

Food Security in the Anthropocene: A Challenge for Policy Facing Global Environmental Change

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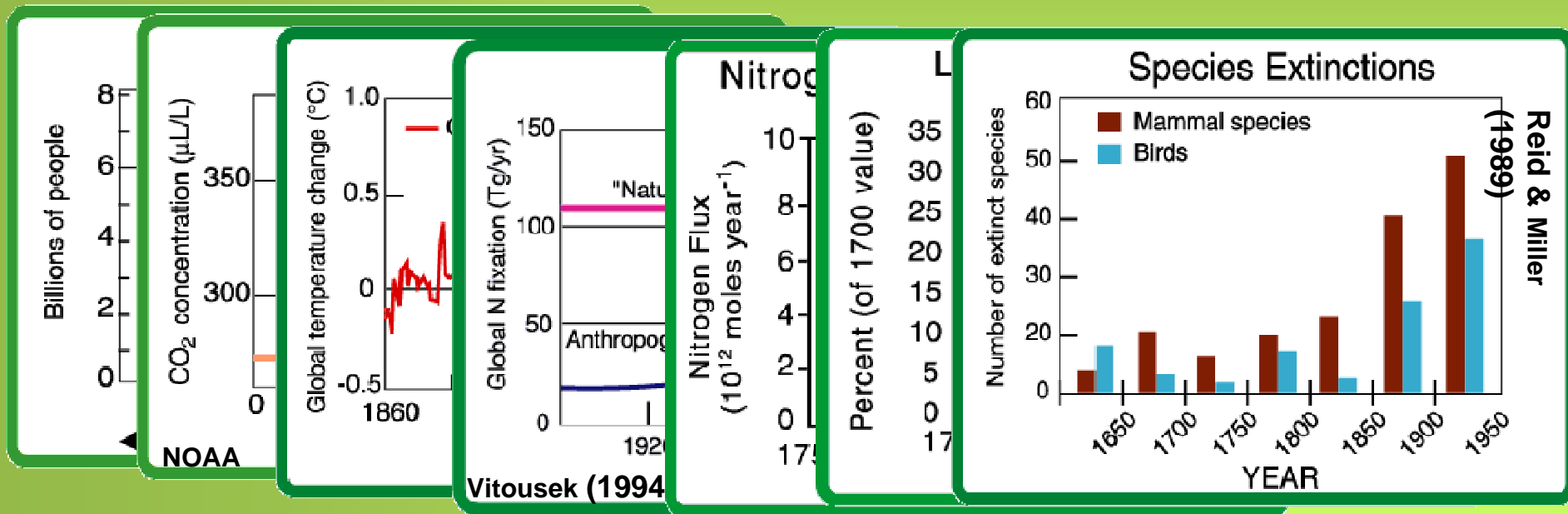
National Coordinator on Water Networks

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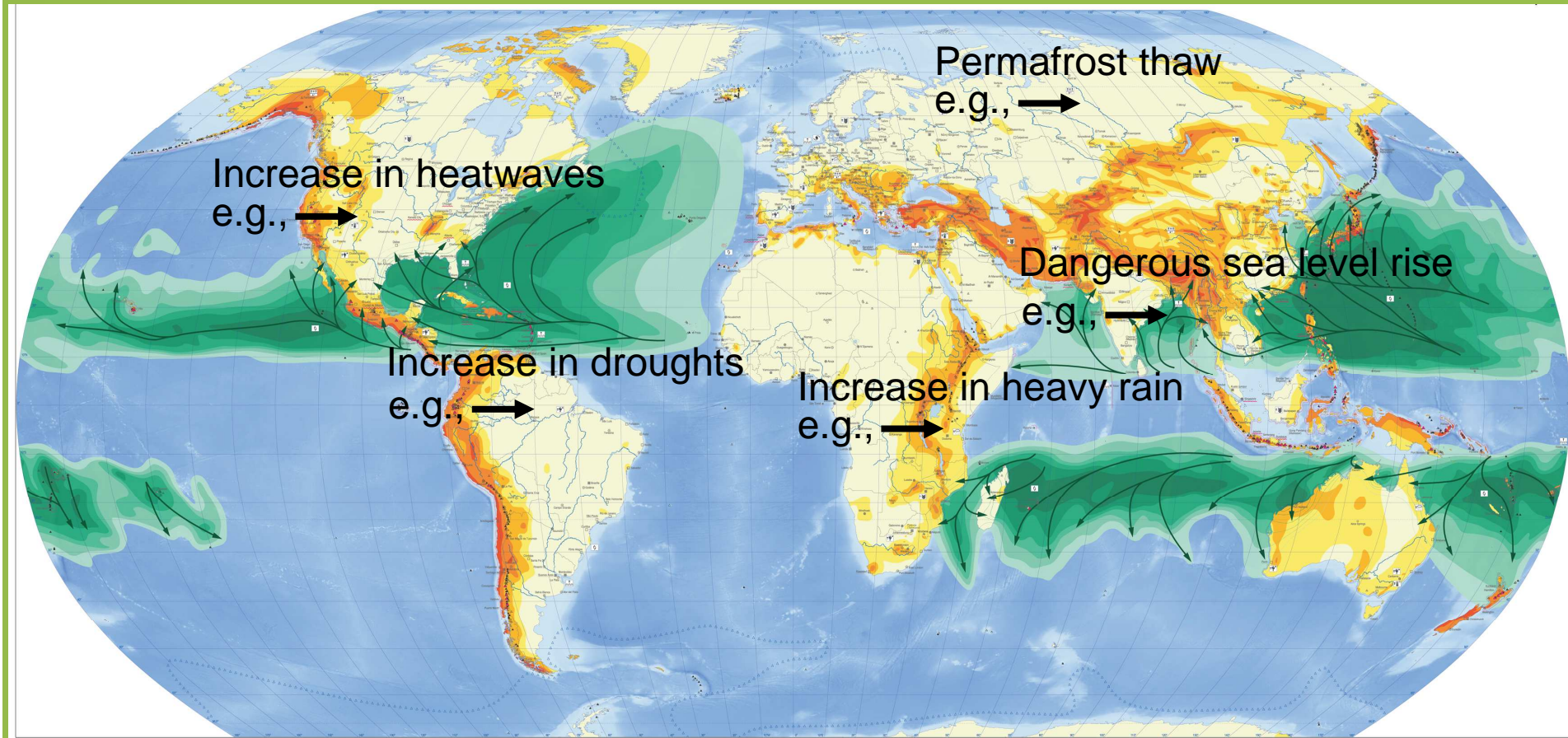
1. How is Global Environmental Change (GEC) related to food security?
2. Definitions on food security and food sovereignty
3. World food situation
4. Social and food insecurity: a problem of equity
5. Threats to food sovereignty: three models of food production
6. Conclusions: food sovereignty with resilience-building from top-down and bottom-up for improving human, gender and environmental security. A HUGE Security

1. How is Global Environmental Change related to Food Security?

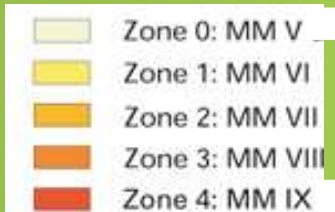
- GEC is more than climate change
- Includes natural **plus** human components
- It is a constellation of changes in different spheres, such as:



Threats from Global Environmental Change

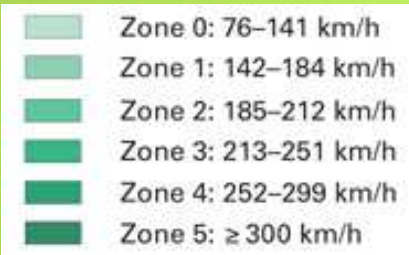


Temblores



MM: modified Mercalli scale

Hurricanes tropicales



Münchener Rück
Munich Re Group

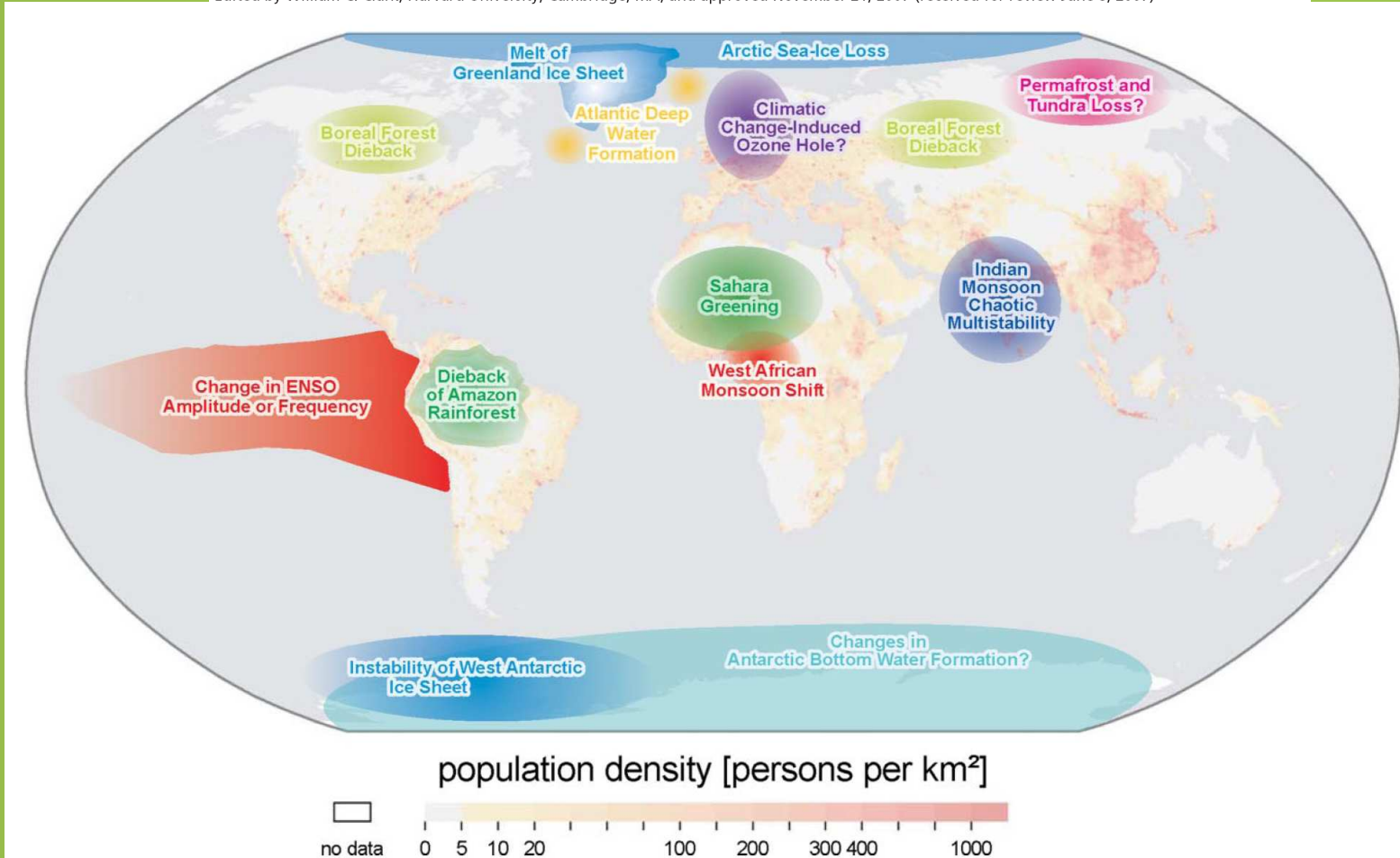
Tipping elements in the Earth's climate system

Timothy M. Lenton^{*†}, Hermann Held[‡], Elmar Kriegler[§], Jim W. Hall[¶], Wolfgang Lucht[‡], Stefan Rahmstorf[‡], and Hans Joachim Schellnhuber^{†¶||**}

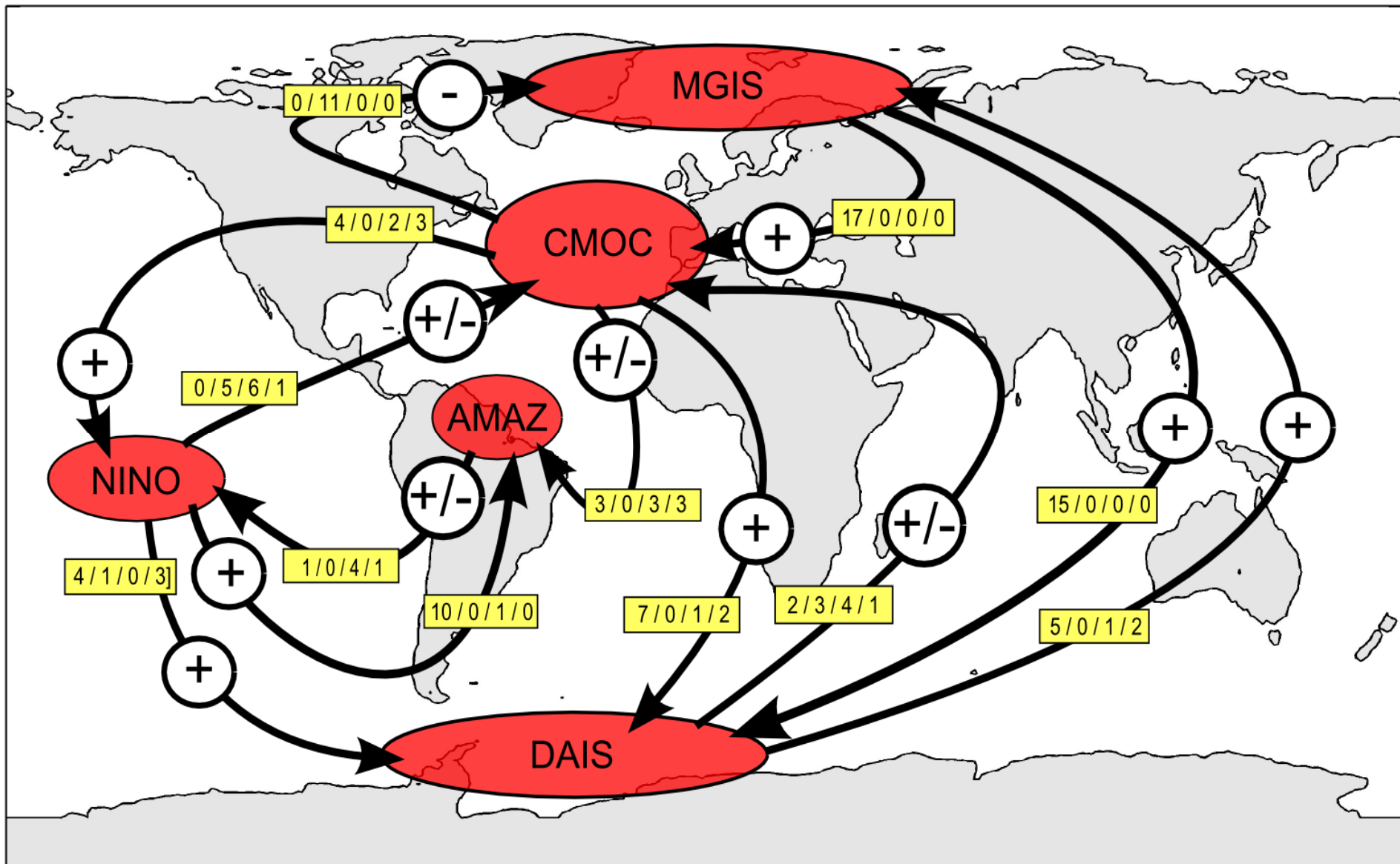
^{*}School of Environmental Sciences, University of East Anglia, and Tyndall Centre for Climate Change Research, Norwich NR4 7TJ, United Kingdom; [†]Potsdam Institute for Climate Impact Research, P.O. Box 60 12 03, 14412 Potsdam, Germany; [‡]Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA 15213-3890; [§]School of Civil Engineering and Geosciences, Newcastle University, and Tyndall Centre for Climate Change Research, Newcastle NE1 7RU, United Kingdom; and [¶]Environmental Change Institute, Oxford University, and Tyndall Centre for Climate Change Research, Oxford OX1 3QY, United Kingdom

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Edited by William C. Clark, Harvard University, Cambridge, MA, and approved November 21, 2007 (received for review June 8, 2007)



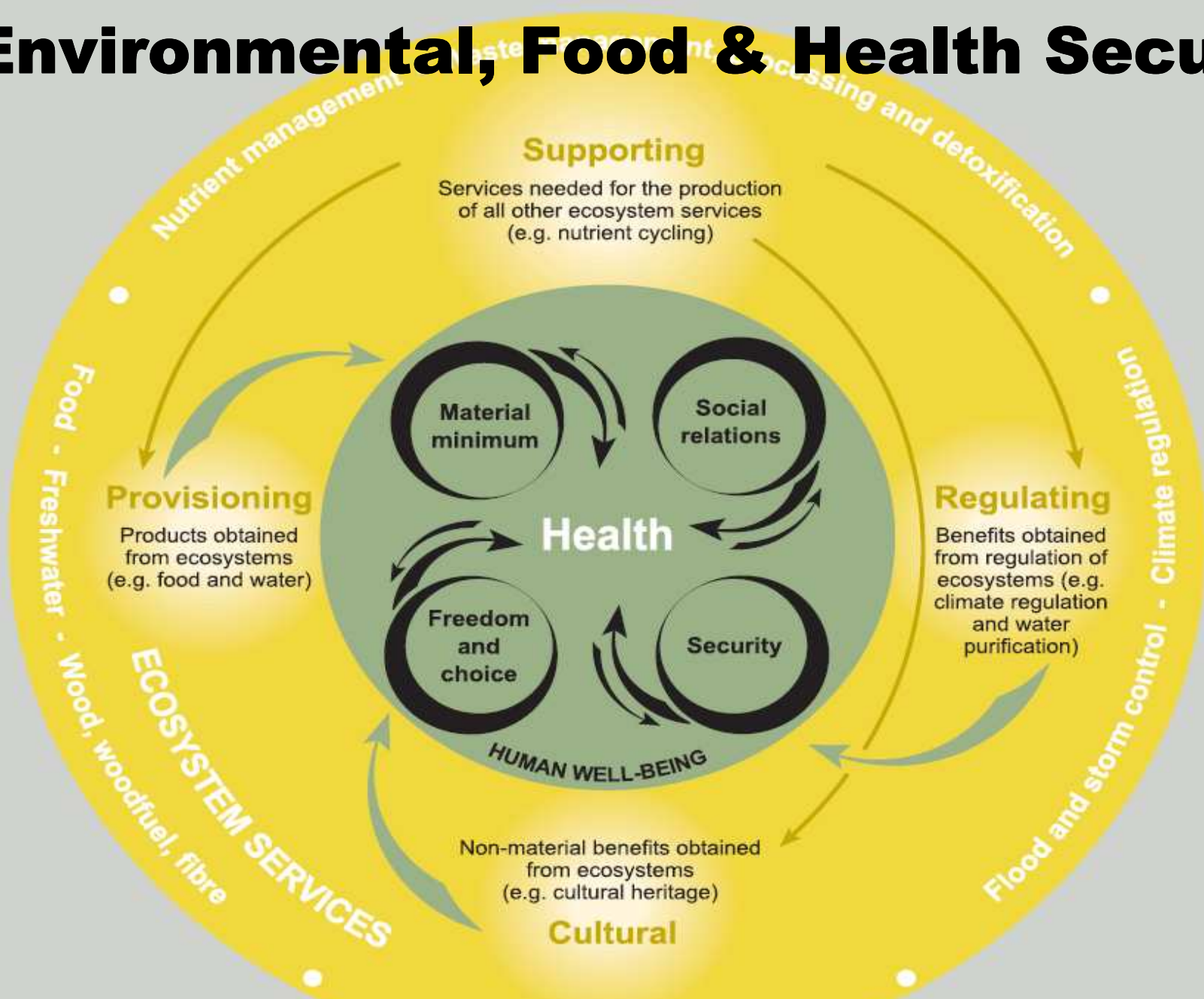
Interdependency among tipping points



Ecosystem Services as Foodprovider

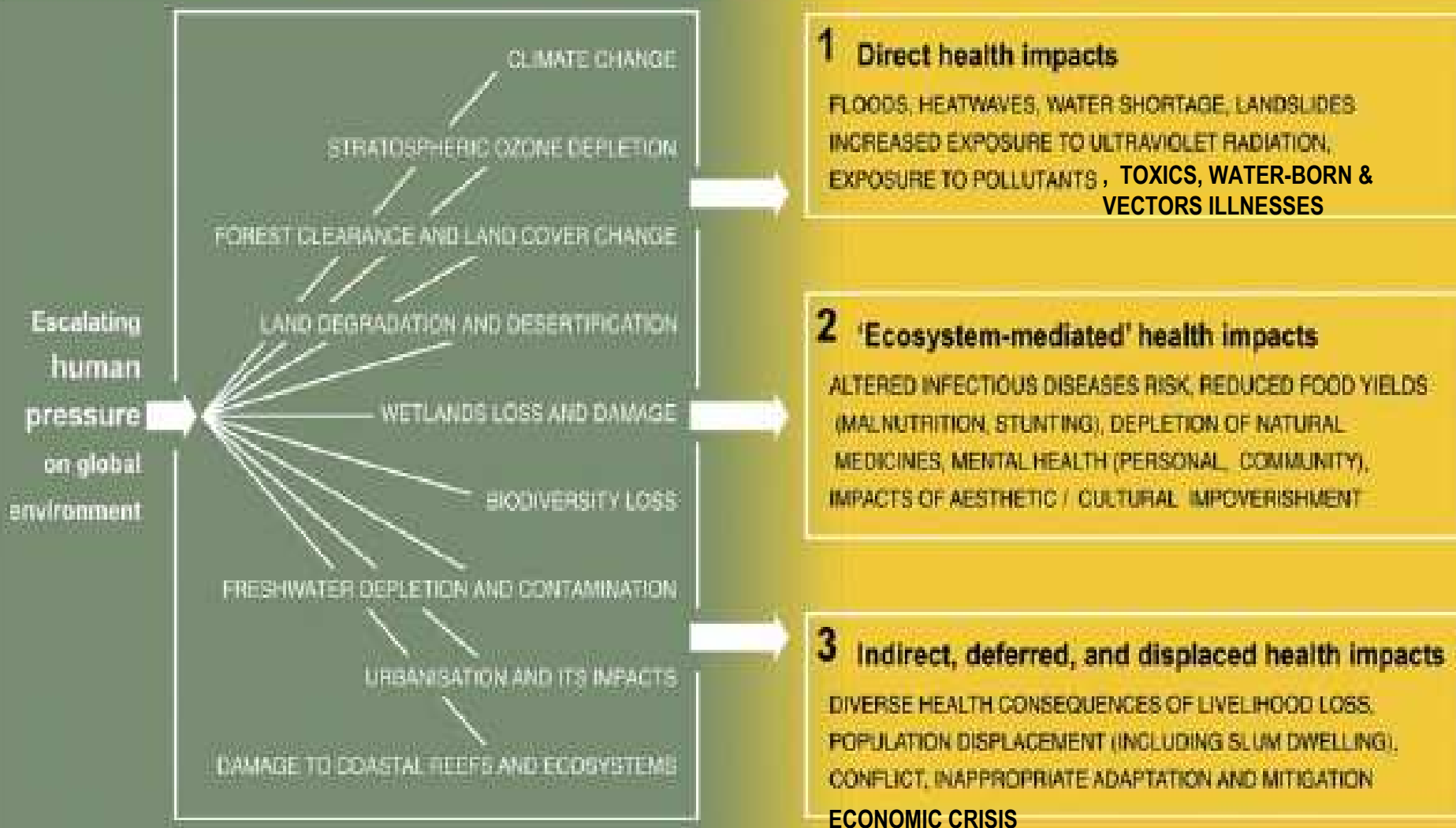
- **15 out of 24 ecosystem services** are degraded or used unsustainably
- **Soil nutrient** depletion, erosion, desertification
- Depletion of **freshwater reserves** and pollution of groundwater
- **Overfishing** is pressuring on fragile soils
- **Loss of tropical forest** and of biodiversity reduces food availability & create illnesses
- **Urbanization** is diminishing the availability of land for food production en ecosystem services.

Environmental, Food & Health Security



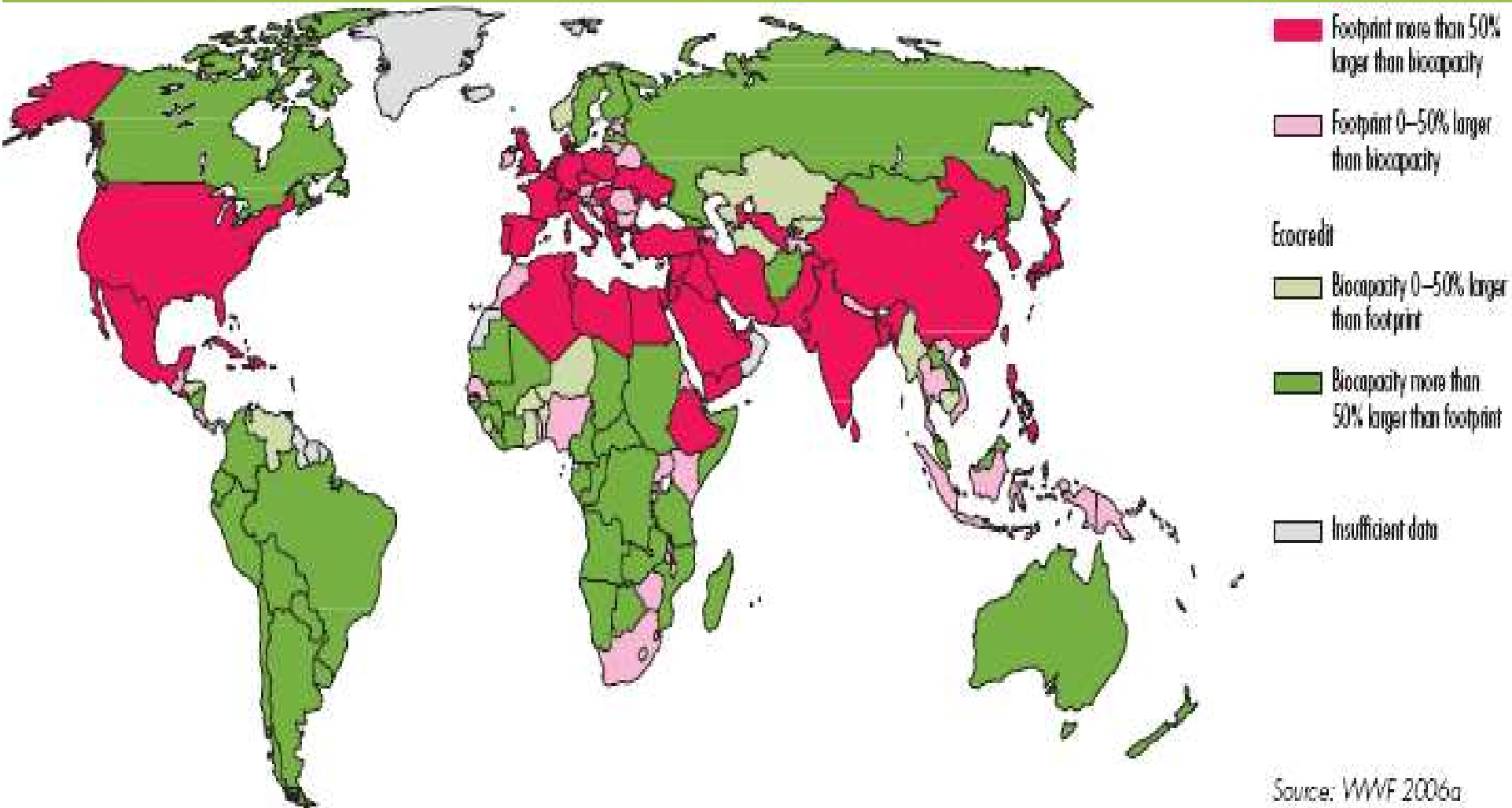
Environmental changes and ecosystem impairment

Examples of health impacts



Source: Environmental Millennium Assessment, 2005

Bio-capacity and bio-debt



2. Some definitions: Food security

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

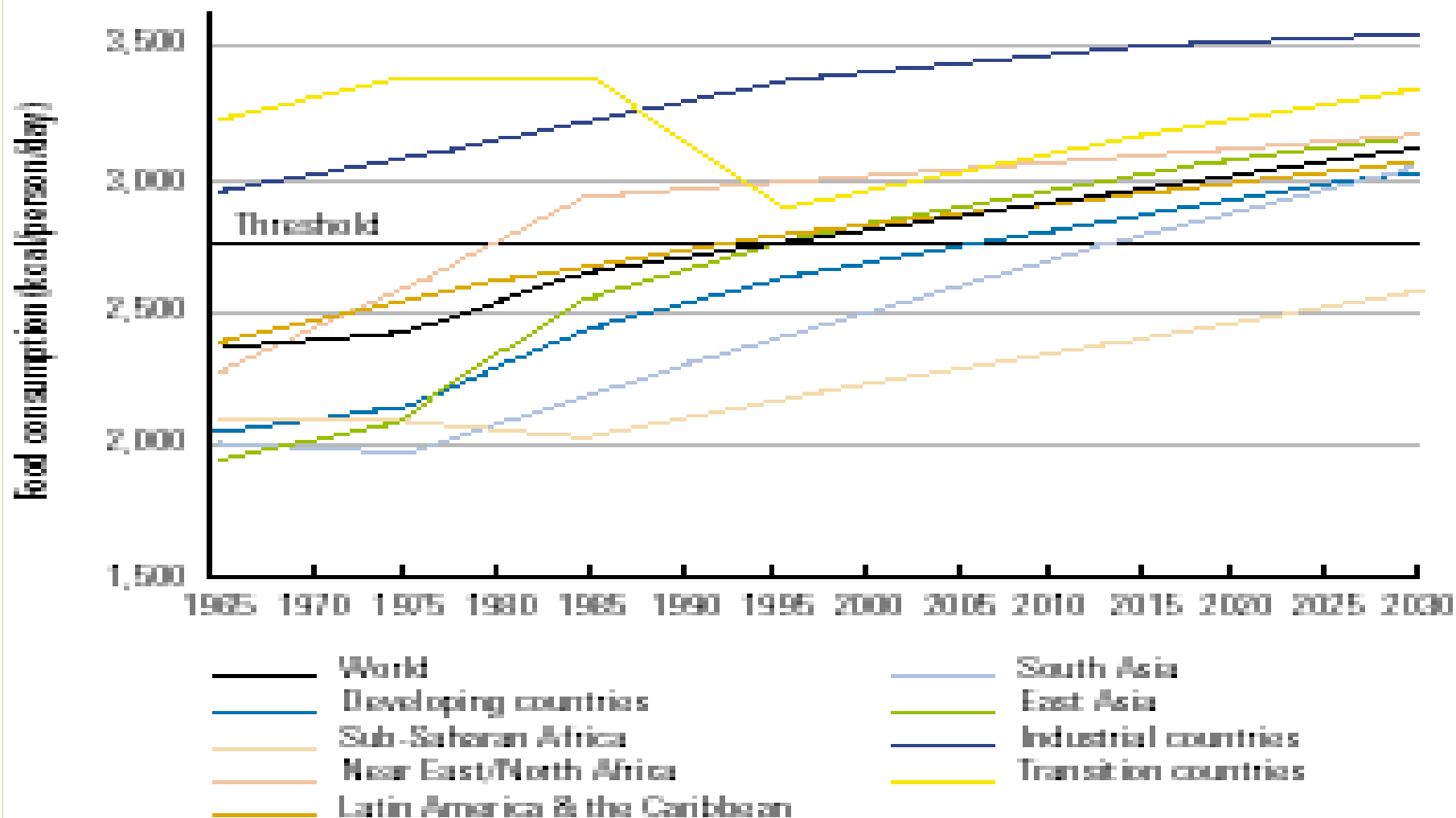
Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.

Vulnerable people are greatly exposed to famine (FAO, 2003)

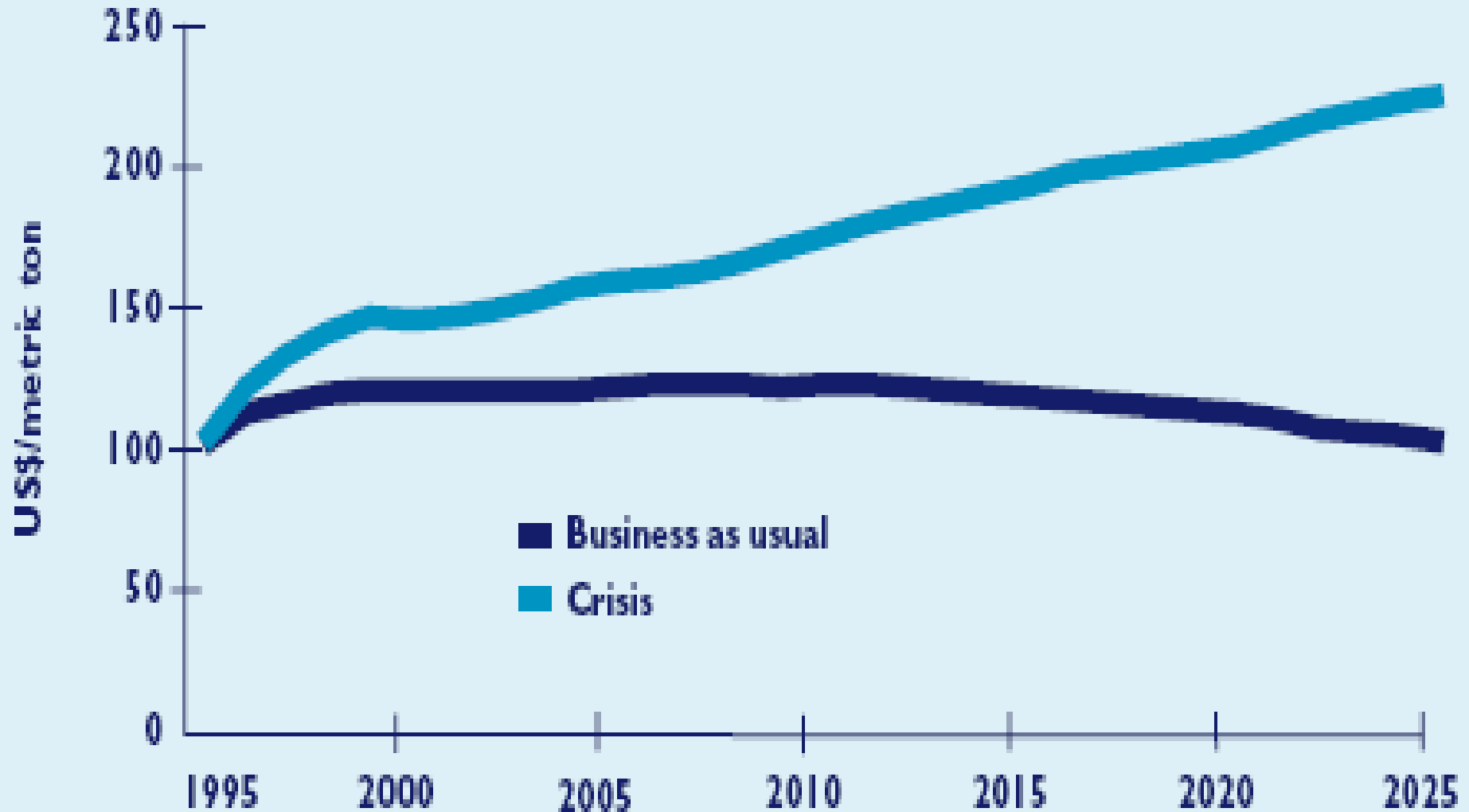
***Via Campesina's* food sovereignty**

“Food sovereignty is the right of people, communities, and countries to define their **own** agricultural, pastoral, labour, fishing, food and land **policies** which are **ecologically, socially, economically, and culturally** appropriate to their unique circumstances. It includes the **right to food and to produce food**, which means that all people have the right to safe, nutritious and culturally appropriate food and to food-producing resources and the ability to sustain themselves and their societies” (2004).

3. World's Food Situation



International Corn Prices



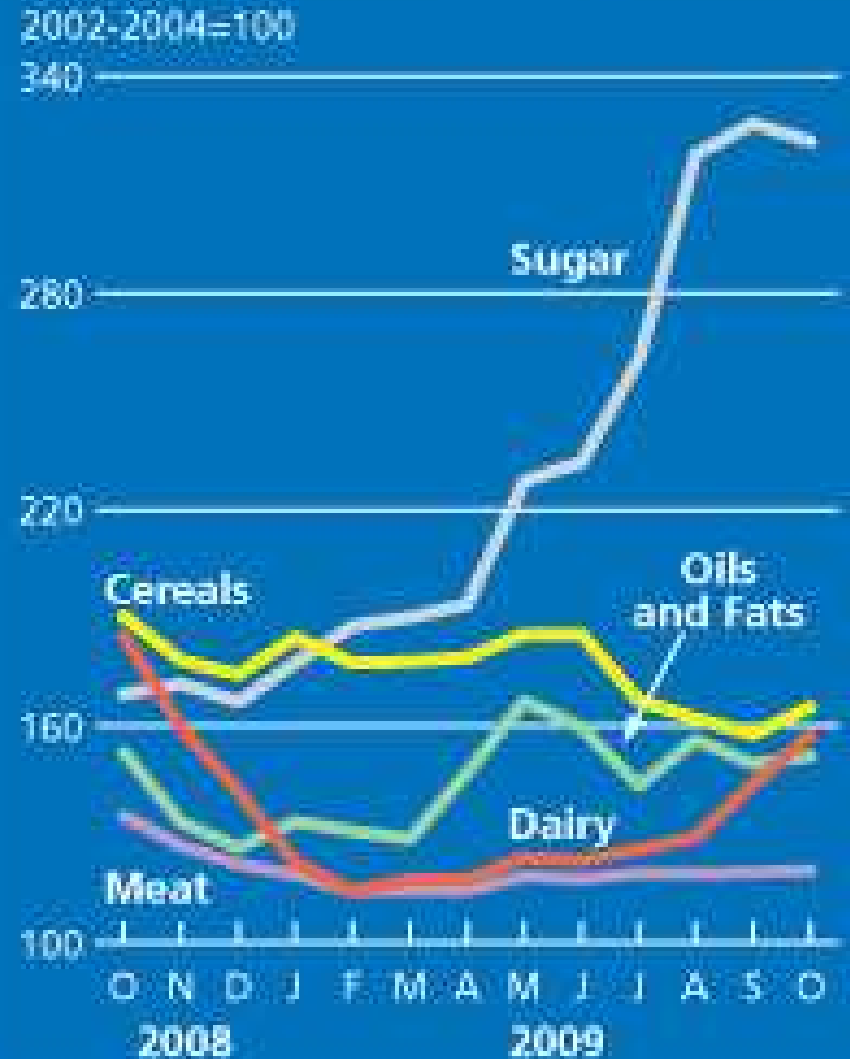
Source: Rosegrant, Mark W.; Cal, Ximing; Cline, Sarah A., 2002: 20

Food Price Speculation & Biofuel, (November 2009)

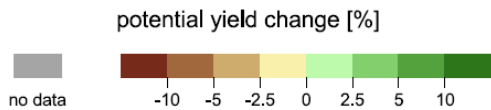
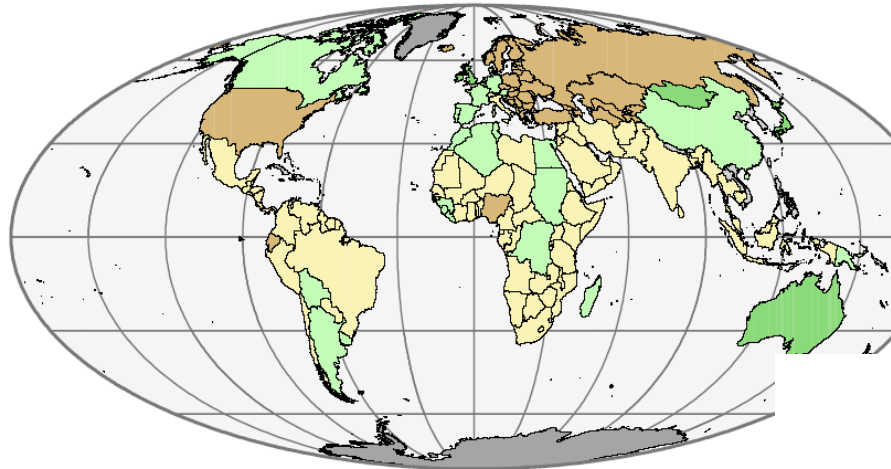
FAO Food Price Index



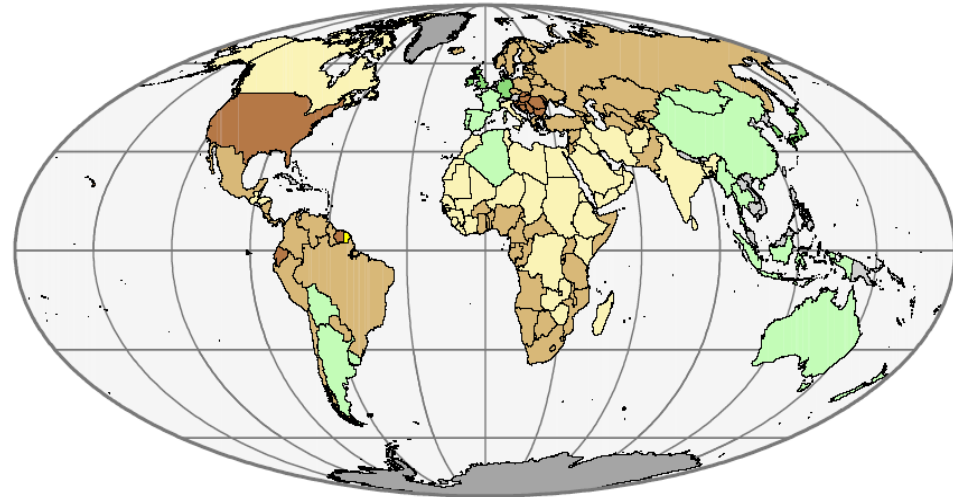
Food Commodity Price Indices



Food Scenarios: 2020, 2050, 2090



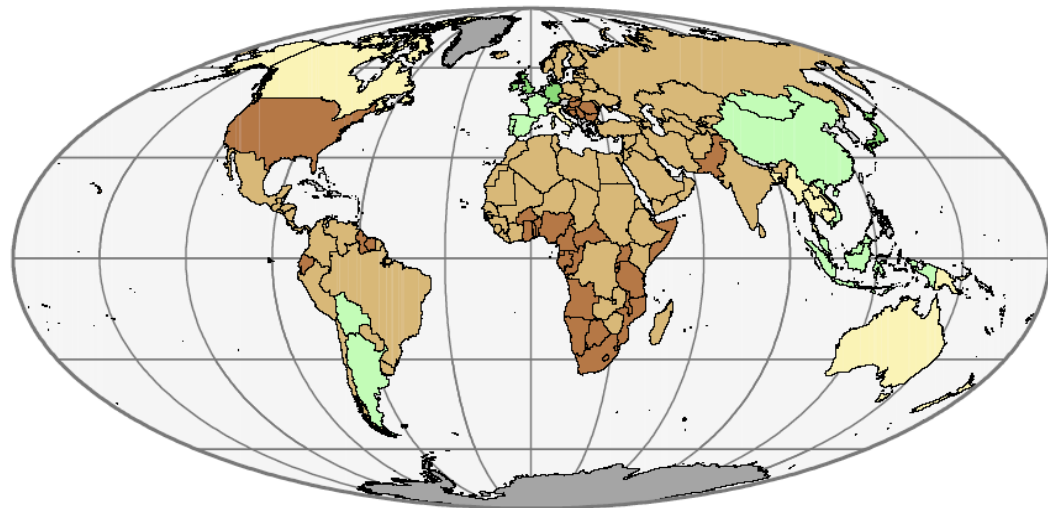
Food security 2040 - 2069 (HADCM3 GGa1)



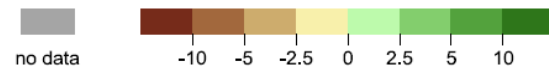
potential yield change [%]



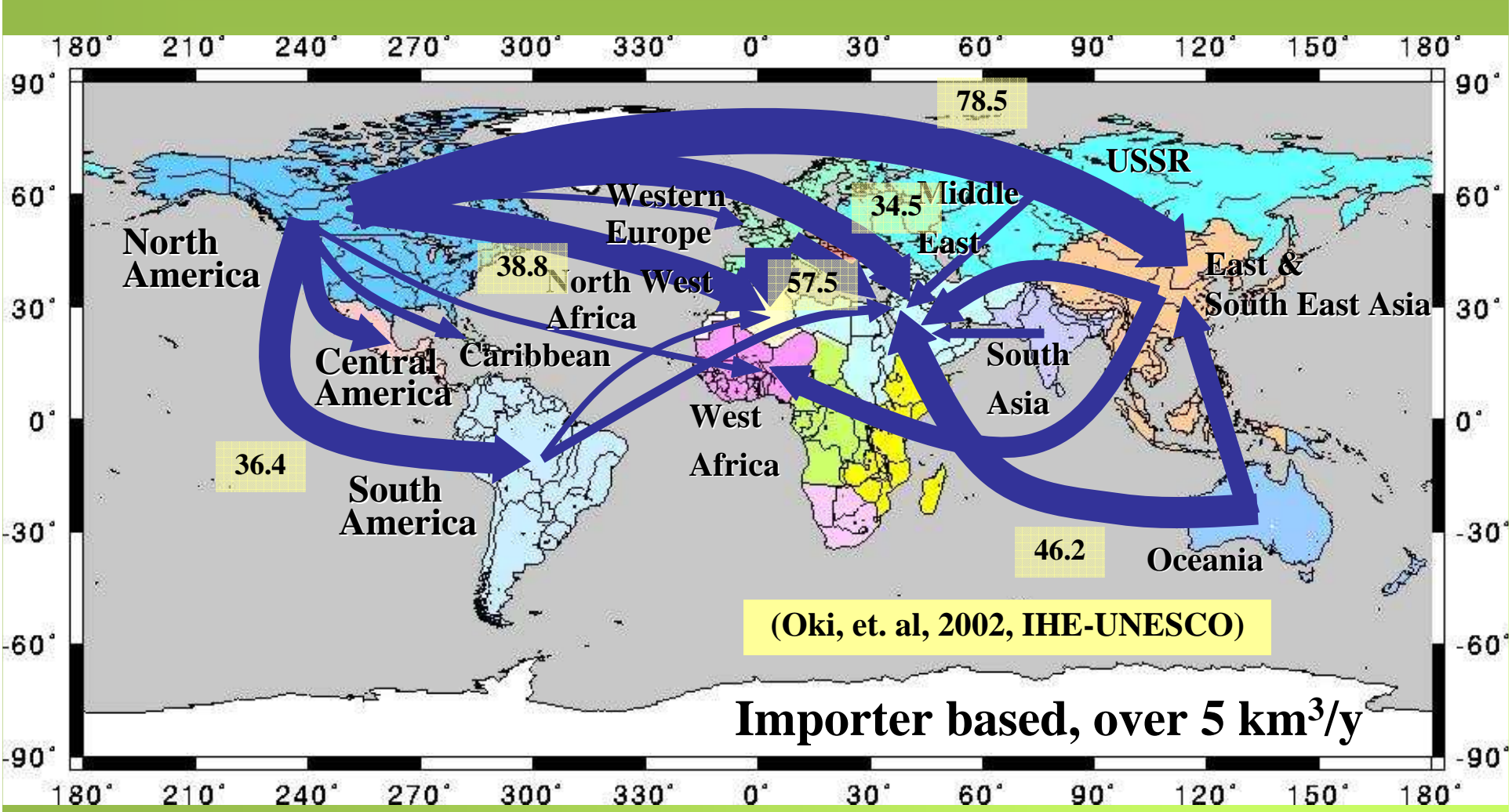
Food security 2070 - 2099 (HADCM3 GGa1)



potential yield change [%]



Food and virtual water in 2000 (only grains)



(Oki, et. al, 2002, IHE-UNESCO)

Importer based, over 5 km³/y



(Based on Statistics from FAO etc., for 2000)

← Existing High Potential for Food Crisis (1901-1995)

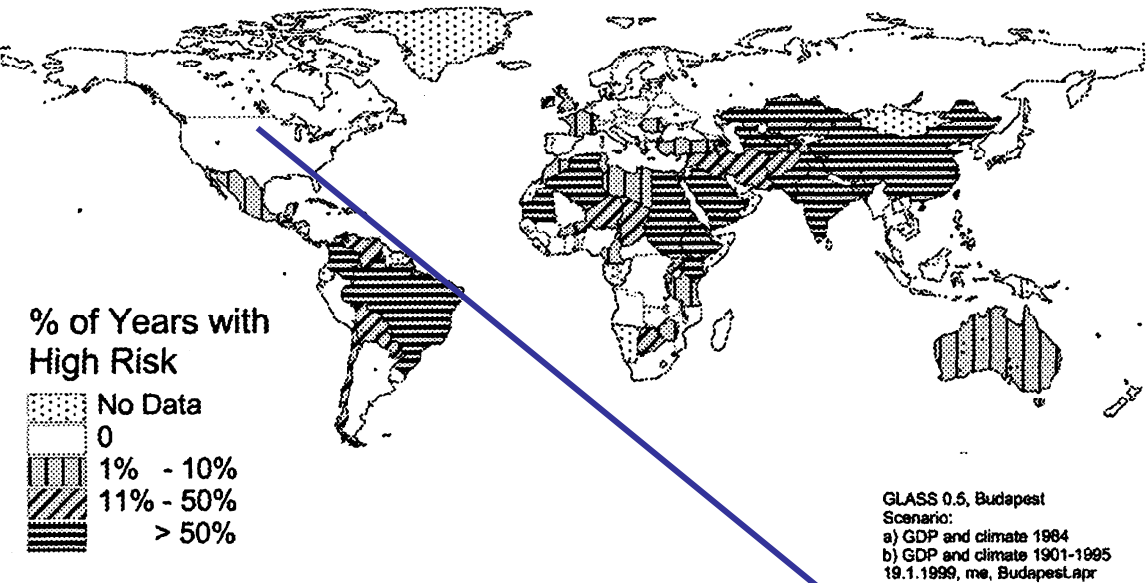


Figure 4. High Potential for Food Crisis 1901-1995.

Higher Potential of Food Crisis with Climate Change (Medium GDP Development (2001-2050) Alcamo/Endejan 2002:143

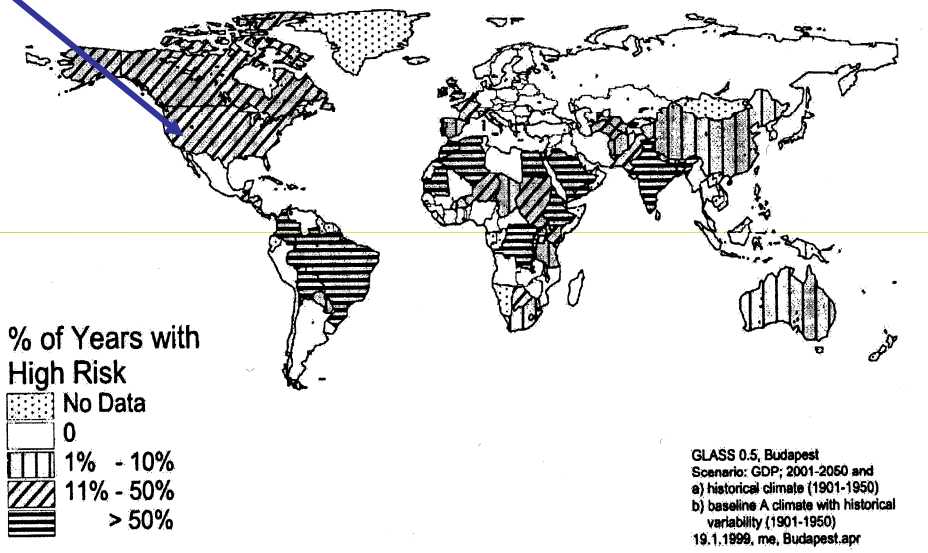


Figure 6. High Potential for Food Crisis 2001-2050 – with GDP Increase and Climate Change.

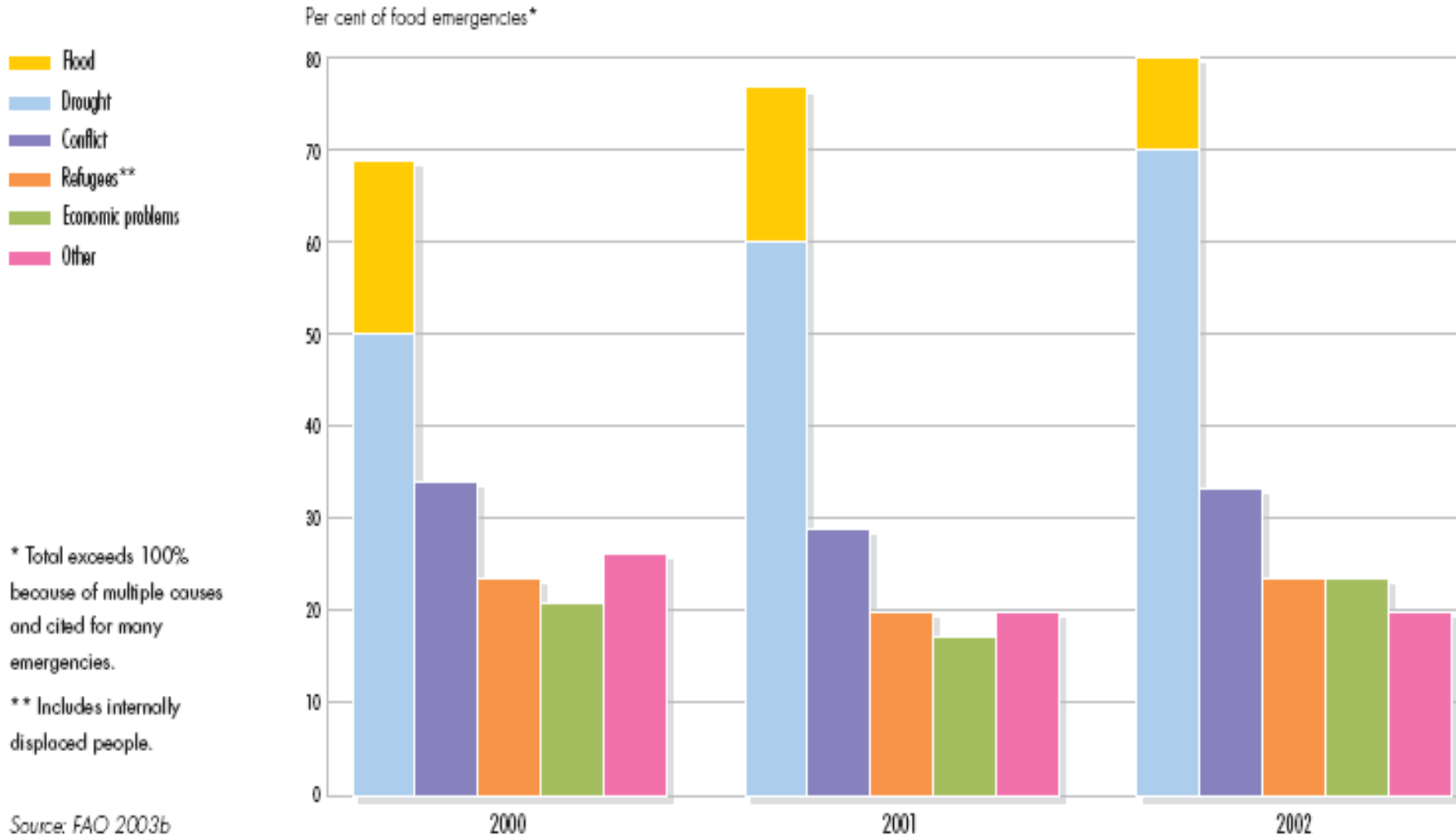


**4. Social and Food Insecurity:
A Problem of Equity**

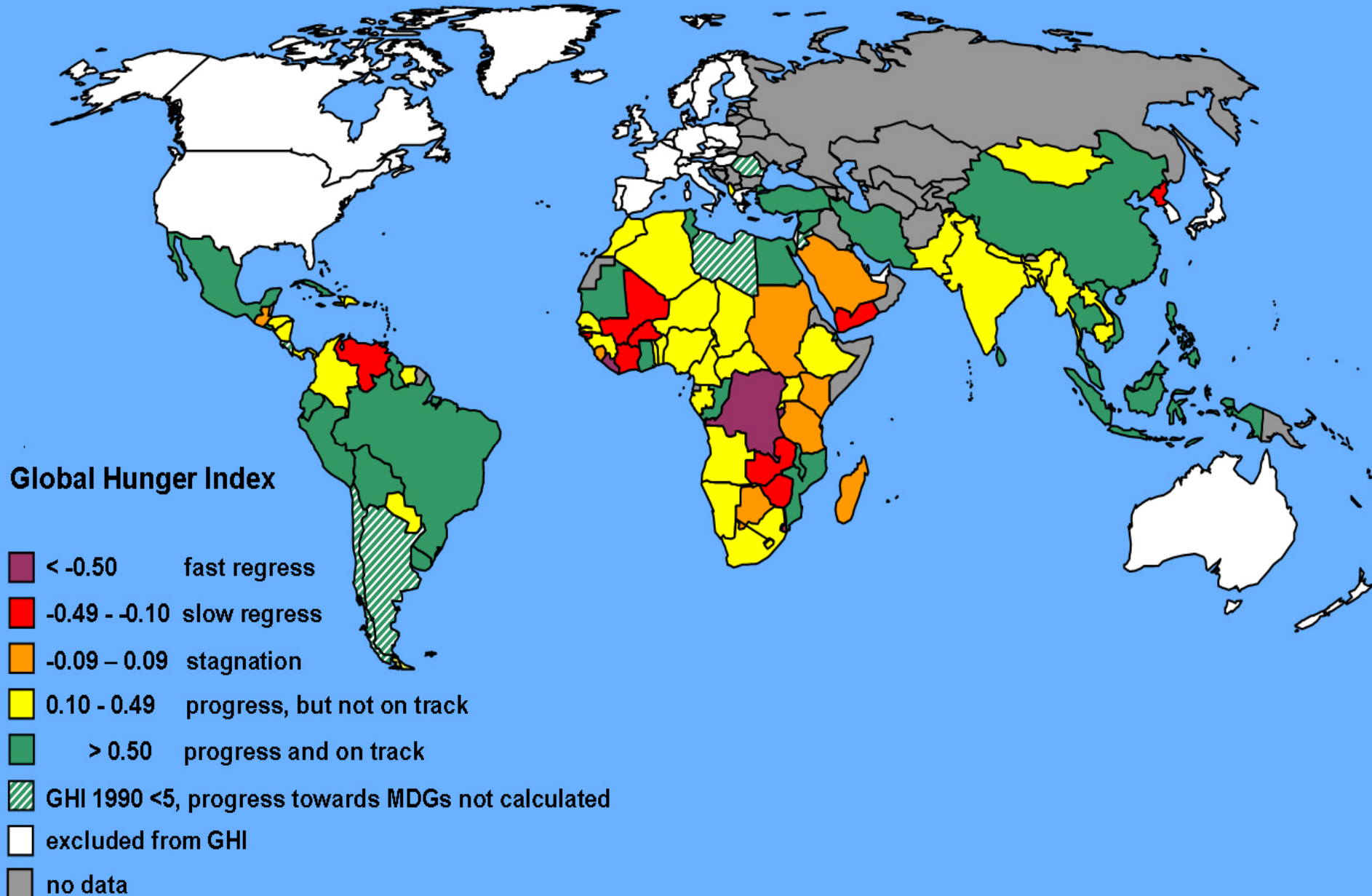
A Problem of Equity

- Each **sixth person** in the globe is hungry: **1.06 billion** are undernourished, have not enough food or money to pay for it. Food price rise **provoked 106 million more hungry people** from 2008 on. MDG can not be reached and affects above all rural and urban poor.
- Land degradation, erosion, soil depletion and desertification cover **one third of the world land surface** and affect around **485 million** people; 46% only in Africa with 43% of desert.
- In Africa the **productivity loss/year** is estimated in 0.5-1%
- Soil deterioration poses multiple global, regional and national security issues: **food, water, climate, livelihood, health, urban, rural and transportation security.**
- DLDD induces **large-scale forced migration movements, hunger riots** and emerging **conflicts** on scarce resources.

Causes of Food Emergency



Global Hunger Index



Women are Key Food Producers

- Women are in all parts of the world **responsible for food and food transformation**
- **Sub-Saharan Africa** countries women represent:
 - 33 % of the rural labour force;
 - 70 % of paid rural daily work;
 - 60-80 % of self-subsistence crops and local sale;
 - 100 % of food transformation;
 - 80% of harvest, transportation from the fields to the community and food storing;
 - 90% of weaving and hooking;
 - 60% of market activities (FAO, 2008)



5. Threats to Food Sovereignty: 3 Models of Food Production

- a) Productivity paradigm**
- b) Life science paradigm**
- c) Green agriculture paradigm**

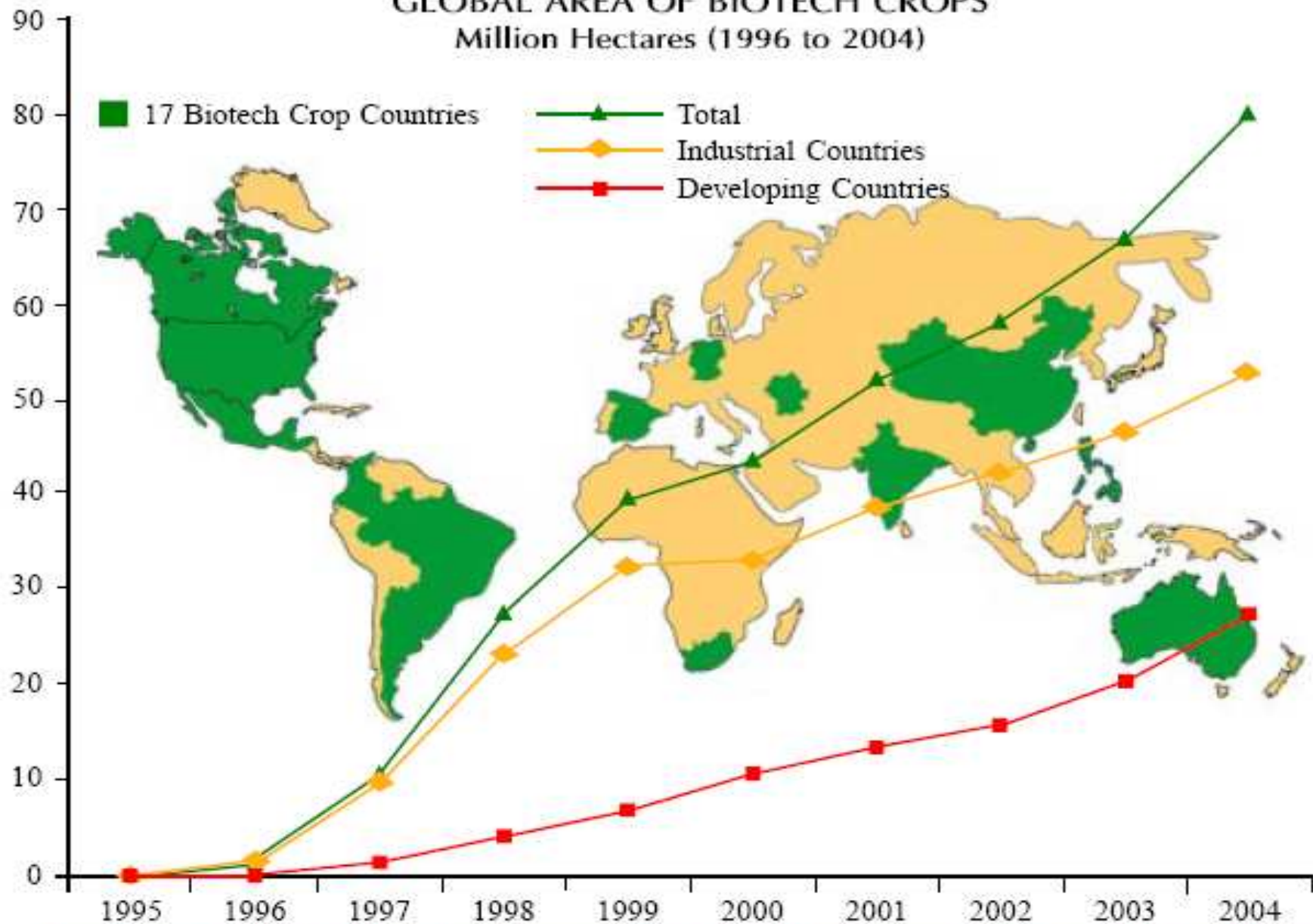
a) Productivity paradigm

- Green revolution with **intensive use of chemicals, veterinarian drugs**, improved seeds, machines, fossil energy, and **irrigation** systems;
- **industrialization** of agriculture.
- **cheap and homogenous** food for urban areas with government subsidies,
- **low food prices** leaving poverty in the countryside.
- production controlled by **agronomists, veterinarians**, and the chemical industry.
- **Ministry of Agriculture** managed natural resources: soils, water, forests, flora, fauna, and fish. Health and environment concerns were marginal.
- **limits** of this model: **negative effects** on health, environment (scarcity in water and oil resources) and the destruction of rural livelihood.

b) Life science paradigm

- ***Life science model*** integrates the food chain in form of **clusters** of production, transformation & trade of food.
- Combines **genetic research** with field experiments, biotechnology, engineering, nutrition, pharmacology, health, and mobile field labs controlled by multinational food chains (Monsanto-Wal-Mart).
- Offers **clean and homogenous** products that can stay for weeks on shelves of supermarkets, thanks to ***genetically modified genes and organisms*** with some undesired social, health and environmental effects.
- **Cornucopian vision** of life where MNE resolves environmental, social, and health problems through science, GMO and technology.
- **Increases costs** of production, food prices due to **TRIPs** and monopolies of agrochemicals & food transformers
- Food get transformed into **medicine, junk food** (Nestlé, 2002)

GLOBAL AREA OF BIOTECH CROPS Million Hectares (1996 to 2004)



Increase of 20%, 13.3 million hectares or 32.9 million acres between 2003 and 2004.

Source: Clive James, 2004

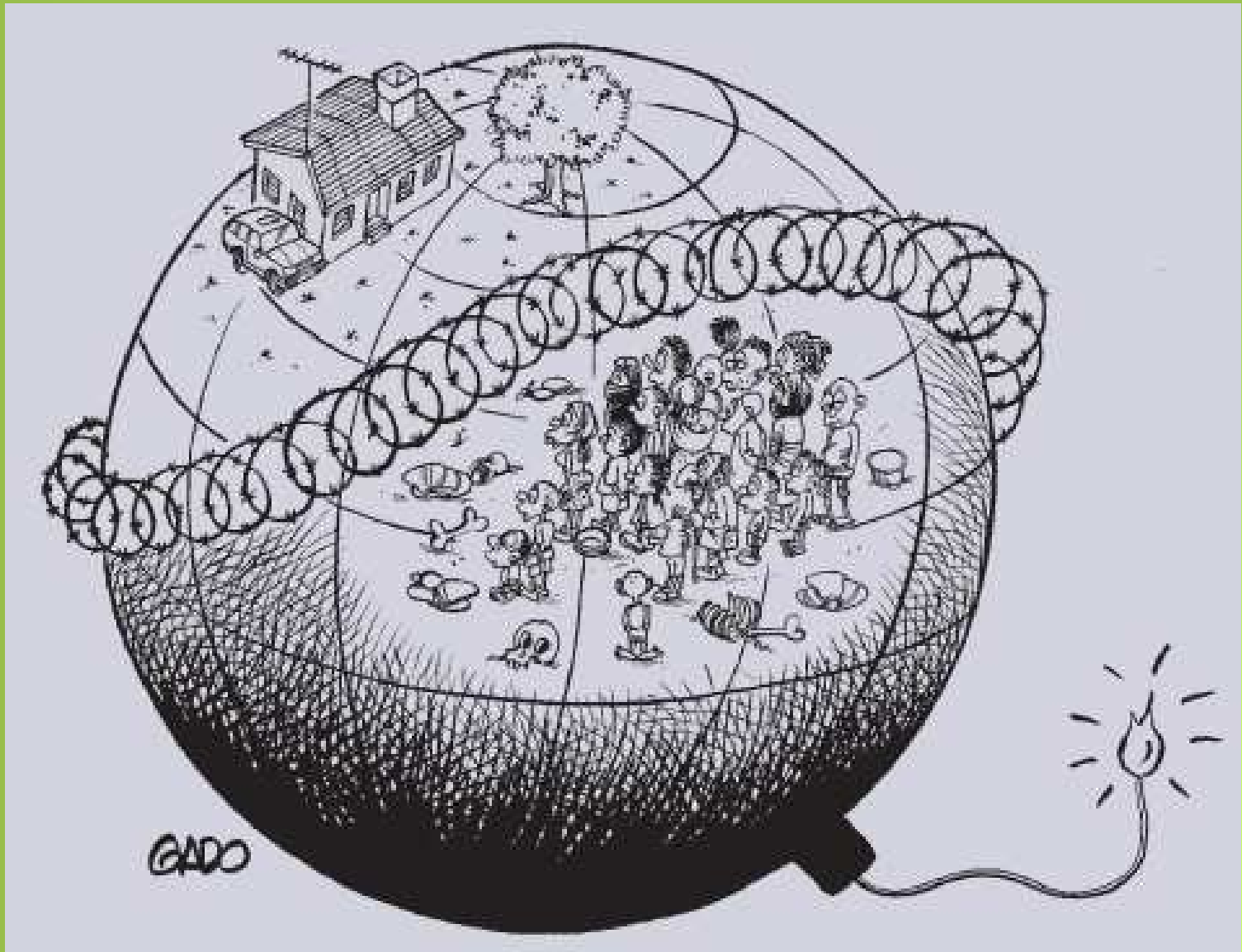
c) Green agriculture

- **Green model** generates **symbiotic relations** and mutual dependence between nature and food production, using soft methods of agriculture.
- **Regionally diverse**, utilizes polycultivation, association of crops, rotation, mixed agriculture, bio-fertilizers, fixation of nitrogen from air to soil, bio-pesticides, traditional methods of soil conservation and food, integral management of water, plagues, and environmental services.
- **Local agricultural production**, transformation and trade, with access for peasants to water, seeds, credits, livelihood
- **Women as key producers** for food issues, care about vulnerable and consolidate livelihood
- When livelihood in villages and countries is granted public resources for **poverty and hunger alleviation** can be reduced and reallocated for other development purposes, creating stable social relations synergies and cooperation.

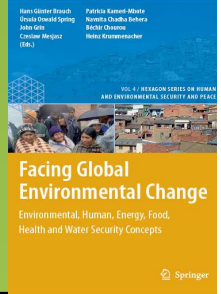
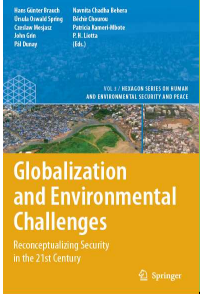
A still life composition featuring a woven basket with several ripe oranges, a cork, and some papers on a dark metal table. The scene is framed by green palm fronds in the foreground. The text is overlaid in a bright yellow font.

**6. Conclusions: Food
Sovereignty with
Resilience-Building from
Top-Down and Bottom-up
for Improving Human,
Gender and Environmental
Security. A HUGE Security**

What kind of Future do We Want?



Widening, Deepening and Sectorialization of Security Threats, Challenges, Vulnerabilities & Risks



Security dimension ⇒ ↓ Level of interaction	Military	Political	Economic	Environmental ↓	Societal
Human individual Human security ⇒	Land mines	Failed state	Food & Health security	Cause & victim	Food & Health security
Societal, community security	Border control	Public security	Water, Food & Health sec.		↓↑
National security	During Cold War shrinking (in USA since 2001 ↑ & since 2009 ↓)		Energy security	↓↑	Energy Food, Water & Health security
International and Regional security			Water security	↓↑	Water security
Global and planetary security ⇒	Terrorism	Intern. migration	Financial crisis	CC; GEC; biodiversity loss	Health security

FAO Program after Food Summit

- To **eradicate hunger** from the earth.
- To **feed 2050 world population**: will grow 50 % & reach 8.5 billion people
- **More coherent and effective system of governance** of food security at national and international levels.
- Compensation for historical and present **Green House Gases, Environmental Forced Migrants and...?**
- **Developing countries get a fair chance** in world commodity markets (no unfair terms of trade).
- **Ensure farmers incomes** comparable to other sector workers.
- **Mobilize additional public and private sector investments in agriculture** and rural infrastructure to boost food production and productivity.
- More than **30 countries** have food emergencies: **effective mechanisms for early reaction to food crises.**

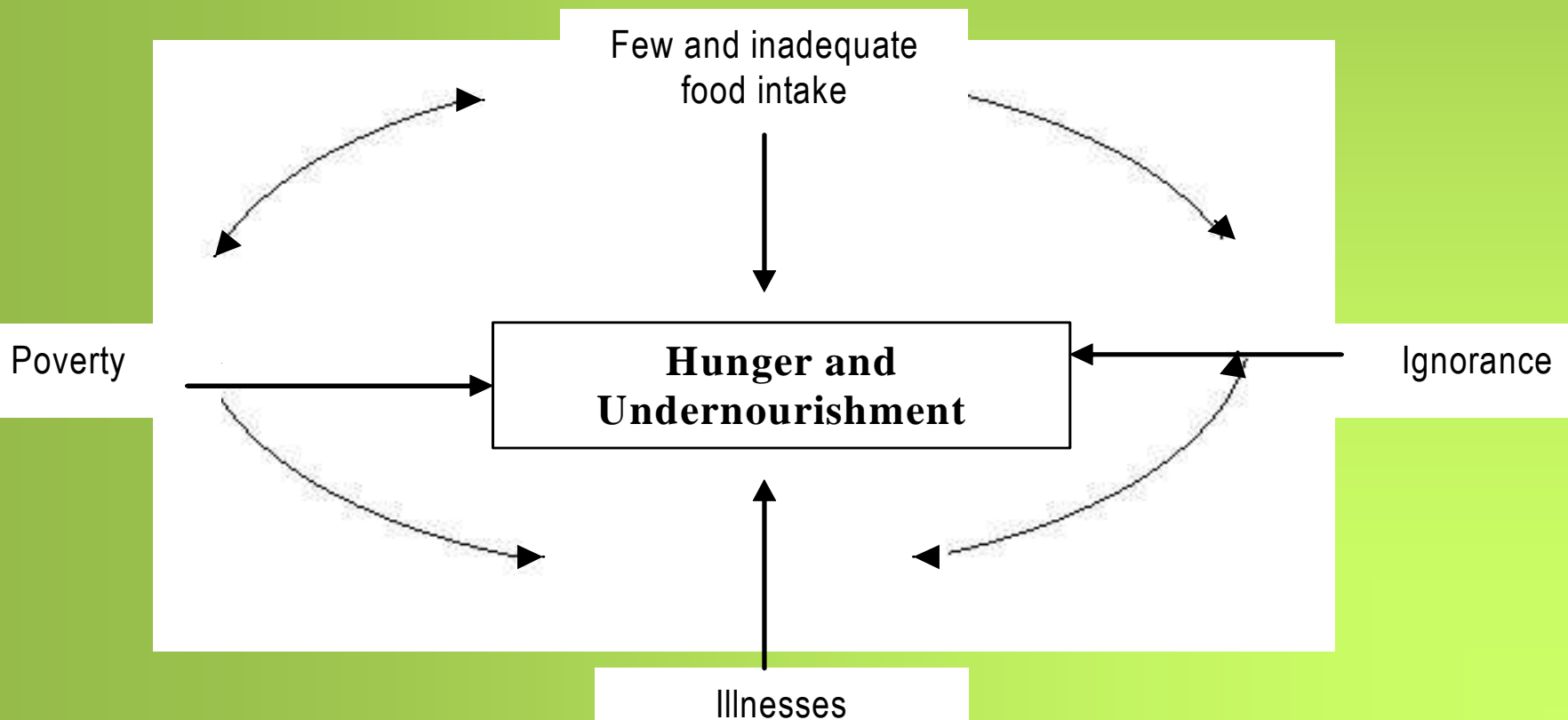


Survival Strategies



Survival strategies, micro-business and local food sovereignty

Vicious circle of hunger, undernourishment, poverty, and ignorance. Source: Chávez/Ávila/Shamah (2007: 208).



Survival Strategies (Oswald, 1991, 2007, 2009)

1. Massive rural migration to urban slums
2. Illegal occupation of marginal and risky land
3. Construction of shelter with precarious materials (waste)
4. Chronic unemployment of men and lack of cash
5. Selling unnecessary goods
6. Credits from family members, neighbors local shop
7. Economic crises increase and create lack of food
8. Recollection of half perished fruits and vegetables
9. Collective popular kitchen
10. Rotation of women in collective community work (kitchen, child rearing)
11. Common struggle for basic services (electricity, water, access, community center)
12. Communal organization for regularization of land and services
13. Struggle for public subsidies and poverty alleviation programs
14. Temporary paid work
15. Multiple activities: services, handicraft, food, washing, ironing, paid jobs
16. Social organization against organized crime and gangs
17. Empowerment and fight against intra-family violence
18. Social and economic consolidation of colony and families



**Human, Gender and
Environmental Security:
a HUGE security**

Securitization: Sustainable Development, Eradication of Poverty, Hunger and a HUGE Security

**Mitigation,
Adaptation
Resilience**

**Climate
Change**

**International
Development**

**Politization:
prevention:
norms, laws,
institutions**

**Organization
of society: top-
down &
bottom-up**

Scientization

```
graph TD; S[Scientization] --> M[Mitigation, Adaptation, Resilience]; M --- C((Climate Change)); C --- I[International Development]; I --- O[Organization of society: top-down & bottom-up]; O --- P[Politization: prevention: norms, laws, institutions];
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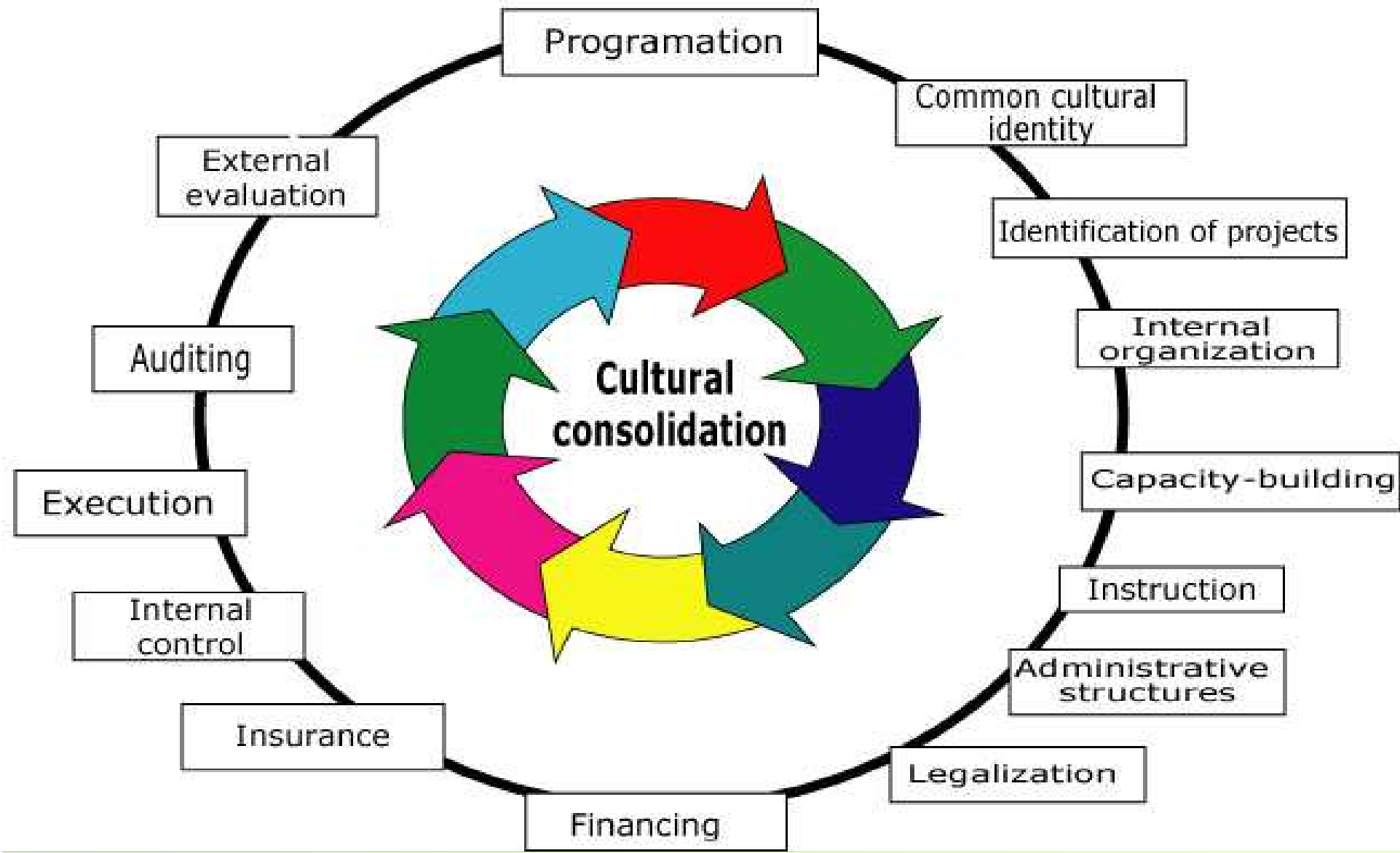
Human, Gender, Environmental Security

Determination Which security?	Reference object: Security of whom?	Value at risk: Security of what?	Source(s) of threat: Security from whom or what?
National security	The State	Territorial integrity	State, substate actors
Human security	Individual, humankind	Survival of humankind people	Natural events, state, globalization
Environmental security	Ecosystems, rural and urban systems, water and food	Sustainability	Humankind, natural events
Gender security	Gender relations, indigenous people, minorities	Equity, identity, social relations, solidarity, tolerance, culture	Patriarchy, totalitarian institutions (élites, governments, religious fundamentalism, dominant cultures), intolerance, violence

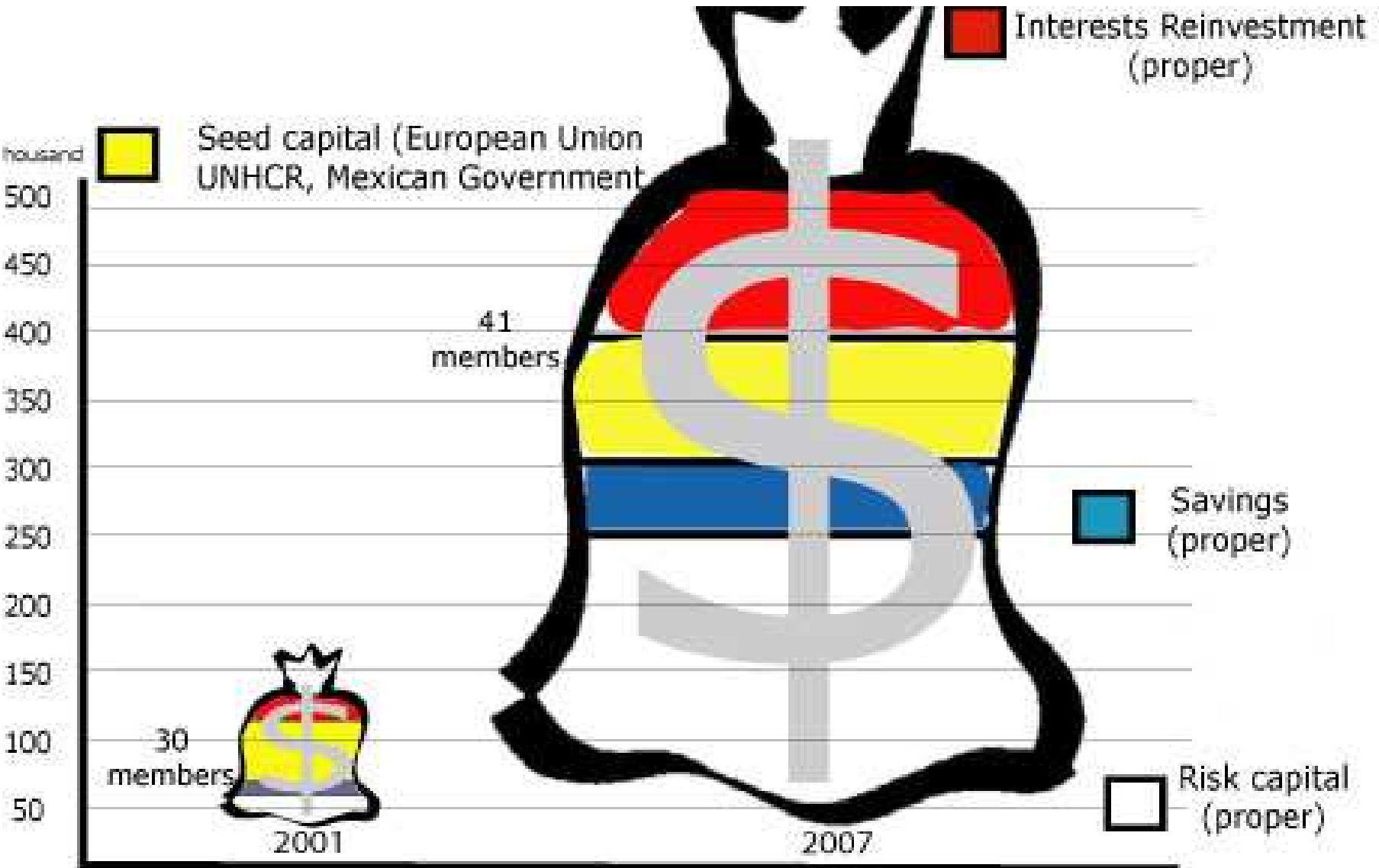
HUGE: Human, Gender & Environmental Security

- Human, Gender and Environmental Security (HUGE) is a widened concept of security that combines an **ample gender concept** (including children, elders, indigenous, vulnerable groups) with a **human-centered** focus on **environmental security** and **peace** challenges.
- HUGE analyzes **patriarchal, violent and exclusive structures** within family and society, questioning the existing process of **social representation-building** and **traditional role assignation** between genders for overcoming **violence & discrimination** against women .
- Reorients 'human security' to **equity and development** through social organization, specific governmental policies, private ethical investments and legal reinforcements.
- As a **holist concept**, HUGE revises '**environmental security**' and proposes policy for a healthy environment, integral management of natural resources, prevention and remediation practices that reduce vulnerability of hazard impacts.

Model of self-reliant entrepreneurship



Self-sufficient Micro-business with Micro-insurance in Campeche, Mex.



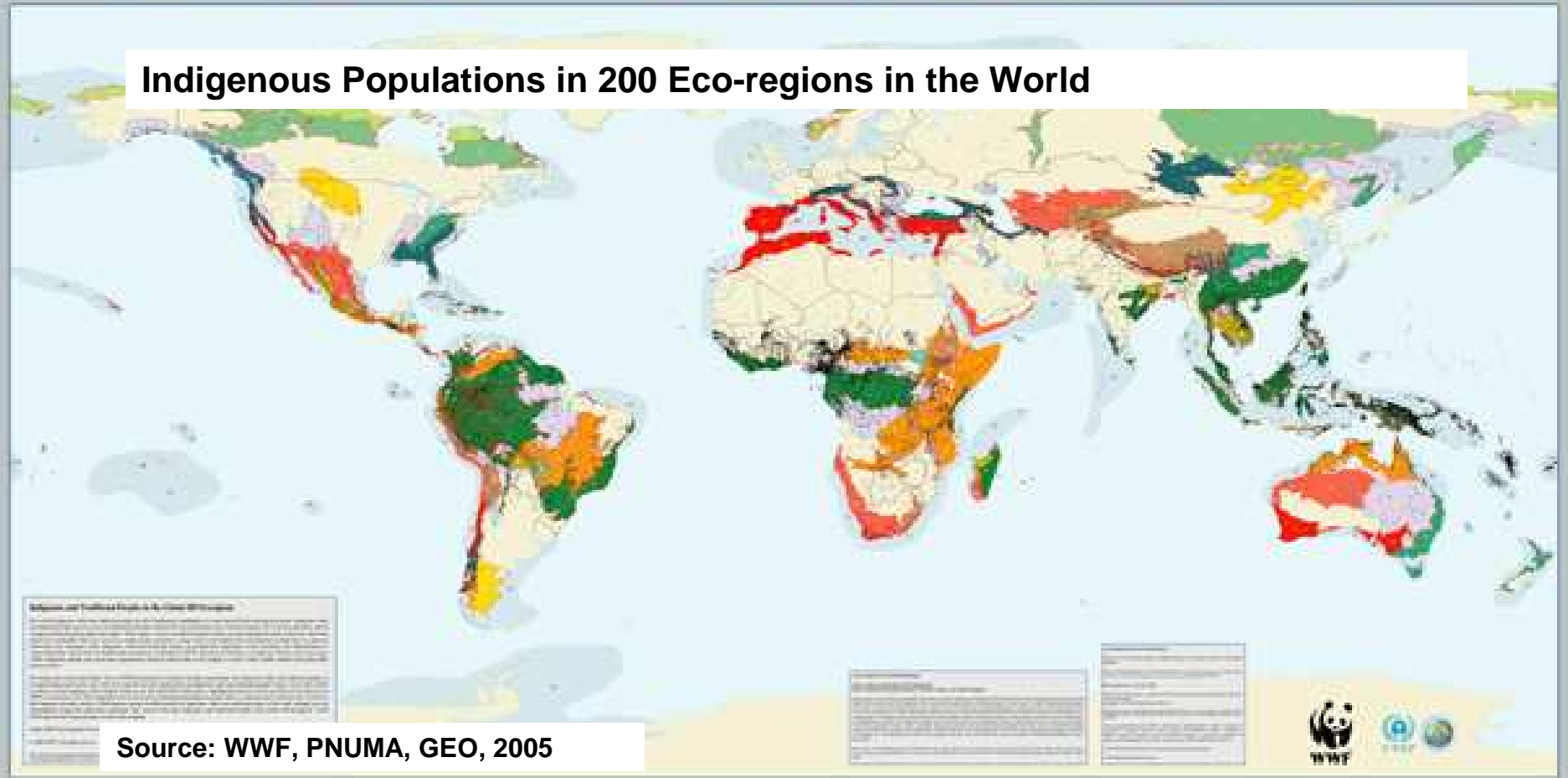
**Traditional Rain Harvesting
Microtunels, Organic
Agriculture in Greenhouses,
Reforestation, Environmental
Services**



Biodiversity, culture and population

INDIGENOUS AND TRADITIONAL PEOPLES IN THE GLOBAL 200 ECOREGIONS

Indigenous Populations in 200 Eco-regions in the World



Source: WWF, PNUMA, GEO, 2005

Global 200 Ecoregions	Indigenous Populations	Worldwide Ecoregions
1. Amazonia	1. Amazonia	1. Amazonia
2. Andes	2. Andes	2. Andes
3. Alps	3. Alps	3. Alps
4. Antarctic Peninsula	4. Antarctic Peninsula	4. Antarctic Peninsula
5. Antarctic Subantarctic Islands	5. Antarctic Subantarctic Islands	5. Antarctic Subantarctic Islands
6. Antarctic Tundra	6. Antarctic Tundra	6. Antarctic Tundra
7. Arctic Tundra	7. Arctic Tundra	7. Arctic Tundra
8. Arctic Subarctic Islands	8. Arctic Subarctic Islands	8. Arctic Subarctic Islands
9. Arctic Mountains	9. Arctic Mountains	9. Arctic Mountains
10. Arctic Lowlands	10. Arctic Lowlands	10. Arctic Lowlands
11. Arctic Coastal Plain	11. Arctic Coastal Plain	11. Arctic Coastal Plain
12. Arctic Subarctic Lowlands	12. Arctic Subarctic Lowlands	12. Arctic Subarctic Lowlands
13. Arctic Subarctic Mountains	13. Arctic Subarctic Mountains	13. Arctic Subarctic Mountains
14. Arctic Subarctic Tundra	14. Arctic Subarctic Tundra	14. Arctic Subarctic Tundra
15. Arctic Subarctic Lowlands	15. Arctic Subarctic Lowlands	15. Arctic Subarctic Lowlands
16. Arctic Subarctic Mountains	16. Arctic Subarctic Mountains	16. Arctic Subarctic Mountains
17. Arctic Subarctic Tundra	17. Arctic Subarctic Tundra	17. Arctic Subarctic Tundra
18. Arctic Subarctic Lowlands	18. Arctic Subarctic Lowlands	18. Arctic Subarctic Lowlands
19. Arctic Subarctic Mountains	19. Arctic Subarctic Mountains	19. Arctic Subarctic Mountains
20. Arctic Subarctic Tundra	20. Arctic Subarctic Tundra	20. Arctic Subarctic Tundra



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for your
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oswald.html](http://www.afes-press.de/html/download_oswald.html)**