



# Food and Water Security with Food Sovereignty

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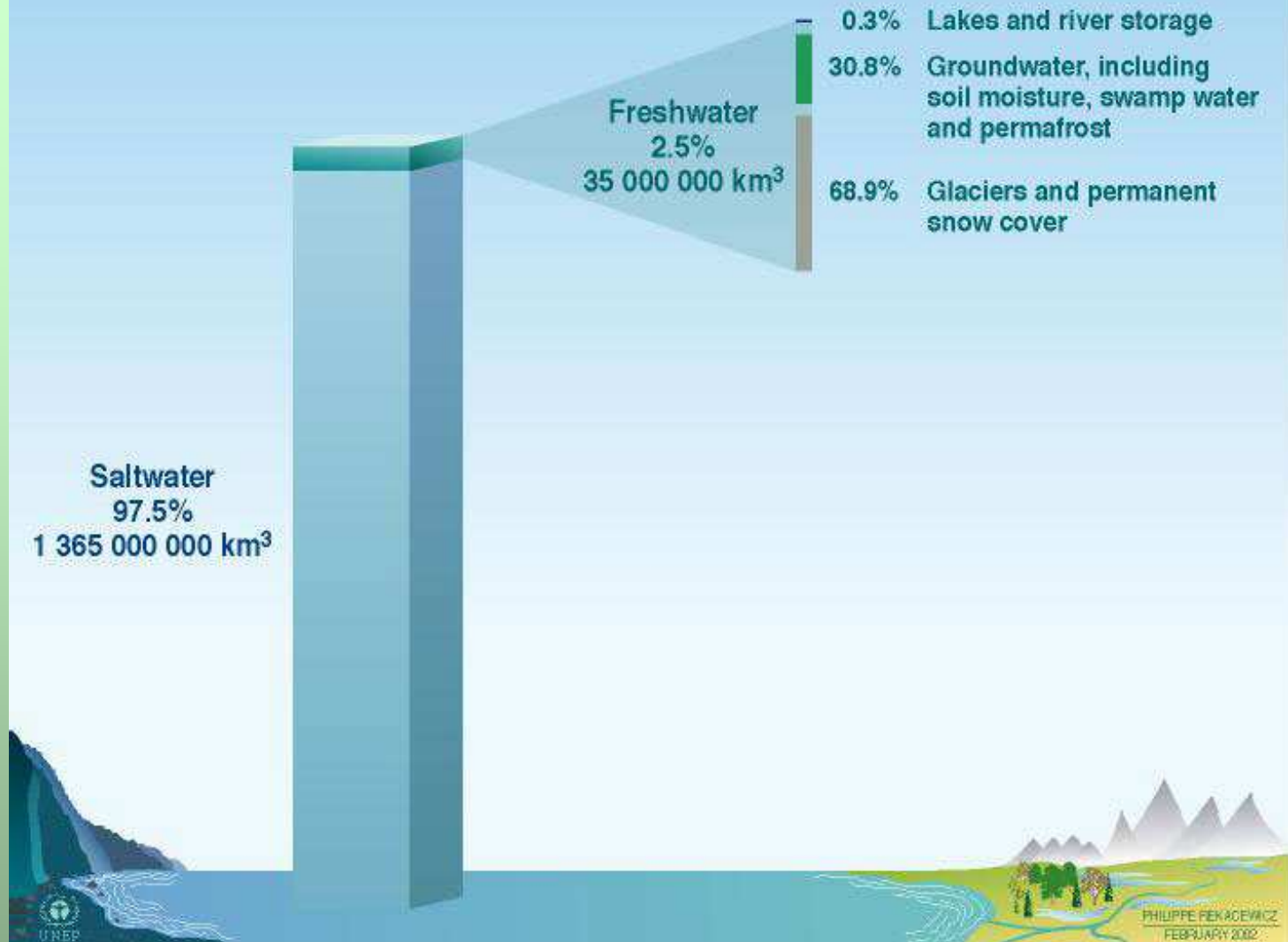
**National Coordinator of Water Research Network, Conacyt**

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1. How is Global Environmental Change (GEC) related to water and food security?
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7. Conclusions: food sovereignty as resilience-building from top-down to bottom-up for improving human, gender and environmental (HUGE) security

# A World of Salt

## Total Global Saltwater and Freshwater Estimates

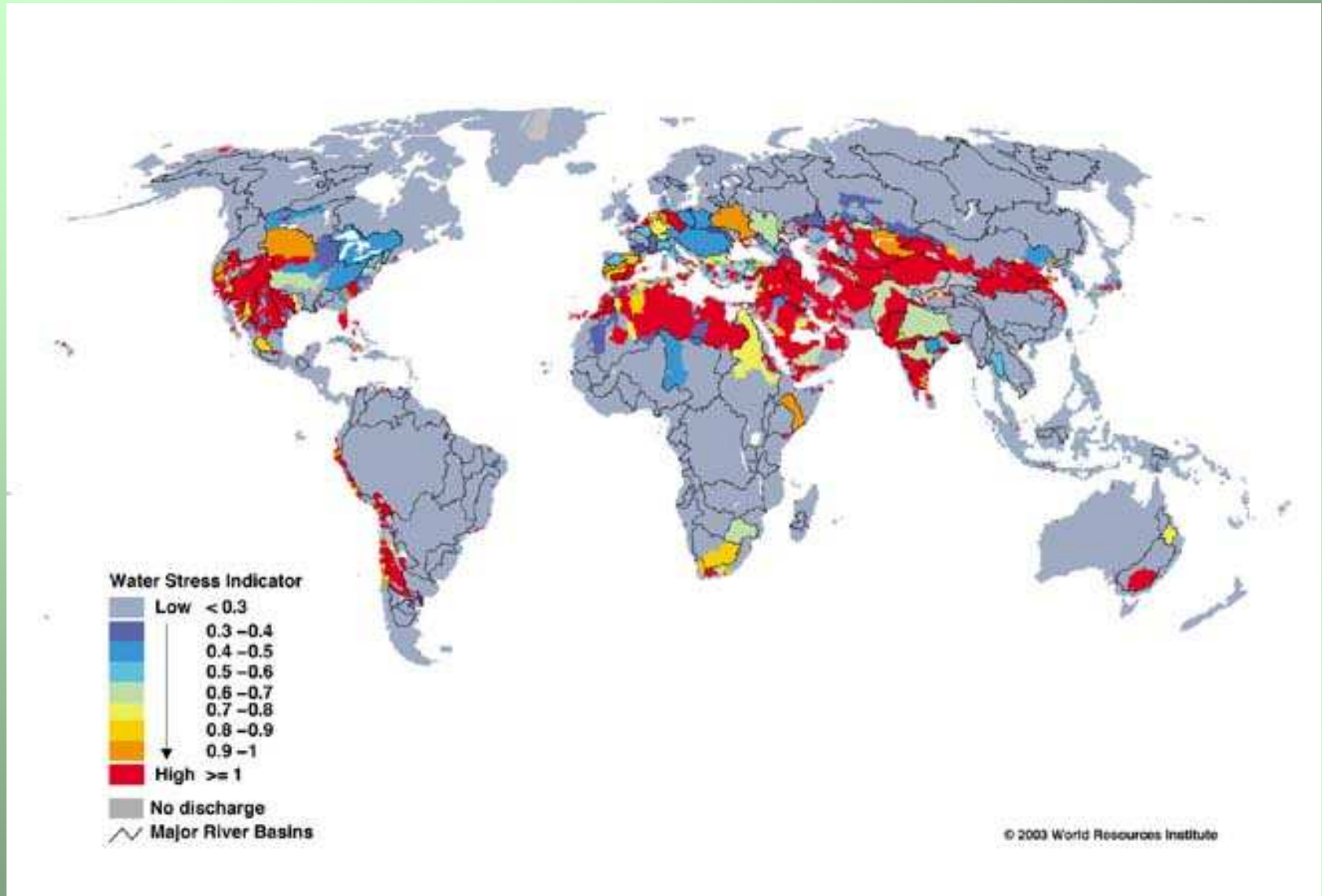


Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

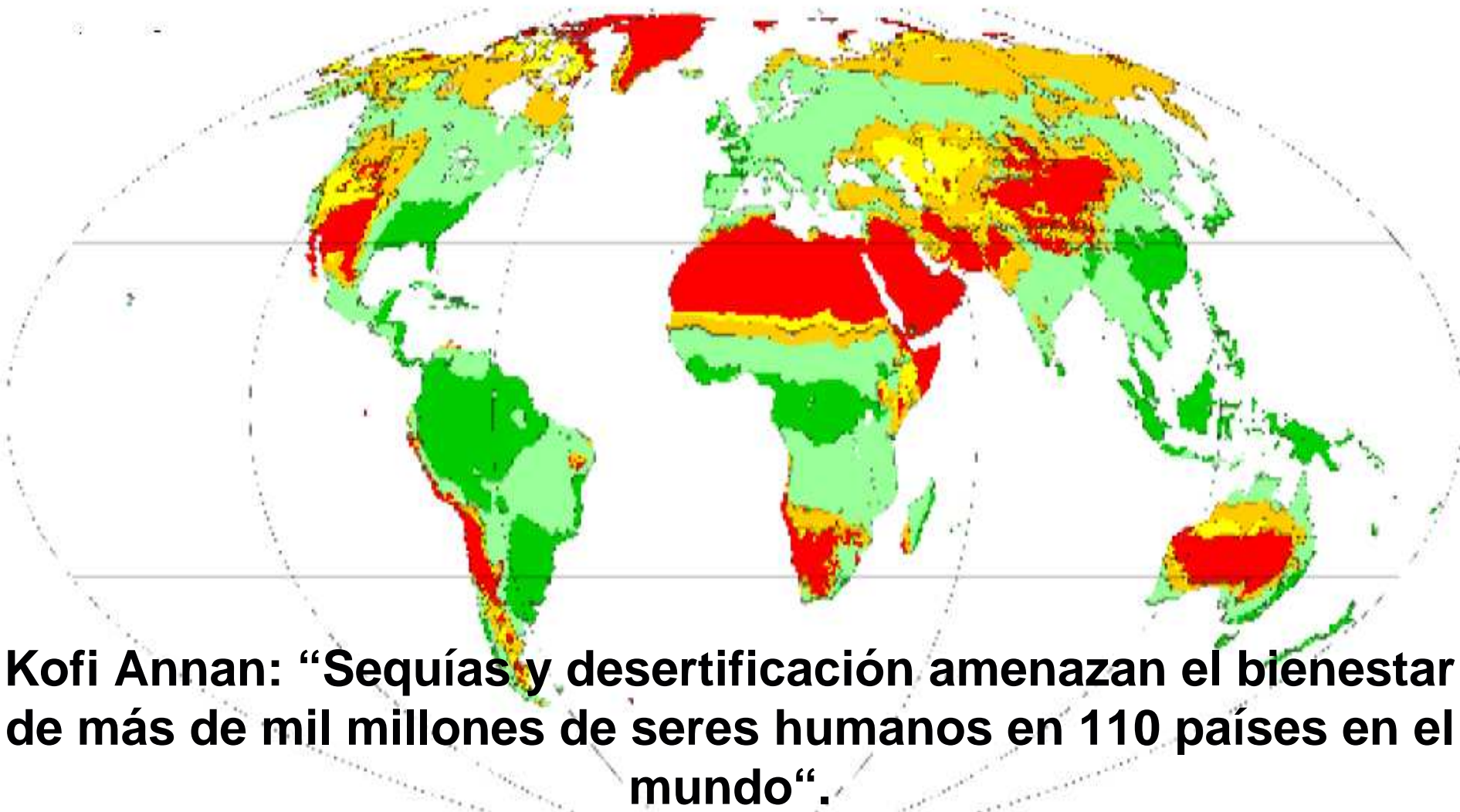


PHILIPPE FENACEMICZ  
FEBRUARY 2002

# Zones with Highest Water Stress



# Dryland Zones of the World



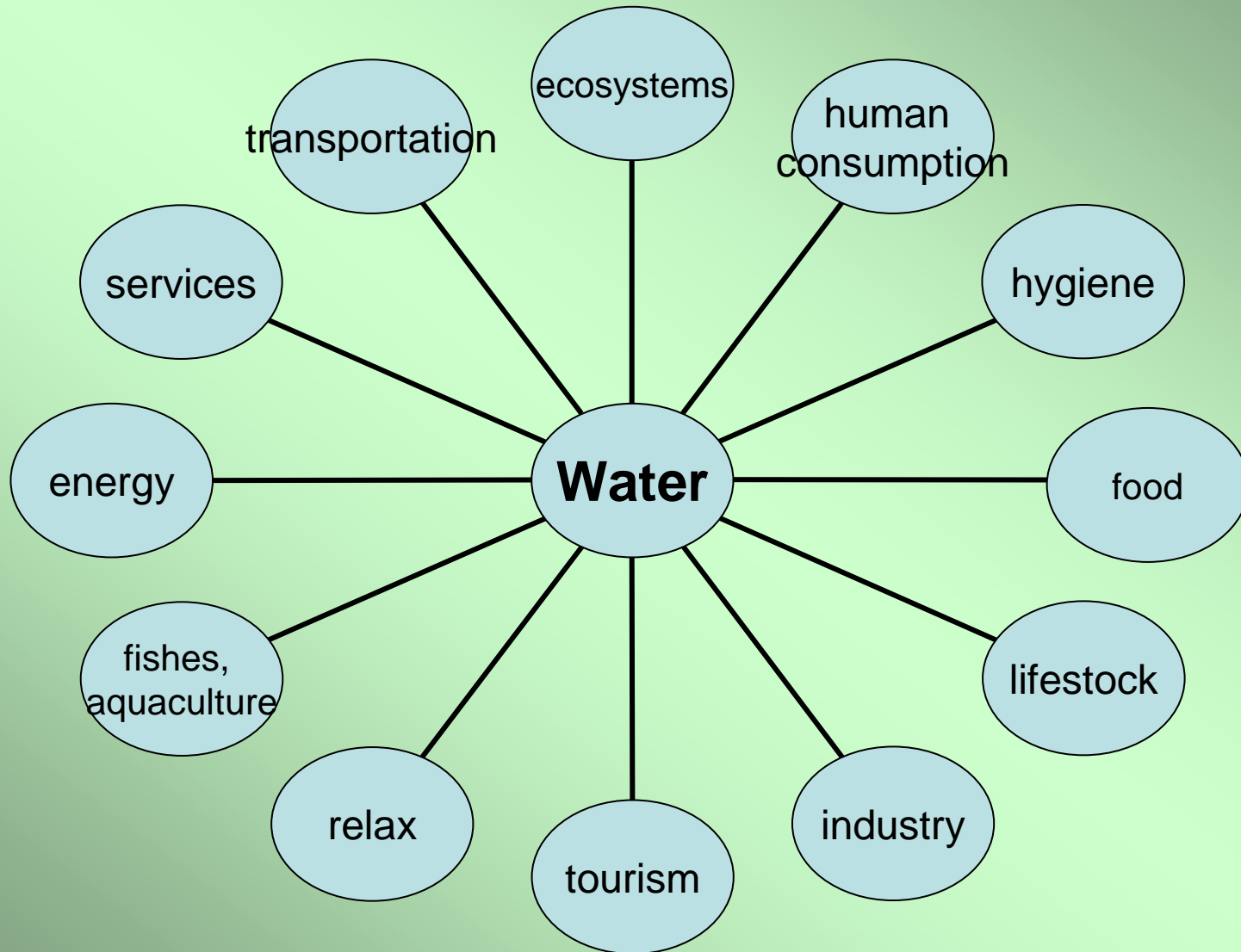
**Kofi Annan: “Sequías y desertificación amenazan el bienestar de más de mil millones de seres humanos en 110 países en el mundo”.**

hyperarid      arid      semi-arid      dry subhumid      non-dryland

# Water Security

- Water is vital for the life and health of people and ecosystems
- **One common goal:** *to provide water security in the 21st Century:*
  - This means ensuring that freshwater, coastal and related ecosystems are protected and improved;
  - sustainable development and political stability are promoted;
  - every person has access to enough safe water at an affordable cost to lead a healthy and productive life
  - the vulnerable are protected from the risks of water-related hazard
- Water resources are under **threat** from pollution, overexploitation, land-use changes, unsustainable use, climate change and other anthropogenic forces.
- Links between threats and poverty: the poor who are hit first and hardest (slum dwellers without basic services).
- One simple conclusion: **business as usual is not an option.**

# Uses of Water



# Water Related Security

- Water as an issue of *economic security*: creates development opportunities.
- Water as a key problem of *social or societal security*: permits livelihood, recreation and joy of life.
- Water creates *environmental security*: maintains eco-system services and protects the biological, and hydrological cycles and the ecosphere.
- Water is a precondition for *food security*: permanent, sufficient, accessible, safe and nutritional food that is also culturally accepted requires enough water.
- Water is essential for *health and livelihood security*: protects people from thirst, water-borne/vector diseases, but also from floods, drought and plagues.



# **Some definitions: Food security**

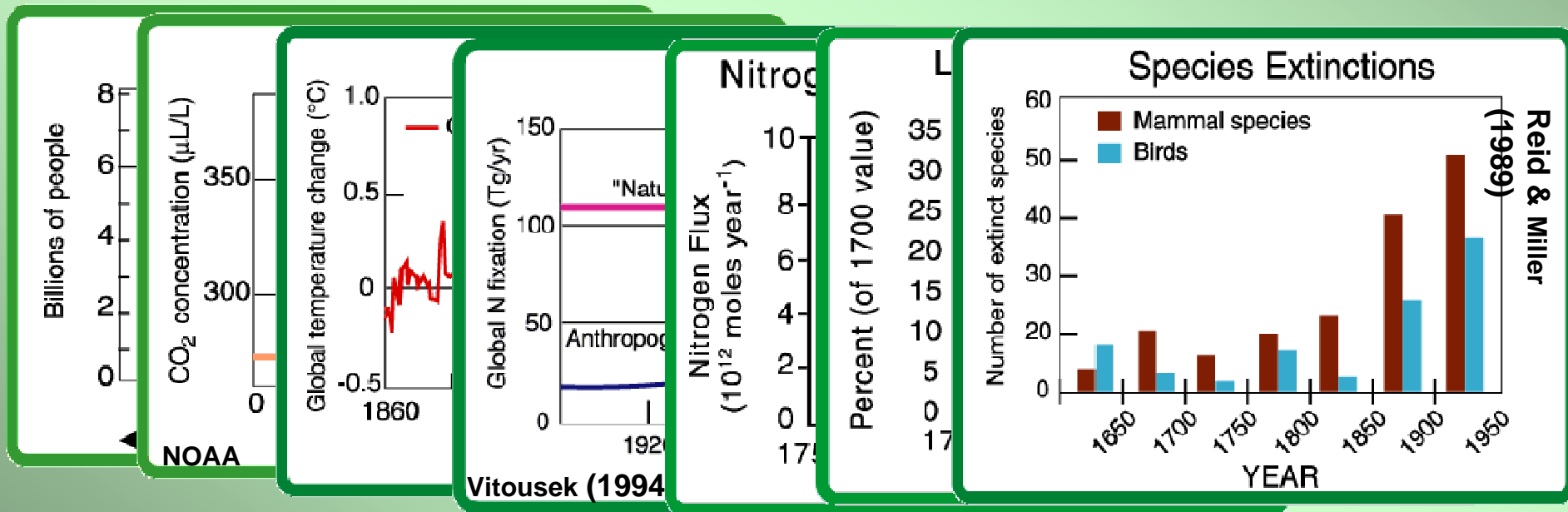
***Food security*** exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

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

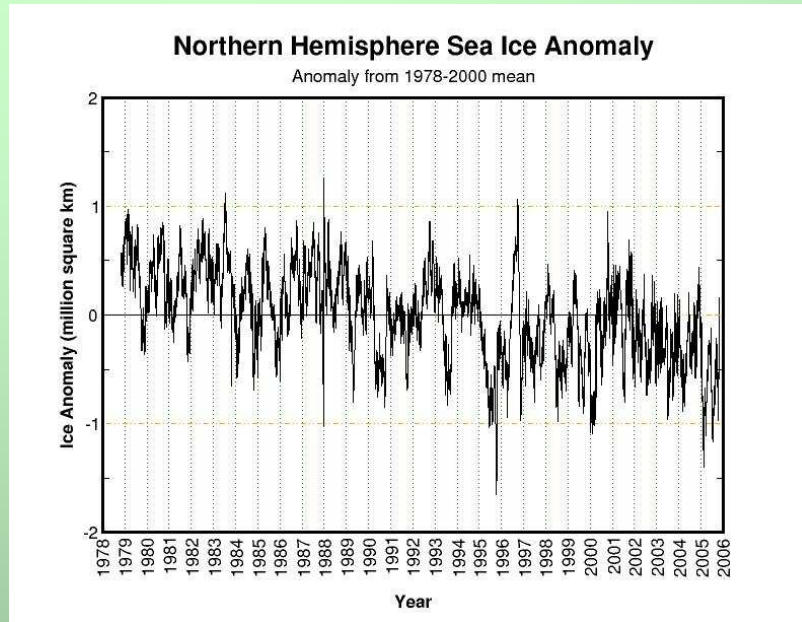
Vulnerable people are greatly exposed to famine (FAO, 2003)

# 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:



# Glaciers and Ice Shields



Larsen B



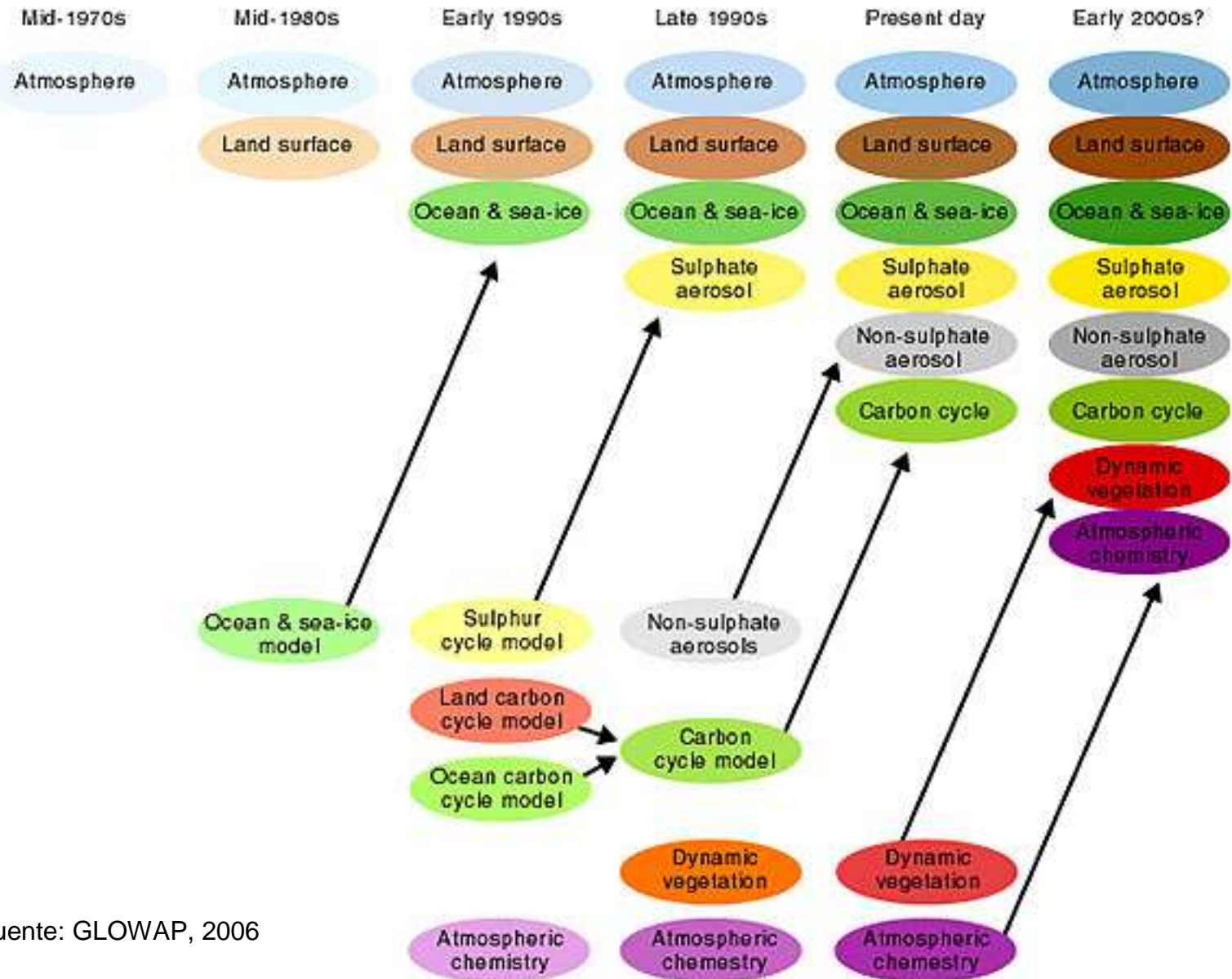
Chacaltaya (1996 y 2004)

# Upsala



Glaciar Upsala (Patagonia) en 1928 y en 2004

# The Development of Climate models, Past, Present and Future



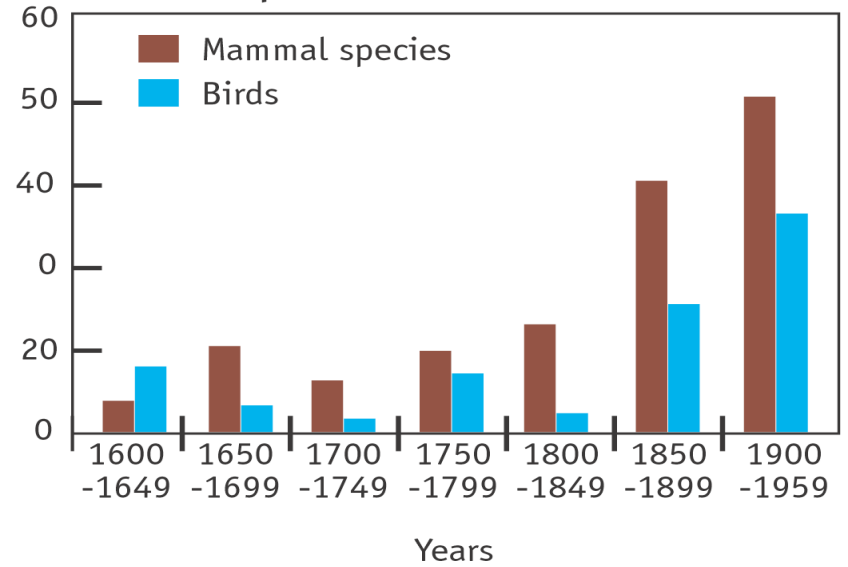
Fuente: GLOWAP, 2006

# Cambio Ambiental Global

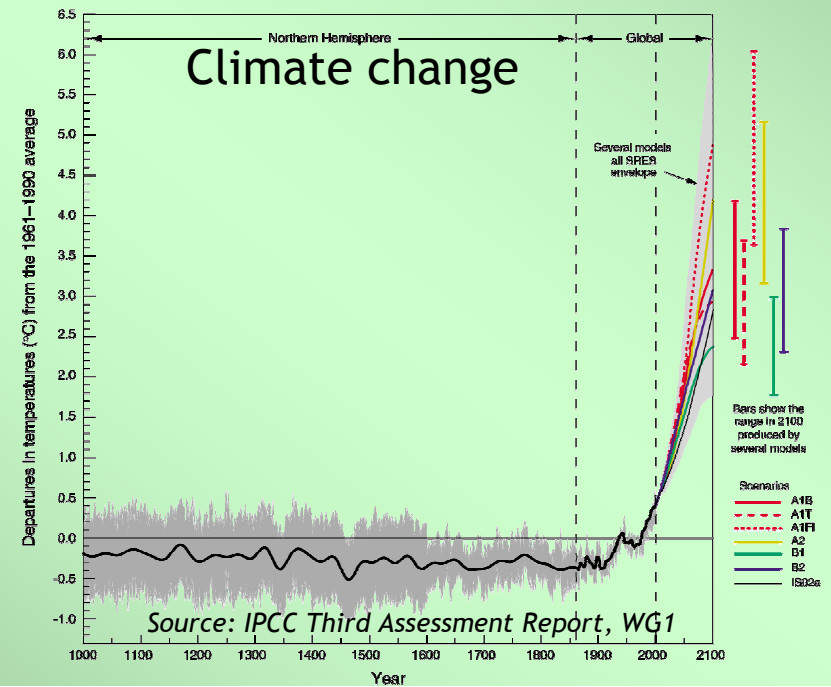
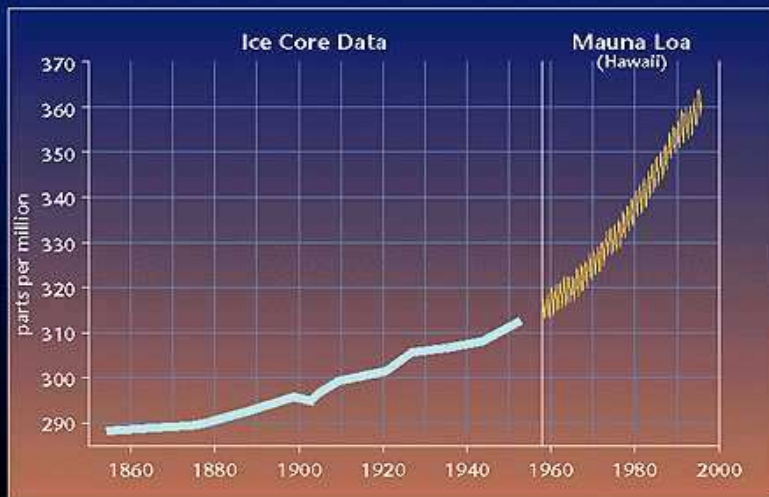
## Physical changes and interaction with soils



## Species Extinctions

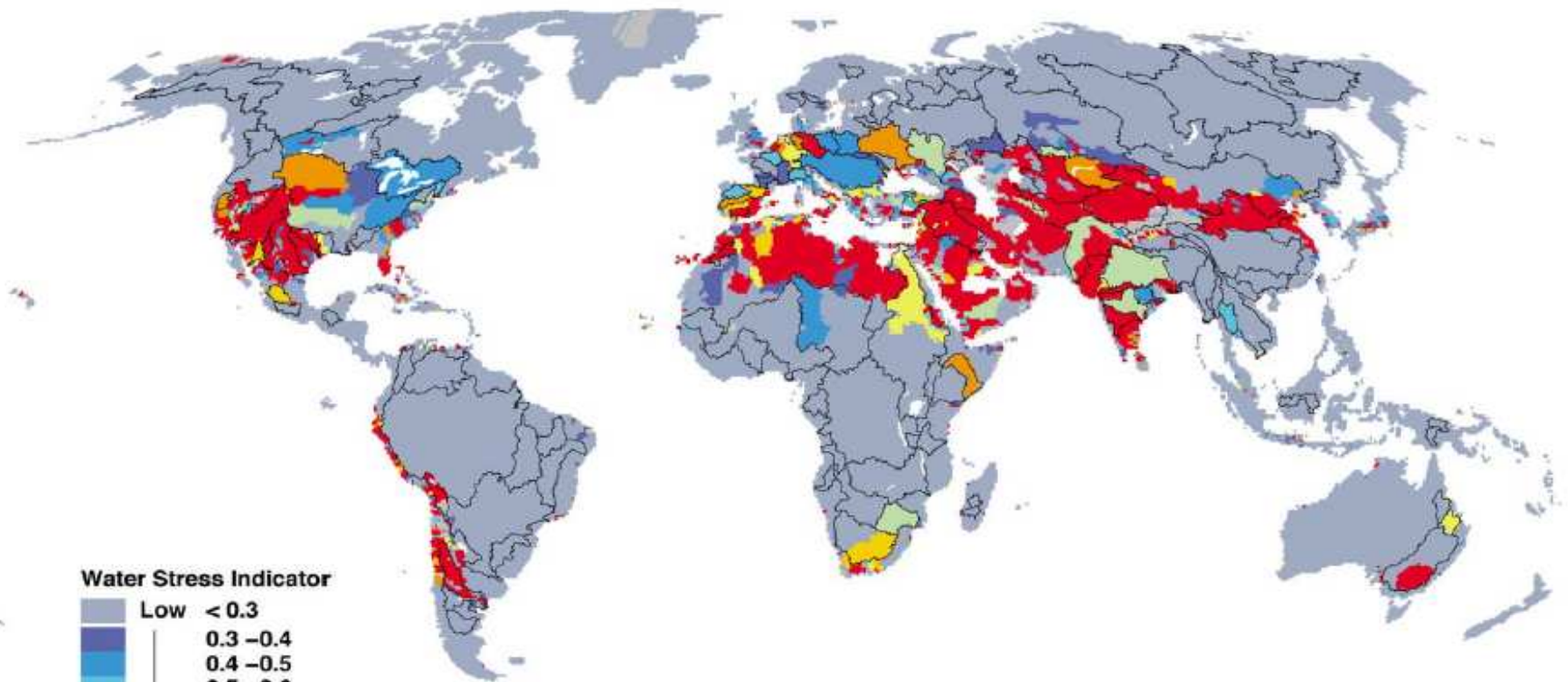


## Chemical changes in the atmosphere

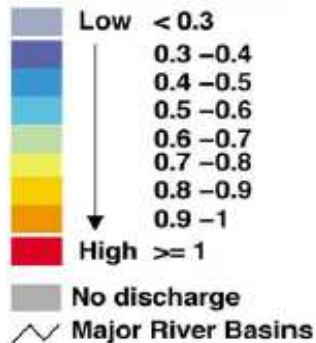




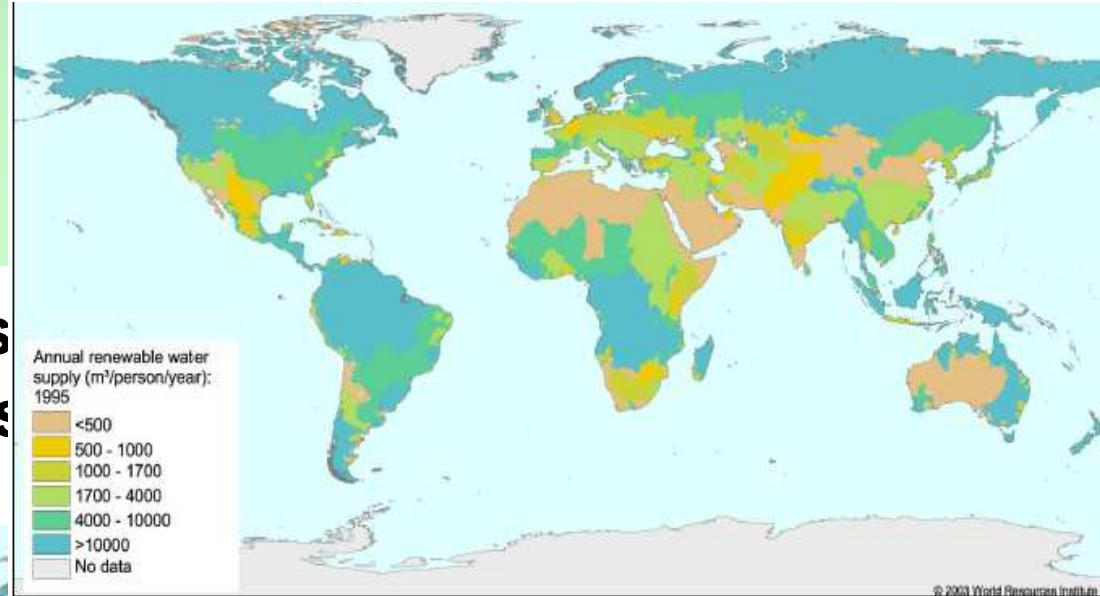
# 16. Environmental Water Scarcity Index by Basin



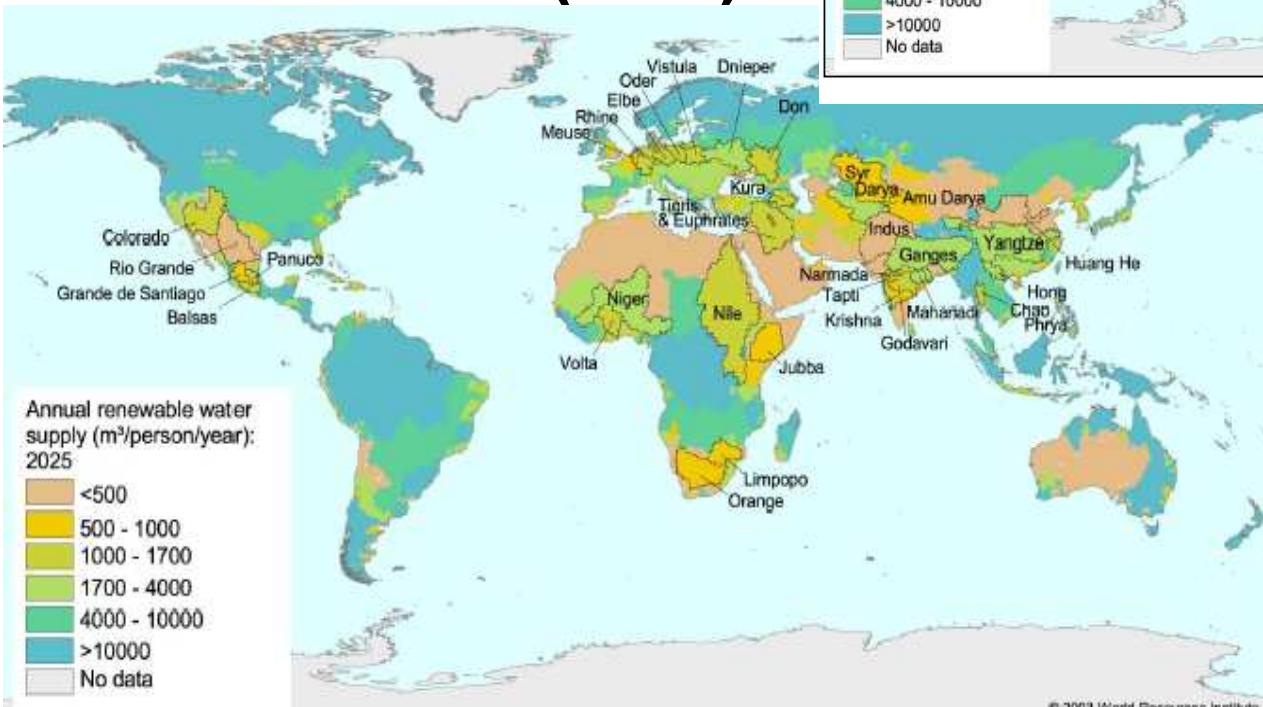
## Water Stress Indicator



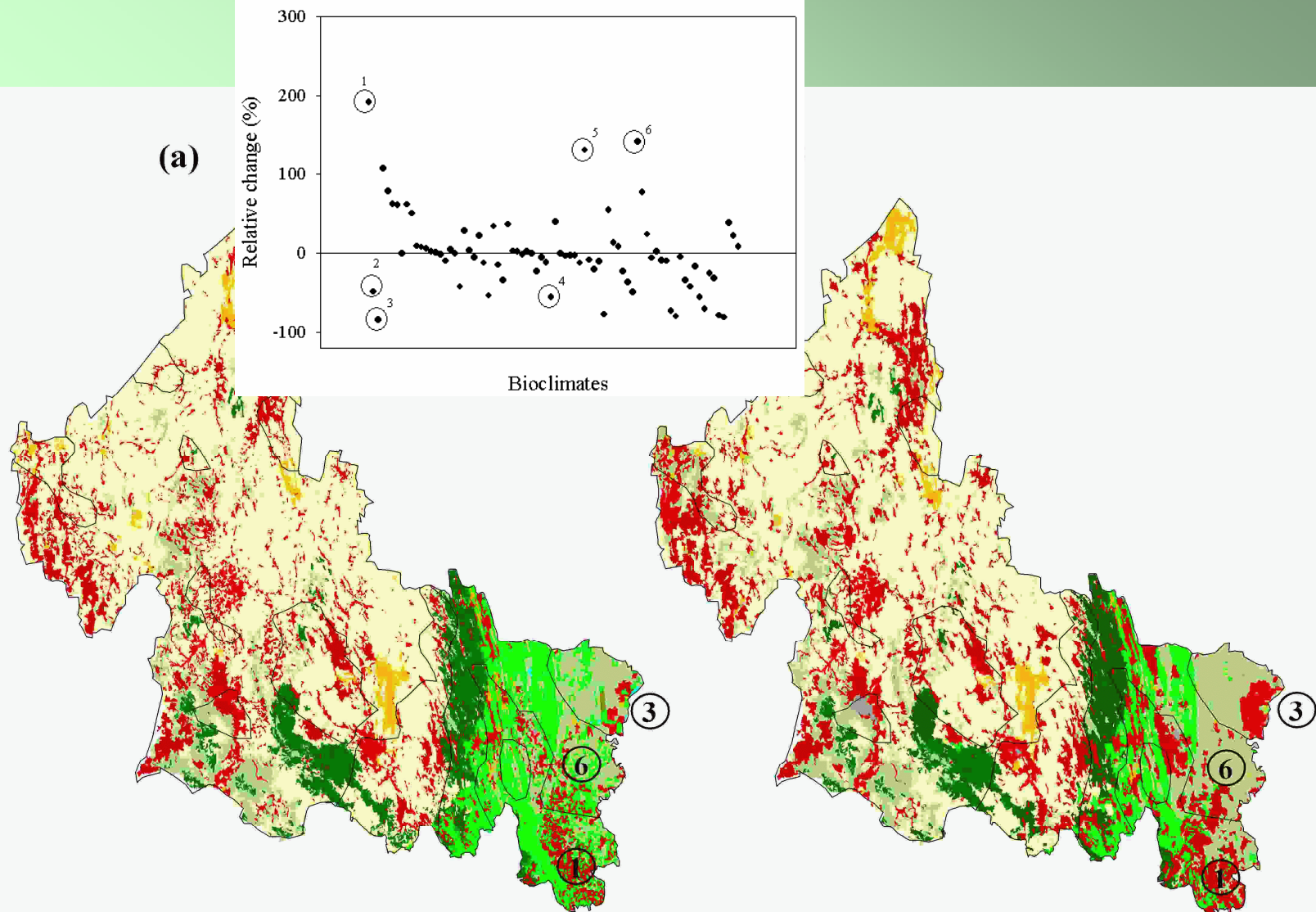
# Mapa 1 Reservas de Agua Renovable por Año/Persona/Cuenca (1995)



# Mapa 2 Proyecciones de Reservas de Agua Renovable por Año/Persona/Cuenca (2025)







## Usos de suelo en SLP periodo 1976 - 2000



# Complex interaction: soil, fertility and vegetation

+ Temperatura del suelo } + Descomposición y pérdida de M.O.  
+ Emisiones de CO<sub>2</sub>

+ Pérdidas de MO por erosión



- Recarga de agua
- Fertilidad de suelo
- Productividad

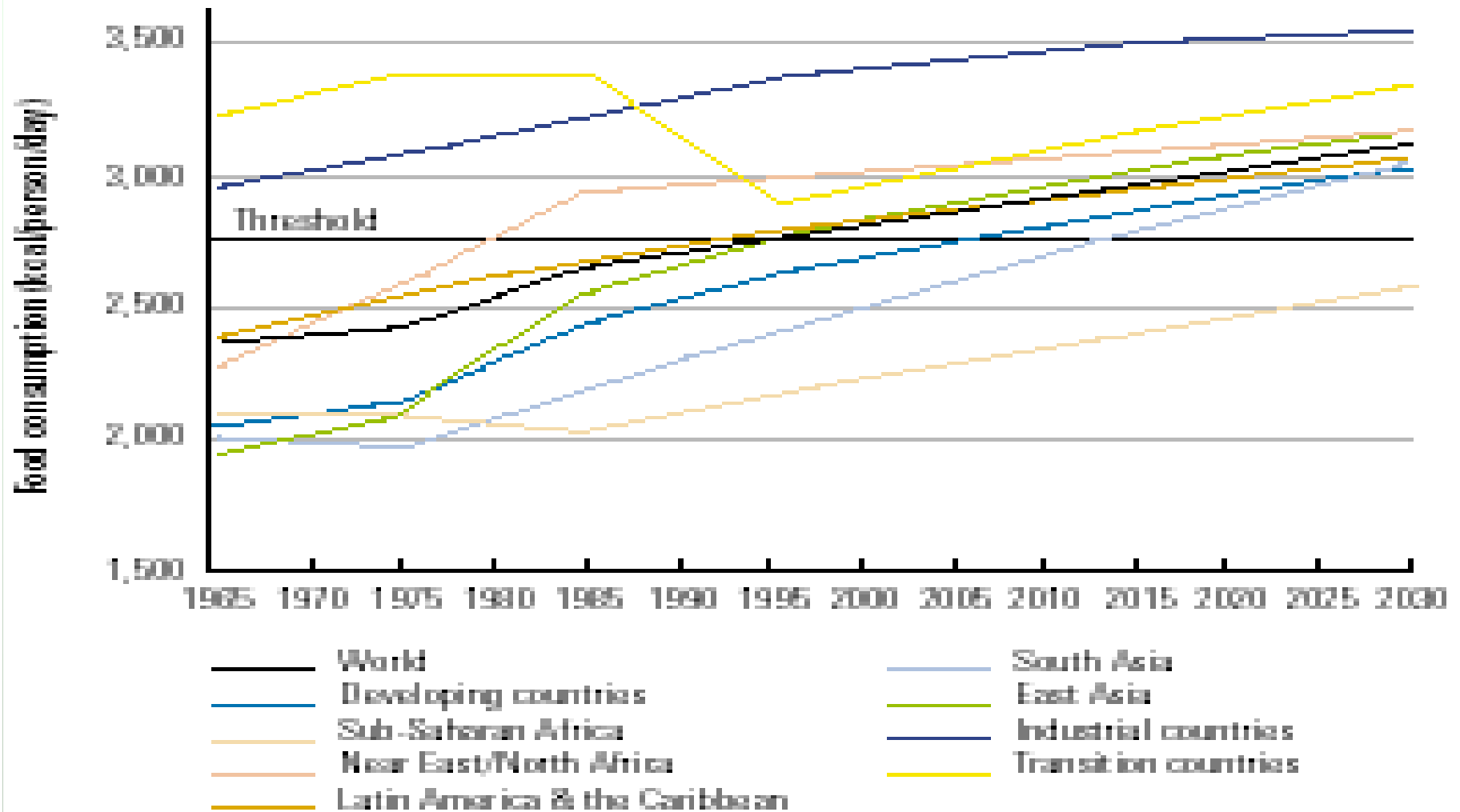
# Ecosystem Services as Foodprovider

- **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 fragile soils
- **Loss of tropical forest** and of biodiversity reduces food availability
- **Urbanization** is diminishing the availability of land for food production.

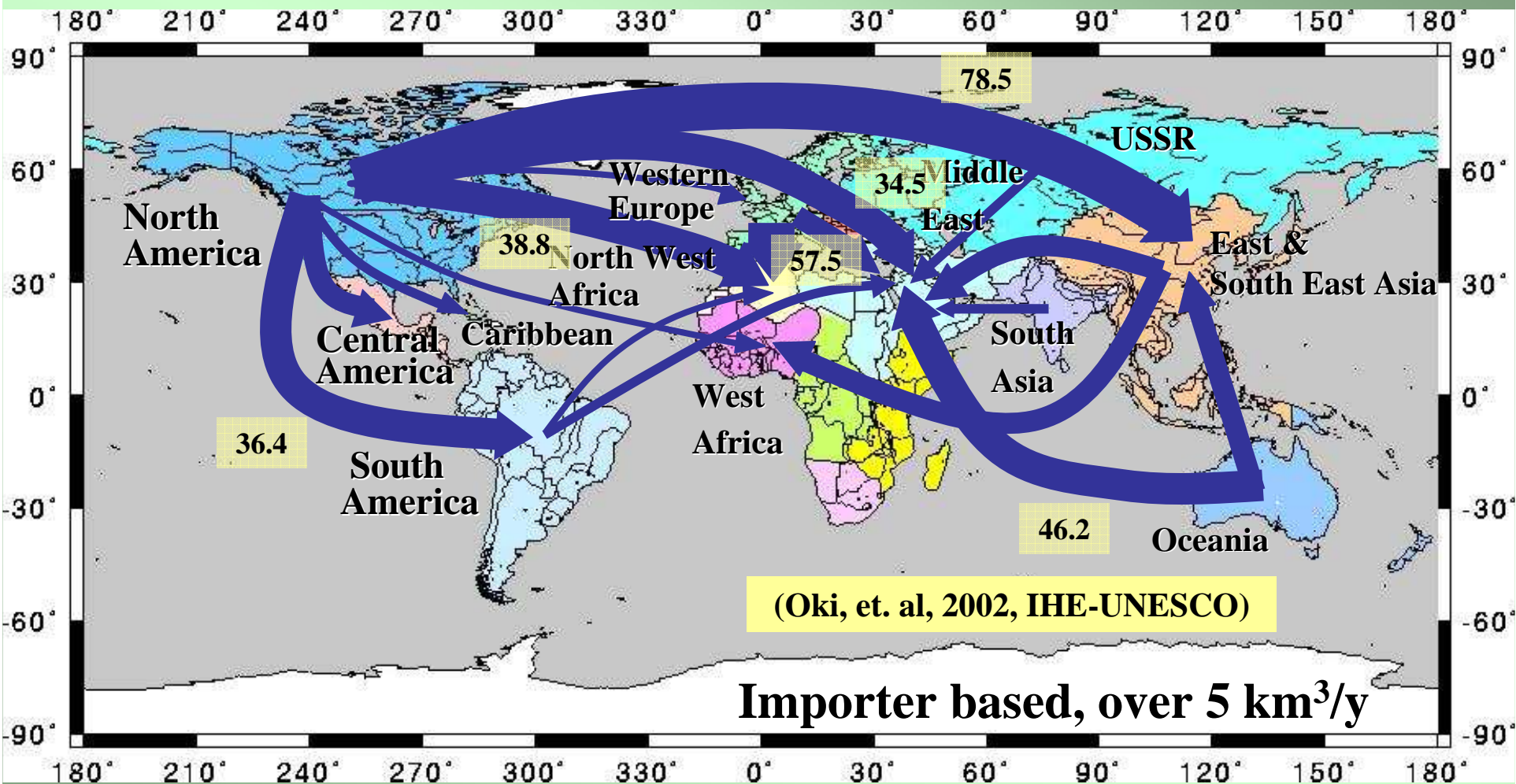
# ***Via Campesina's* food sovereignty**

**“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).

# World Food Situation



# Food and virtual water in 2000 (only grains)



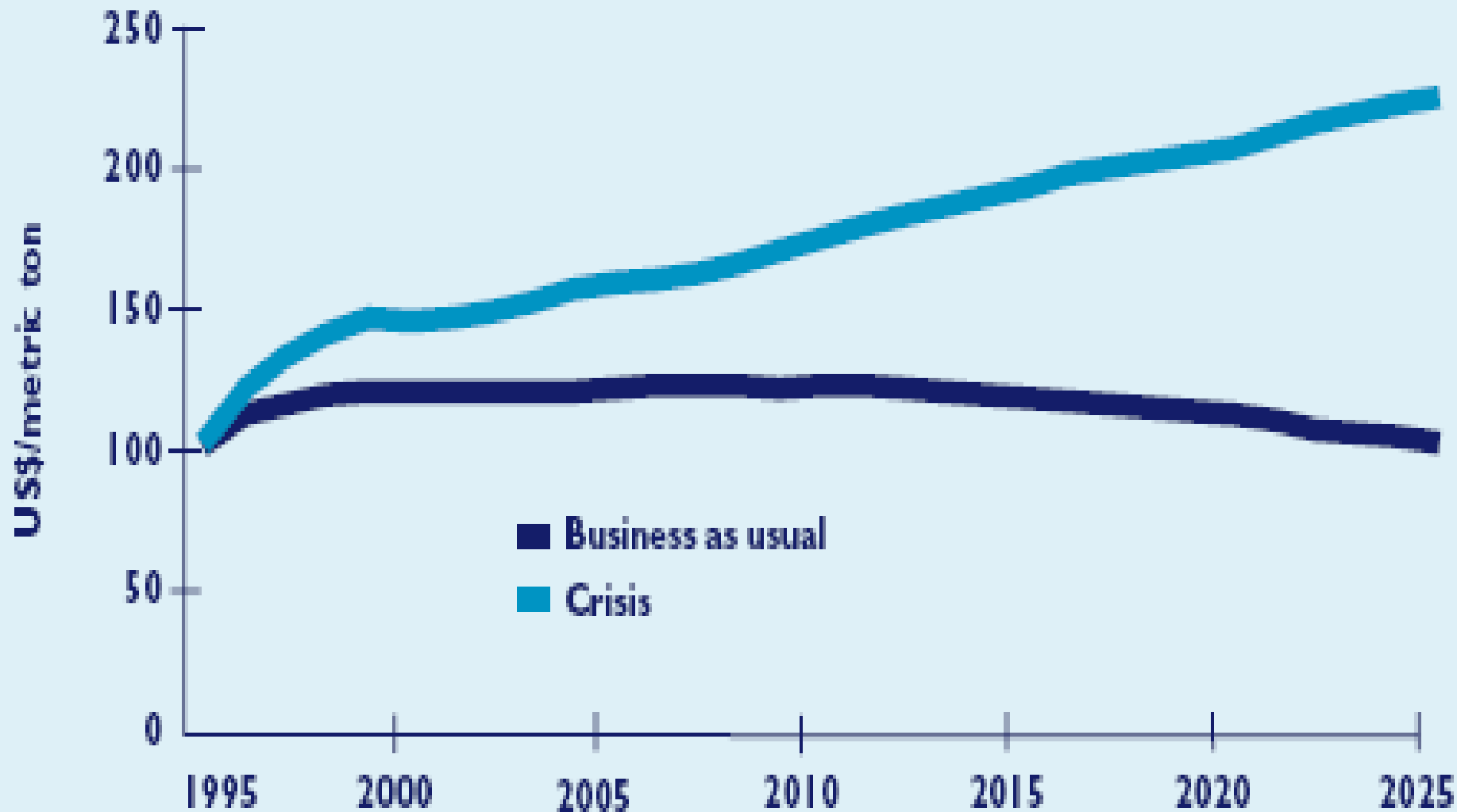
(Oki, et. al, 2002, IHE-UNESCO)

Importer based, over 5 km<sup>3</sup>/y



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

# International Corn Prices



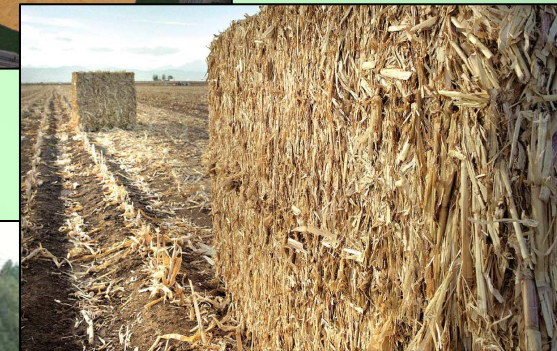
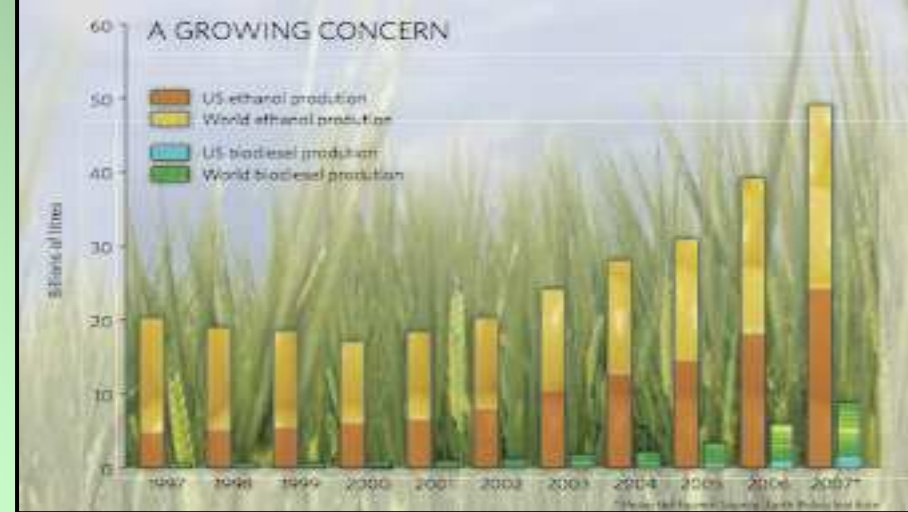
source: Rosegrant, Mark W.; Cal, Ximing; Cline, Sarah A., 2002: 20



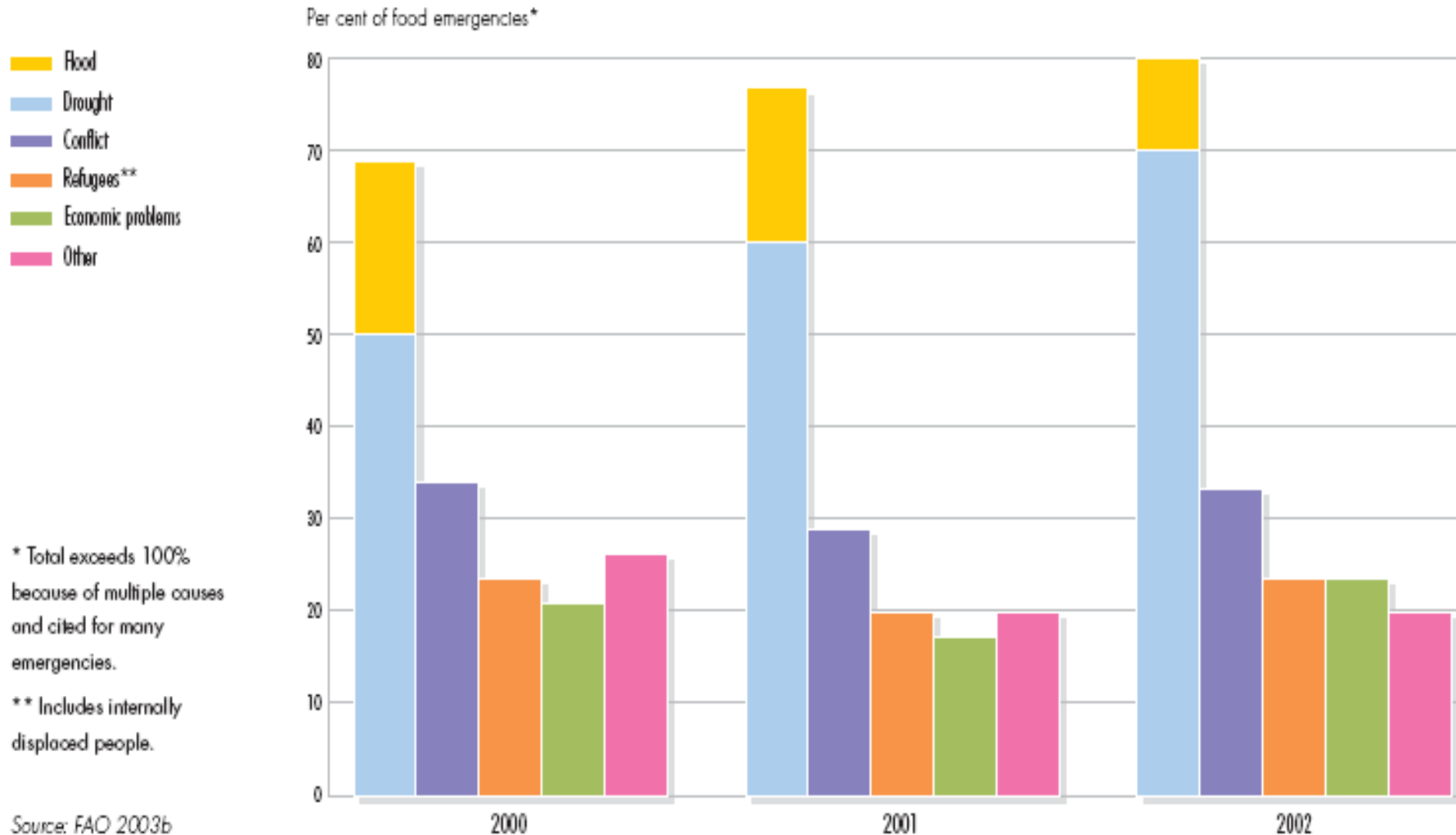


# Hunger and bioenergy

- Cultivation for bioenergy, electricity and heat
  - Crops (grains and agricultural waste)
  - Forest waste
  - Solid municipal waste
- Who produces? OCDE; Brazil
- Why?
  - Energy security
  - Climate change mitigation
  - Rural development
- Required characteristics
  - Native, perennial, rapid growth, resistance to illnesses, no competition to food, not invasive
  - Switchgrass (*Panicum virgatum*)
  - Alamo

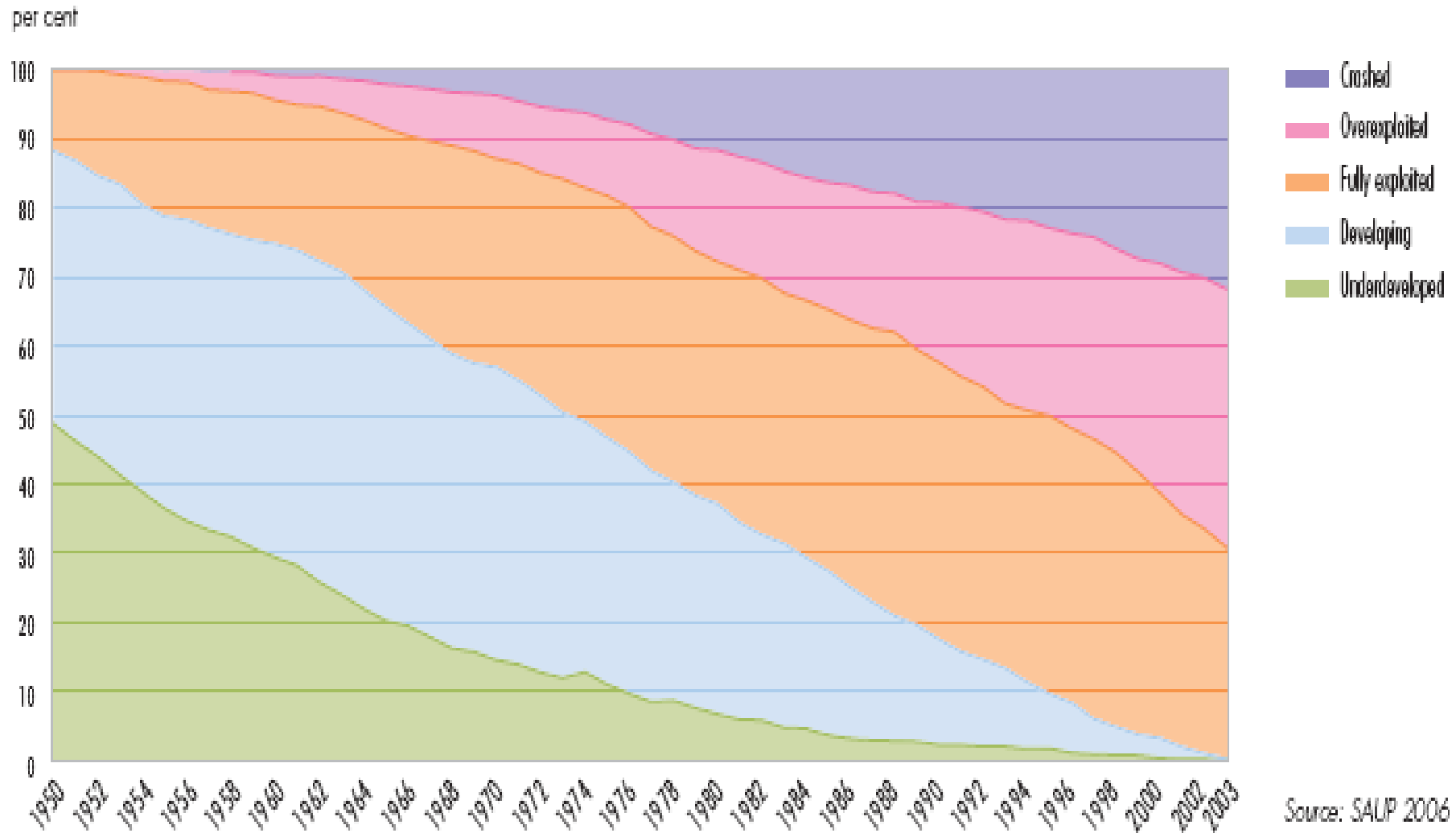


# Causes of food emergency



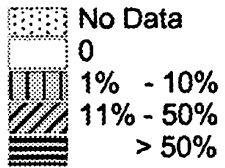
# Exploitation of marine fish stocks

Figure 4.13 Exploitation status of marine fish stocks



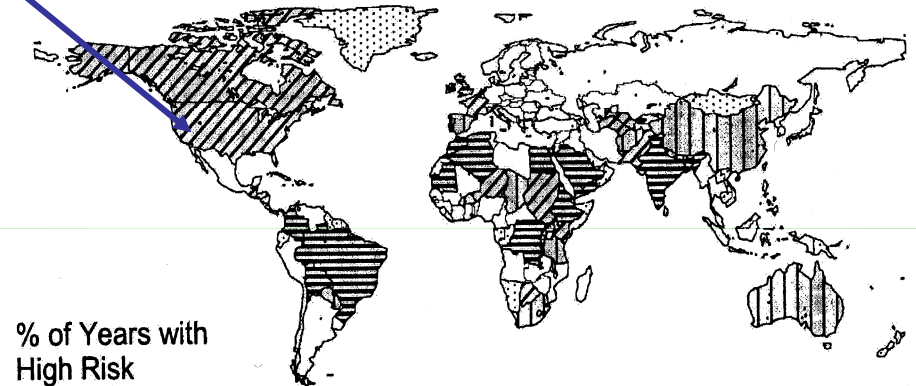
# Food Insecurity Scenario

% of Years with High Risk

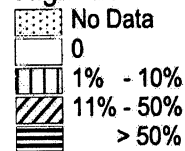


GLASS 0.5, Budapest Scenario:  
 a) GDP and climate 1984  
 b) GDP and climate 1901-1995  
 19.1.1999, me, Budapest.apr

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



% of Years with High Risk



GLASS 0.5, Budapest Scenario: GDP; 2001-2050 and  
 a) historical climate (1901-1950)  
 b) baseline A climate with historical variability (1901-1950)  
 19.1.1999, me, Budapest.apr

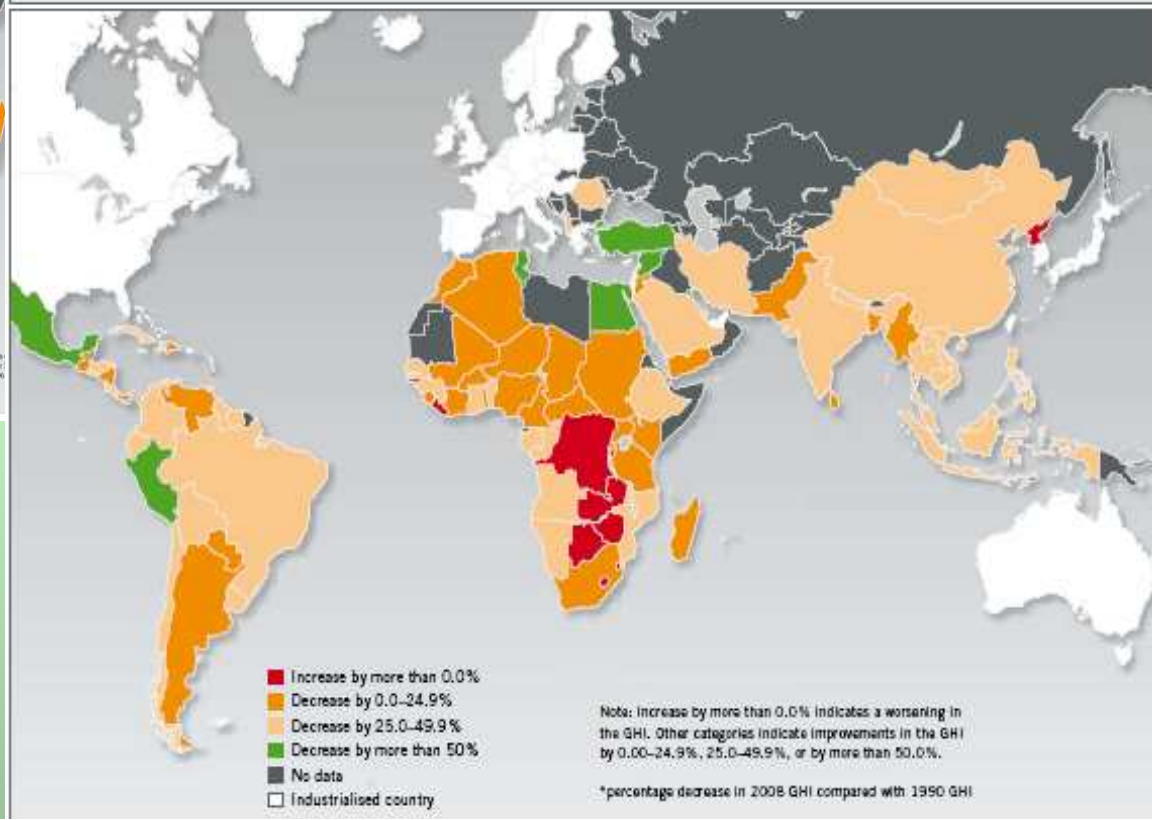
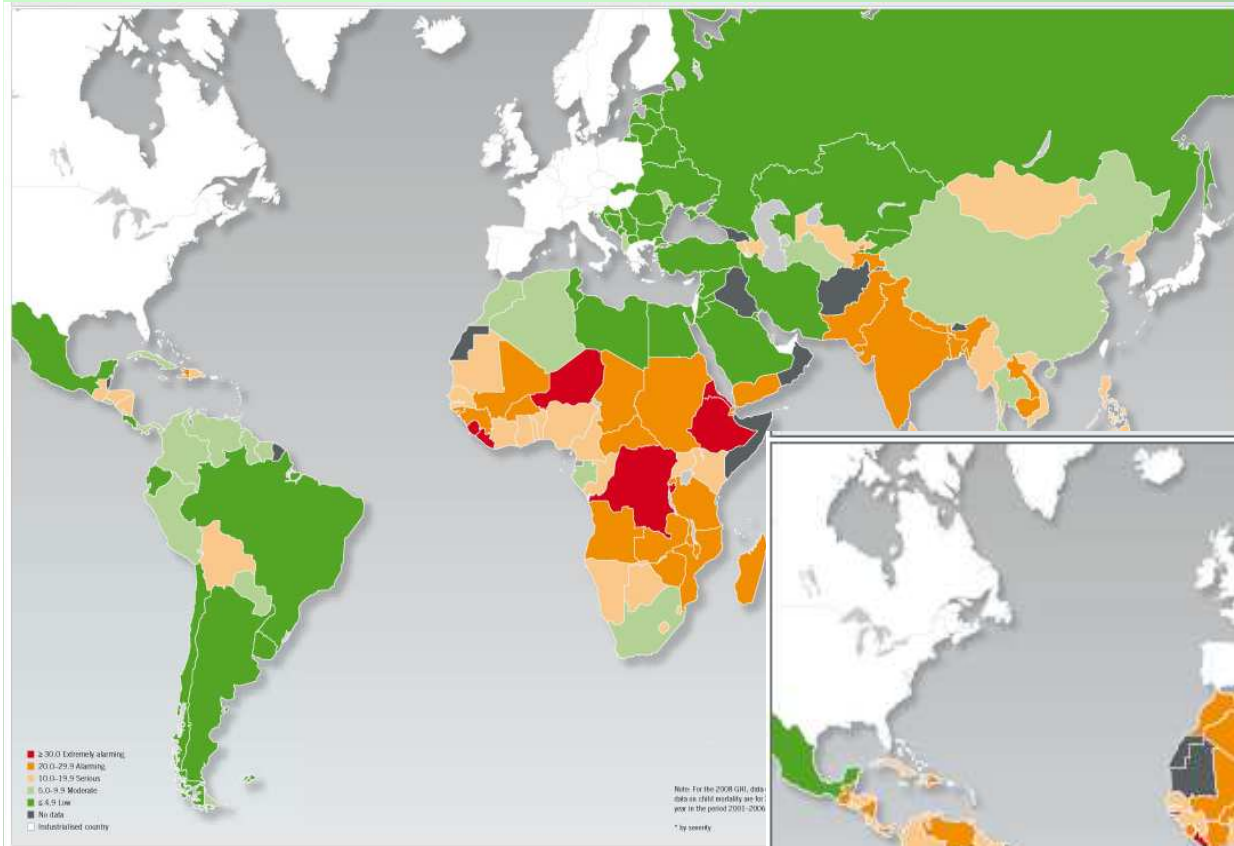
Figure 6. High Potential for Food Crisis 2001-2050  
 – with GDP Increase and Climate Change.

Source: Alcamo, 2002

# Global Hunger Index 1990 & 2008

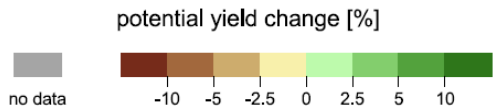
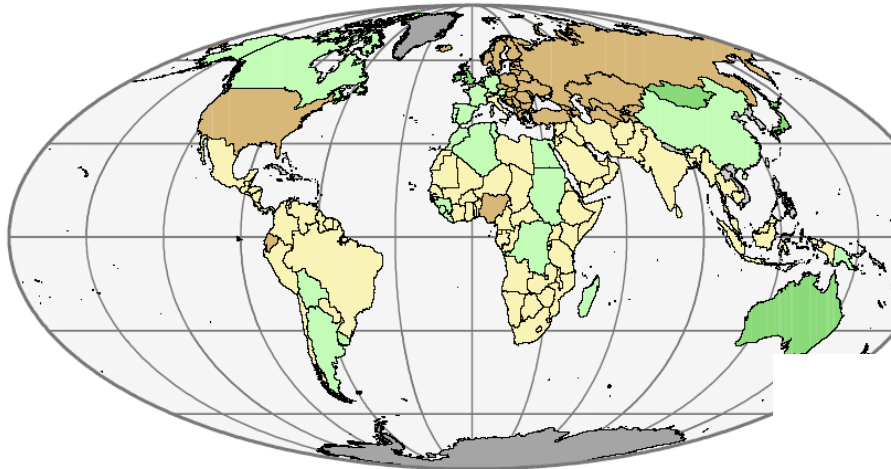
← 2008 Global Hunger Index.

Country progress in reducing the Global Hunger Index between 1990 and 2008 ↓

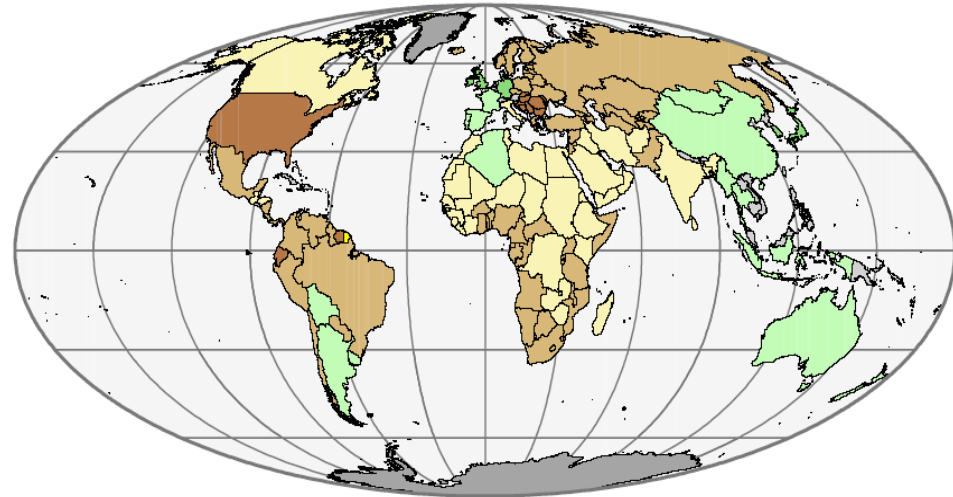


Source: IFPRI, 2008

# Food Scenarios: 2020, 2050, 2090



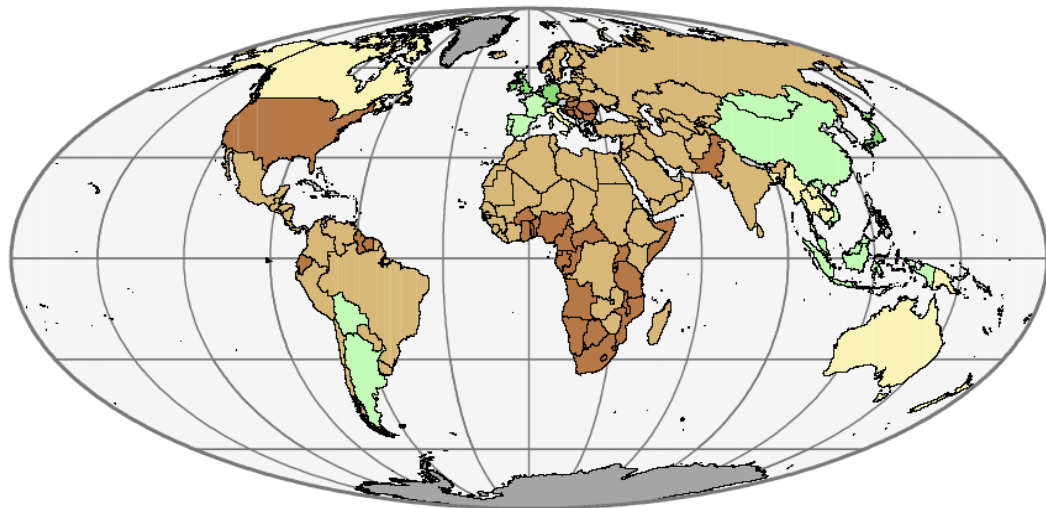
Food security 2040 - 2069 (HADCM3 GGa1)



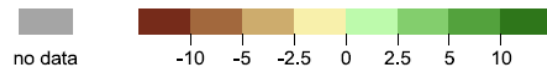
potential yield change [%]



Food security 2070 - 2099 (HADCM3 GGa1)



potential yield change [%]





**Social Processes and Food Insecurity**



# **Threats to Food Sovereignty: 3 Models of Food Production**

- Productivity paradigm**
- Life science paradigm**
- Green agriculture paradigm**



# 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 107 million more hungry people** in 2008. MDG can not be reached and affects above all rural and urban poor.
- Land Degradation and Desertification affect **one third of the world land surface** and affects around **485 million** people; 46% of people in Africa have 43% of desert.
- In Africa the **productivity loss/year** is estimated in 0.5-1%
- **Desertification and land degradation** pose multiple global, regional and national security issues: **food, water, climate, livelihood, health, urban, rural and transportation security.**
- Desertification and land degradation aggravated by drought may induce **large-scale forced migration movements, hunger riots** and emerging **conflicts** on scarce resources.

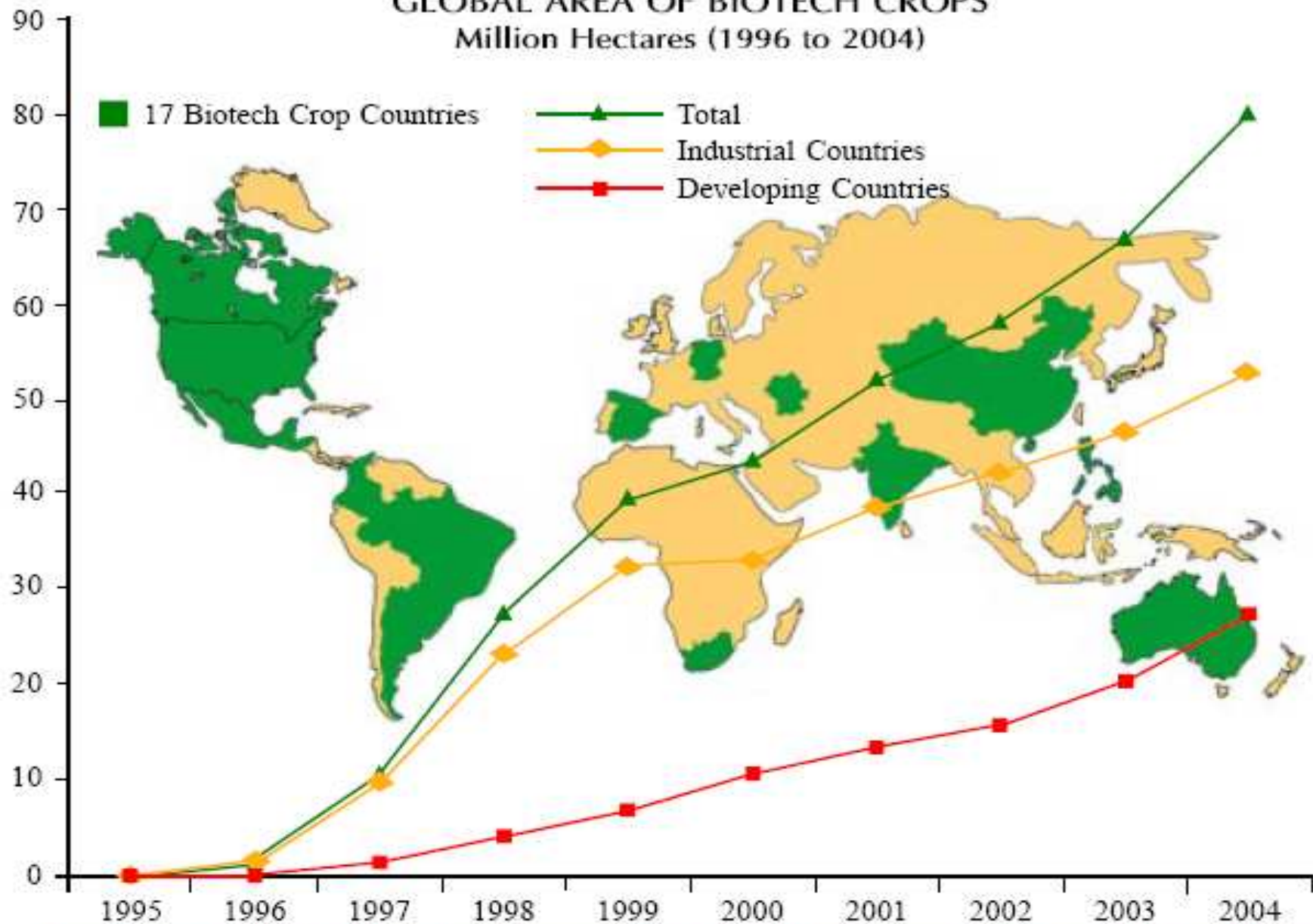
# Productivity paradigm

- **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.

# 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.
- Offers **clean and homogenous** products that can stay for weeks on the 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 and technology.
- **Increases costs of production** and **food prices** due to **TRIPs**, and created monopolies of agro-chemicals and food transformation.
- Food get transformed into **medicine** (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

# Accidents with Genetic Modified Organisms: Transgenics



# 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, inte-gral management of water, plagues, and environmental services.
- **Local agricultural production**, transformation and trade, with access for peasants to water, seeds, credits
- **Women as key producers** for food issues, care about vulnerable and consolidate livelihood,
- When livelihood in villages and countries is guaranteed public resources for **poverty and hunger alleviation** can be reduced and reallocated for other development purposes, creating stable social relations synergies and cooperation.

# FAO Program after Food Summit

- To **eradicate hunger** from the earth.
- To **feed 2050 world population**: will grow 50 % & reach 9 billion
- **More coherent and effective system of governance** of food security at national and international levels.
- **Developing countries get fair chance** in world commodity markets (no unfair international 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**.

# 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)



# Integral proposal of poverty alleviation and environmental recovery to reduce migration





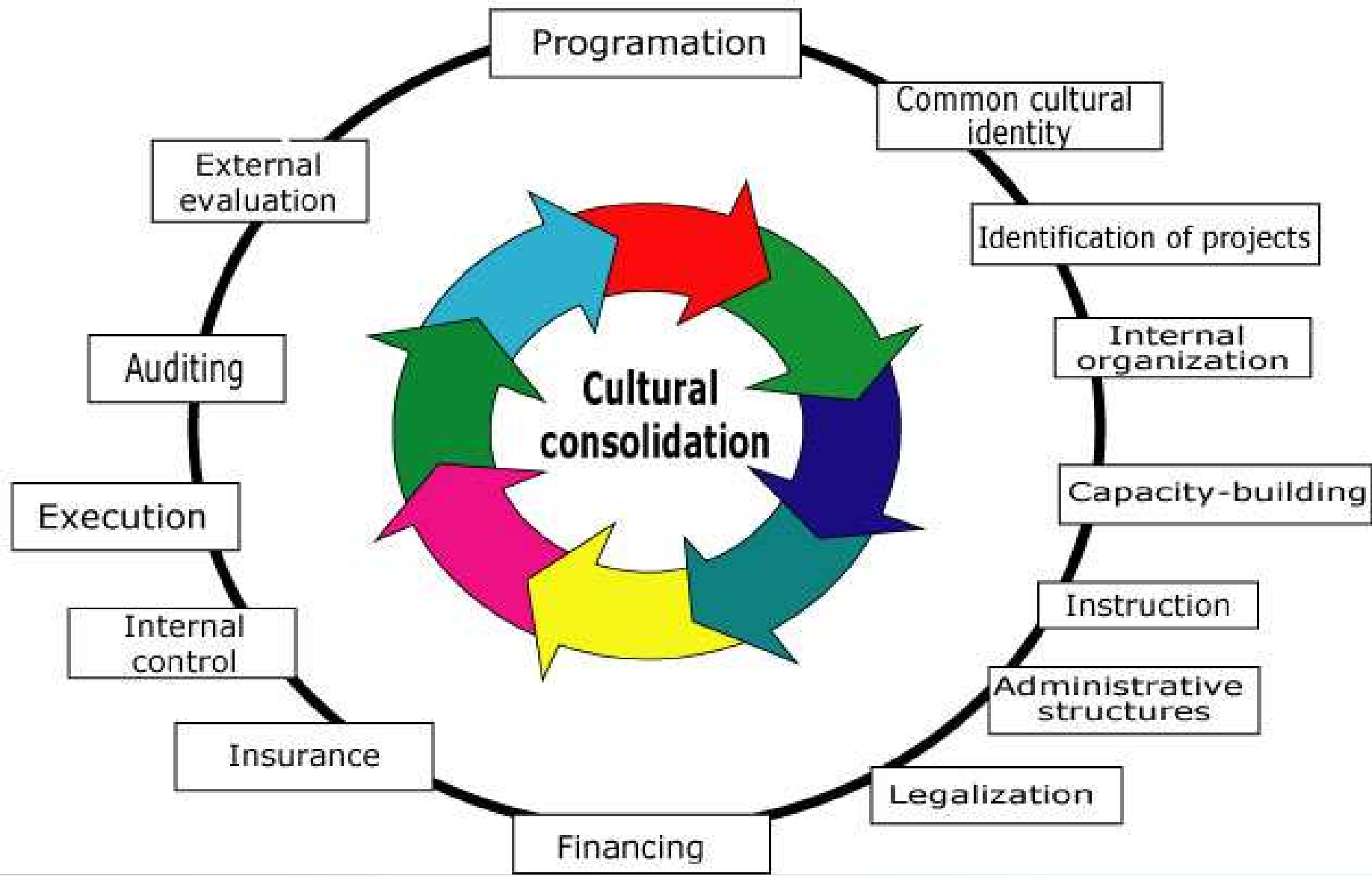
# Survival Strategies



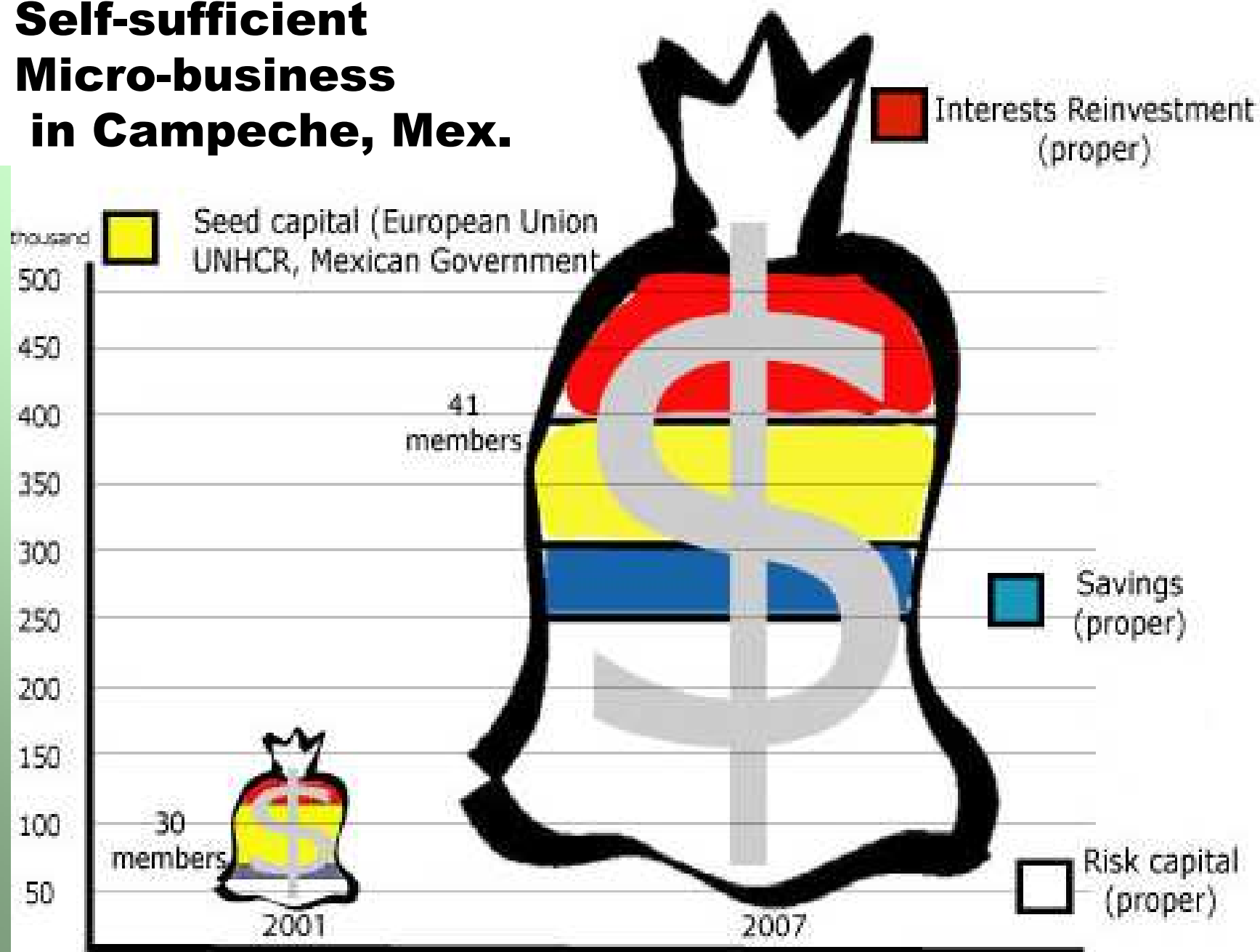
# **Survival Strategies** (Oswald, 1991, 2007)

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 and neighbors
7. Economic crises increases and lack of food
8. Recollection of 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

# Fig 1. Model of self-reliant entrepreneurship



# Self-sufficient Micro-business in Campeche, Mex.



# **Transition to Alternative Livelihoods and Sustainable Economy**

- **Decentralized governance: traditional knowledge from women, peasants, *grassroots* movements against desertification**
- **Consolidation of leadership (local clergymen, spiritual leaders, doctors, lawyers, schools, teachers) and training (old/young people, migrants)**
- **Off-farm jobs create financial resources to recover degraded land and feed people**
- **Concrete Action Programmes to prevent migration, crises and conflicts.**

# Achieving Soil, Water, Food Security for People Most Affected by GEC

- **Food security & sovereignty** (FAO, Via Campesina).
- **Water security:** Ministerial Declaration, II World Water Forum, The Hague (2000)
- **Health security** (WHO, scientific discourse)
- **Human, gender and environmental: a HUGE security addresses major related challenges for the people most affected by GEC.**





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