

# **Climate Change 2014 Impacts, Adaptation, and Vulnerability: Human Security at Threat**

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# 1. Climate change, effective adaptation, and sustainable development

- **Climate change is a threat to equitable and sustainable development. Adaptation, mitigation and sustainable development are closely related, with potential for synergies and trade-offs.**
- **Climate change poses an increasing threat to equitable and sustainable development.** Climate change is a threat multiplier. It exacerbates other threats to social and natural systems, placing additional burdens particularly on the poor and constraining possible development paths for all.
- **Aligning climate policy with sustainable development requires attention to both adaptation and mitigation.** Interaction among adaptation, mitigation and sustainable development occurs both within and across regions and scales, often in the context of multiple stressors.
- **Co-benefits:** (i) improved air quality; (ii) enhanced energy security, (iii) reduced energy and water consumption in urban areas through greening cities and recycling water; (iv) sustainable agriculture and forestry; (v) food security; (vi) protection of ecosystems for carbon storage and other ecosystem services.

# Effective adaptation

- **Effective adaptation and mitigation responses will depend on policies and measures across multiple scales:** international, regional, national and sub-national. Policies across all scales supporting technology development, diffusion and transfer, as well as finance for responses to climate change, can complement and enhance the effectiveness of policies that directly promote adaptation and mitigation.
- **Many adaptation and mitigation options can help address climate change, but no single option is sufficient by itself.** Effective implementation depends on policies and cooperation at all scales and can be enhanced through integrated responses that link mitigation and adaptation with other societal objectives.
- **Improving institutions as well as enhancing coordination and cooperation in governance can help overcome regional constraints associated with mitigation, adaptation and disaster risk reduction.**

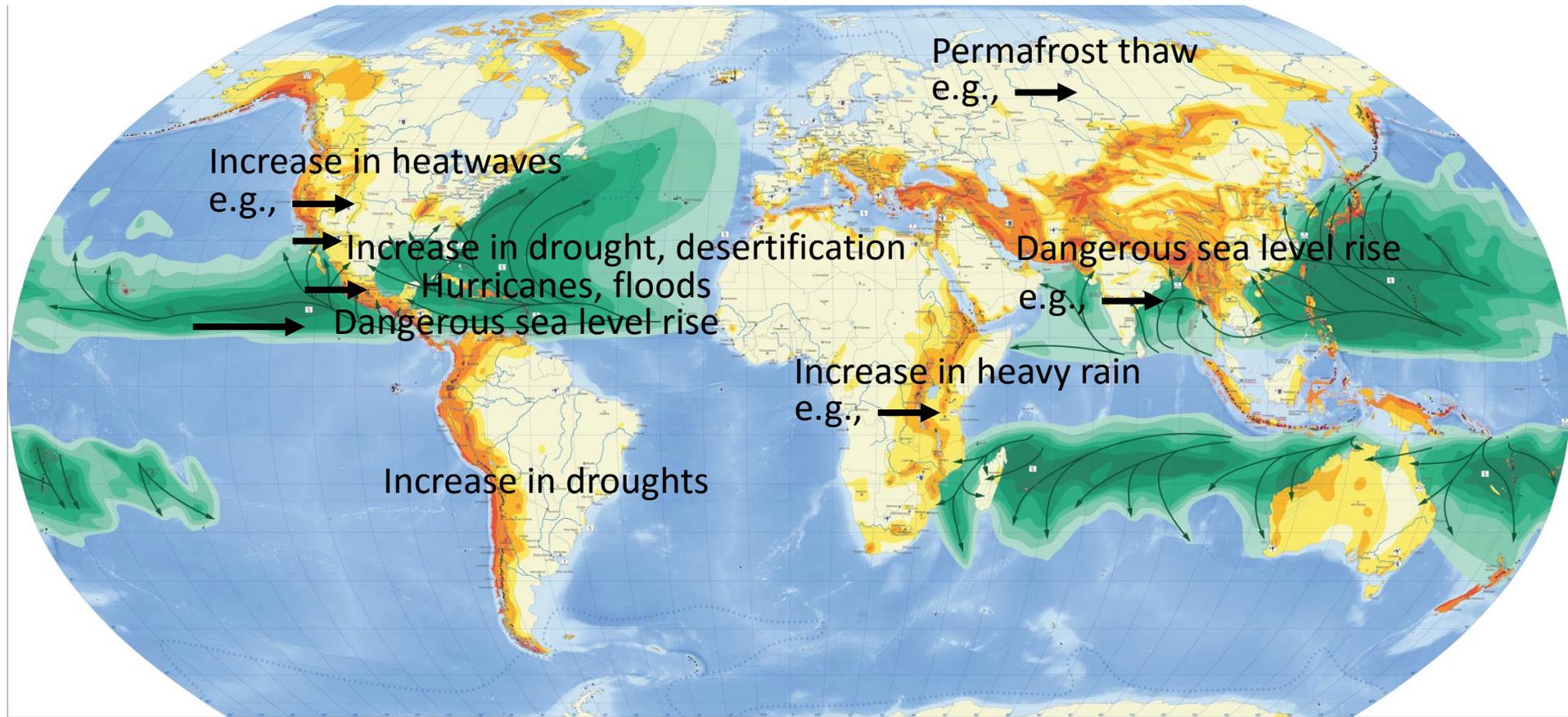


## 2. Impacts and Risks

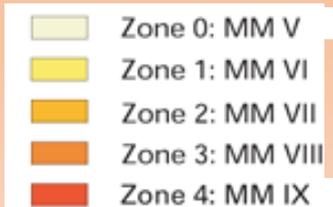
- **Distribution of impacts:** Risks are unevenly distributed and are generally greater for disadvantaged people and communities in countries at all levels of development. Risks are already moderate because of regionally differentiated climate-change impacts on crop production. Based on projected decreases in regional crop yields and water availability, risks of unevenly distributed impacts are high for additional warming above 2°C.
- Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions.
- **Freshwater-related risks of climate change increase significantly with increasing greenhouse gas concentrations. Climate change over the 21st century is projected to reduce renewable surface water and groundwater resources significantly in most dry subtropical regions.** Adaptive water management techniques, including scenario planning, learning-based approaches, and flexible and low-regret solutions, can help create resilience to uncertain hydrological changes and impacts due to climate change.
- **Within this century, magnitudes and rates of climate change associated with medium- to high-emission scenarios pose high risk of abrupt and irreversible regional-scale change in the composition, structure, and function of terrestrial and freshwater ecosystems, including wetlands.**

- **Impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability.**
- Impacts of such climate-related extremes include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being. For countries of development, these impacts are consistent with a significant lack of preparedness for current climate variability in some sectors.
- **Climate-related hazards exacerbate other stressors, often with negative outcomes for livelihoods, especially for people living in poverty.** Climate-related hazards affect poor people's lives directly through impacts on livelihoods, reductions in crop yields, or destruction of homes and indirectly through increased food prices and food insecurity.
- **Violent conflict increases vulnerability to climate.** Large-scale violent conflict harms assets that facilitate adaptation, including infrastructure, institutions, natural resources, social capital, and livelihood opportunities.
- **Forest dieback poses risks for carbon storage, biodiversity, wood production, water quality,** amenity, and economic activity. Heat stress, extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, and water scarcity pose risks in urban areas for people, assets, economies, and ecosystems.

# 3. Climate change, hazards, exposure, and dual vulnerability

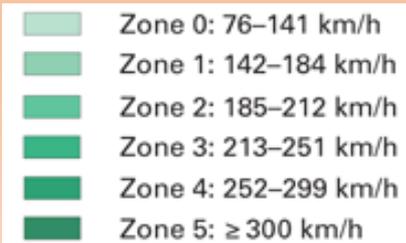


## Earthquakes



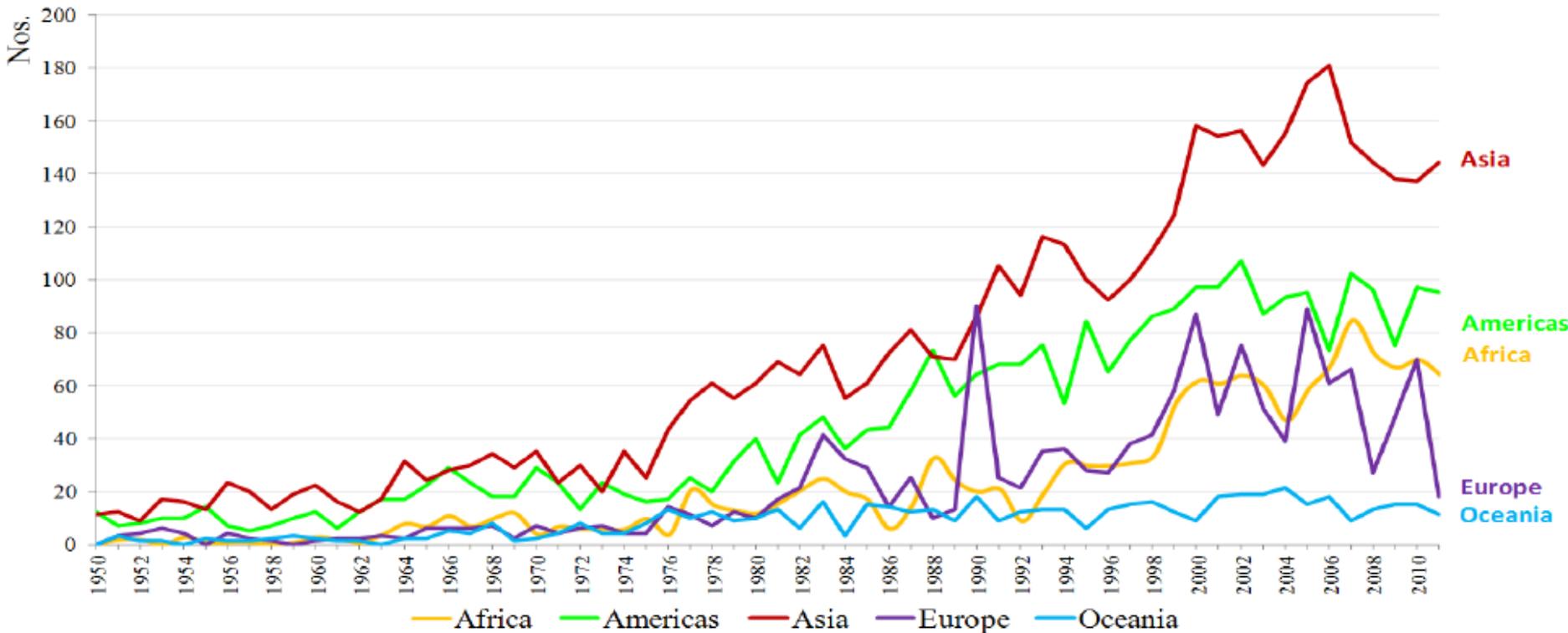
MM: modified Mercalli scale

## Tropical Hurricanes

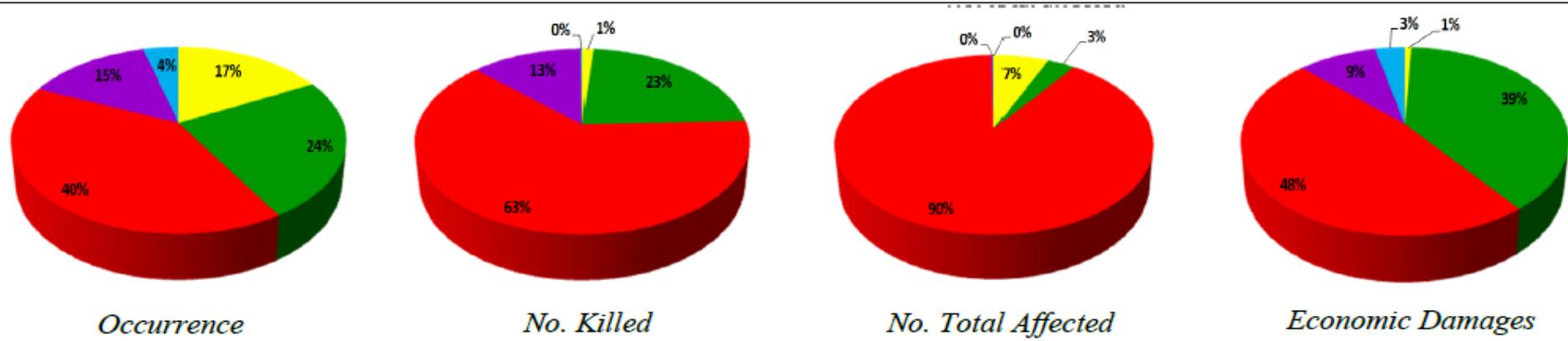


Münchener Rück  
Munich Re Group

# 60 Years of Disasters worldwide: 1950-2011



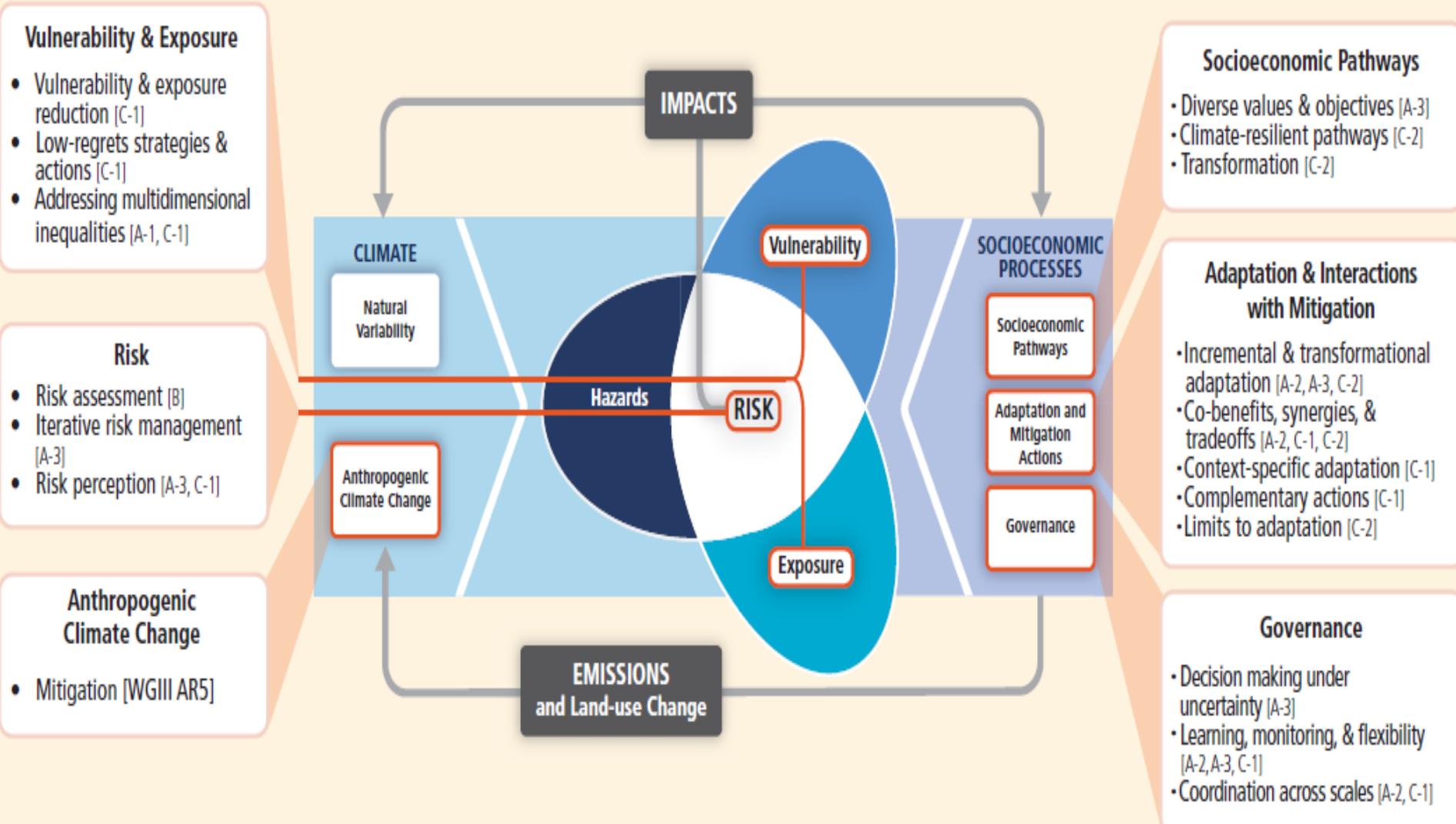
## Asia's share: 2002-2011

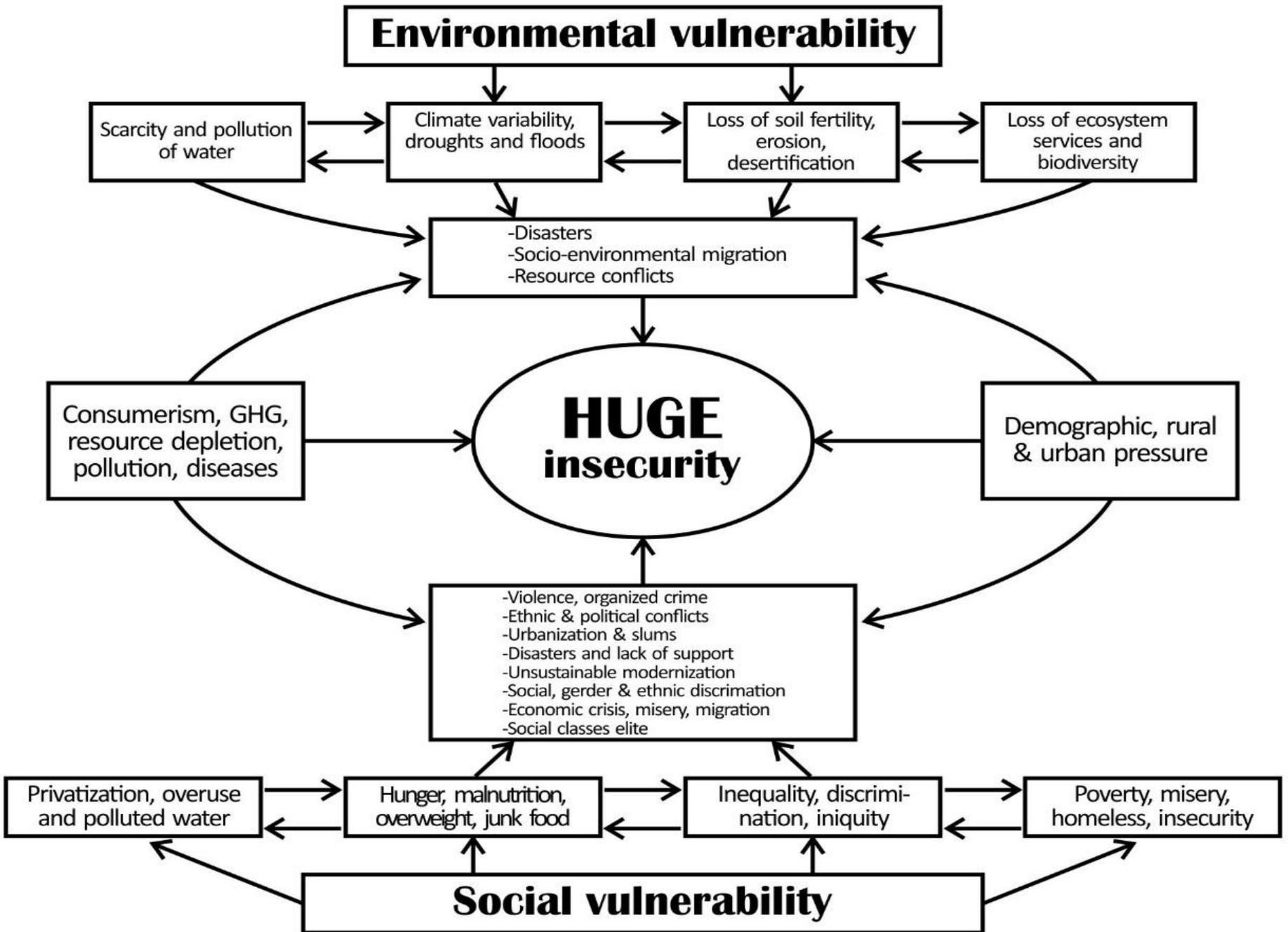


Source: CRED, 2013

— Africa — Americas — Asia — Europe — Oceania

# Dual vulnerability, DRR, Sustainable Development





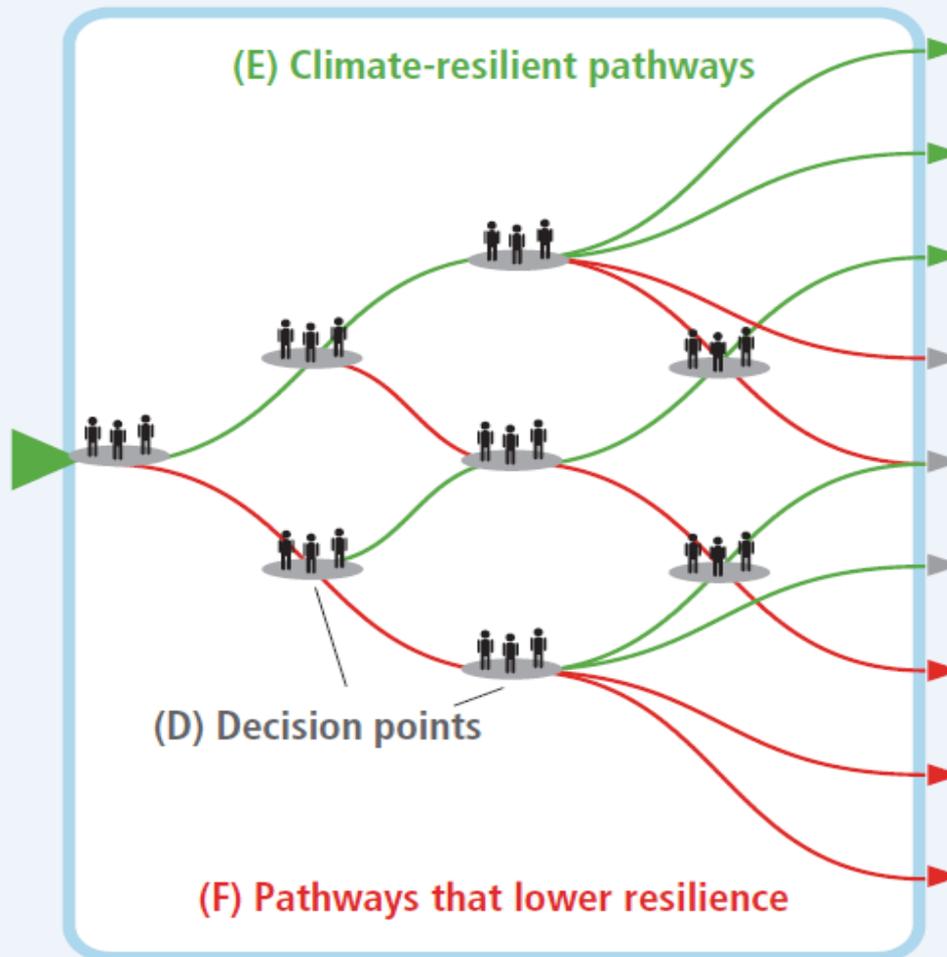
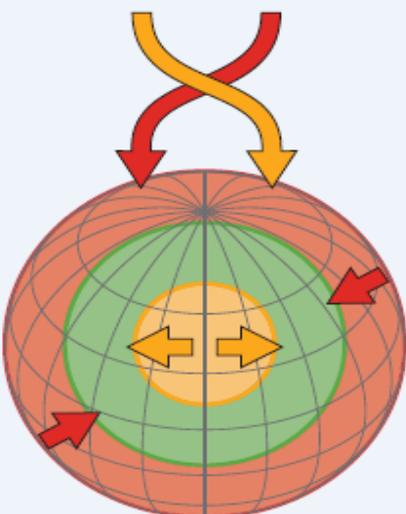
# 4. Multiple stressors

(A) Our world

(B) Opportunity space

(C) Possible futures

Multiple stressors including climate change



High resilience    Low risk

Low resilience    High risk

- Biophysical stressors
- Resilience space
- Social stressors

(D) Decision points

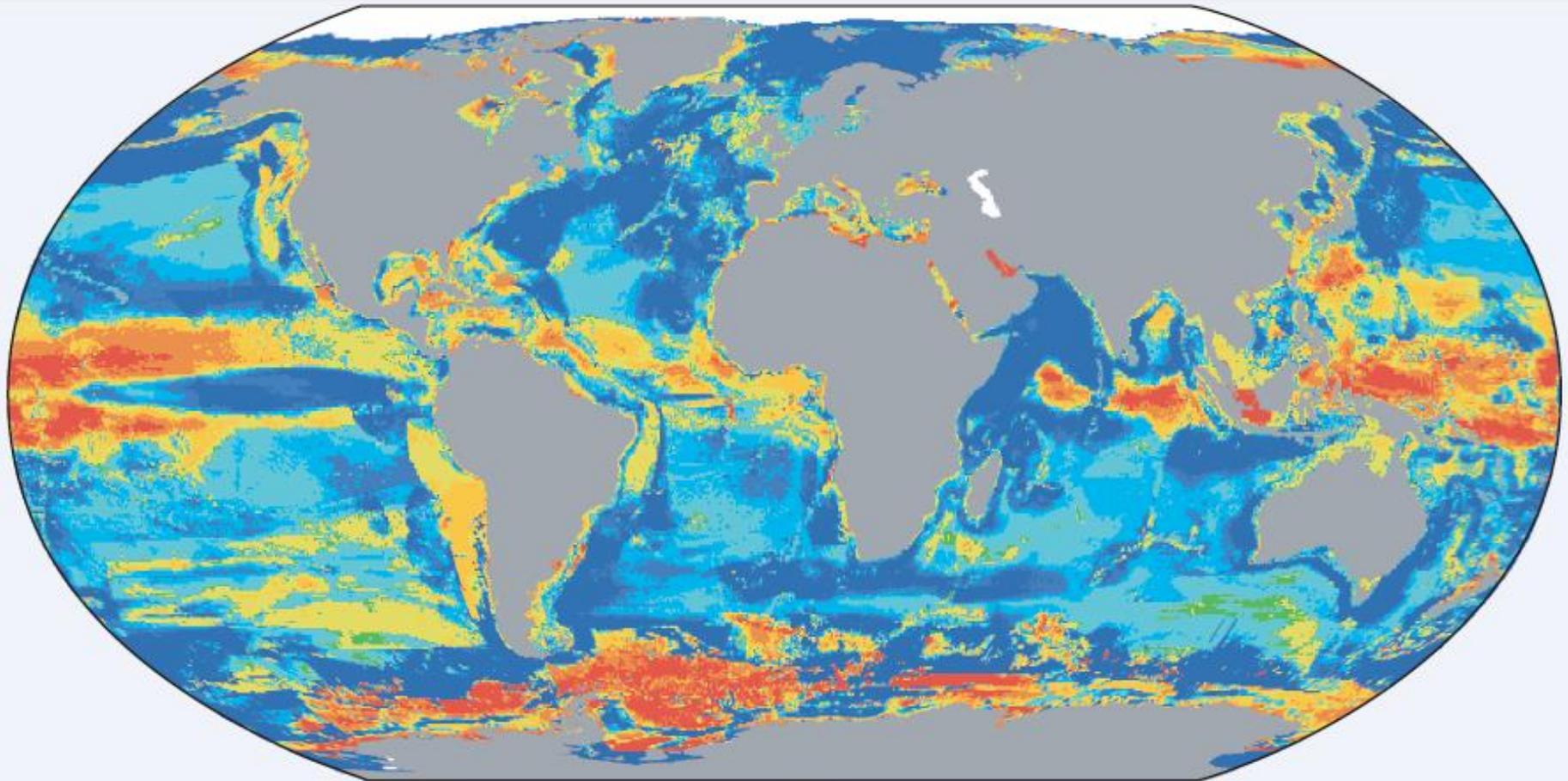
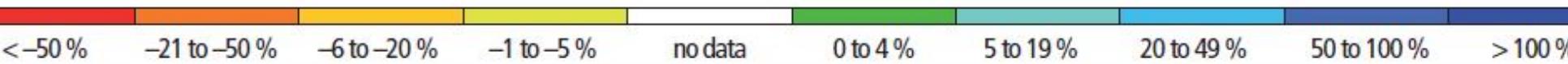
(E) Climate-resilient pathways

(F) Pathways that lower resilience

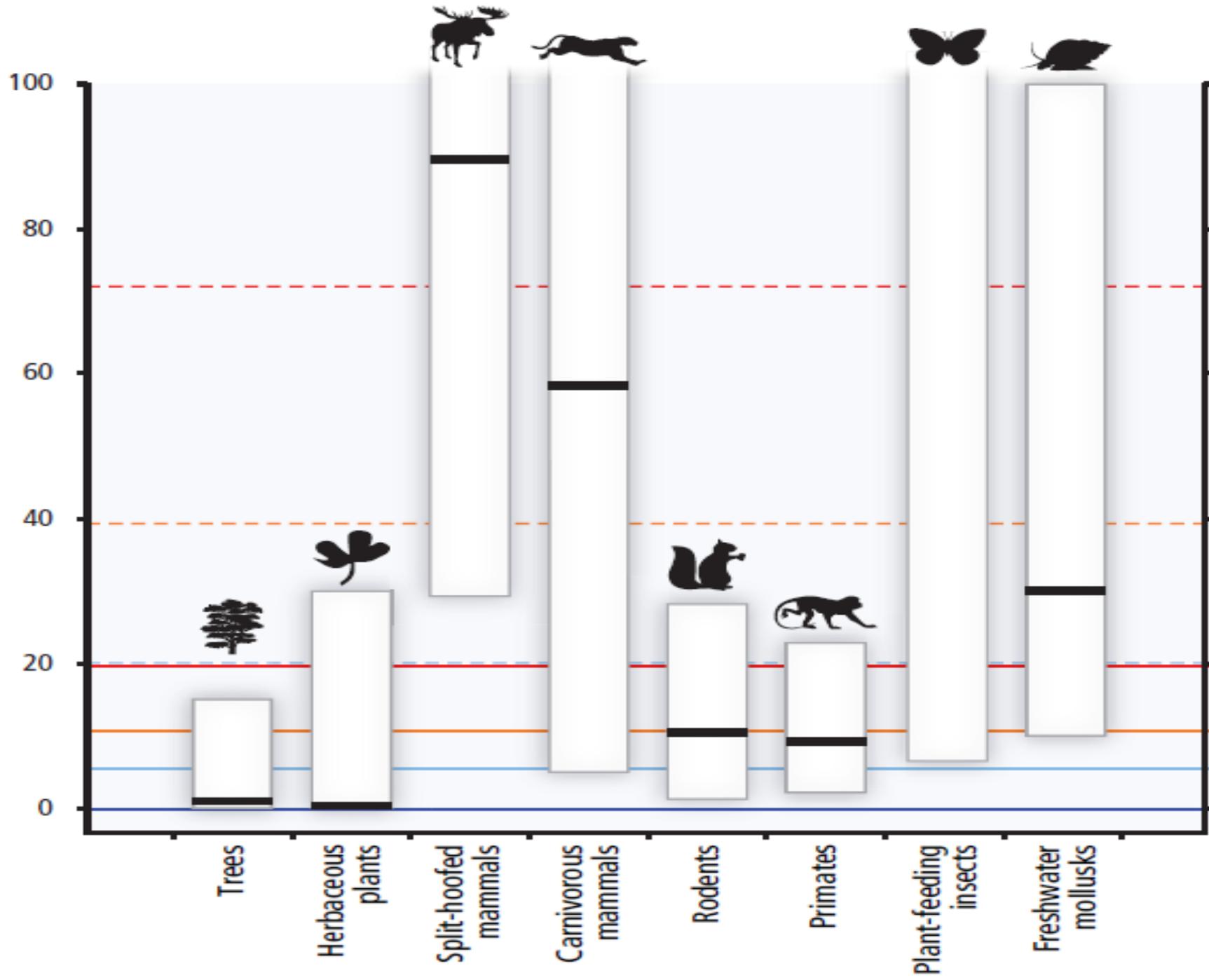
# 5. Water security

- In many regions, changing precipitation or melting snow and ice are altering hydrological systems, affecting water resources in terms of quantity and quality.
- Many terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions in response to ongoing climate change.
- At present the worldwide burden of human ill-health from climate change is relatively small compared with effects of other stressors and is not well quantified. However, there has been increased heat-related mortality and decreased cold-related mortality in some regions as a result of warming. Local changes in temperature and rainfall have altered the distribution of some waterborne illnesses and disease vectors.

# Catch potential (2051-2060 compared 2001-2010)



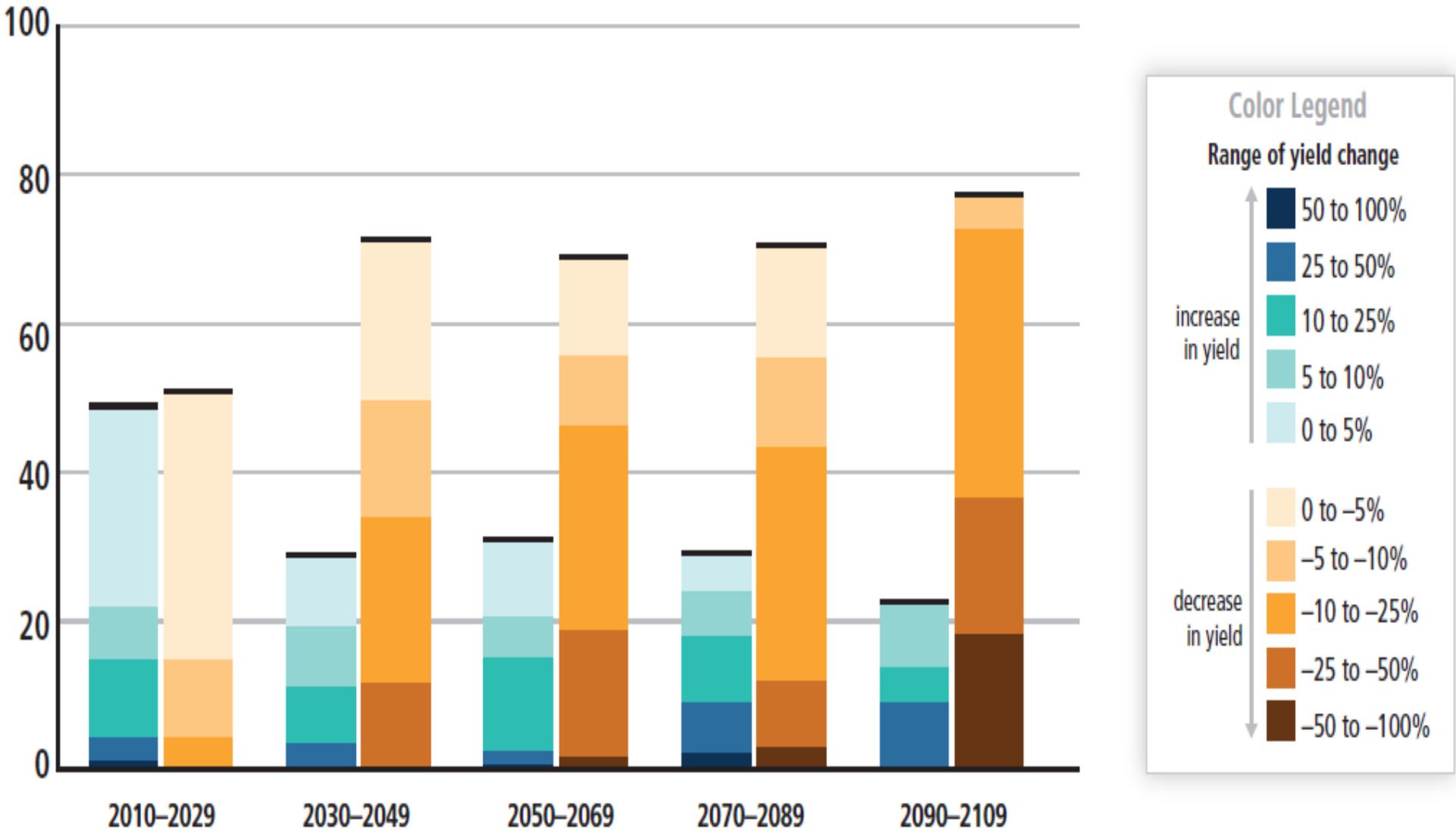
Maximum speed at which species can move (km per decade)



# 6. Food security

- **Climate change has negatively affected wheat and maize yields for many regions and in the global aggregate.** Effects on rice and soybean yield have been smaller in major production regions and globally. Observed impacts relate mainly to production aspects of food security rather than access.
- **For the major crops (wheat, rice, and maize) in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late-20th-century levels, although individual locations may benefit**
- **Global climate change risks are high to very high with global mean temperature increase of 4°C, and include large risks to global and regional food security, and the combination of high temperature and humidity compromising normal human activities, including growing food or working outdoors in some areas for parts of the year.** Redistribution of marine fisheries catch towards higher latitudes poses risk of reduced supply, income and employment.

# Projected changes in crop yields (%)



# 7. Human Security: HS

- Human security identifies the **risks climate change poses to livelihoods, cultures, indigenous peoples, and political stability**. Migration and violent conflicts increase vulnerability to climate change, as well as highlighting that migration plays a role in adaptation.
- Human security and insecurity are **universal issues**. While the impacts of climate change on human security will be experienced **most in developing countries**, human security is at risk for **vulnerable populations everywhere**.
- Understanding the effects of climate change on human security analyses evidence **about social and environmental processes across multiple scales and sectors**. Some transboundary impacts of climate change, such as changes in sea ice, shared water resources, and pelagic fish stocks, have the potential to increase rivalry among states, but robust national and **intergovernmental institutions can enhance cooperation and manage many of these rivalries**.

- **Human security will be progressively threatened as the climate changes.**
- **Climate change will compromise the cultural values that are important for community and individual wellbeing**
- **Indigenous, local and traditional forms of knowledge are a major resource for adapting to climate change**
- **Climate change will have significant impacts on forms of migration that compromise human security**
- **Mobility is a widely used strategy to maintain livelihoods in response to social and environmental changes**
- **Some of the factors that increase the risk of violent conflict within states are sensitive to climate change**
- **People living in places affected by violent conflict are particularly vulnerable to climate change**
- **Climate change will lead to new challenges to states and will increasingly shape both conditions of security and national security policies**

# Multiple stressors

Climate change

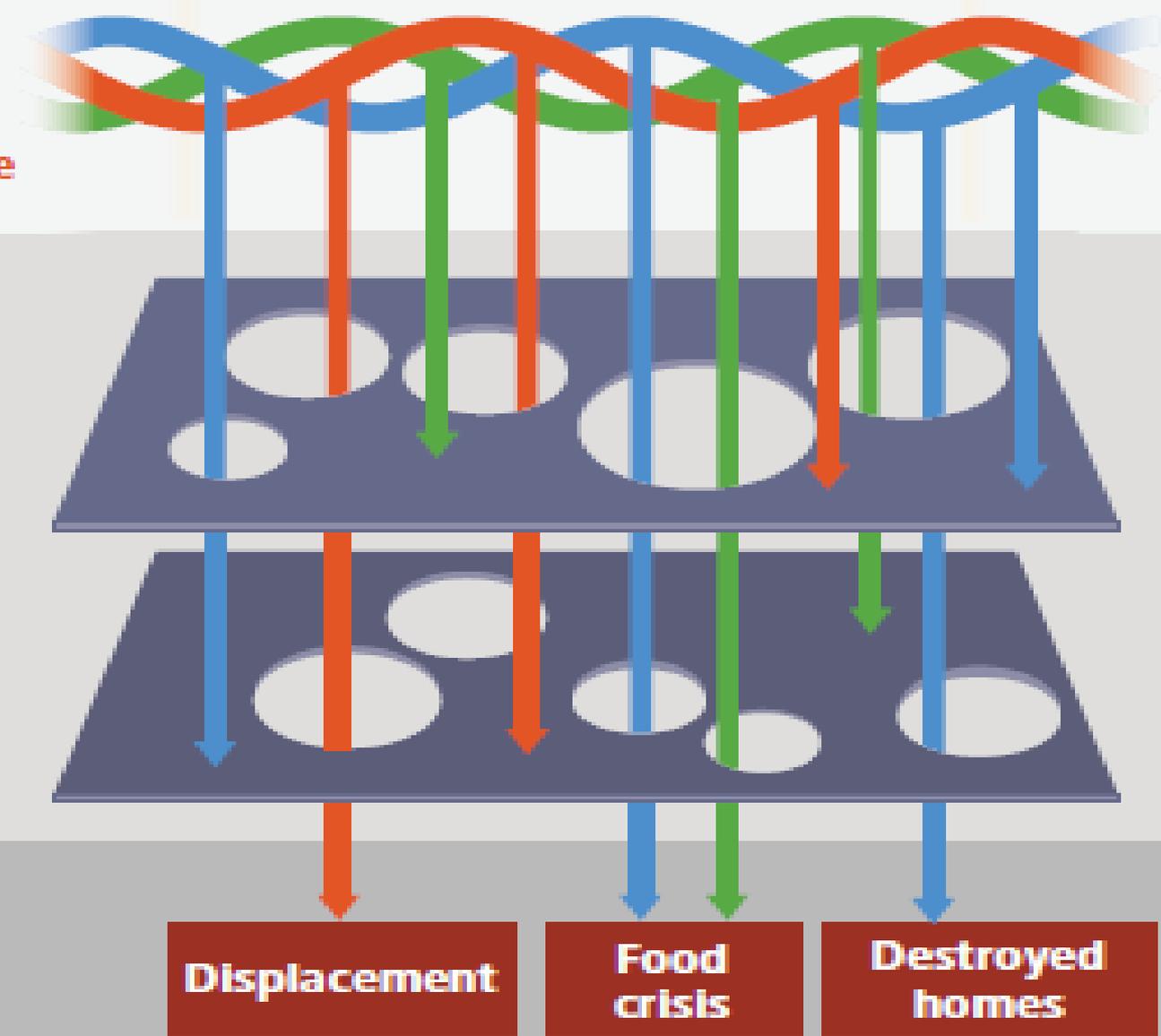
Globalizations

Technological change

Institutions such as:

- Social protection
- Relief organizations
- Disaster prevention

Livelihoods



Displacement

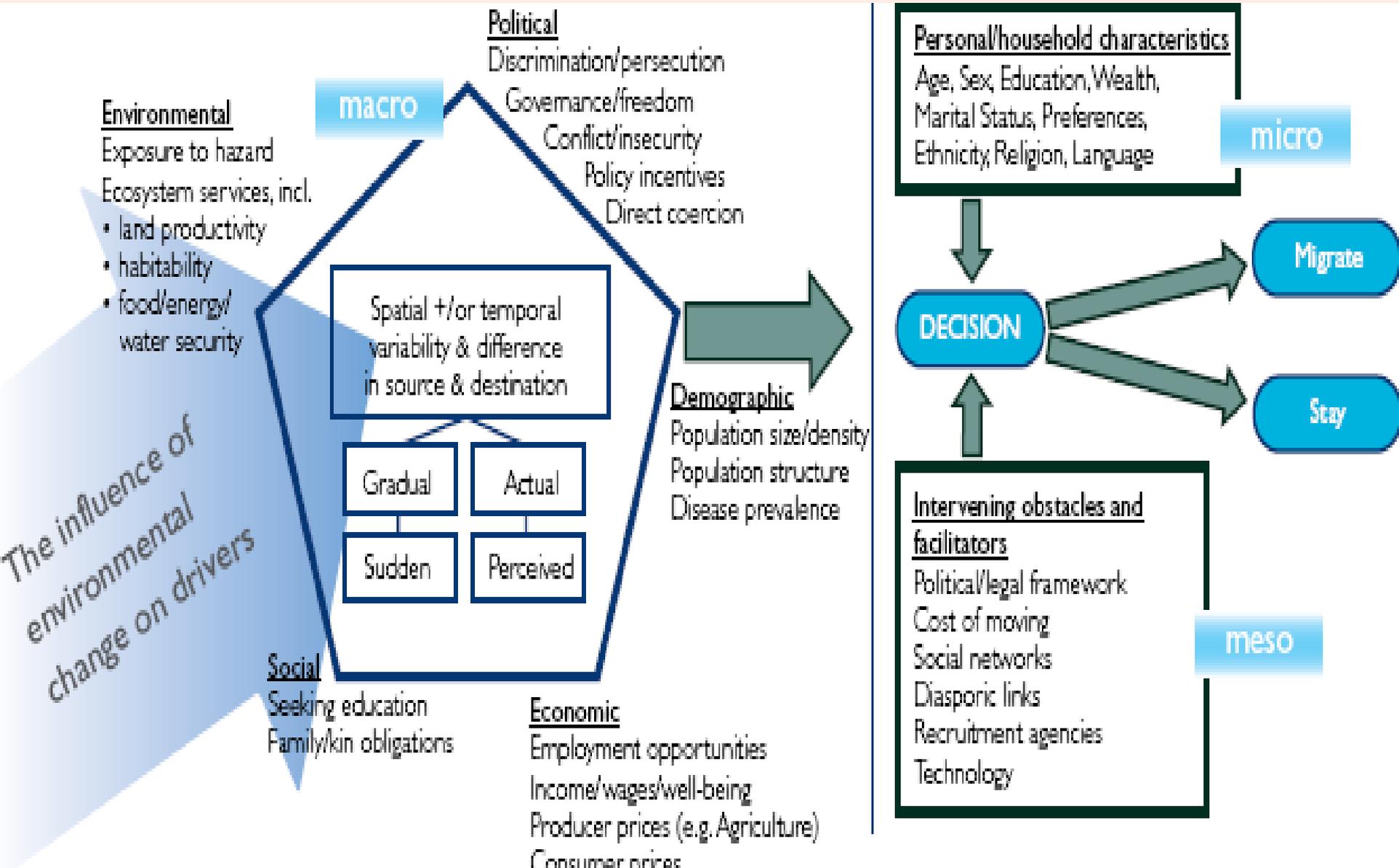
Food crisis

Destroyed homes

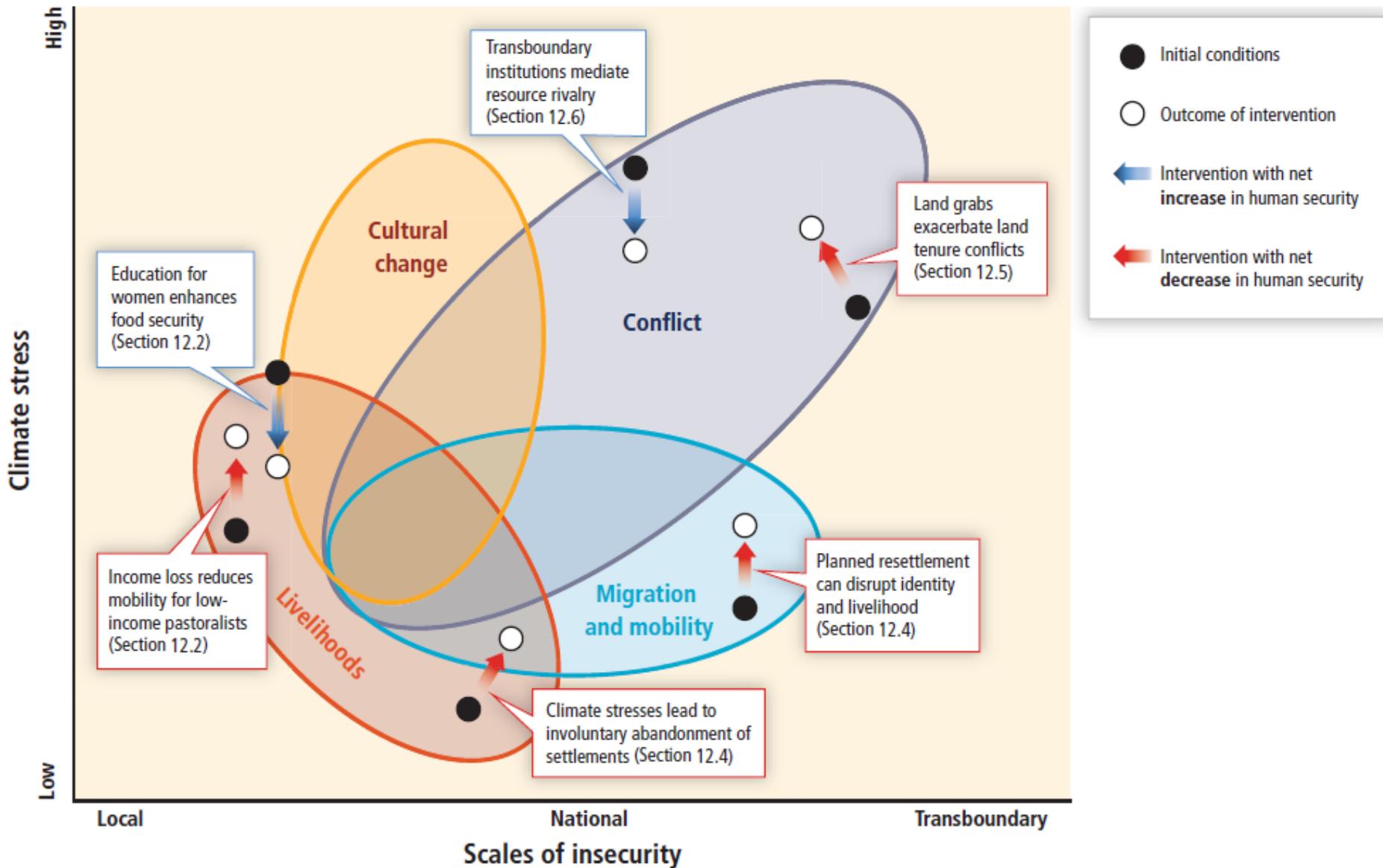
# Climate-induced migration

Source: UK

Government Office for Science (2011: 12)



# Climate stress, conflicts and human security



## Primary Actors

### INTERNATIONAL

- Bilateral and multilateral partners
- Intergovernmental organizations

### NATIONAL / SUB-NATIONAL

- National government and statutory agencies
- Civil society organizations
- Private sector
- Research and communication bodies
- Local government agencies

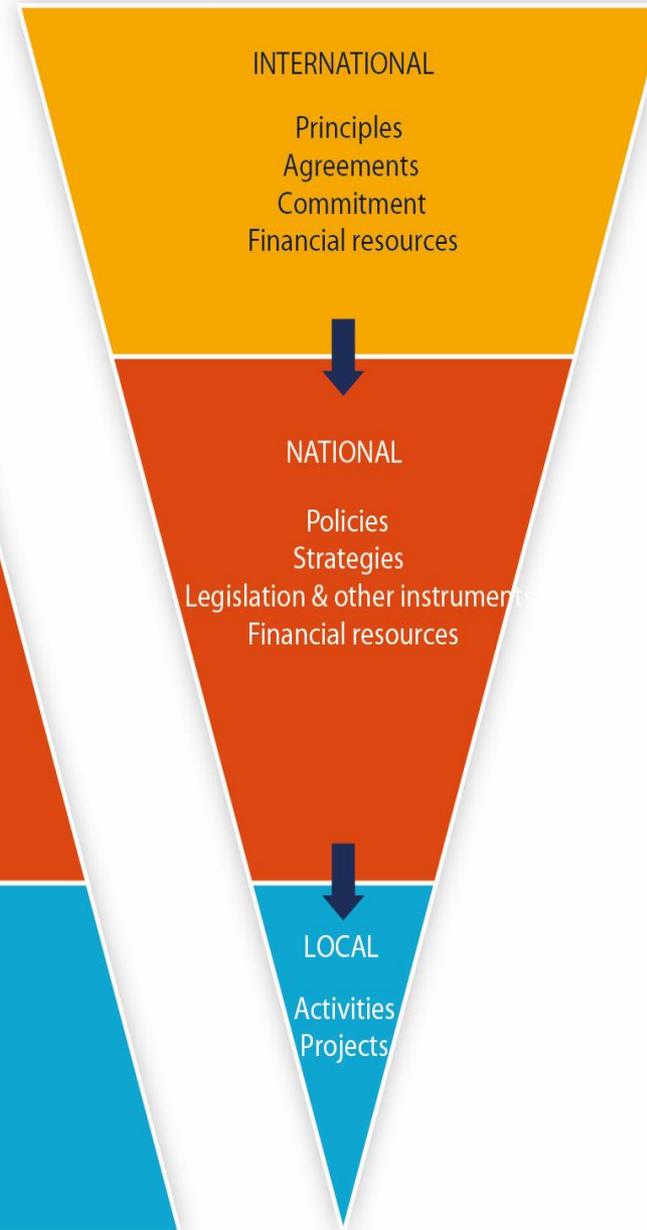
### LOCAL

- Individuals, households, and communities
- Private sector
- Community-based organizations
- Faith-based organizations

## "BOTTOM-UP" Functions



## "TOP-DOWN" Functions



Global Climate  
Projections

Regional / National  
Climate Projections

Scientific and Local  
Experiential  
Knowledge

Vulnerability,  
Risk, and Adaptation  
Assessments



**Thank you for your attention**

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