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SPECIAL MOBILITY STRAND

DISASTERS, POVERTY AND DEVELOPMENT: A COMPREHENSIVE VIEW FROM INDIVIDUAL LEVEL TO SOCIETY

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NOVI SAD
18 DECEMBER 2018

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Outline of presentation:

1. Disaster and poverty
2. Macroeconomic risk of natural disasters
3. Risk perception at individual level
4. Resilience in case of disasters
5. Case study presentation
6. Research within disaster risk management field

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Collapse during Turkey earthquake, 1999

A house slides into the Atlantic Ocean in the aftermath of Hurricane Irma, 2017

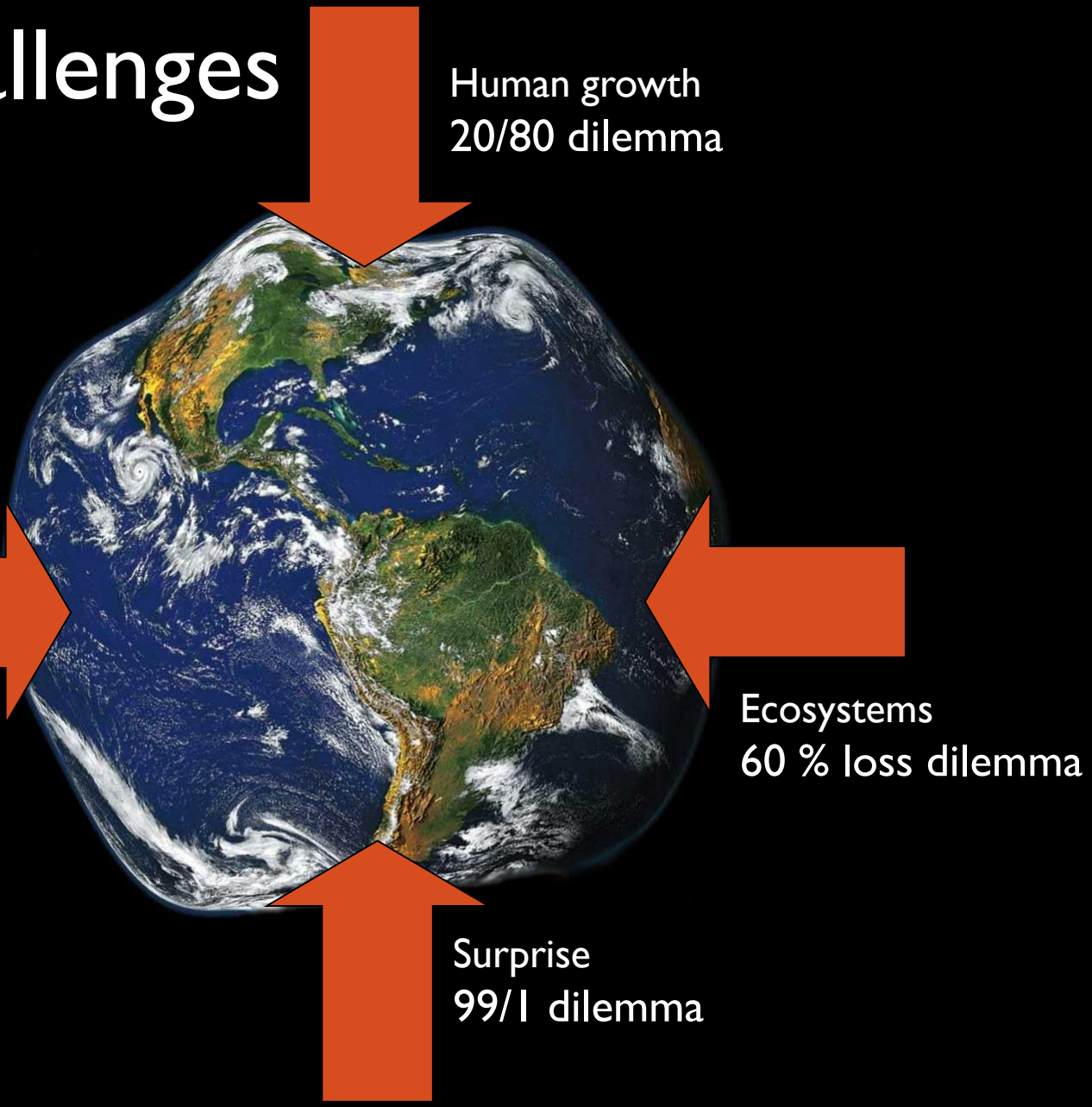
Forest fires in Portugal, 2017

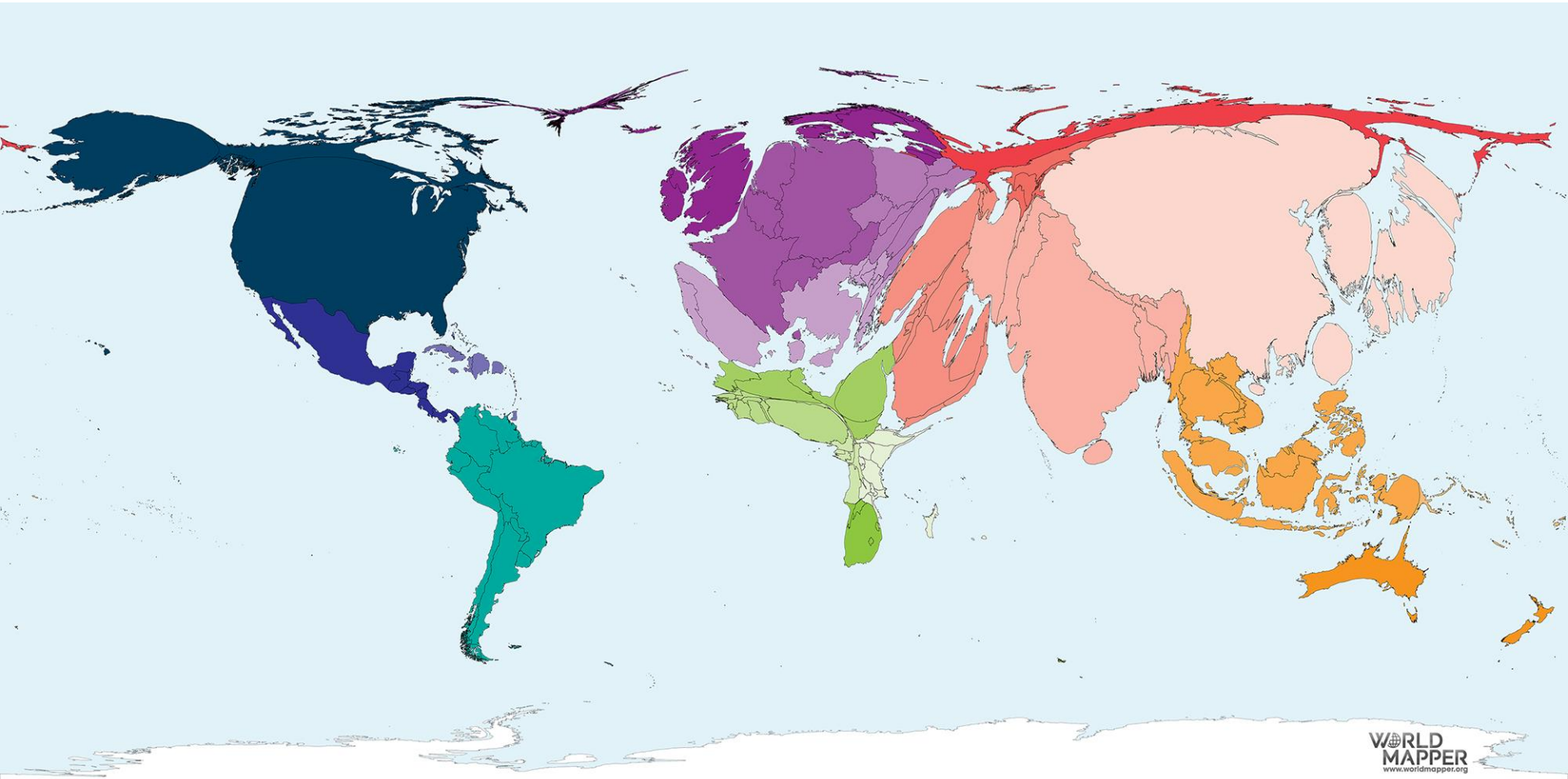
Search and rescue operations by the Japan Disaster Relief Rescue Team in 2003 after Algeria Earthquake

People evacuate using boats in the middle of the city Shkodra flooding, Albania, 2010

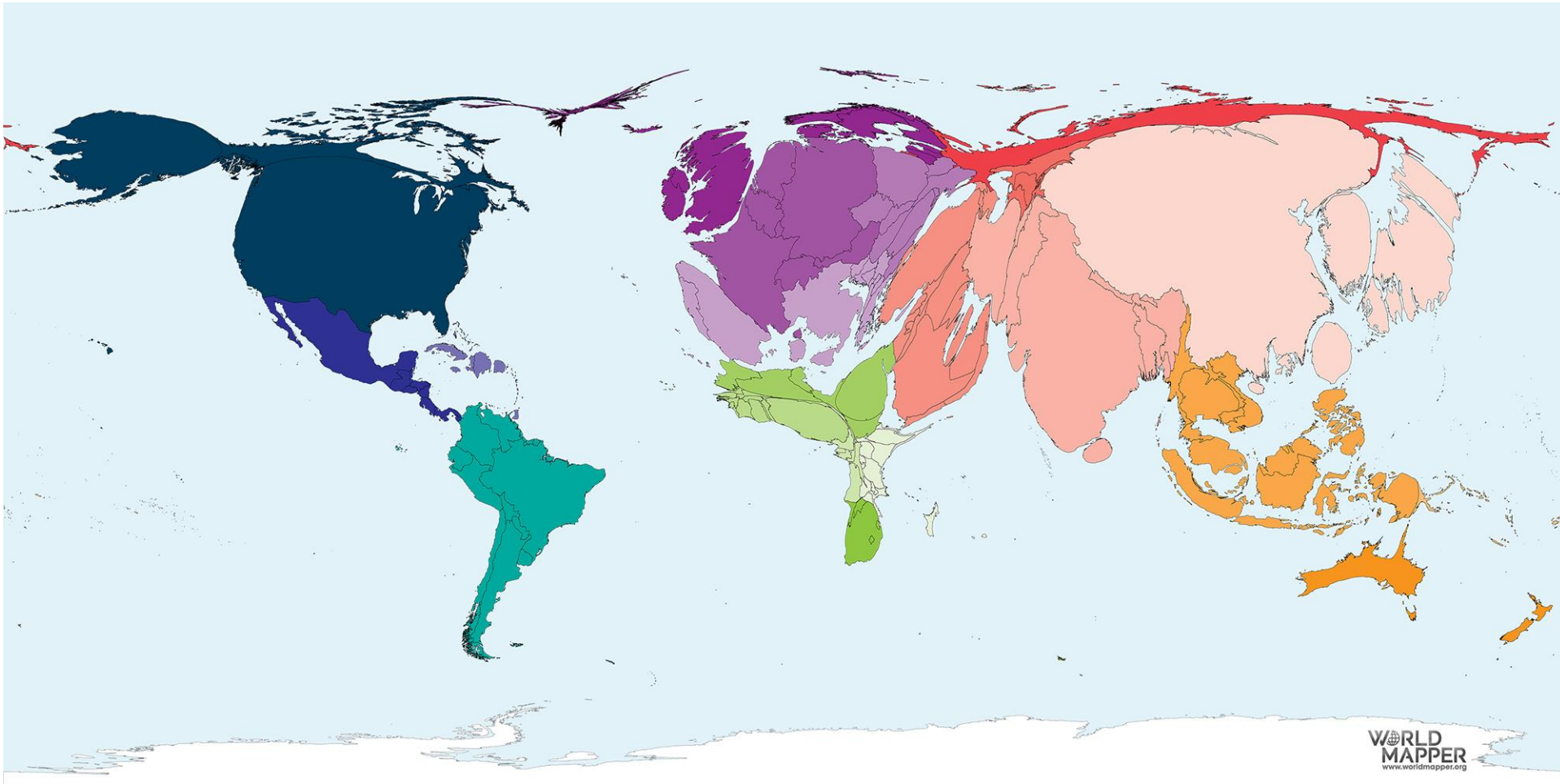
Image from Barbados, Caribbean Islands

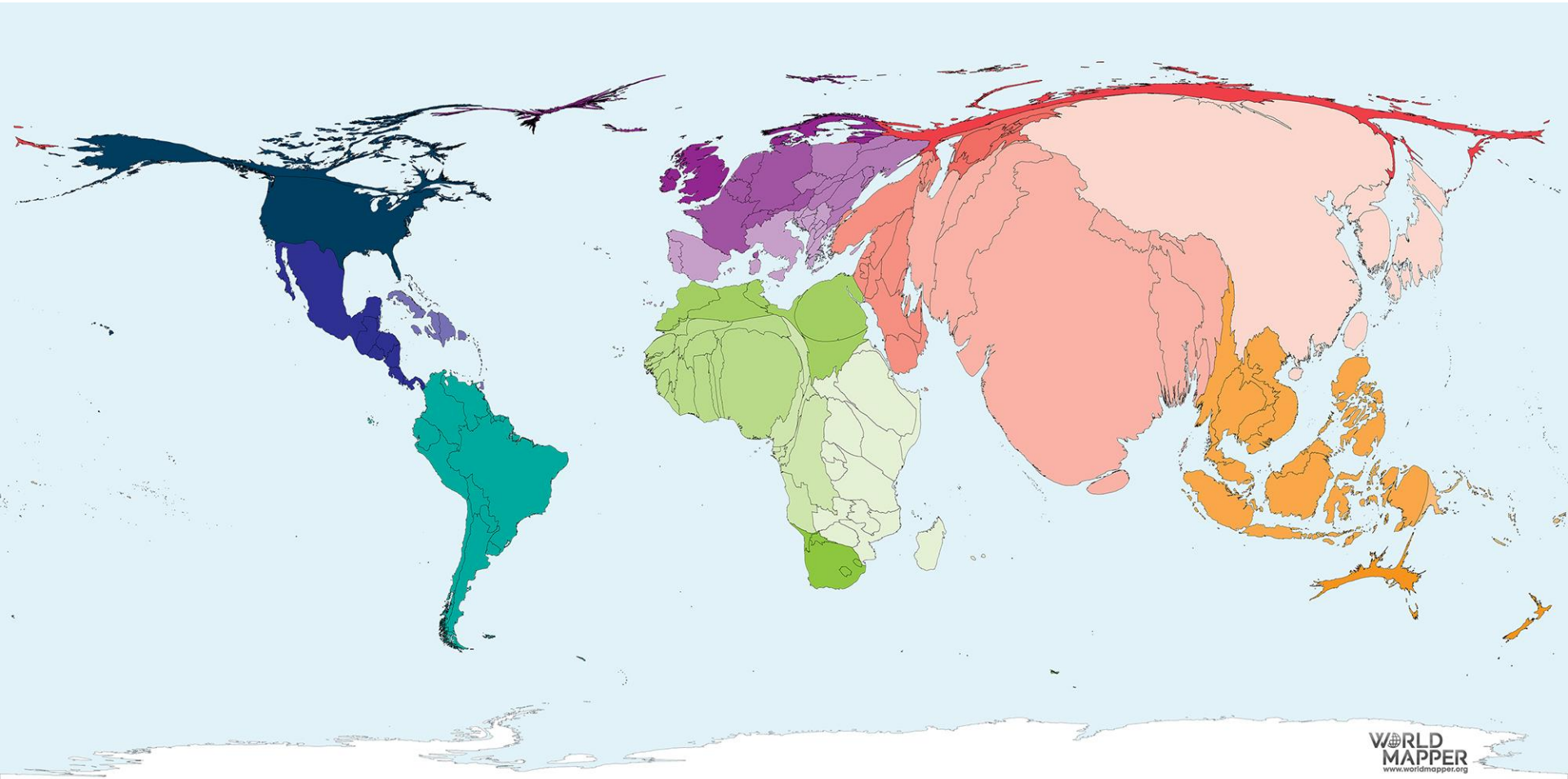
Global challenges



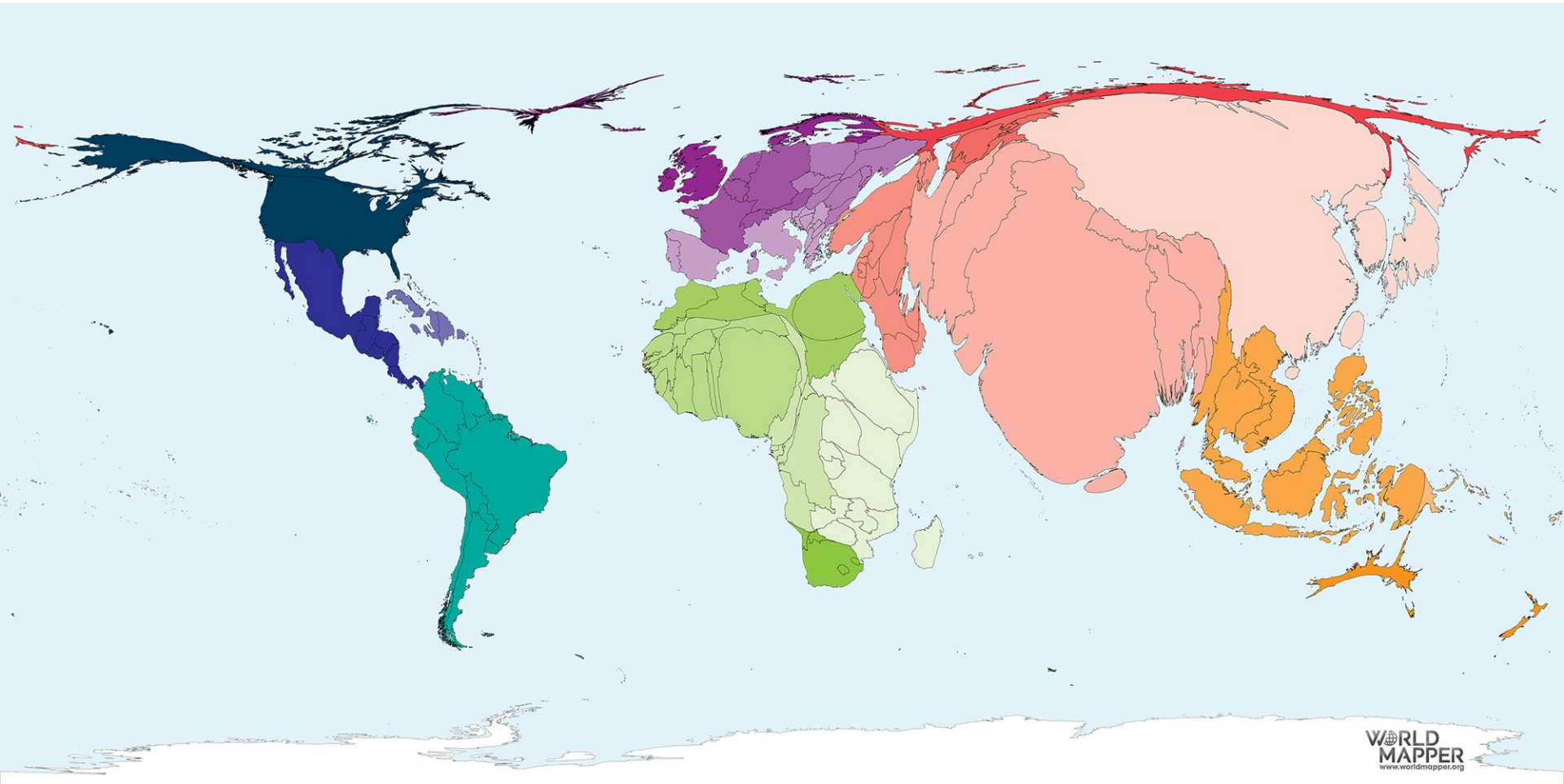

WORLD
MAPPER
www.worldmapper.org

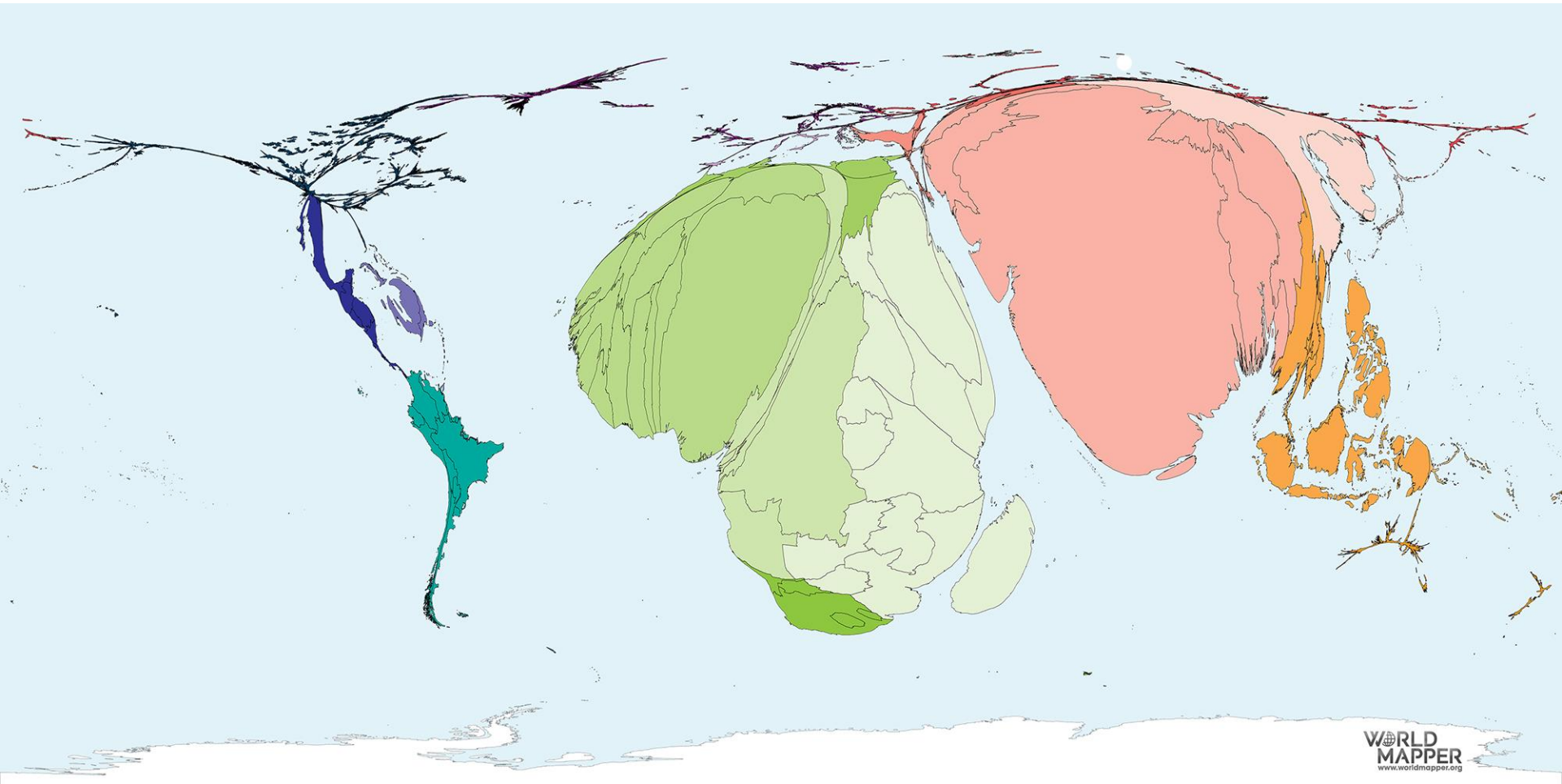
World map based on GDP



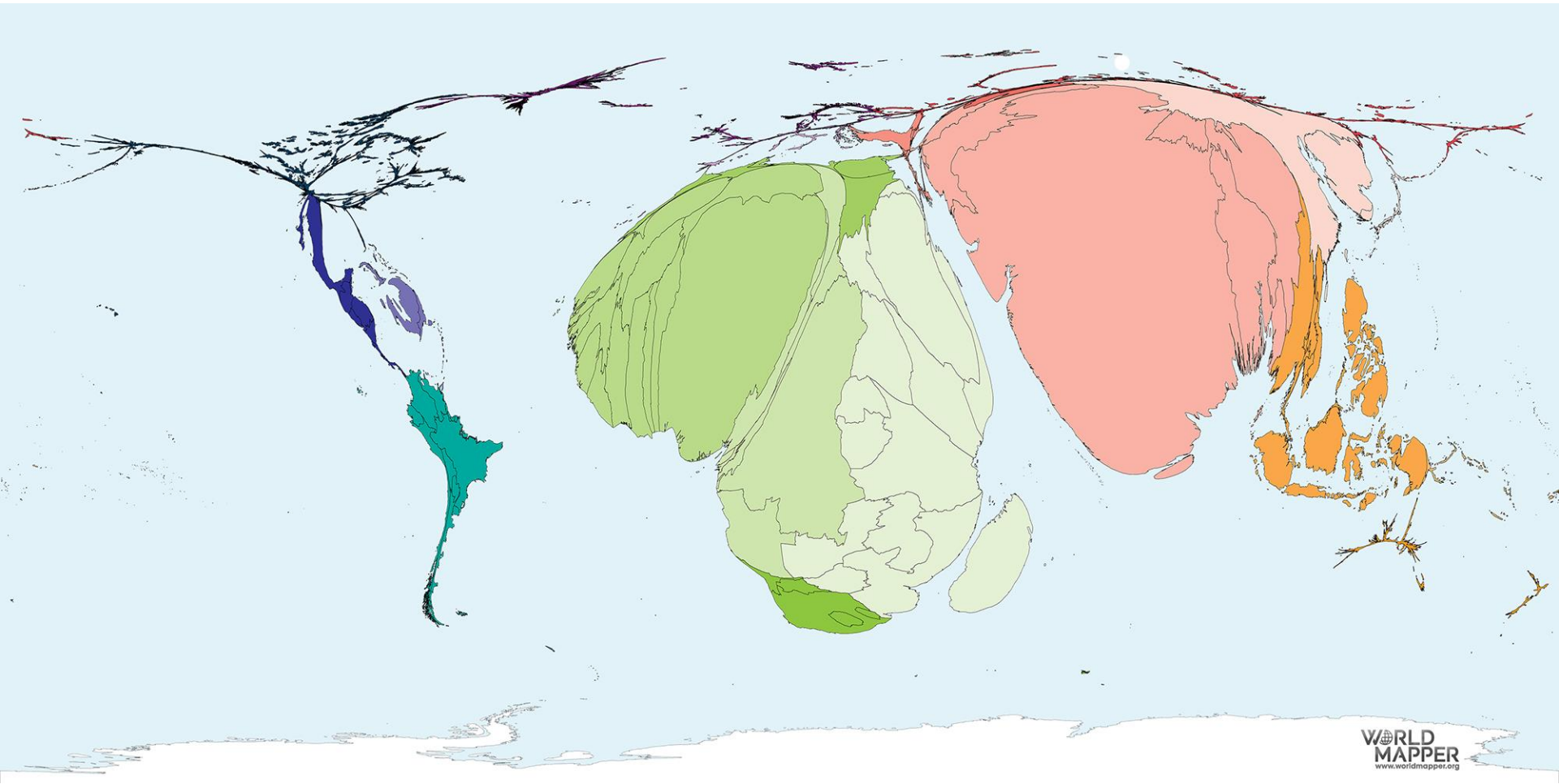

WORLD MAPPER
www.worldmapper.org

World map based on total population

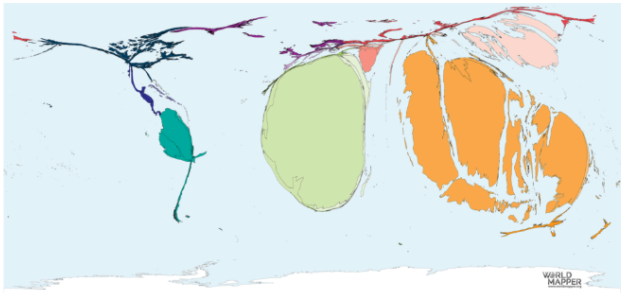



WORLD
MAPPER
www.worldmapper.org

World map based on inequality, absolute poverty

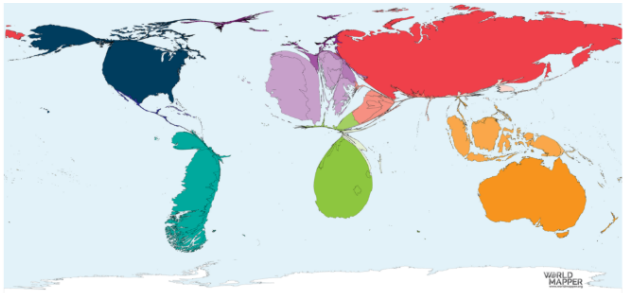


Maps and disasters



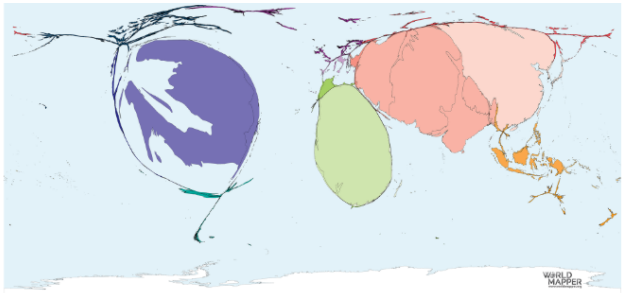
Volcanic Eruptions Deaths 2000–2017

Environment



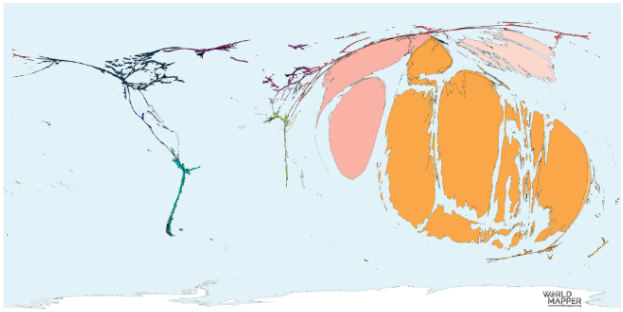
Fires Deaths 2000–2017

Environment



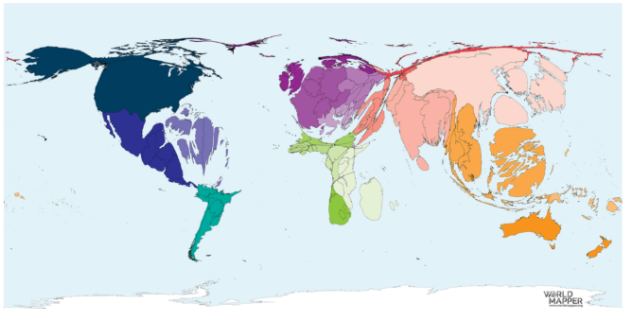
Earthquakes Deaths 2001–2017

Environment



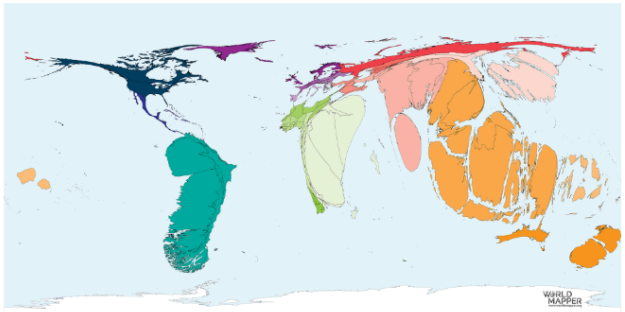
Tsunami Deaths 2001–2017

Environment



Storms 2000–2017

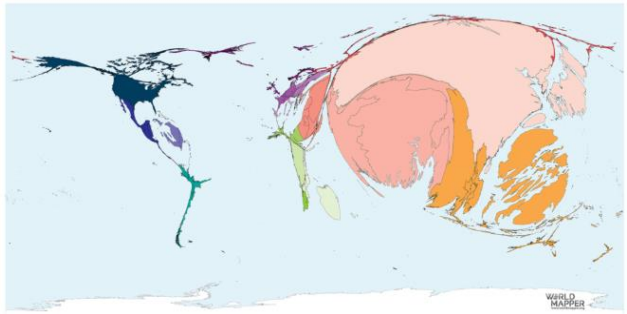
Environment



Tsunamis 2001–2017

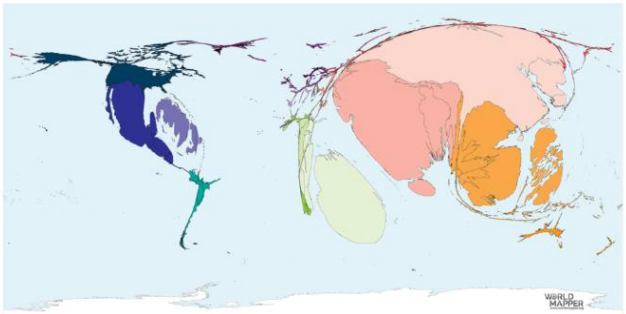
Environment

Maps and disasters



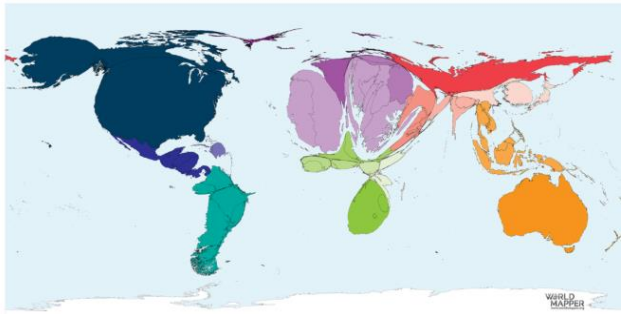
Storm Injured 2000–2017

Environment



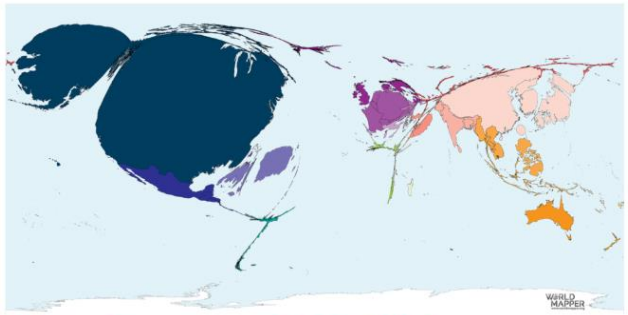
Storms Homeless 2000–2017

Environment



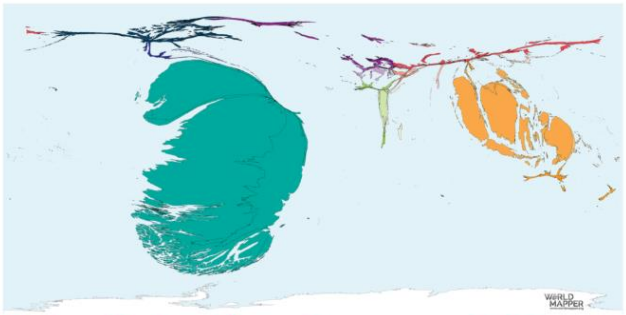
Fires 2000–2017

Environment



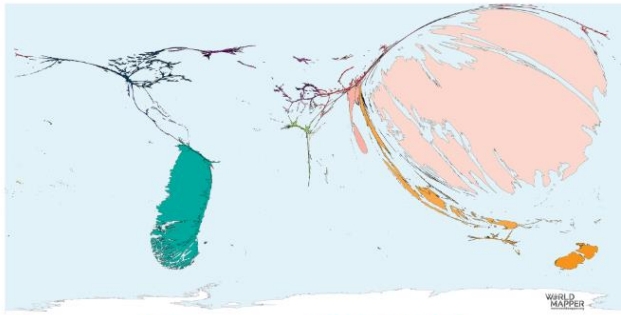
Storm Damages 2000–2017

Environment



Volcanic Eruptions Damages 2000–2017

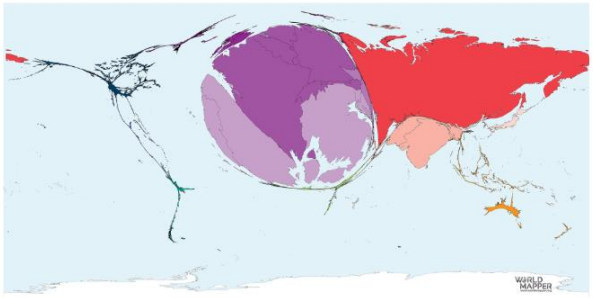
Environment



Tsunami Damages 2001–2017

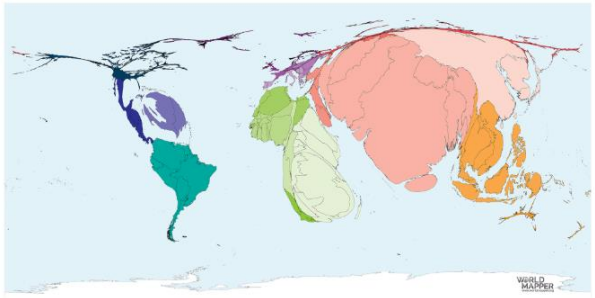
Environment

Maps and disasters



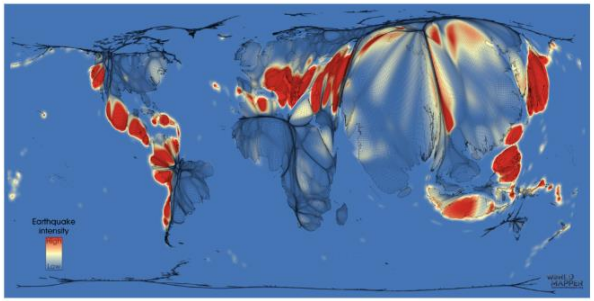
Heatwaves Deaths 2001–2017

Environment
Health



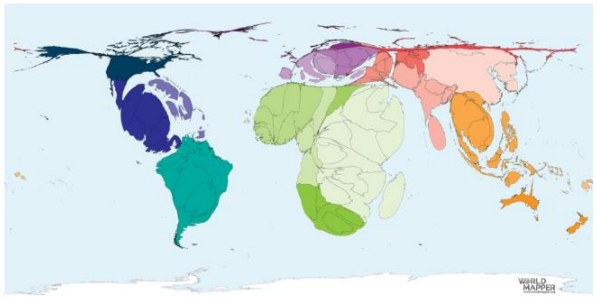
Floods Deaths 2001–2017

Environment
Health



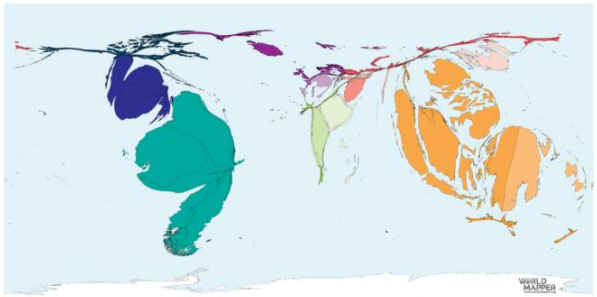
Earthquake risk

Environment



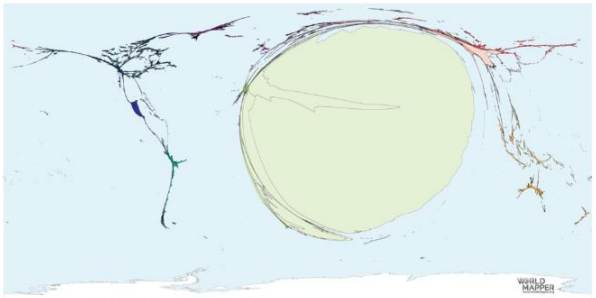
Droughts 2000–2017

Environment



Volcanic Eruptions 2000–2017

Environment



Drought Deaths 2000–2017

Environment

First Part
Disasters and development

Disaster and poverty

- Exposure to disasters do not depend on economic development
- Disaster consequences are much higher in developing countries
  - Impact to GDP (relative weight)
  - Number of people killed
  - Damage to infrastructure
  - Resilience
- The level of inequality is even greater because of under-reporting

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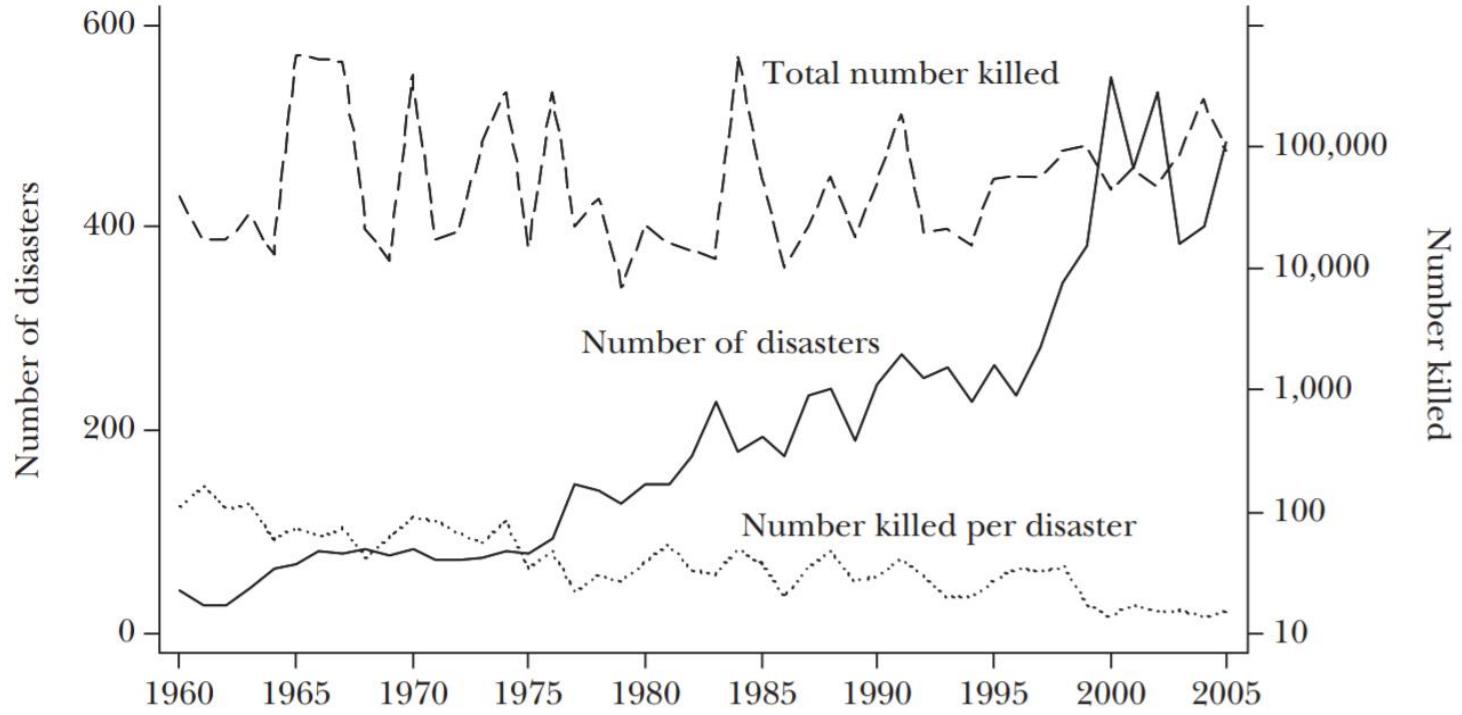
Disasters in numbers



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Disasters and climate change

- Climate change affects disaster risk and development in two ways:
  - short-term climate variability and its extremes
  - longer-term variability
- *Climate change action and disaster risk management practices not in the same agenda*
- *Climate change action*
  - *Mitigation*
  - *Adaptation*

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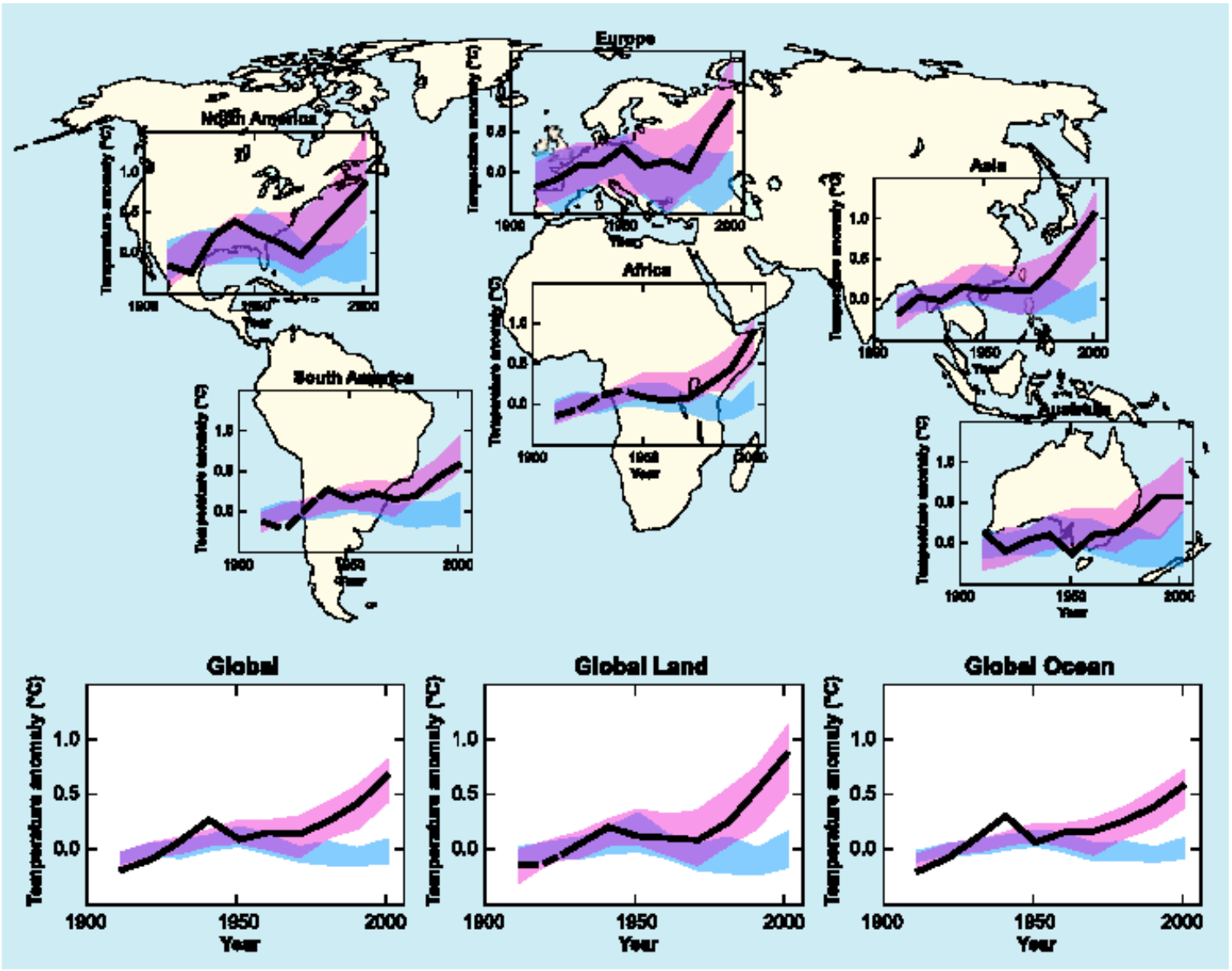
Evidence on climate change

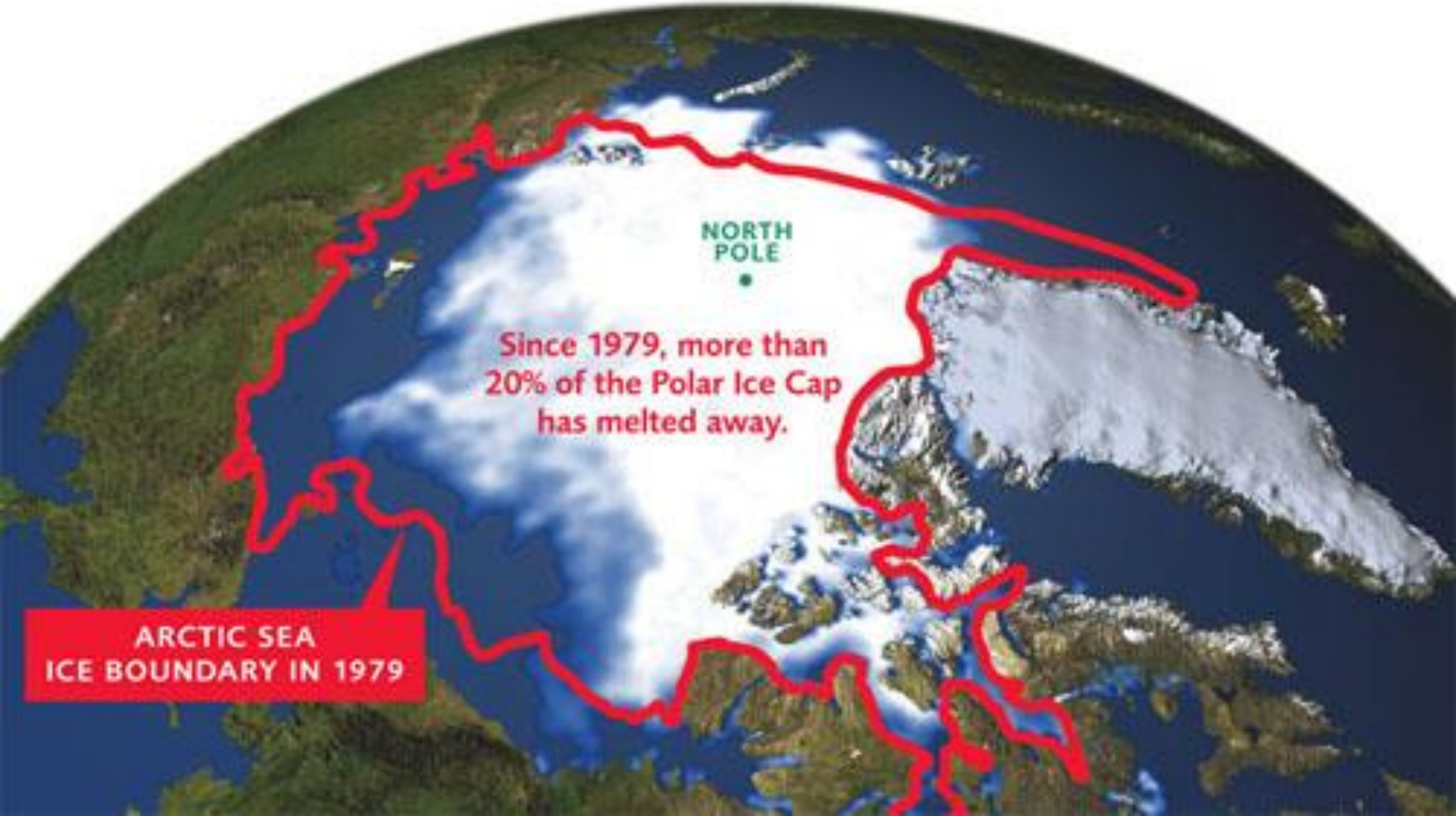


Change from Natural factors

Change from Anthropogenic + Natural factors

(IPCC, 2007)

Evidence on climate change

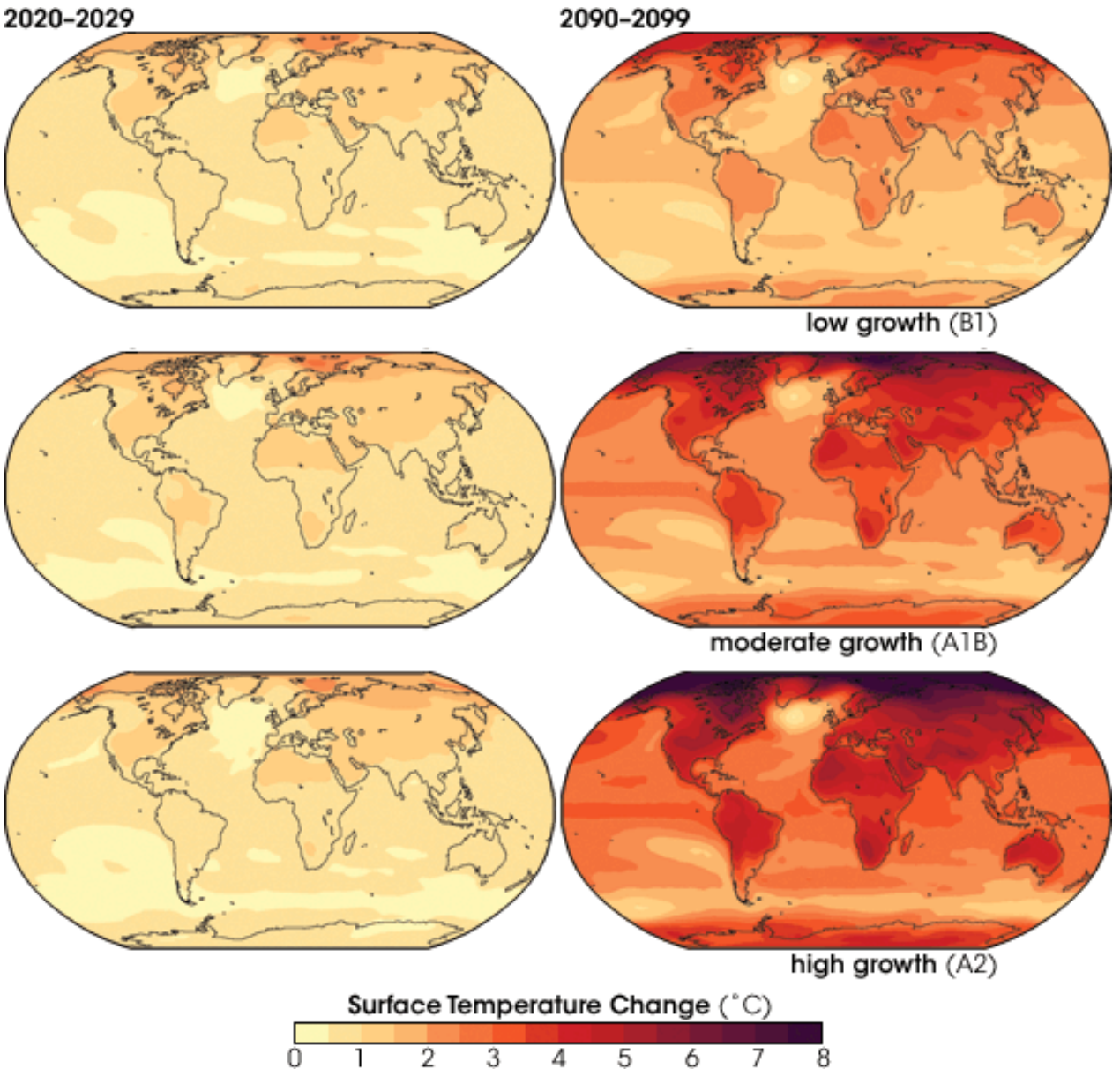


Projections of future changes in climate

Projected warming in 21st century expected to be

greatest over land and at most high northern latitudes

and least over the Southern ocean and parts of the North Atlantic Ocean



Climate change impacts

- Increase of weather disasters
- Public water supply and drinking water
- Biodiversity loss
- Agricultural production
- Forestry yield
- Energy for heating and cooling
- Tourism and recreation
- Health

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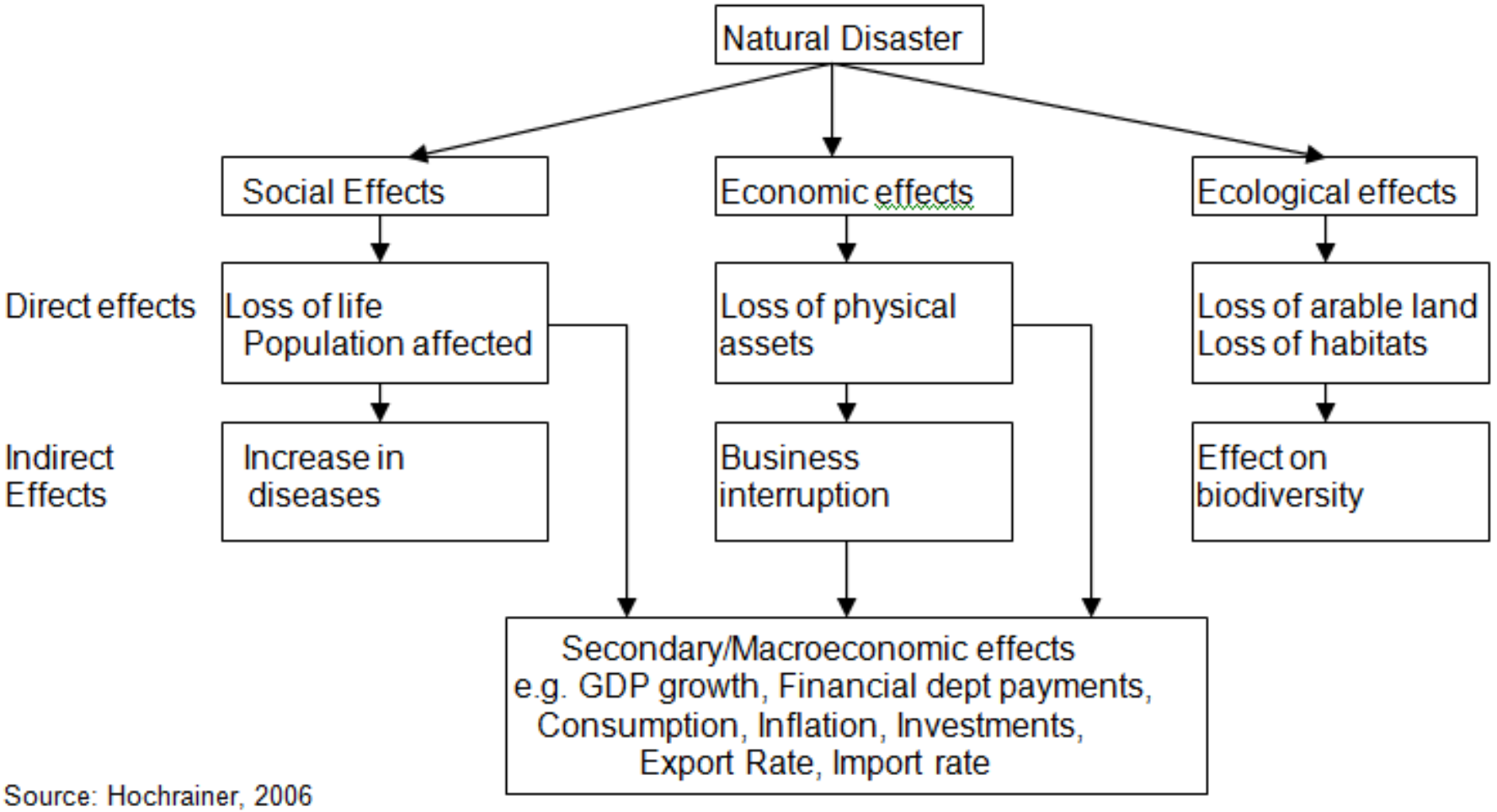
|Second Part
Disasters and macroeconomic risk

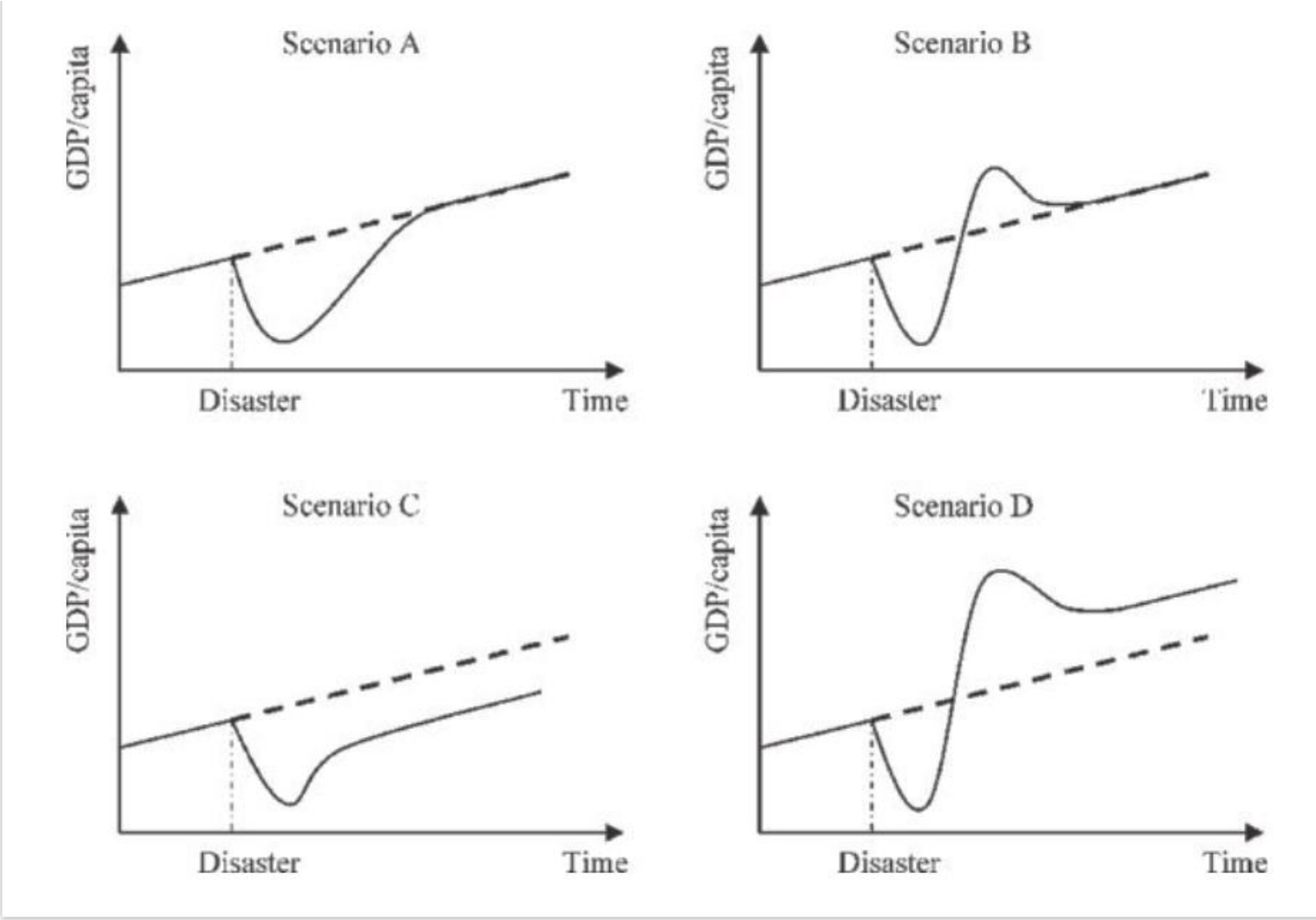
Macroeconomic risk of natural disasters



Source: Hochrainer, 2006

Macroeconomic Indicator	Expected change
GDP	Immediately drop in GDP growth in the year of the event Rise in GDP growth in the year after the event Slowdown in second and/or third year
Agricultural sector	Significant fall in production
Manufacture Sector	Decrease in activity due to disruption of transportation, reduced production capacities
Service Sector	Decrease in activity due to disruption of transportation and payment system
Exports of goods	Reduction in the rate of growth in the year of the event In the year after return to the previous levels In subsequent years continuation of the year after
Imports of Goods	Considerable increase in the rate of growth in the event year A return to pre-disaster level a year after In subsequent years a further drop, possibly caused by reducing incomes
Gross Formation of Fixed Capital	Sharp increase in the year following the disaster
Inflation rate	Short increase caused by the disruption of production and distribution and increasing transportation costs
Public financing	Worsening of deficit due to a shortfall in tax revenues and increase of public expenditures
Trade balance	Deficit due to decrease in exports and an increase in imports, associated with the decline in production capacities and strong public and private investments for reconstruction

GDP Scenarios in case of disasters



| Third Part
Disasters and risk perception

Overview

Risk communication **is a social process by which people are informed of the dangers, their behavior is influenced by information and they are given the opportunity to participate in decision-making about risk issues in an informed manner**

Morgan, M., Fischhoff, B., Bostrom, A., & Atman, C. (2001)

Risk perception **can be considered as an interpretation or understanding that the individual gives to particular threats that could potentially cause loss of life or property**

UNISDR. (May 2009)

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Risk perception and factors related to it

- Risk factors
  - Related to experience with past disaster events
- Information factors
  - Related to public trust and risk communication
- Personal factors
  - Related to demographic factors in line with risk theory
- Context factors
  - Related to household and income conditions

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Risk communication

- Any population exposed to natural dangers wish and should be optimally informed about the risk characteristics, preventive measures and appropriate behaviors during emergencies.
- Authorities should devise appropriate planning, prepare coping strategies, and effectively communicate information to residents, people in the workplace, and communities as a whole.
- Better response to natural disasters requires active involvement of residents, which should have been informed and taught about the dangers they are facing
- Public discussion, stakeholder participation and perhaps joint resolution of conflicts are needed
- Risk communication is perceived as a necessary link between perception of risk and its management.
- Communication programs should be based on a sound understanding of individuals' sociopsychology

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|Fourth Part
Disasters and risk perception

Overview

- Financial strategies for disaster risk management are intended to ensure that individuals, businesses and governments have the resources necessary to manage the adverse financial and economic consequences of disasters
- The analysis of financial exposure of a country to disasters is an important part of disaster risk management strategy.
- Financial protection will help governments mobilize resources in the immediate aftermath of a disaster, while buffering the long-term fiscal impact of disasters.

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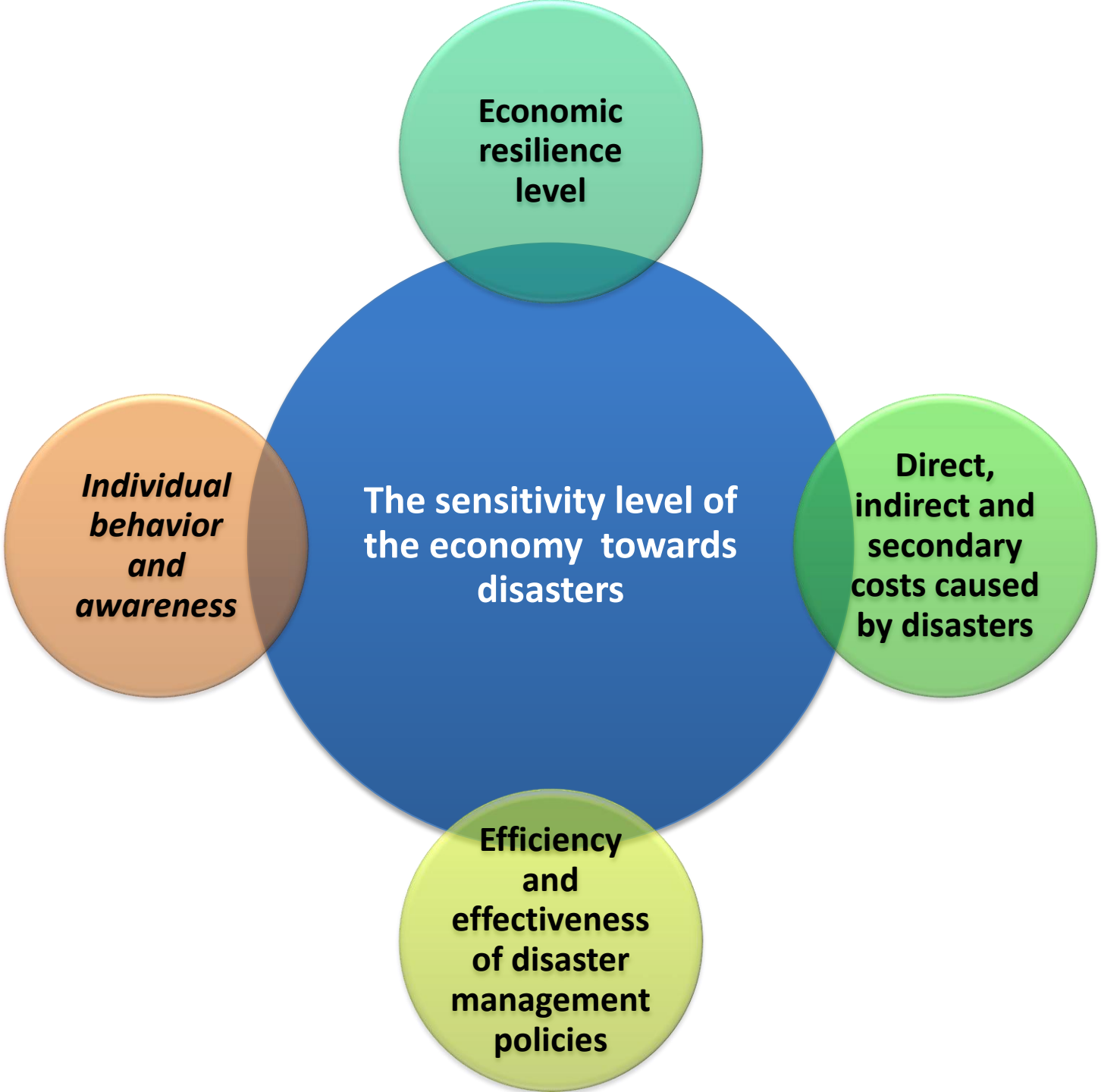
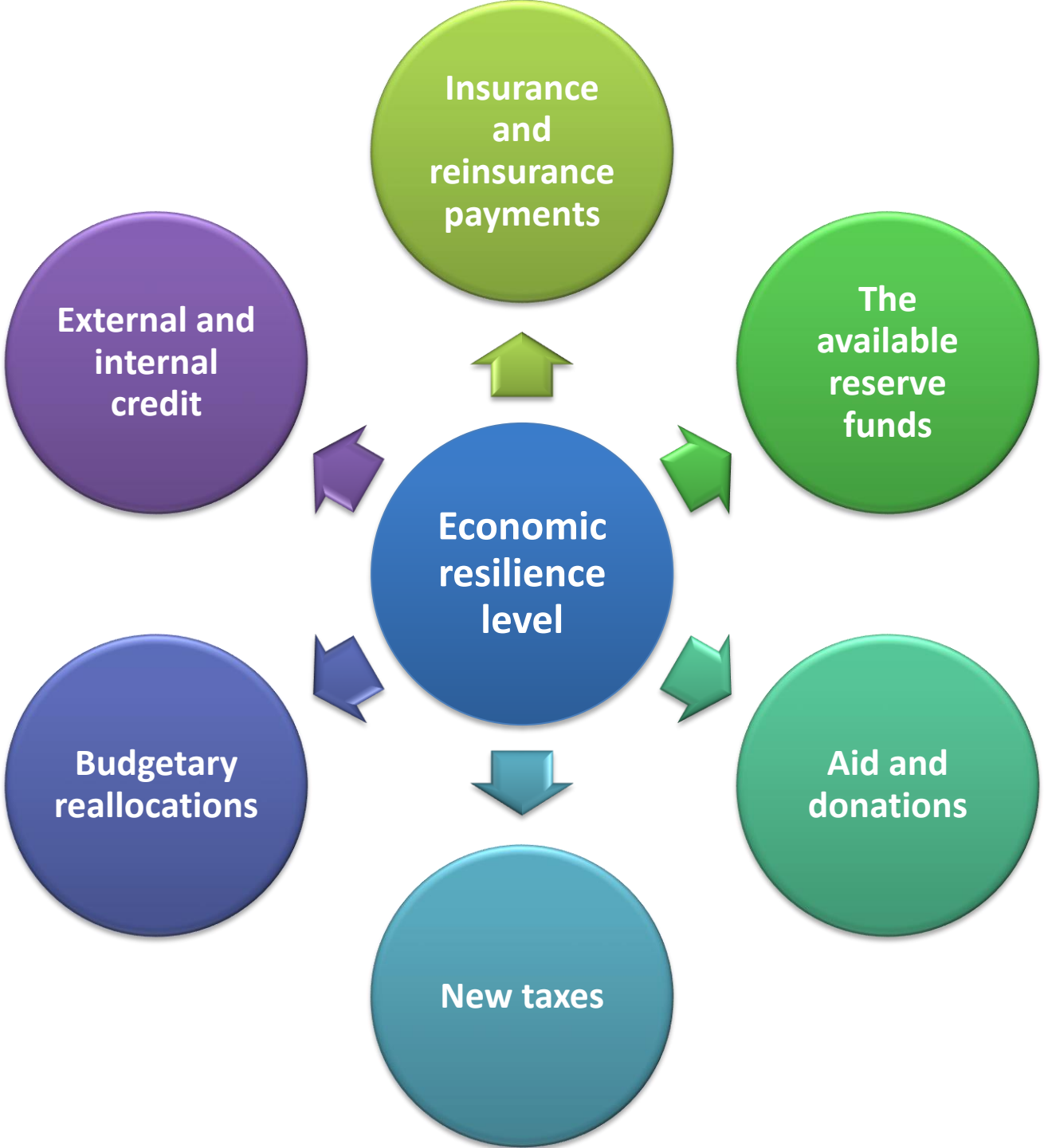
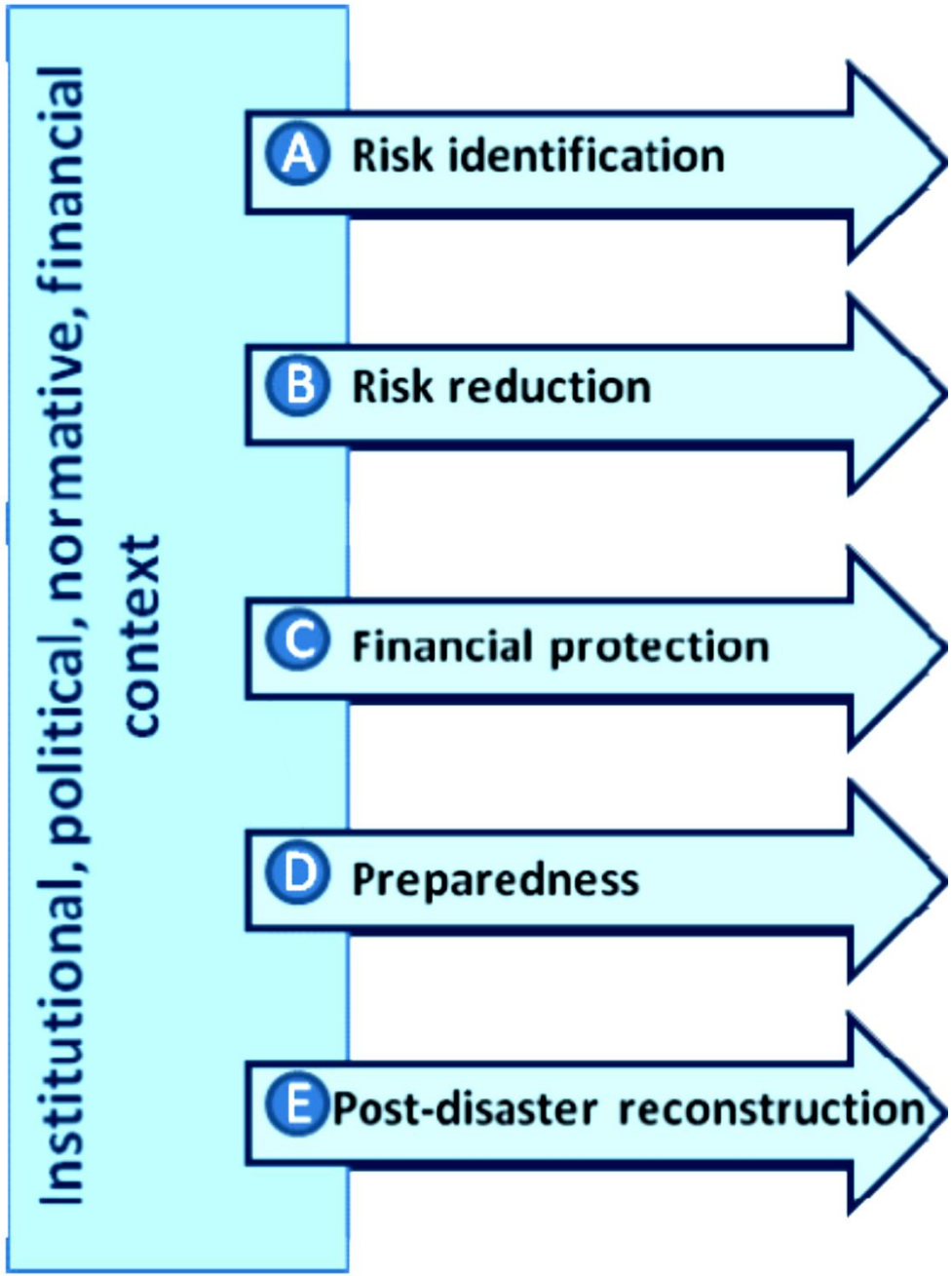
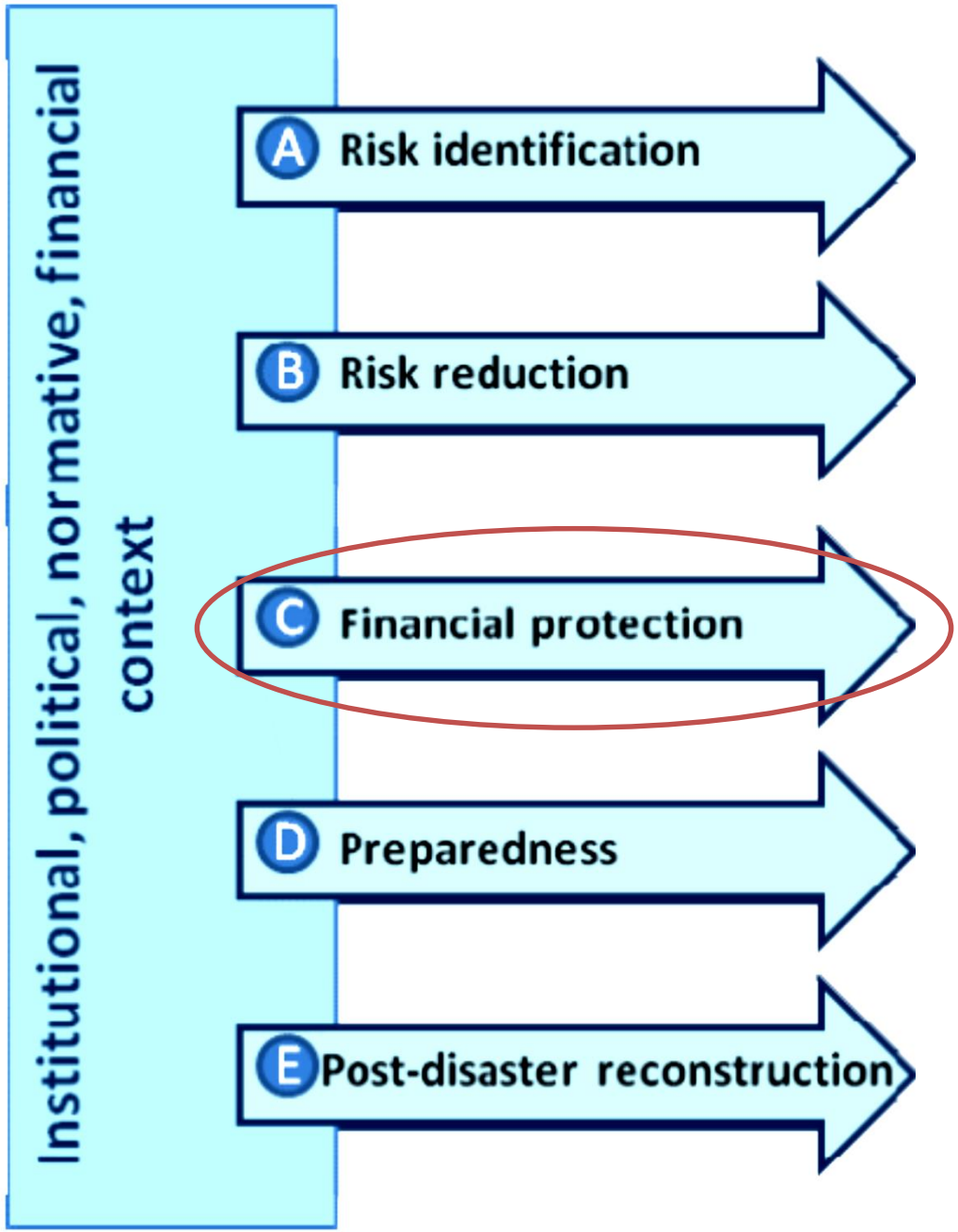

Economic resilience level
Individual behavior and awareness
The sensitivity level of the economy towards disasters
Direct, indirect and secondary costs caused by disasters
Efficiency and effectiveness of disaster management policies


Insurance and reinsurance payments
The available reserve funds
Aid and donations
New taxes
Budgetary reallocations
External and internal credit
Economic resilience level


Institutional, political, normative, financial context
A Risk identification
B Risk reduction
C Financial protection
D Preparedness
E Post-disaster reconstruction


Institutional, political, normative, financial context
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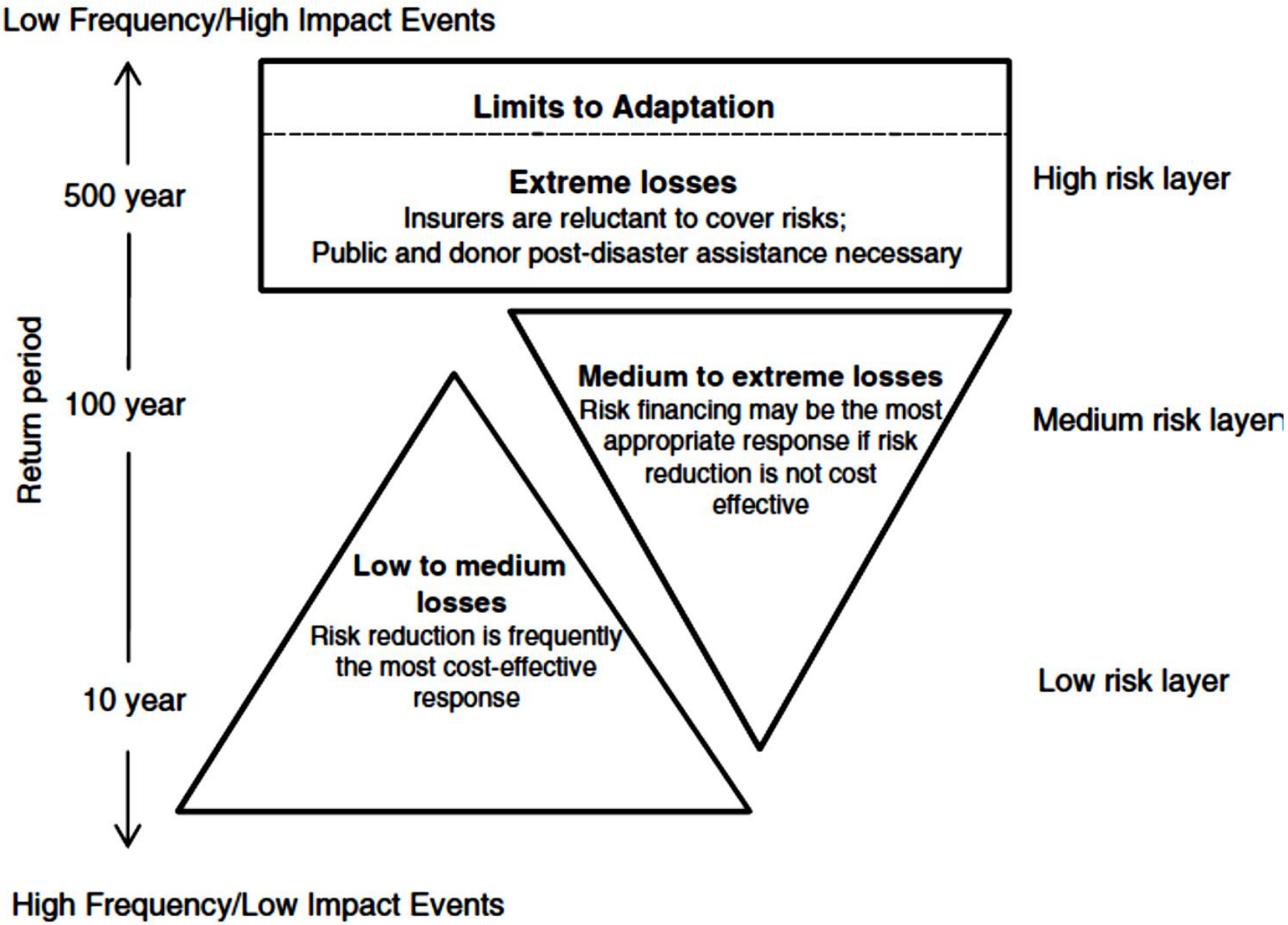
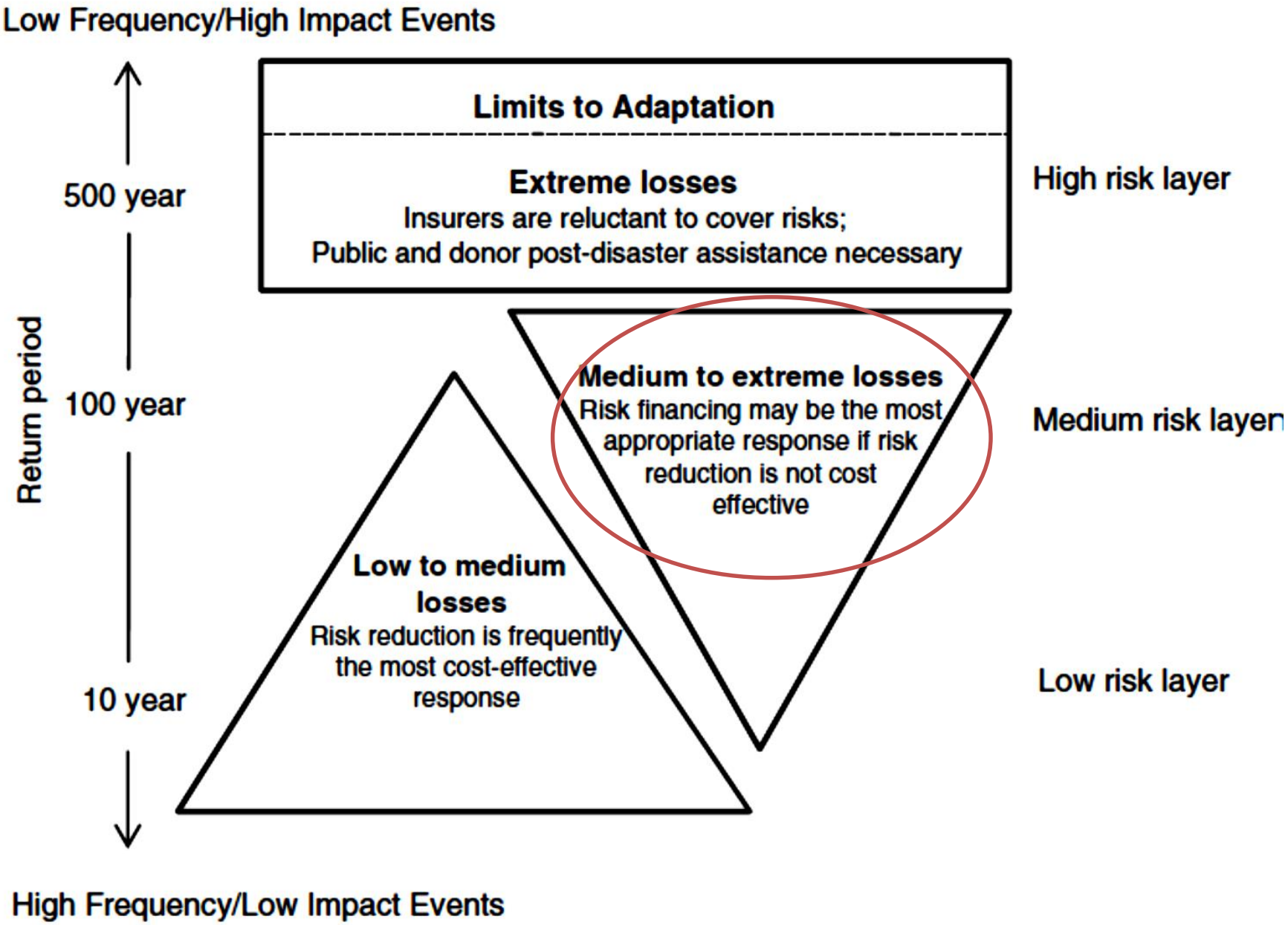
Disaster Risk Layers



Disaster Risk Layers



Approaches and instruments for financing the risk of natural disasters

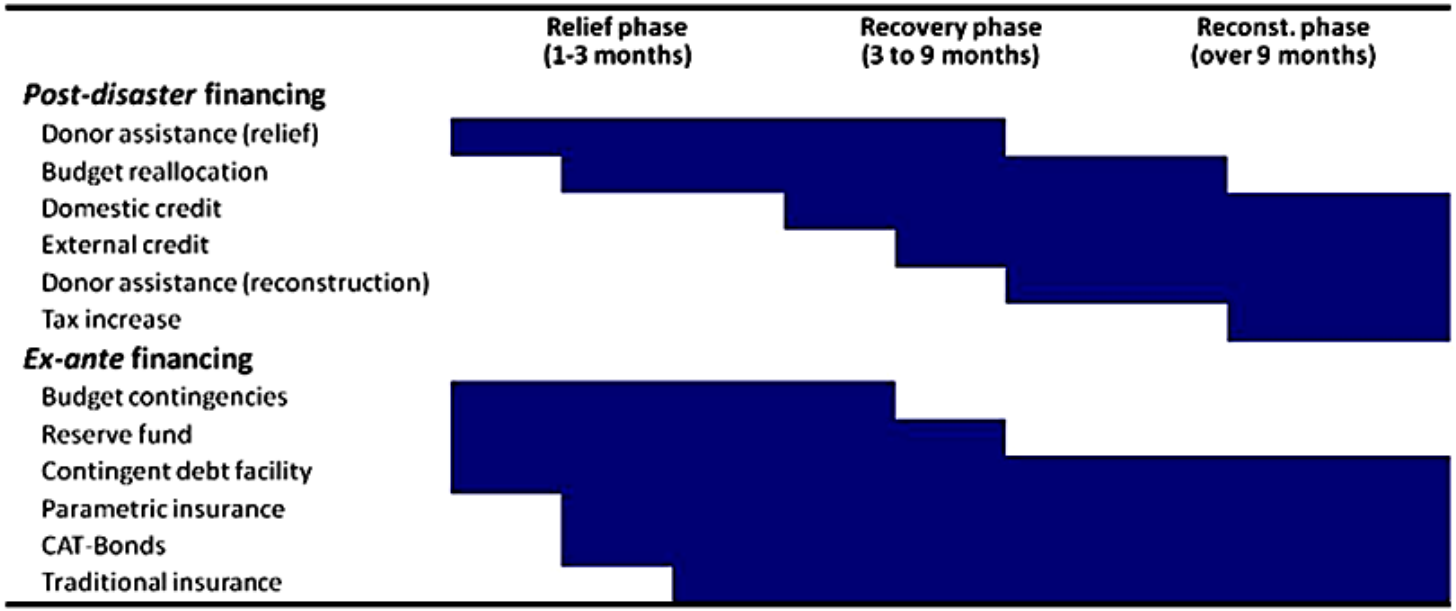
Approaches	Examples of Instruments
Non-market risk transfer	Government assistance (taxes) for private and public sector relief and reconstruction funding Kinship arrangements Some mutual insurance arrangements Donor Assistance
Market risk transfer	Insurance and reinsurance, Micro insurance, Financial market instruments: Catastrophe bonds, Weather derivatives
Inter-temporal risk spreading	Contingent credit (financial market instrument), Reserve fund, Microcredit and savings

Approaches and instruments for financing the risk of natural disasters

***Ex* ante Sources**[a]		***Ex post* Sources**
Instruments without risk transfer Nonreimbursable resources ? Calamity funds ? Reserve funds or diversion of national budgetary resources ? Development and social funds Reimbursable resources ? Contingent credits ? Development and social funds	*Instruments with risk transfer* ? Insurance and reinsurance with damage coverage based on real losses ? Insurance and reinsurance with parametric activation of payments ? Catastrophe bonds with damage coverage based on real losses ? Catastrophe bonds with parametric activation of payments	Nonreimbursable resources ? Emergency donations ? Taxes Reimbursable resources ? Emergency credits (for example the IDB's Emergency Reconstruction Mechanism) ? Reconstruction loans ? Reformulation of existing loans

Approaches and instruments for financing the risk of natural disasters

Ghesquiere and Mahul (2010) provides an assessment of the time necessary to mobilize funds through these instruments



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| Fifth Part

Case study: Climate change adaptation in the protected areas between Drini-Mati River (Albania)

*A task performed within the project ”Identification and Implementation of Adaptation Response Measures in the Drini - Mati River Deltas”– A project fundet by the GEF and implemented by the Ministry of Environment and the UNDP Climate Change Program in Albania

Context of development of an adaptation project

- *Post communist country*
- *After 1990 - complex environmental problems arise*
- *Causes:*
  - the retreat of the state from its regulatory role
  - the increasingly individualistic behavior of the population
  - the low level of awareness about environmental issues
  - chaotic urban development
- *Very recent environmental policy – still under development*
- *Aspiration to join the EU – driver of environmental movement*

Some general data

Population: 2.9 Millions people

Capital: Tirana

Regime: Parliamentary democracy and a transition economy

GDP (2016): $11.8 billion

GDP Growth (2016): 3.8%

Inflation: 3.4%

Area (sq.km): 28750

Main economic sectors: Tourism, agriculture, services

Climate change action within the environmental policy

- *Climate change issues are being discussed in the environmental policy in Albania*
- *A National Adaptation Plan have been drafted*
- *Three National Communication to the IPCC have been prepared and published*
- *New environmental legislation has included articles about climate change mitigation and adaptation*

Background information on the project and the protected area

- The Drini and Mati River Deltas (DMRD) are 2 of 3 deltas found on the northern Adriatic coast of Albania, which harbour significant biodiversity values.

- The DMRD has been identified as a region of critical vulnerability to climate change and variability.

- Climate change scenarios for Albania have predicted an increase in sea surface temperature and sea level rise of up to 61 cm.
-
- Serious stress on marine and littoral biodiversity as well as livelihoods of local communities.


MADHE
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Shalë
Kir
Breglumë
Zogaj
Liqeni i Fierzës
Fierzë
Koplik
SHKODËR
Iballë
HAS
Krumë
Liqeni i Shkodrës
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Shëmri
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Koritnik
Pukë
Fushë-Arrëz
Gostil
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Lumës
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Ungrej
Poshqesh
Zall-Reç
Velipojë
LEZHË
Shëngjin
Kallmeti i Madh
MIRDITË
Krej Lurë
Lezhë
Rubik
Rrëshen
Kurbnesh
2121
Runja e Lurës
Drini i Zi
Korab
2764
Korab
Gjiri i Drinit
Urakë
DIBËR
Ulëz
Muhur
Peshkopi
Mat
Liqeni i Ulëz
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Mat
Ishëm
Klos


KORLIK
GRUEMIRE
SHKODER
OBLIKE
BUSHAT
BARBULLUSH
VELIPOJE
DAJC
BUNISHT
KALLMET
KOLC
Drini Delta
ZEJMEN
SHENKOLL
Mati Delta
FUSHE KUQE
LAC

Communes within the project area

Goals and outcomes

- Funded by: The Global Environment Facility, the UNDP, and the Albanian Government.

- Objective of the project
  - to build adaptive capacities in the DMRD to ensure resilience of the key ecosystems and local livelihoods to climate change.

- Parallel to the policy objectives, the project aimed at:
  - strengthening the research on vulnerability and adaptation
  - connecting scientific results with policymaking processes
  - enhancing local community dialogue on expected changes in ecosystems and their involvement in decision making

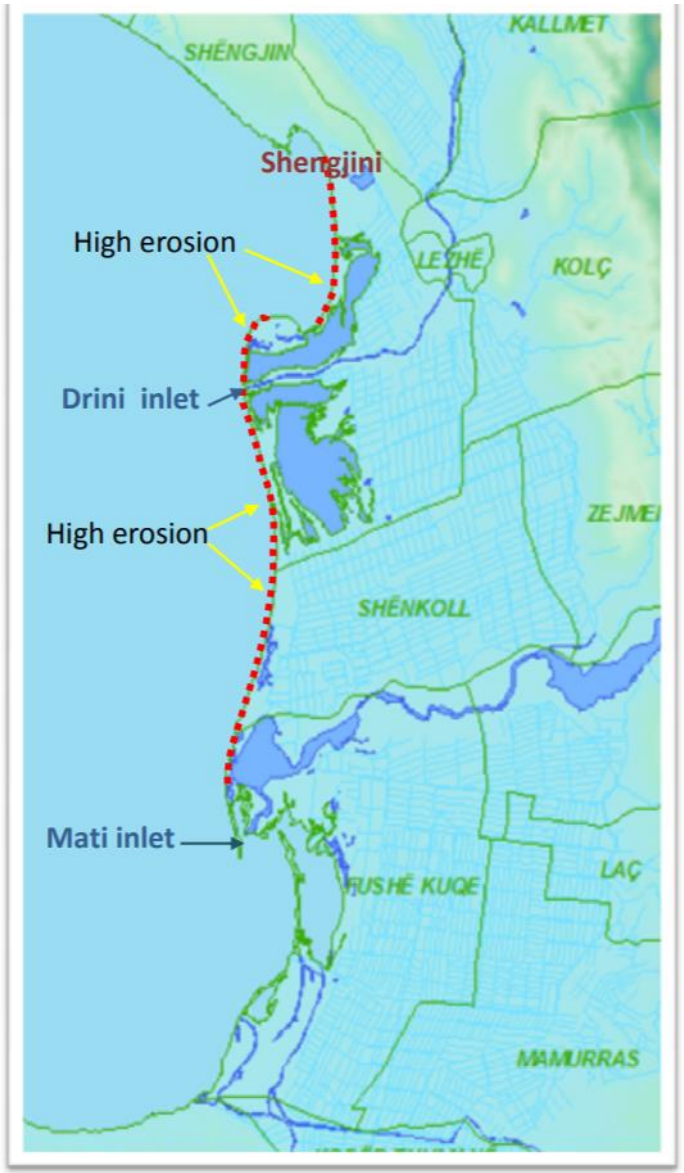
Climate impacts in project area

- Sea level rise
- More frequent and severe droughts with greater fire risk
- Increase of the number of rainy days
- Increase of extreme weather events
- Increased spring temperatures
- Reduction in annual total precipitation
- Warmer winters
- Loss of wetland area

Parameters	Unit	2030	2050	2080	2100
Annual temperature rise	°C	1.2 (0.8-1.3)	1.8 (1.3-2.4)	2.8 (2.1-4.1)	3.2 (2.3-5.0)
Number of days with temperatures ≥ 35°C	Days	4-5	6-7	8-9	10-11
Number of days with heat wave	Days	60	80	95	120
Precipitation decrease	%	3.9 (2.6-5.4)	8.1 (5.5-11)	12.9 (8.4-21)	15.5 (9-26)
Hazardous precipitation	Days	1-2	2-3	3-4	4-5
Sea level rise - Average scenario - Maximum scenario	cm	8 (5–14)	15 (7-28) 16 (9-29)	28 (12-53) 35 (15-62)	38 (15-72) 49 (21-91)
Coastline erosion for maximum scenario of sea level rise	Ha	520	1450	2860	5350

Pressure of the Erosion

DMRD ecosystems are subjects to significant erosion. Sea invasion, due to erosion along the Drini River delta was approximately 500 m during 1971-2005



Impacts of sea level rise and coastal erosion		2050		2100	
		av. min	av. max	av. min	av.max
Net loss of wetland area	km^2	0.14	0.58	0.41	1.04
People actually flooded	1000/year	0.019	0.040	0.006	0.007
Coastal floodplain area	km^2	56.14	59.20	57.19	65.95
Coastal floodplain population	thousands	4.14	4.33	3.99	4.61
Total wetland area	km^2	4.5	4.06	4.22	3.60
Coastal forest area	km^2	1.14	1.01	1.12	0.91
Low unvegetated wetlands area	km^2	3.37	3.05	3.10	2.69

Projection of coastal line in 2030

Source: Ndini, Mucaj 2010

Projection of coastal line in 2050

The most risked zones are:

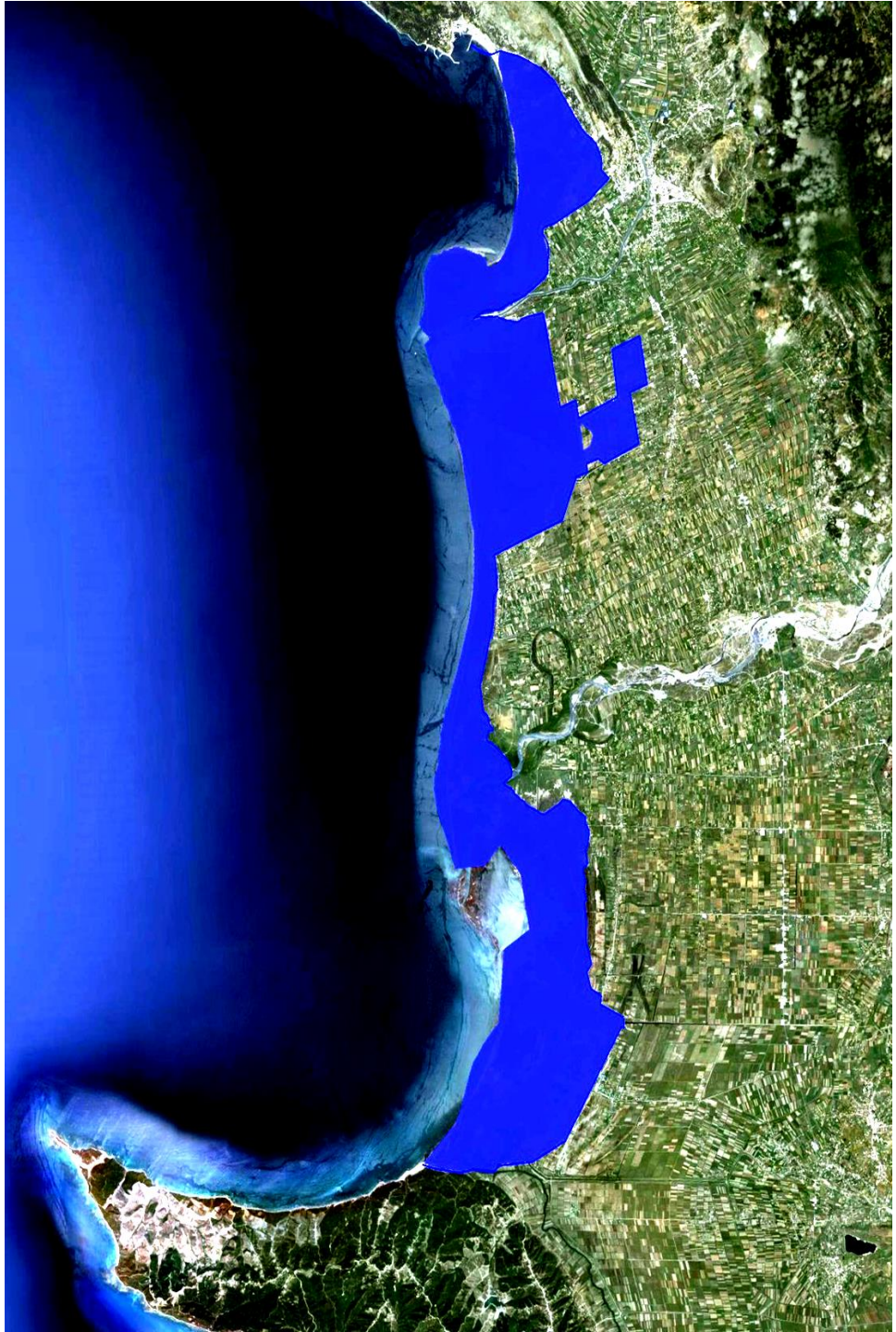
- Both sides of river mouths
- Kune lagoon
- Patoku lagoon

Source: Ndini, Mucaj 2010

Projection of coastal line in 2080

Source: Ndini, Mucaj 2010

Projection of sea level rise in 2100



Source: Ndini, Mucaj 2010

Sectors at risk

- Biodiversity
- Agriculture
- Tourism
- Fishing
- Human settlements
- Ecosystem carbon

Proposed Adaptation measures

- Adaptation framework
- CBA objectives
- Biodiversity measures assessment
  - Assumptions
  - Appraisal for each lagoon
- Community measures assessment
  - Assumptions
  - Appraisal for each commune
- Results and investment priorities

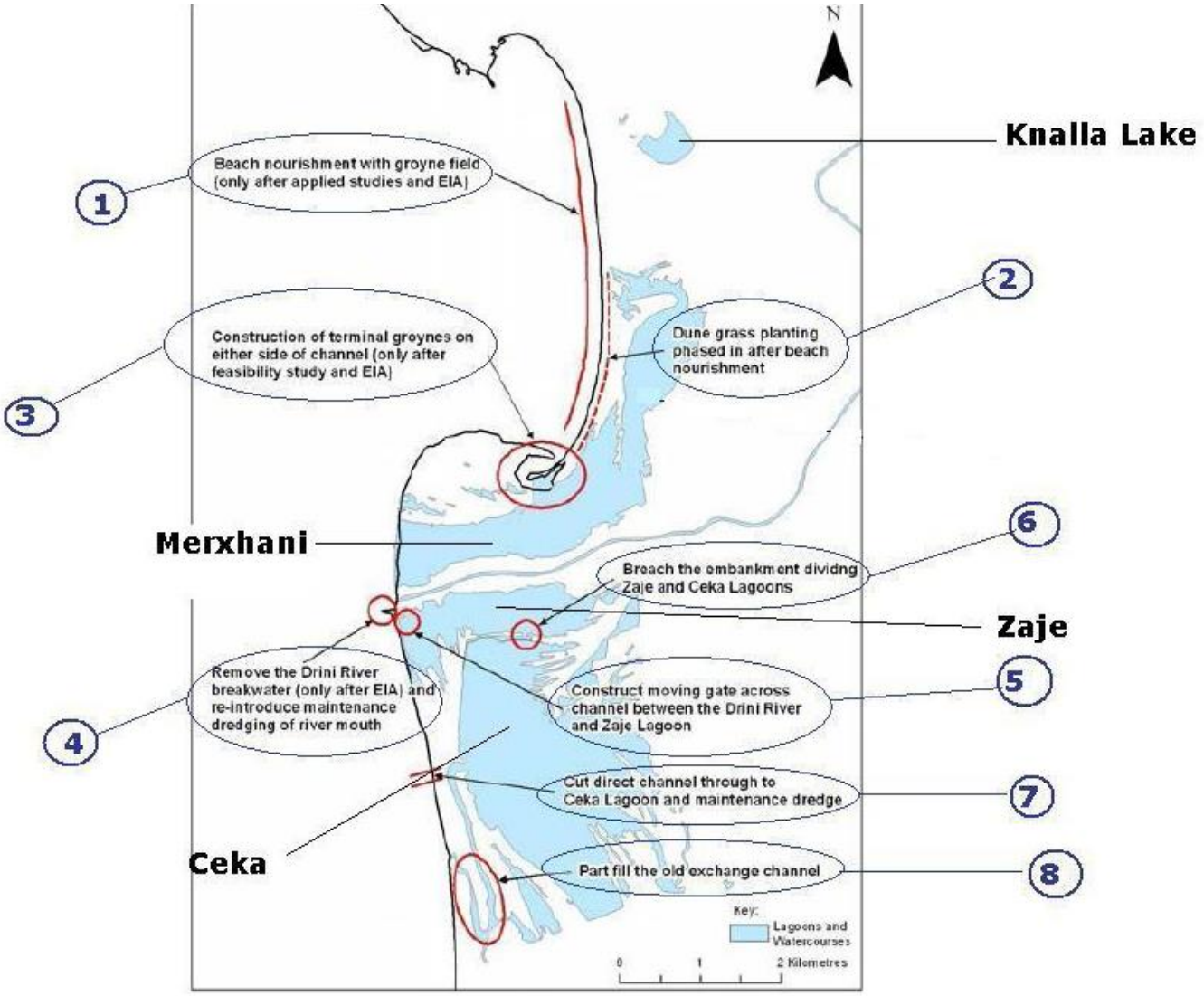
Adaptation framework within the area

- ***Starting point -*** *Strategic risk assessment:*
  - Identify and prioritise the potential risks of climate change to the DMRD region.
  - Identify and prioritise adaptation strategies to address the identified impacts.
  - Build capacity of DMRD stakeholders (regional and local) to evaluate the impacts of climate change and develop adaptation strategies.
- ***Objectives****:*
  - Resilient natural environment;
  - Resilient infrastructure and buildings;
  - Resilient economy;
  - Resilient society

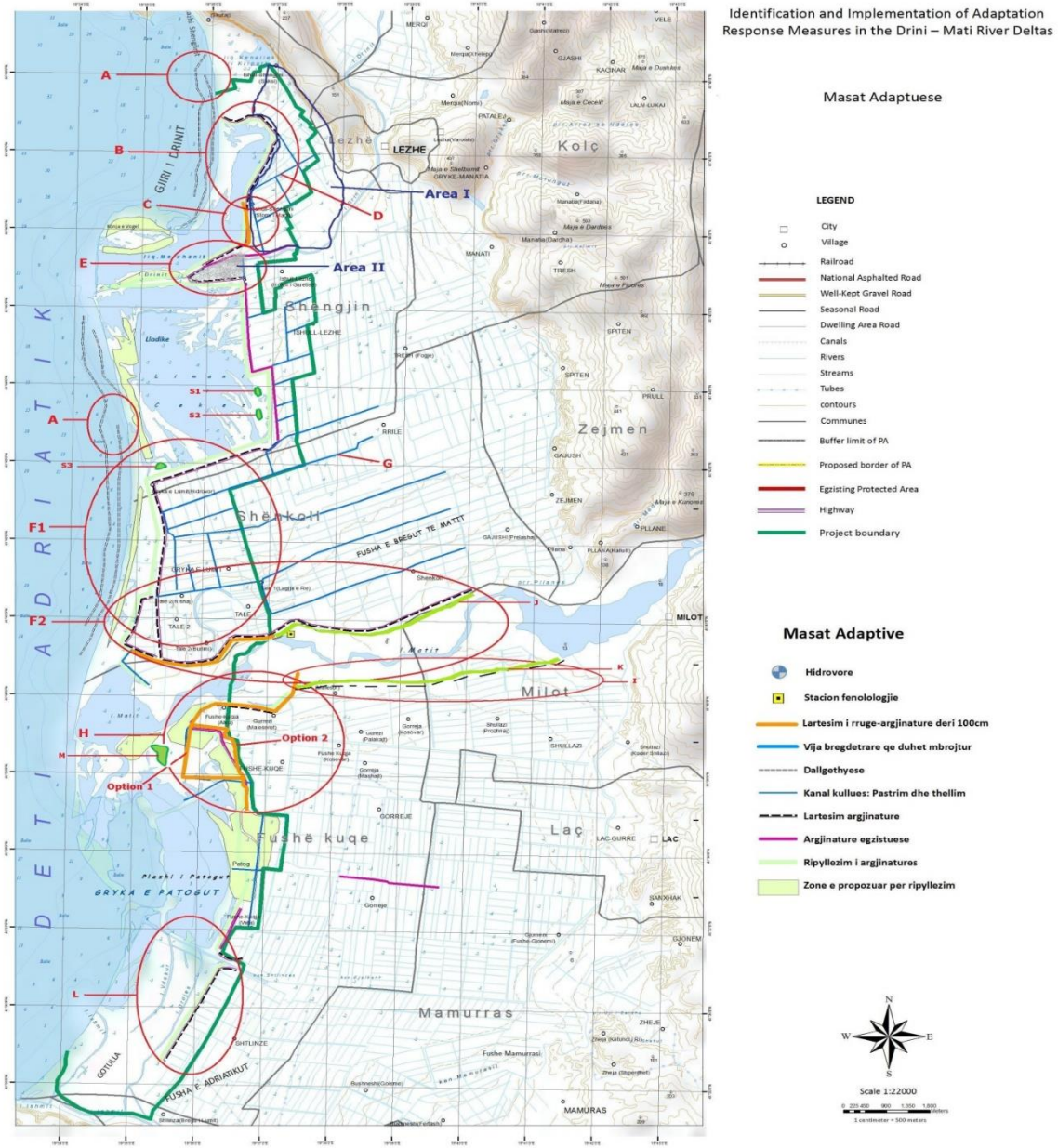
Strategic risk assessment

Impact category	Risk ID	Consequence	Likelihood rating	Consequence rating	Risk rating	Controls
Ecosystems	Population and species extinctions Increasing of invasive types	Biodiversity loss	Likely	Major	High	2
		Reduced ecotourism that indicate to MDGs	Likely	Major	High	2
	Reduced ecosystem resilience to stress	Increase in management requirements	Likely	Moderate	Medium	2
	Increased pressure on dunal systems.	Biodiversity loss	Almost certain	Major	Extreme	2
		Reduced recreational amenity	Almost certain	Major	Extreme	1
		Biodiversity loss resulting in regional species endangerment and/or extension.	Almost certain	Major	Extreme	2
	Increases in ecological disturbances.	Reduced recreational amenity	Likely	Major	High	2
	Fragmentation of habitats	Increasing maintenance costs for housing/agricultural buildings	Likely	Major	High	1
	Ground subsidence as the ground dries out	Biodiversity loss leading to peril or regional extension of species.	Almost certain	Major	Extreme	2

Adaptation proposals: Biodiversity



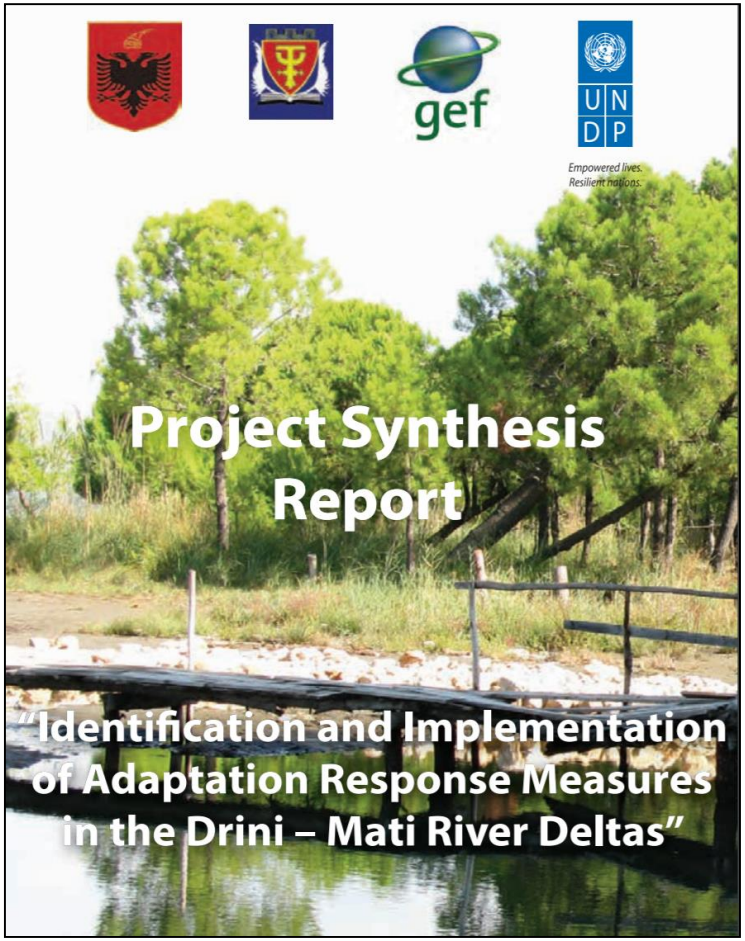
Adaptation proposals: Community



More information

Project synthesis report, available at:

Other information and documents available at:



|Sixth Part
Research and Disaster Risk Management

Choices and Strategies of research

- Research Choice
  - Qualitative vs Quantitative
  - Multi and Mixed Methods
- Research Strategy
  - Survey
  - Case study research
- Data collection
  - Questionnaires
  - Interviews
  - Secondary data
  - Observation
- Topics:
  - Multidisciplinary
  - Technical impact
  - Economic impact
  - Behavior

  Local/Regonal/International

- Research Objectives
  - Research around objects
  - Research around people
  - Comparative research
- Research Output
  - Recommendations
  - Public policies
  - Risk communication
- Research tools
  - Comparative research
  - Cost Benefit analysis
  - Technical analysis
  - Financial analysis
  - Decision making

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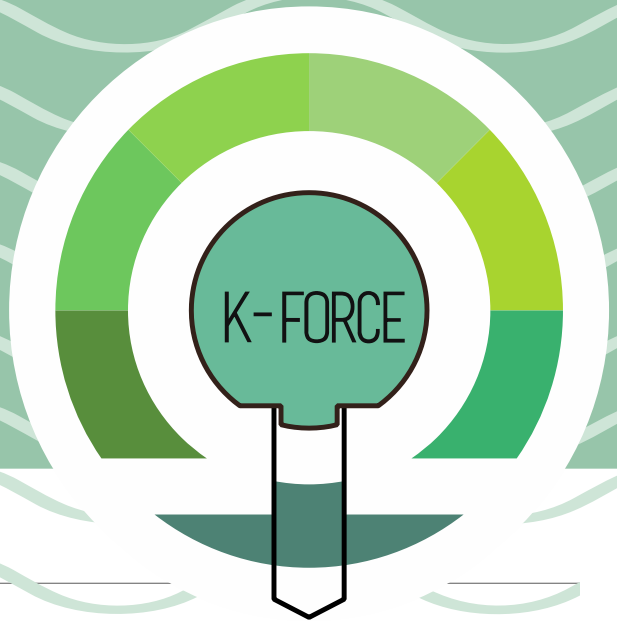

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Thank you
for your attention

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Knowledge **FO**r **R**esilient so**C**i**E**ty