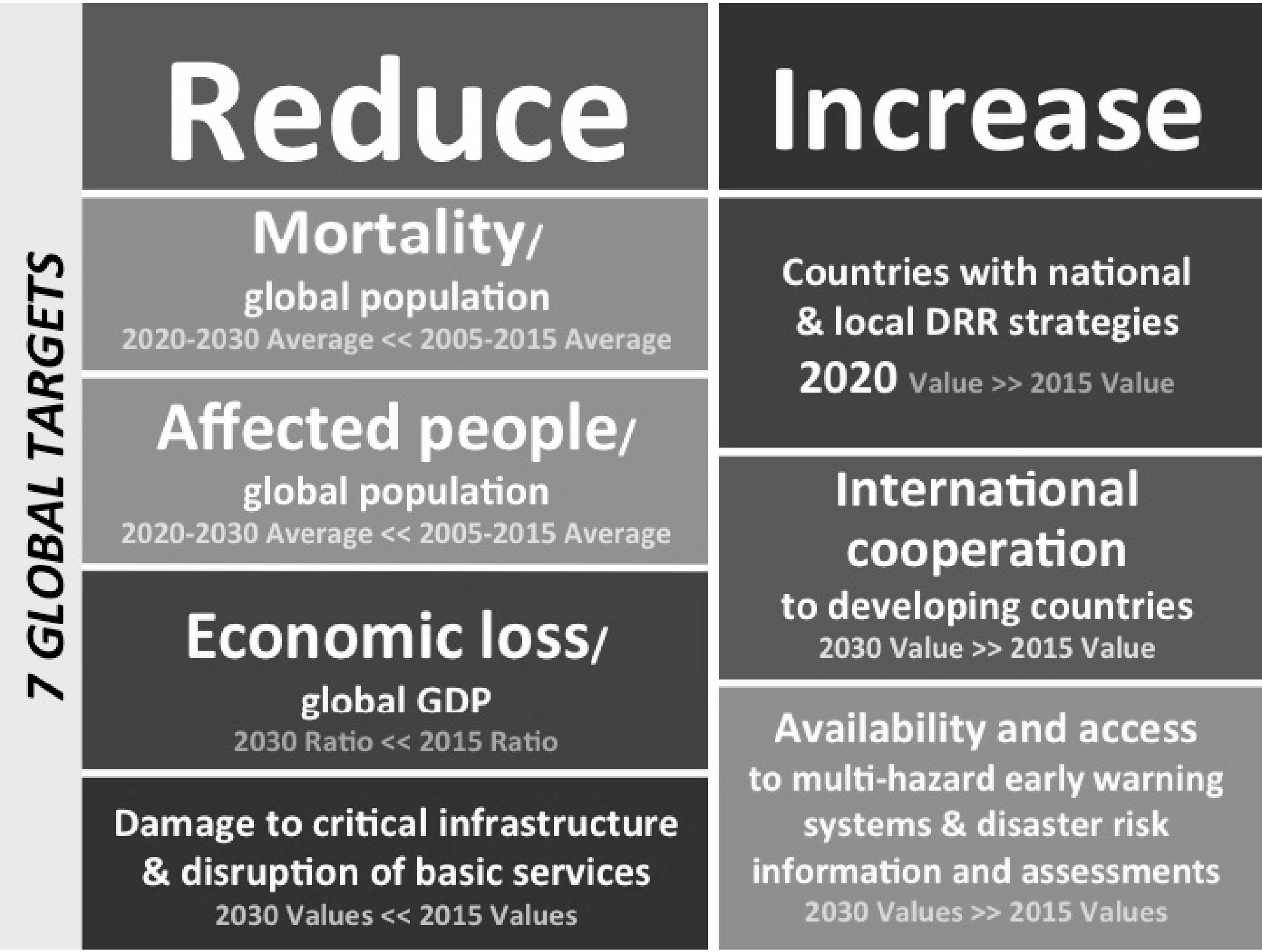
Haiti

Deaths: 548 (+128 missing)

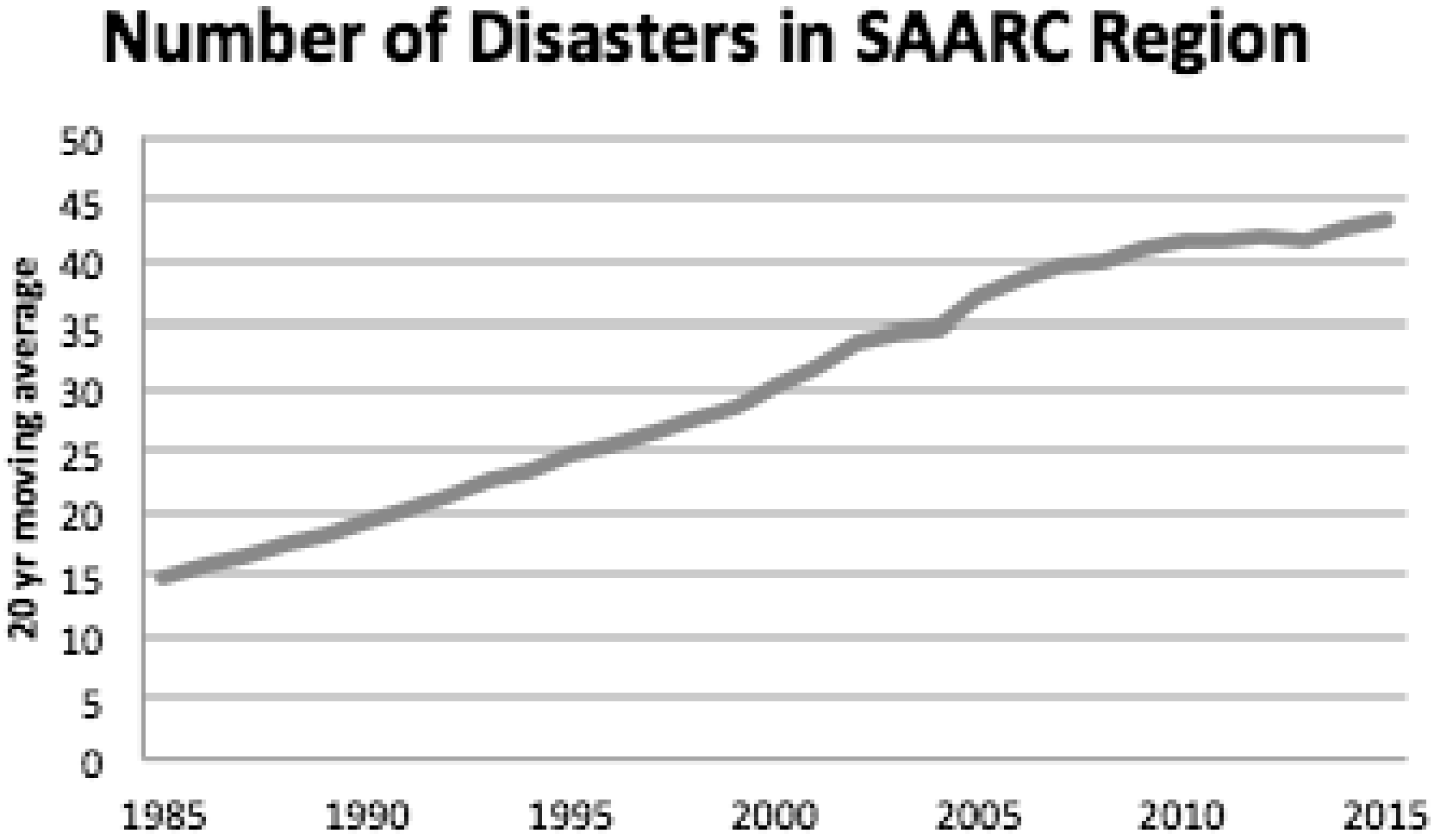
Evacuated (displaced): 175,000

Population of most affected municipalities: 1,000,000

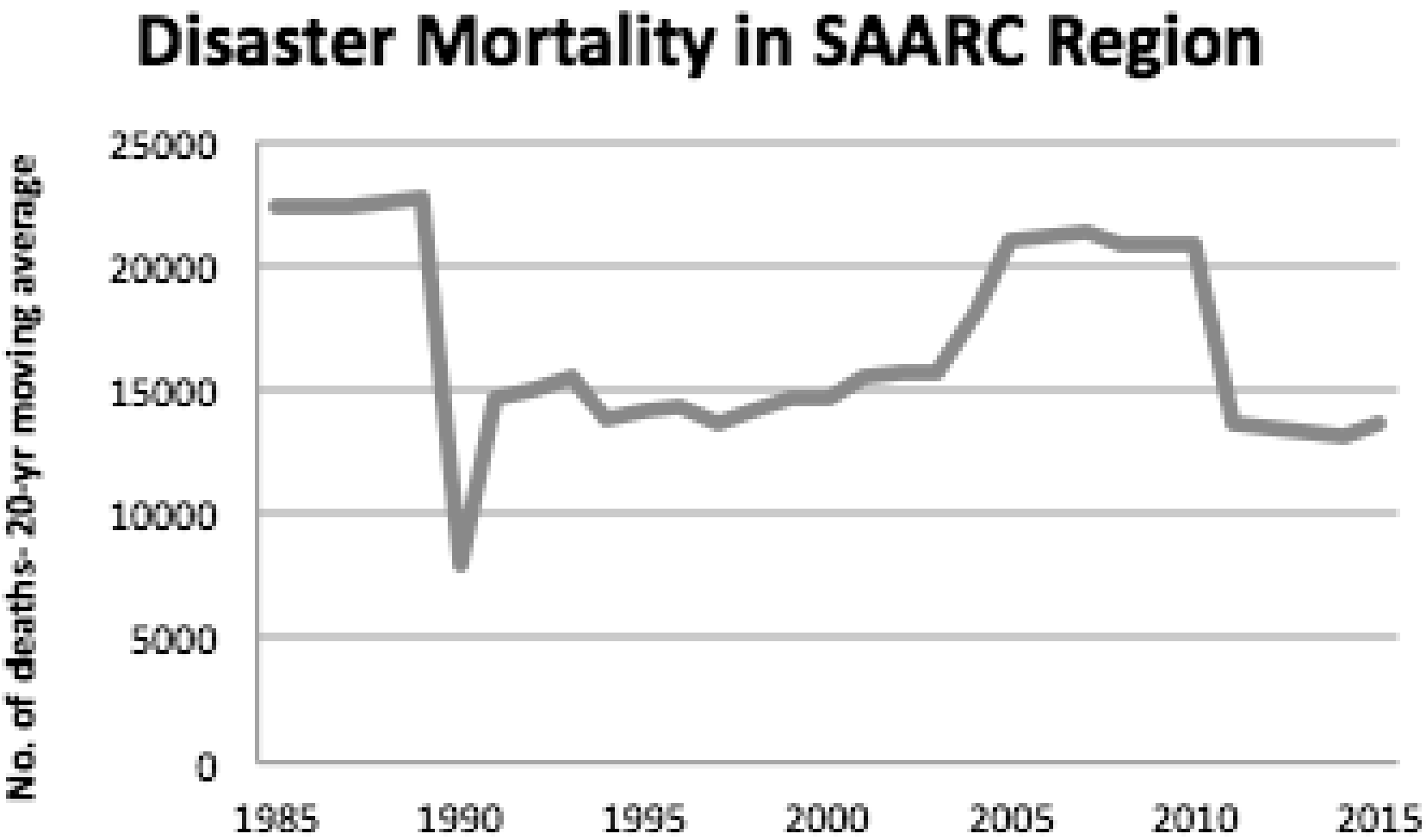

4 PRIORITIES FOR ACTION
Priority 1
Understanding disaster risk
Policies and practices for DRR should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment.
Priority 2
Strengthening disaster risk governance to manage disaster risk
Disaster risk governance at the national, regional and global levels is of great importance for an effective and efficient management of disaster risk.
Priority 3
Investing in disaster risk reduction for resilience
Public and private investment in DRR are essential to enhance the economic, social, health & cultural resilience of persons, communities, countries, their assets, as well as environment
Priority 4
Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction
Strengthened disaster preparedness for response, recovery, rehabilitation and reconstruction are critical to build back better
National and local dimensions
Regional and global dimensions


7 GLOBAL TARGETS
Reduce
Mortality/
global population
2020-2030 Average << 2005-2015 Average
Affected people/
global population
2020-2030 Average << 2005-2015 Average
Economic loss/
global GDP
2030 Ratio << 2015 Ratio
Damage to critical infrastructure
& disruption of basic services
2030 Values << 2015 Values
Increase
Countries with national
& local DRR strategies
2020 Value >> 2015 Value
International
cooperation
to developing countries
2030 Value >> 2015 Value
Availability and access
to multi-hazard early warning
systems & disaster risk
information and assessments
2030 Values >> 2015 Values

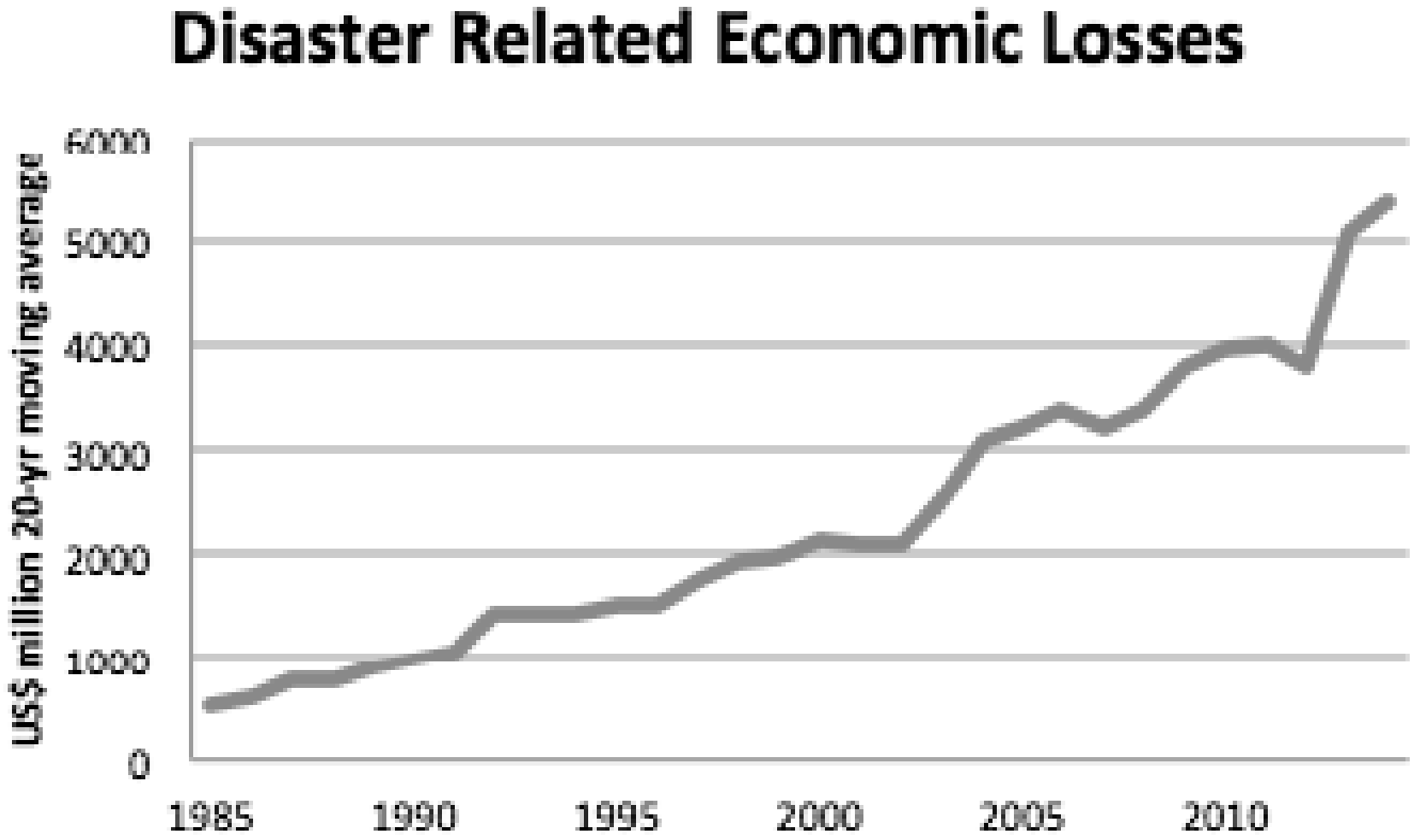
Average Number of Disasters 1985-2015



Average Number of Disaster Related Deaths 1985-2015



Average Economic Losses
1985-2015



Monitoring progress

- **Voluntary** and **non-binding**
- **National and local** DRR Plans and Strategies with targets and indicators
- Open-ended intergovernmental working group to develop **global indicators**
- Countries to develop **baselines for different targets and indicators** by 2020

Key Issues

- **Targets**
  - Which Targets?
  - Quantitative (specific) or Qualitative?
  - Baseline
- **Scope**
  - Which additional hazards to include?
  - Risk information for biological, man-made hazards
- **Linkages**
  - With each Country's **development** targets
  - Involvement of **Statistical Offices**

What leads to high level disaster risk?

HAZARDS: almost all principal natural hazards: earthquakes, floods, cyclones, drought, and landslides

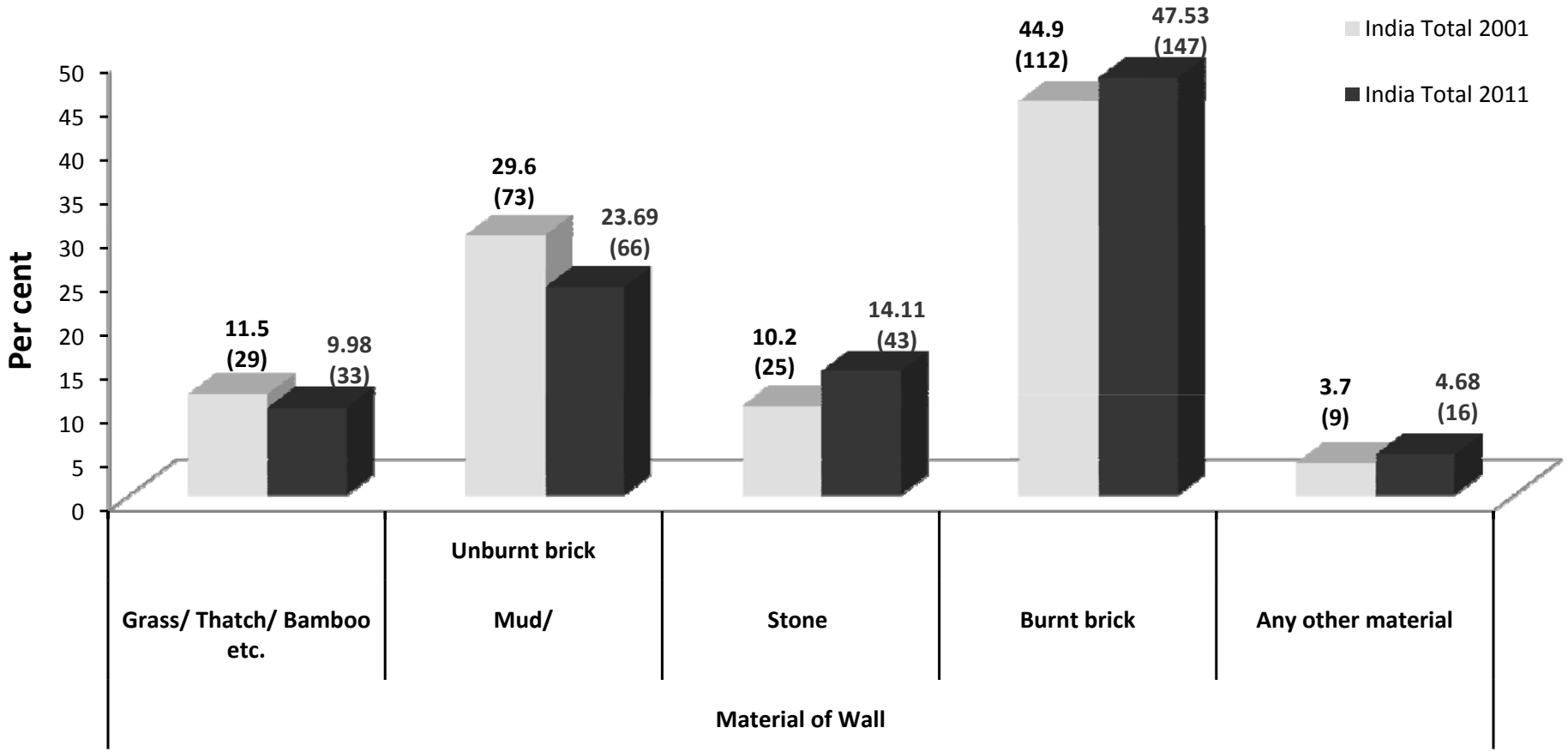
EXPOSURE: Large, disproportionate concentration of people, capital assets and economic activity in hazard prone areas. This exposure is increasing!

VULNERABILITY: Inherent vulnerability of the built environment, socio-economic systems, environmental concerns exacerbating risk

Disproportionate Exposure

Seismic Zone	Area	Total Population (2001)
Zone V	10.90 %	9%
Zone IV	17.30 %	27%
Zone III	30.40 %	42%

Increasing Vulnerability



Note: Figures in bracket are the number of houses in Million.

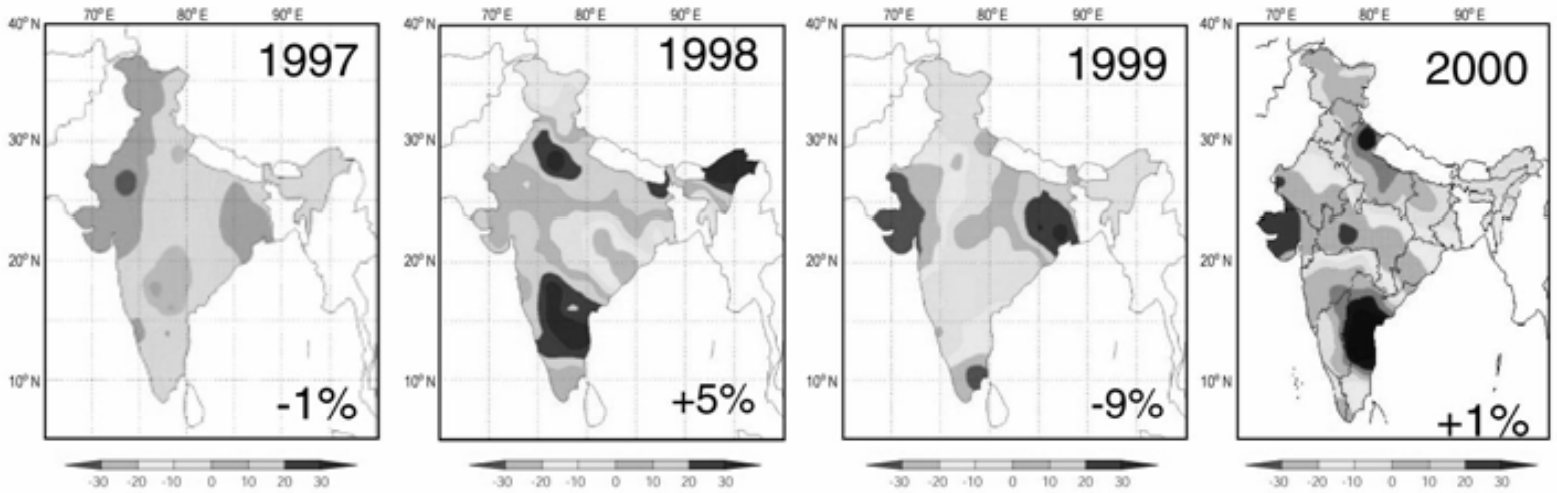
- Share of houses, which are prone to Earthquakes, is growing while the share of traditional houses which can withstand disasters is reducing.

Climate Change, Complexity and Uncertainty

- Processes of climate change are adding new and more intractable dimensions to the problem of risk
- In a sense “everybody lives downstream” – territorial complexity, concatenation of causal factors, scale
- It is accepted that climate change will alter the severity, frequency and complexity of climate related hazards
- However, there is great uncertainty about the local level manifestations (even “natural” variability impacts are varied from event to event)

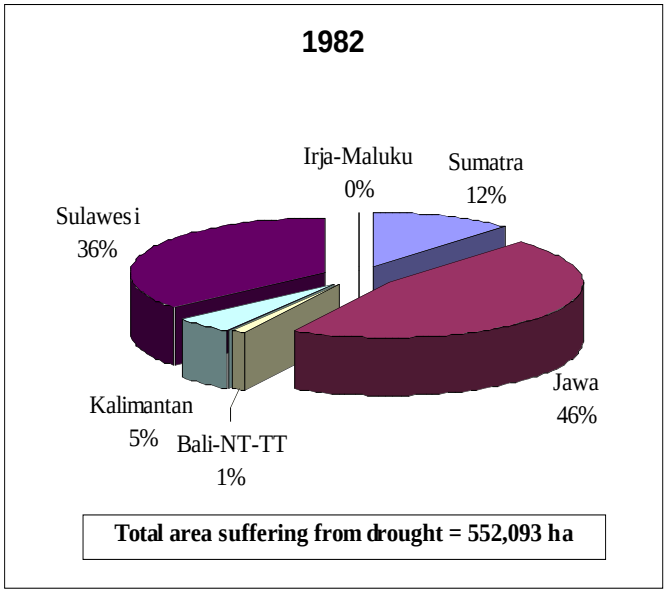
Four near normal monsoon years over India

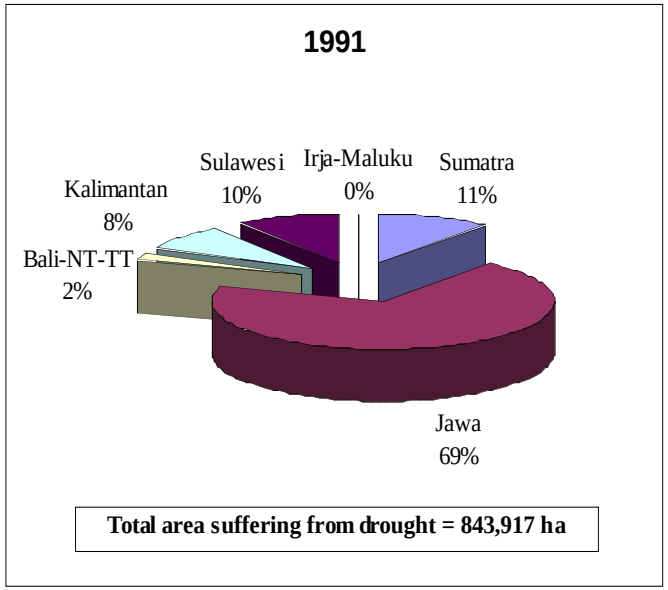
Climate Forecasting Applications in Bangladesh CFAB

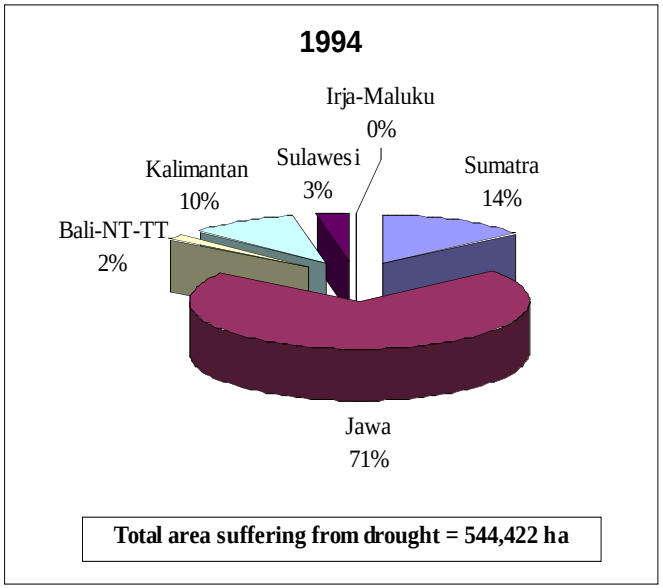


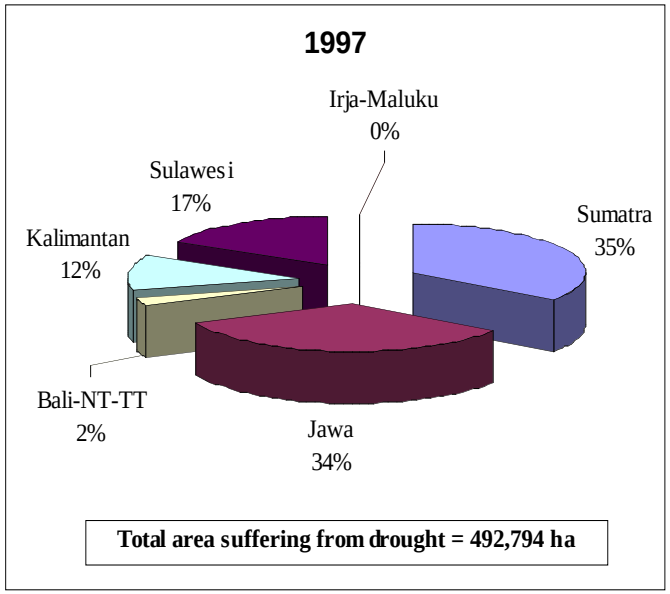
The mean summer rainfall over India plotted as % of the long term average relative to the colour code. Each year falls within the definition of a normal precipitation season falling within ±10% of normal. However, coherent variations exist from year-to-year. Bangladesh not included in analysis.

Drought Occurrence in Indonesia in El Nino years









Integrated Climate Risk Management

- Adaptation to climate change **can not be based solely on scenarios** of what **might happen** in 30-40 years
- Risk management for a wide range of elements at risk, ranging **from communities to ecosystems**, at **short and long** time scales and **across spatial scales**.
- Learn to manage your “now” to be prepared for “future”
- Adaptation has to be often extension of on-going efforts to reduce climate related disaster risks.
- While past climate is not a good guide as to the future climate, past experiences and lessons learned are

Physical Infrastructure:

- Transport
- Communications
- Energy
- Water & Sanitation
- Irrigation
- Flood Control Structures

Housing, Health Facilities, Schools, Government buildings etc. are covered under social infrastructure

Damage and Loss in Selected Disaster Events

Event	Total D&L (million $)	Infra. D&L (million $)	Infra D&L as % of Total Loss	Infra D&L as % of Public Loss
2001/India/Quake	2.131	334	16%	n/a
2004/ Indonesia / Tsunami	4.452	877	20%	56%
2004/ Sri Lanka/ Tsunami	970	127	13%	n/a
2005/ Pakistan/ Quake	2.852	472	17%	n/a
2006/ Indonesia/ Quake	3.134	59	2%	17%
2010/Pakistan/ Flood	10.056	2.025	20%	n/a
2012/ Samoa/ Cyclone	204	75	37%	66%
2014/ Cape Verde/ Volcano	28	2	8%	30%
2015/ Nepal/ Quake	7.065	668	9%	30%
2016/ Fiji/ Cyclone	1.327	116	9%	47%

Data Source: Various Post-Disaster Needs Assessment Reports commissioned by national governments with the help of United Nations and International Financial Institutions

Preliminary observations

Damage and loss to infrastructure as a proportion of total damage and loss: **8% to 37%**

Damage and loss to infrastructure as a proportion of public sector damage and loss: **as high as 66%**

Loss component of "damage & loss" to infrastructure is quite high: Pakistan 2010 flood (**40%**); Samoa 2012 cyclone (**34%**)

Preliminary observations

- Moderate hazard events lead to disproportionately high private losses (housing, productive sectors) but low infrastructure losses
- Cumulative damage from frequent moderate hazard events leads to progressive degradation to infrastructure and loss of productivity
- This increases vulnerability of such locations – a case of two-way linkage between infrastructure development and disaster risk

Preliminary observations

- Hydro-meteorological vs Geo-physical hazards?
- Losses increase exponentially with slight increase in hazard intensity

  (e.g. change in wind speed from 40m/s to 60m/s increases marginal damage from 2% to 10% and from 60 m/s to 80m/s increases marginal damage to 75% in buildings of substandard quality)

What does it mean for Future Risk?

New infrastructure needs to account for **intensive risk**

If disaster resilience issues are not taken into account, the exposure of infrastructure and hence **losses will rise** rapidly even without change in hazard patterns

The notion of resilient infrastructure needs to extend beyond physical assets to include resilience of **services *from* infrastructure**

In addition to **risk *to* infrastructure**, we need to look at risks that may be created in the societal systems ***by***

What can be done?

- Develop standards/ practices that **visualize future hazards**; and address the challenge of **dealing with uncertainty**!
- Pool resources for different infrastructure classes for **mitigating extensive risk** (high frequency, low impact events)
- Develop **institutional/ management systems** around physical infrastructure that build resilience
- Identify **differential approaches** for: large/ small countries; publicly/ privately managed infrastructure; different infrastructure classes

What can be done?

- Develop systems for systematically **assessing damage and loss** to infrastructure even after moderate events
- Develop predictable mechanisms to **support recovery** of physical infrastructure
- **Identify** existing practices where risk management is already hard-wired in infrastructure development processes and build on it/ update it

Thank You