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Landscape Ecology and Environmental Security

Threats, Challenges, Vulnerabilities and Risks

Common and Differentiated Trends in the Mediterranean During the 21st Century

NATO CCMS Pilot Study

Use of Landscape Sciences for Environmental Assessmen

Pilot Study Meeting at Lecce (Italy)

September 5th to 9th, 2004

Linkages among Landscape Assessment, Quality of Life and Environmental Security

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1. Introduction: Different Disciplines and Common Research Questions

Some of the questions posed to me on 12 July 2004 are:

- Do linkages exist between research on landscape ecology, environment and security policy?
- What is the security relevance of work on landscape ecology?
- What role do spatial differentiations play for security questions?
- Which population trends do you foresee for Europe (& the Mediterranean) and what are their potential political implications?
- Which are projected urbanisation trends for Southern and Eastern Europe as well as for North Africa and the Middle East?
- What are the required strategies for agriculture and food production in Eastern Europe and on the southern and eastern shores of the Mediterranean?

1.1. Tasks for Two Scientific Disciplines: Geography vs. Political Science

Geography

- Physical geography
- Geomorphology (landscape)
- Climatology
- Biogeography
- Resource management, env. studies
- Human geography
- Population geography
- Economic geography
- Cultural and social geography
- Urban vs. rural geography
- Political & historical geography
- Regional geography

Political Science

- Political theory
- Comparative government
- Dom. politics & policies
- Environmental policy
- Urban policy & planning
- International relations (IR)
- Political structures (*polity*)
- Policy actors & process (*politics*)
- Research areas (*policy*)
- ***Security policy*** (IR subfield)
- Strategic, war studies
- Peace research or peace studies

1.2. Landscape Ecology and Ecosystem

Landscape ecology

- **Mutlidisciplinary reference in a holistic sence:**
  - **Climate ecology**
  - **Bio-ecology (flora & fauna)**
  - **Soil-ecology**
  - **Hydro-ecology**
  - **Forest ecology**
  - **Agricultural ecology**
  - **Anthopogenic ecology**
  - **Environmental medicine**
- **Focus & Relevance for security analysis**

Landscape ecosystem

- **geo-system (geo-ecology)**
- **bio-system (bio-ecology)**
- **human system (human geography)**

Geoecology

Geoecology emerged in 1990s as an interdis ciplinary natural science on structures, func- tions, interdependencies and linkages in our environment excluding political processes.

Geoecosystem

dynamic entities, organised on a hierarchical basis that perpetually respond to changes within themselves and in their surroundings.

1.3. Goal of the CCMS Pilot Study

Purpose of the landscape sciences pilot study proposal:

- **exchange information about landscape science approaches** useful for **environmental assessment and**
- **transfer landscape assessment technologies,**
- for **use in environmental protection and preservation programmes,**
- **Land use and land cover characterisation**
- Use of **landscape indicators** for **environmental assessment**.
- **Exact geographic areas** … & selection of **landscape indicators**
- **Multiple geographic areas** in **United States** & **Europe (not MENA region)**
- **Quantifying & assessing environmental condition, processes of land degradation**, & **impacts on natural and human resources** by combining
- advanced **technologies of remote sensing**, **geographic information systems**, **spatial statistics**, **process models** & **landscape ecology theory.**

1.4. Ecolological Geopolitics vs. Political Geoecology

Old and Critical Geopolitics

- **Old geopolitics:** Kjellen, Ratzel, Haushofer, Mackinder, Mahan, Spykman
- **Critical geopolitics:** O Tuathail
- **Revival of geopolitics in France:** Lacoste & **Italy:** Carlo Jean (Limes)

Simon Dalby:

Ecolological Geopolitics

- To understand **politics and ecology** as **processes in motion**, rather than as stable entities, requires a more sophisticated **political ecology** that understands **environmental change** as a **series of complex social processes** in specific geographical contexts".

Brauch: Political Geoecology

- To overcome these shortcomings, a ***political geoecology*** is suggested that combines the **natural science perspectives on global environmental change** with those in the **social science on their effects and outcomes**.
- The analysis of **environmental security** issues on a regional level requires a ***spatial approach***.
- As neither the approaches of ***globalisation* and *geopolitics*** have included **environmental factors** & problems of **environmental security**, an approach of a ***political geoecology*** is needed.

1.5. My Goal: Political Geoecology

- **Dalby approached *ecogeopolitics* from critical geopolitics**
- **Brauch proposes a *political geoecology* that combines the geoecological approach in the geosciences with the socio-economic effects of global environmental change, avoiding references to geopolitics.**
- **Geoecology** draws on ***spatial sciences*** (geography, cartography, landscape & regional planning) & on the ***natural sciences***, but it excluded the effects of environmental degradation on environmental stress & outcomes.
- **Political geoecology** combines the complex causes & interactions of key factors of **regional environmental change** with **environmental stress, natural disasters, distress migration, crises & conflicts** from a **human security perspective** for the **environmental security dimension**.
- A **political geoecology** requires an **interdisciplinary** discourse on global change & its regional impacts for environm. security & conflict avoidance.
- A ***political geoecology*** uses methods of **international relations.**
- **Mediterranean needs a spatial approach** on **common ecological challenges to which the landscape sciences can contribute!**

2. Security Analysis: Worldviews, Mindsets, Schools and Programmes

- **Are there linkages between landscape science (ecology & ecosystem) and security analysis?**
- **How to analyse them from a security perspective?**
- **Environment:** ***Encyclopaedia Britannica*** **(1998) defined 'environment':**

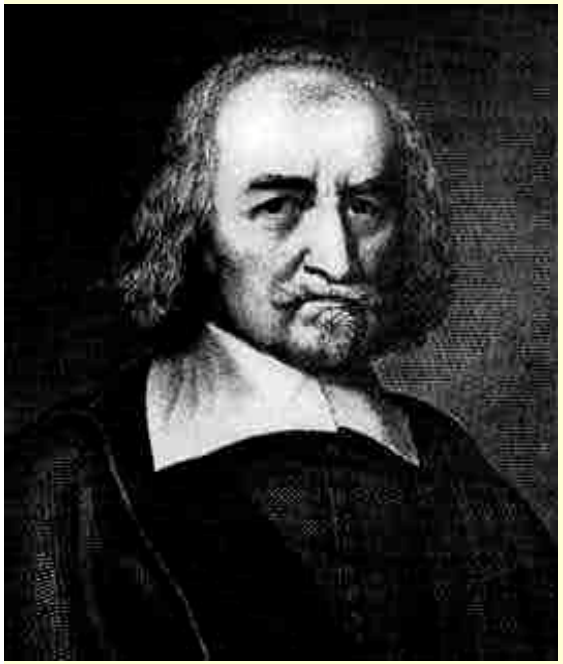
  "complex of physical, chemical, & biotic factors that act upon an organism or an ecological community & ultimately determine its form and survival".
- **Neo-Malthusian: Resource scarcity (Lester Brown, Norman Myers)**
- **Cornucopian: Abundance (B.Lomborg: Skeptical Environmentalist)**
- **Pragmatic multilteralist: cooperation in int. organisations matters**

Arnold Wolfers (1962): objective vs. subjective security:

„Security, in an *objective sense*, measures the absence of threats to acquired values, in a *subjective sense*, the absence of fear that such values will be attacked."

Subjective security perception depends on worldviews or traditions.

2.1. English School: Hobbes, Grotius & Kant



Hobbes (1588-1679) **Grotius (1583-1645)** **Kant (1724-1804)**

Security perceptions depend on worldviews or traditions

- **Hobbessian pessimist: *power* is the key category (narrow concept)**
- **Grotian pragmatist: *cooperation* is vital (wide security concept)**
- **Kantian optimist: *international law* and *human rights* are crucial**

2.2. Ideal Type Worldviews on Security and Standpoints on Environment

Worldview/Tradition on security (ffi Standpoints on environmental issues (ffi	Machiavelli, Hobbes, Morgenthau, Waltz (pessimist, realist school)	Grotius, *Cooperation is needed, matters* (pragmatist)	Kant *International law matters and prevails (Democratic peace)* (neoliberal institu-tionalistoptimist)
Neomalthusian *Resource scarcity* (pessimist)	I George W. Bush-Administration ?	II ffi	III ffi
Reformer, *Multila-teral cooperation solves challenges* (pragmatist)	IV	V UN system most EU states (my position)	VI
Cornucopian *Technological inge-nuity solves issues* (neoliberal optimist)	VII George W. Bush-Administration ?	VIII Bill J. Clinton Administration ?	IX Wilsonian liberal optimism

2.3. Widening of Security Concepts: Towards Environmental Security

4 trends in reconceptualisation of security since 1990:

- Widening (dimensions, sectors), Deepening (levels, actors)
- Sectorialisation (energy, food, health), Shrinking (WMD, terrorists)

Dimensions & Levels of a Wide Security Concept

Security dimension? ? Level of interaction	Mili-tary	Political	Economic	Environ-mental ?	Societal
Human individual ?			Food/health	Cause & Victim	Food/health
Societal/Community				??	
National	shrinking		Energy se.	??	
International/Regional				??	
Global/Planetary ?				GEC	

2.4. Environmental & Human Security

Table: Expanded Concepts of Security (© Bjørn Møller, 2003)

Label	Reference object	Value at risk	Source(s) of threat
National security	The State	Territ. integrity	State, substate actors
Societal security	Societal groups	Nation. identity	Nations, migrants
Human security	Individ., mankind	Survival	Nature, state, global.
Environmental sec.	Ecosystem	Sustainability	Mankind

Env. Security: Referent: Ecosystem; Value at risk is *sustainability.*

- **Major challenges**: ***global environmental change & humankind***,
- **Focus**: **Interactions between ecosystem & humankind**, impact of **global environm. change** on **environm. degradation**, of **increasing demand** on **environmental scarcity** & **environmental stress**.

Human security: Referent: individuals and humankind.

- **Values at risk: survival of human beings and their quality of life.**
- **Major source of threat: nature (*global environm. change*), globalisation, nation state with its ability to cope with dual challenge.**

2.5. Human Security Network Members

NATO	EU	Third World
Canada		Chile
Greece	Austria	Jordan
Nether-lands	Ireland	Mali
Slovenia		Thailand
		South Africa
Norway	Switzerl.	(observer)

Anti-person. Landmines, Intern. Criminal Court, protection of children in armed conflict, control of small arms & light weapons, fight against transnational organised crime, human development, human rights educat., HIV/AIDS, implement. of international humanitarian & human rights law, conflict prevention.

The Network has an inter-regional & multiple agenda perspective, strong links to civil society & academia.

The Network emerged from landmines campaign at a Ministerial in Norway,1999.

Conferences at Foreign Ministers level in Bergen, Norway (1999), in Lucerne, Switzerland (2000), Petra, Jordan (2001) Santiago de Chile (2002), Graz (2003), Bamako, Mali (May 2004).

2.6. Vision of the Human Security Network

- A humane world where people can live in security & dignity, free from poverty and despair. ... In such a world, every individual would be guaranteed freedom from fear and freedom from want.... Building human security is essential to achieving this goal.
- **In essence, human security means freedom from pervasive threats to people's rights, their safety or even their lives**.
- **Human security has become both a new measure of global security and a new agenda for global action. Safety is the hallmark of freedom from fear, while well-being is the target of freedom from want.**

Human Security Commission: Human Security Now: S.Ogata & A.Sen: „protection“ and „empowerment“.

2.7. Towards a Fourth Phase of Research on Environmental Security

1. Conceptual Phase: Concept Environmental Security

- Inclusion of environmental factors in US national security agenda
- Ullmann (1983), Myers (1989), Mathews (1989)
- Brundtland-Commission (1987), Gorbachev (1987), NATO (1996-)

2. Empirical Phase: Case Studies: Scarcity - Conflict

- Toronto: T. Homer-Dixon: since 1991: 3 Projects
- Zürich/Bern: G. Bächler, K.Spillmann (3 volumes 1996,1997)

3. Phase: Manifold Research without Integration (1995-)

- Resource scarcity or abundance as a cause of conflict

4. Phase: Human & Environm. Security & Peace (HESP)

- My proposal: focus on linkages between global environmental change and fatal outcomes (hazards, migration, crises and conflicts).
- Brauch, ch. 2 & 51 of: ***Security & Environment in the Mediterranean***

2.8. Goals of a Fourth Phase of Research on Human & Environmental Security & Peace

4th phase of research on environmental security aim at:

- a **"people-centred" human security perspective** from the individual to the global level to develop **strategies for adaptation and mitigation** to **reduce** both the likelihood and the impact of and the **vulnerability to these outcomes by strengthening resilience .**
- The **normative orientation** at the dual policy goals of sustainable develop-ment and sustainable peace requires the scientific development of complex **knowledge, a societal and political problem awareness, anticipatory learning and "ingenuity" in the framework of a "culture of prevention".**
- **Practical purpose & policy relevance** of a 4th phase of research is to recog-nise **early-warning indicators**, to examine the **environmental consequences of wars and the existing conflicts over scarce resources, to prevent that they escalate into violence** & to **develop longer-term priorities for Euro-pean countries, for international organisations** to avoid **fatal environmental outcomes**, to contribute to **regional environmental good governance.**

2.9. The Human and Environmental Security and Peace Project (HESP)

- **Synthesis of four approaches:**

  a) environmental security debate (environmental dimension)

  b) human security (human being: cause & victim of GEC)

  c) Grotian approach: multilateral, international law based

  d) proactive focus: conflict avoidance (structural factors)

- **4th Research Phase on environm.-security links**

- **AFES-PRESS contributions:**

  a) HEXAGON Series on Human & Environmental Security and Peace Project (HESP) with Springer Publishers (Berlin – NY - London - Tokyo)

vol. 1: Environment & Security in the Mediterranean (2001-2003)

vol. 2: Reconceptualisation of Security in 21st Century (2004-2006)

vol. 3: Global Environmental Change and Env. Conflict Avoidance (?)

vol. 4: Redefining Security Interests and Structures (2006-2008)

b) Context: GMOSS contributing to GMES (2008 operational)

2.10. AFES-PRESS Contribution to GMOSS

Reconceptualisation of Security in 21st Century (2004-06)

- **EU-sponsored network of excellence on security GMOSS: *Global Monitoring for Security and Stability* in the context of the 6th EU Research Framework Programme (24 partners)** [http://gmoss.jrc.cec.eu.int/]
- **A contribution to GMES: *Global Monitoring for Environment & Security***
- **AFES-PRESS with FOI Swedish Defence Research Agency: joint work package on: Security Concepts and Threats**

  [http://www.afes-press.de/html/download_gmoss.html]
- **Major reference book in Hexagon Series (Springer-Verlag): Coeditors: Brauch- Grin- Mesjasz-Behera-Chourou-Oswald-Liotta-Kameri-Mbote: *Facing Global Environmental Change and Globalisation – Reconceptualising Security in the 21st Century*** (Berlin-New York: Springer, 2006)

Redefining Security Interests (2006-2008)

- **Possibly second major reference book in the Hexagon Series to be discussed & developed by AFES-PRESS.**

3. Hard Security Threats and Environmental Security Challenges

- **4 concepts** are used often synonymously: **threats** are associated with hard military security issues, **challenges** may be of a hard or soft security nature while **vulnerabilities** and **risks** are used for environmental problems
- **Threat: Ullman defined a national security *threat*:** An action or sequence of events that: 1) threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state, or 2) threatens significantly to narrow the range of policy choices available to the government of a state or to private-non-governmental entities (persons, groups, corporations) within the state. **Mathews** & **Myers: *new threats***: population growth, resource scarcity, env. degradation
- **Challenge:** may refer to less urgent & non-violent *soft security* problems, such as **migration, human and drug trafficking**. These issues are less on the external and primarily on the internal security agenda, and thus a topic for the home and justice ministries and agencies, such as national and international police organisations (Europol) and of the courts but also of non-governmental societal groups.
- **Migration** may be a consequence of domestic conflicts emerging from environmental degradation and resource depletion (food, water) while it will remain difficult to distinguish empirically between *push* and *pull* factors

3.1. Environmental & Societal Vulnerabilities

- **Vulnerability:** a **key concept of environmental security** that has been used both in the context of **climate change impacts & by the disaster community**.
- **Vulnerability** results from **poverty, exclusion, marginalisation and inequities** in material consumption. It is generated by social, economic and political processes.
- **IPCC:** distinguishes between *sensitivity*, *adaptive capacity* and ***vulnerability*** **("the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes").**
- **ISDR:** "as a set of conditions & processes resulting from physical, social, economi-cal, & environmental factors, which increase the susceptibility of a community to the impact of hazards" that are shaped "continually by attitudinal, behavioural, cultu-ral, socio-economic and political influences at the individuals, families, communities, and countries"
- **UNDP:** *World Vulnerability Report of the UNDP* (2004).
- **O'Riordan defined *vulnerability* at the societal level as:** „the incapacity to avoid danger, to be uninformed of impending threat, to be so politically powerless & poor as to be forced to live in conditions of danger. On a personal level, vulnerability re-lates to such a physical condition as to be unable to withstand stress to a weakened immune system.
- **H.G. Bohle: dual internal (socieatal) or external (environmental) vulnerability**

3.2. Environmental Risks

- **Concept of risks has been used in the social sciences and especially in sociology, with a special reference to environmental issues.**
- **Ulrich Beck offered this definition:**

  Risk is the modern approach to **foresee and control the future consequences of human action**, the various unintended con-sequences of radicalised modernisation. **It is an (institu-tio´nalised) attempt, a cognitive map, to colonise the future**. Every society has, of course, experienced dangers. But the risk regime is a function of a new order: it is not national, but global. … risks presuppose decision. These decisions were previously undertaken with fixed norms of calculability, connecting means & ends or causes and effects. These norms are pre-cisely what 'world risk society' has rendered invalid.

  The concept of risk and risk society combines what once was mutually exclusive – society & nature, social sciences & material sciences, the discursive construction of risk & the materiality of threats.
- **Beck distinguished between predictable *risks* & unpredictable *threats* and offered a typology of three types of global threats:**

  1) ***wealth-driven* ecological destruction** & **technological-industrial dangers** (ozone hole, global warming, regional water shortage) & risk of genetic engineering;

  2) **risks related to *poverty*** (environmental destruction); and

  3) ***weapons of mass destruction***.

3.3. Environmental Security Risks

- **Kasperson and Kasperson** (2001): distinguish between ***systemic* risks** (global warming) and ***cumulative environmental change*** that may cause both short- and long-term consequences. **Five sources of risks:**

? disputes arising from human-induced local environmental degradation;

? ethnic clashes arising from migration & social cleavage due to environm. scarcity;

? Civil strife caused by environmental scarcity that affects economic productivity & people's livelihoods, elite groups, & ability of states to meet changing demands;

? Scarcity-induced interstate war over, for example, water; and

? North-South conflicts on mitigation, adaptation & compensation for global env. probl.

Type	Characteristics	Example
Systemic	Direct impact on glo-bally functioning system	industrial & land-use emissions of GHG indust. & consumer emis. of ozone-depletion gases land-cover changes in albedo
Cumulative	Impact through worl-wi-de distribution of change Impact through magni-tude of change (share of global resource)	groundwater pollution and depletion species depletion/genetic alteration (biodiversity) deforestation industrial toxic pollutants soil depletion of prime agricultural land

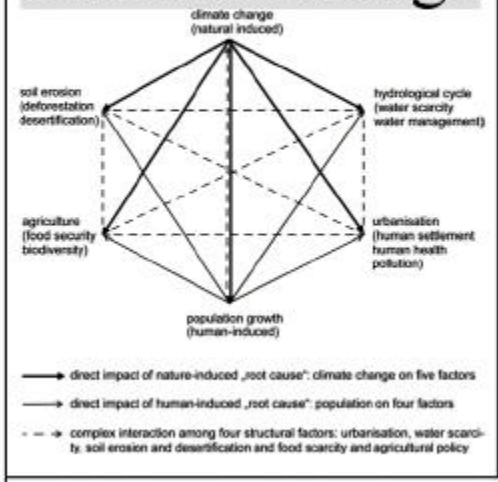
3.4.Environmental Security Dimension:

Threats, Challenges, Vulnerabilities and Risks

- **Environmental challenges due to interaction between anthopogenic activities and the natural variability of global environmental change (GEC) pose different risks to human beings, societies, and countries**
- **due to degree of internal (societal) & external (environm.) vulnerability**
- **Only in the worst case they pose threats to national security interests.**

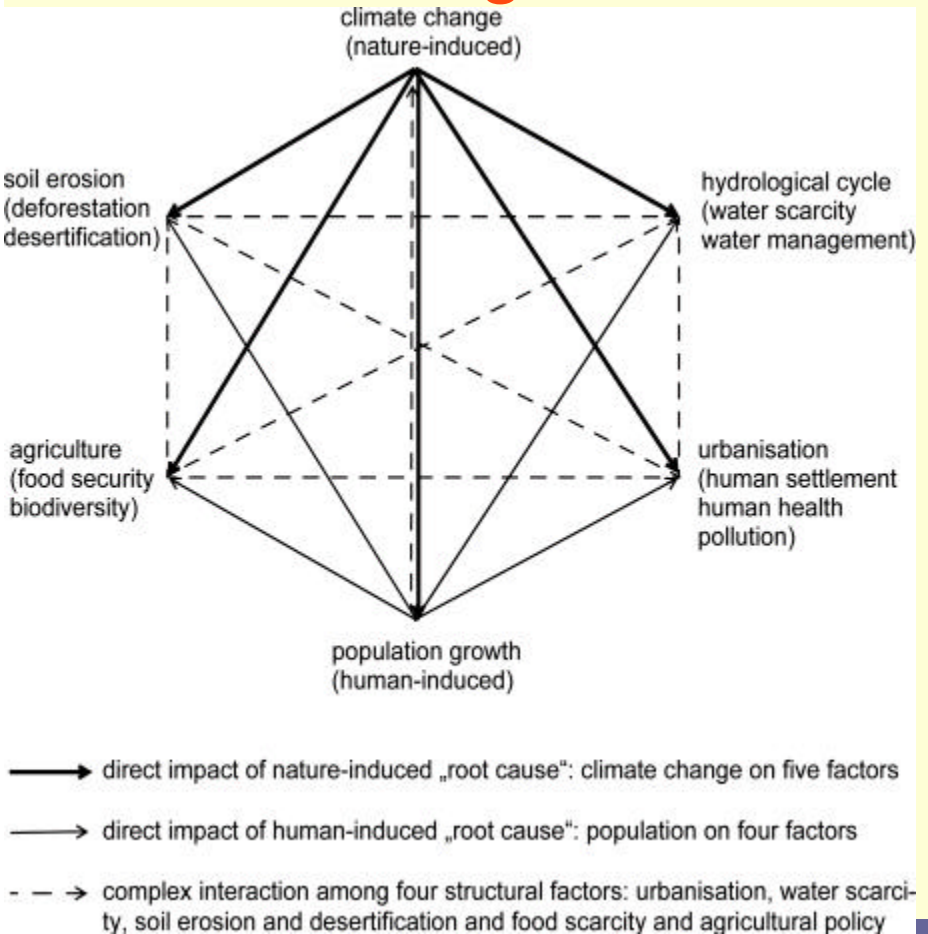
Security dimension? ? Level of interaction	Environ mental ?	Threat	Chal-lenge	Vulne-rability	Risk
Human individual ?	victim			Internal (societal)	
Societal/Community	??		hazards		
National	??	rarely		??	
International/Regional	??		migration	External (environ mental)	
Global/Planetary ?	GEC				

4. Model: Global Environmental Change and Fatal Outcomes

Causes (Hexagon)	Effect (Interaction)	Environmen-tal Stress	Probable Outcomes
↗→→→→ Extreme Weather Events →→→↘			
Climate change 	environmental → **degradation** (soil, water) ↓↑ → → **scarcity** (water, food, housing)	global cond. ↓ Environ-mental stress ↑ nation. cond.	**disaster** conflict avoidance ↗ ↗ → **Crisis** ↘ ↘ **migration** **conflict**

4.1. Environmental Challenges in the 21st Century: Survival Hexagon

Survival Hexagon: 6 factors



Environmental security is affected by

Nature & human-induced

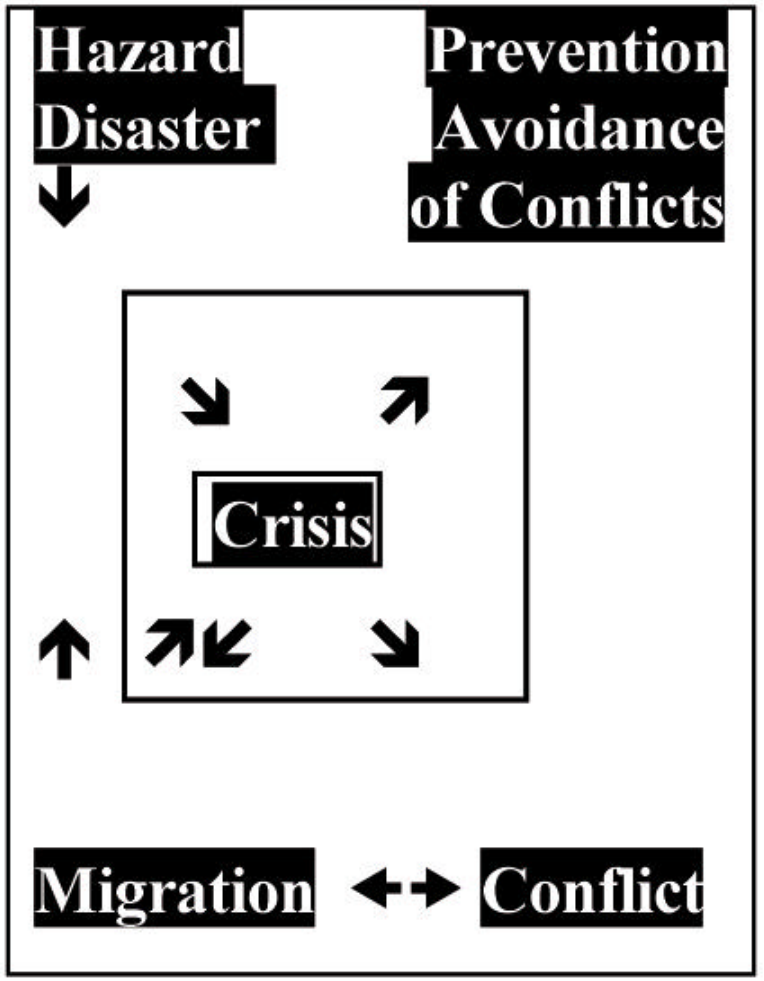
- **Air:** Global climate change
- **Soil** degrad., desertification
- **Water** scarcity, hydrological cycle

Human-induced factors

- **Population growth**
- **Urbanisation**
- **Food & Agriculture**

Six factors are relevant for landscape science!

4.2. Fatal Outcomes: Linking Natural Disasters with Societal Consequences



Much knowledge on the factors:

- Hazards, migration, crises, conflicts

Lack of knowledge on linkages among fatal outcomes

- Disasters & disaster-ind. migration
- Famine & environm.-ind. migration
- Conflicts & conflict-induced migration

Lack of knowledge on societal consequences:crises/conflicts

- Domestic/international crises/conflicts
- Environmentally or war-induced migration as a cause or consequence of crises and conflicts

4.3. Urban Water-related Hazards & Disasters

Source: F. Nathan: http://www.afes-press.de/pdf/Nathan_Water_Cities.pdf

- According to **UNESCO World Water Assessment Programme**, "more than 2200 major & minor water-related disasters occurred in the world during 1990-2001".
- Of these disasters, **50% were floods**, 28% were water-related epidemic, 11% were drought, **9% were landslides** and avalanches, and 2% were famines.
- The **deadliest natural disasters** of the 20th century were epidemics, droughts with famine, and floods (in Asia). However, when considering the average number of deaths per disaster, cyclones and floods were coming first.
- Among the **234 biggest disasters** of the second half of the century, **90% of them are constituted of storms and floods, amounting to about 1.4 million deaths**.
- **Asia** in disproportionately affected, concentrating 94% of the victims of natural disasters between 1964 and 1998. Bangladesh, China and India, gather 85% of the affected people in the world, 90% of which because of floods and landslides.
- **Floods** thus account for a high proportion of damages and suffering throughout the world, accounting to 49% of the deaths of natural disasters from 1985 to 1999. In absolute numbers, "between 1973 and 1997 an average of 66 million people a year suffered flood damage, making flooding the most damaging of all natural disasters"
- **Increasing economic damage in Europe, in Mediterranean diverging numbers of human victims** due to different degree of **internal (societal) vulnerability**

4.4. Flood-related Victims

- Number of people worldwide vulnerable to a devastating flood is expected to mushroom to 2 billion by 2050 due to climate change, deforestation, rising sea levels and population growth in flood-prone lands.
- One billion people are estimated to live today in the potential path of a 100-year flood and, unless preventative efforts are stepped up worldwide, that number could double in two generations, said Dr. Janos Bogardi, director of UNU Institute for Environment and Human Security
- Floods affect more than 520 million per year, 25,000 deaths, extensive homelessness, disaster-induced disease, crop & livestock damage.
- Unsustainable land use & human actions aggravate the situation.
- Greatest potential flood hazard is in Asia. Every year more than 400 million have been directly exposed to a flood. 1987- 1997, 44 %of all flood disasters affected Asia , claiming 228,000 lives (93 % of all flood-related deaths). Economic losses in Asia totaled US $136 billion.
- Fast-growing cost to world economy of floods & other weather-related disasters ($50- $60 billion per year) equals total global development aid. Flood-related death toll 15 %of all natural disaster-related deaths

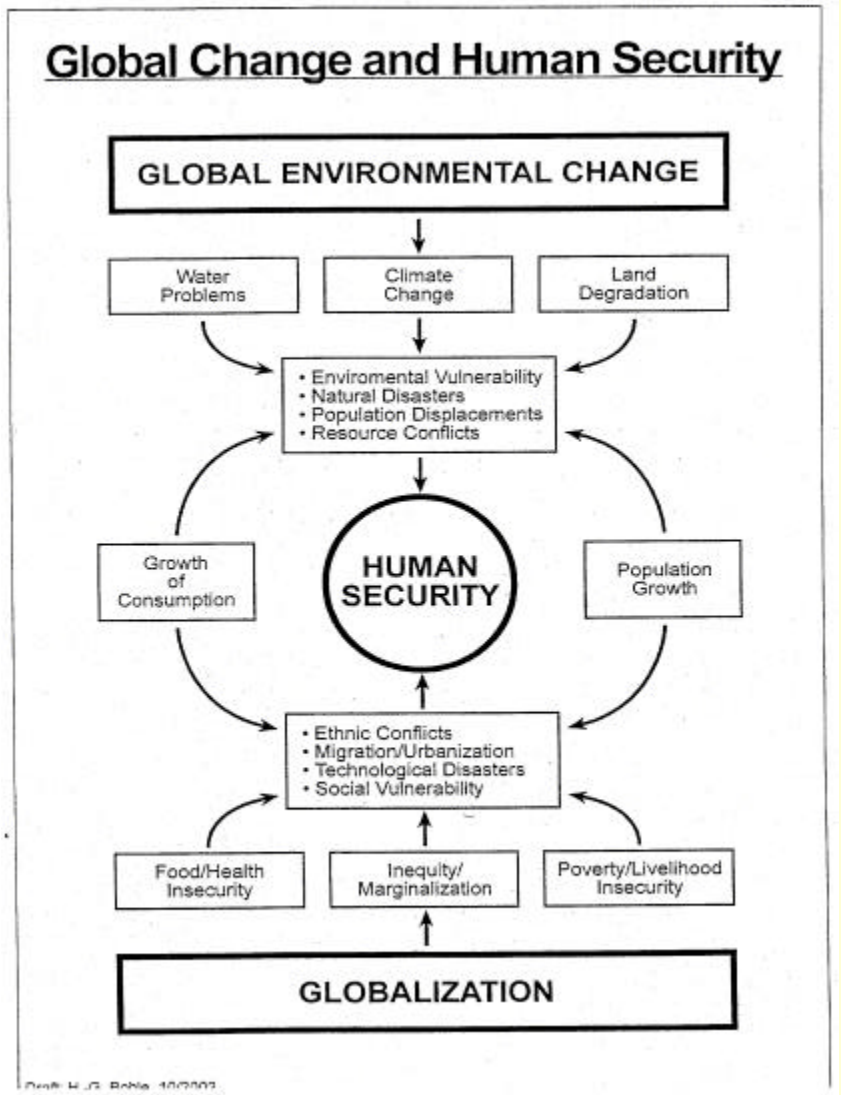
Source: UNU: http://update.unu.edu/issue32_2.htm

4.5. Water-Related Risks and Vulnerabilities

- **Dual Challenge: climate change (extreme weather events) & rapid urbanisation due to population growth**
- **Fatal Outcomes: hydro-meteorological hazards/disasters: coastal water-related hazards, floods, mudflows, storms**
- **Focus on water-related urban disasters in the Mediterranean**
- **Fabien Nathan: Risk** is an on-going process resulting of the combination of dynamic hazards and changing vulnerability. The difficulty of urban risks comes from these constant changes, which renders the process difficult to grasp for human thought. Disasters, as realized risks, follow these patterns: "urban disasters (…) are not just amalgams of disaster and urbanization; they are the pro-ducts of a set of changeable relations between both components" (Mitchell, 1999).
- **Vulnerability:** a) propensity to undergo **damages**, a **state of fragility, set of conditions**, riasing susceptibility of a community to impact of a disaster; b) incapacity to anticipate, cope with, resist, adapt to & recover from hazard.
- **External**: exposure (physical, socio-ecological): **environm. Vulnerability**
- **Internal:** incapacities to prevent, prepare for, face, cope with hazard/ disaster **(**physical weakness; legal vulnerability; organisational vuln.; technical vuln.; political vuln.; socio-economical vuln.; psychological & cultural vulnerability**)**
- **Source: Nathan**: http://www.afes-press.de/pdf/Nathan_Water_Cities.pdf

4.6. Environmental & Societal Vulnerability

Facing Global Environmental Change & Globalisation



Human Security Perspective

- **referent:** individual & mankind
- **value at risk:** human survival
- **threat:** nature, GEC & globalisation

- **GEC > *environm. vulnerability* > disaster > migration > scarcity**
- **Globalisation > inequity > social or *societal vulnerability***

Achieving human security requires:

- **adapting to, mitigating environmental vulnerability** (protection-empowerment)
- **Reducing societal vulnerability:** enhance coping capacity (resilience) by poverty eradication.

5. Mediterranean Space: Geo-ecological Commonalities vs. Socio-economic Differences

Suggested focus: Expand landscape analysis to MENA region

5.1. The Mediterranean: A Common Ecological Space & Divided Political Region

- No accepted **definition** & common criteria of the Mediterranean: a **sea**, a **space, region, climate and way of life**.
- ***Sea* & region**: connecting 3 continents: Europe, Africa and Asia;
- Cradle of **civilisations** of Egypt, Crete, Hellenism & Rome
- Home of monotheistic **religions** of Jews, Christians & Muslims
- **Mediterranean**: *unity* & *diversity*, cooperation & conflict, tolerance & violent conflicts, cultural exchange & clashes, economic cooperation, dependence & interdependence & exploitation,

? ***narrow concept*** of the **Blue Plan** of the administrative units with a Mediterranean coastline, of the watershed or of the cultivation areas of the olive

? ***medium concept*** of a Mediterranean perspective that includes all countries with **Med. coastlines (riparians)** plus Portugal, Jordan & possibly Bulgaria

? ***wide concept*** that includes the **Black Sea, Red Sea & Persian/Arab Gulf** region, recognising the **ecological, cultural and economic similarities**

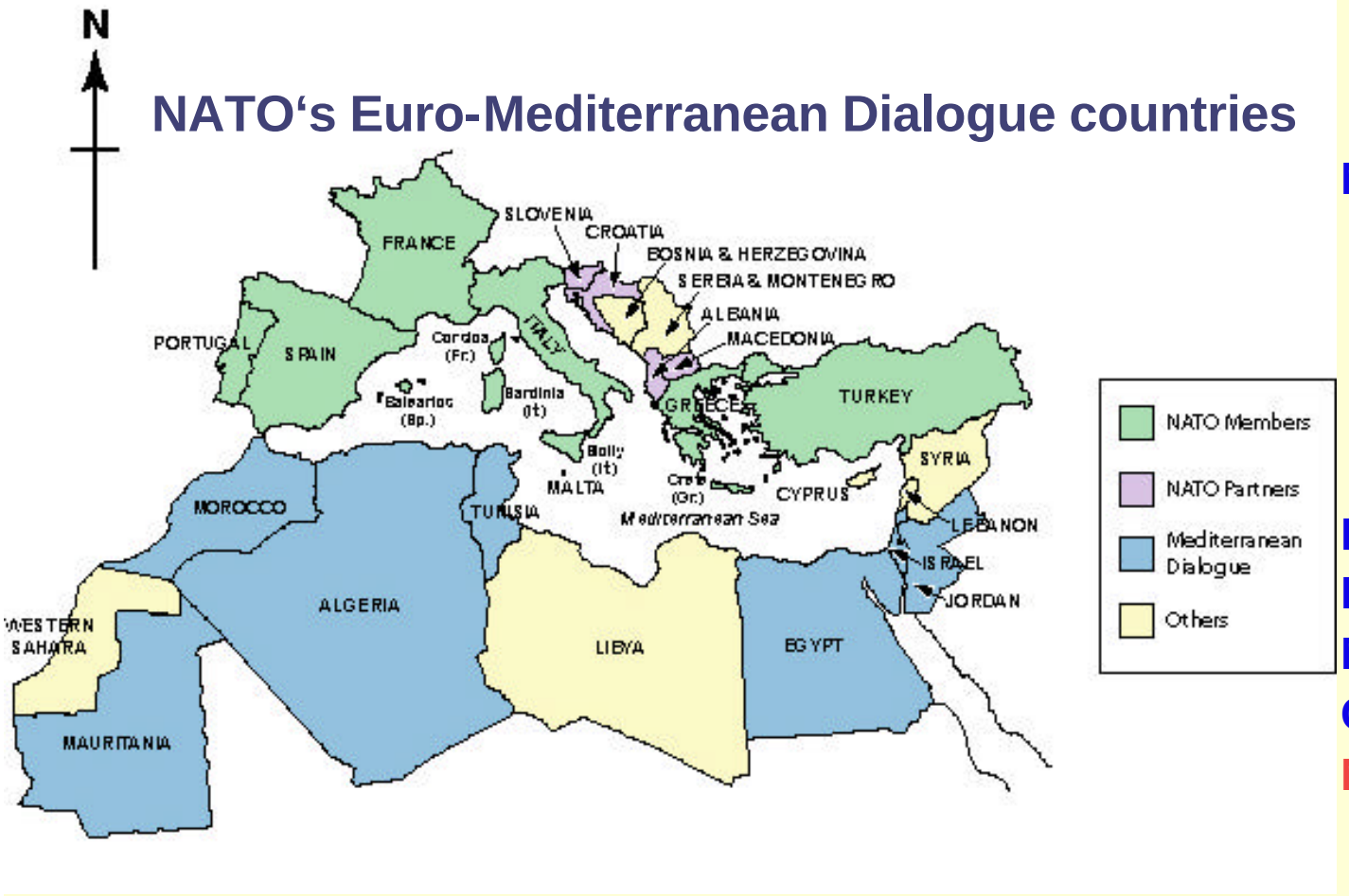
5.2. Mediterranean space

3 continents, 3 religions, common cultural &d historical space, deep economic & political North/South divide

Area of tourism and of many unresolved conflicts

A region that is confronted with fundamental political, economic, societal and environmental challenges during the 21st Century

5.3. Political Space: NATO‘s Med. Dialogue



NATO Mediterranean Dialogue: 26+7= 33 countries

NATO CCMS Pilot Study

NATO: Bulgaria, Canada, Czech Rep., Germany, Hungary, **Italy,** Latvia, Lithuania, Poland, Romania, **Slovenia, Turkey**, USA

EU: Austria, Finland,

PfP: Russia,Ukraine

Med. Dialogue: none

Other: Australia

National projects from Mediterranean countries: Italy, Slovenia, Turkey

5.4. Euro-Med. Partnership (EMP)

- **Euro-Mediter. Partnership (EMP) or Barcelona process: 1 May 2004: 25+10 (35 countries)**
- **EU-programme SMAP**

2 meetings of Environm. Ministers

- **Nov. 1997: Helsinki**
- **July 2002: Athens**

June 2003, Council of Thessaloniki, EU Green Diplomacy (Network)

NATO CCMS Pilot Study

EU: Austria, Czech Republic, Finland, Germany, Hungary, **Italy,** Latvia, Lithuania, Poland, **Slovenia,**

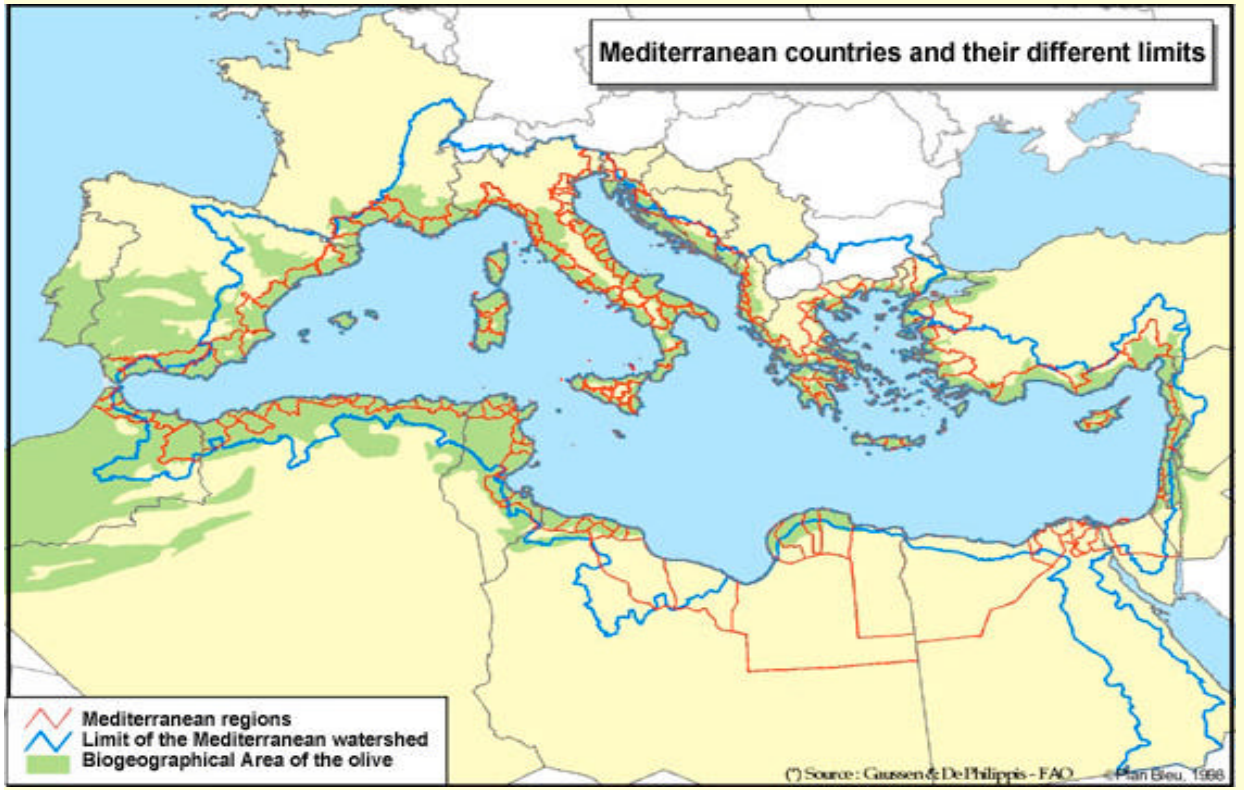
NATO: Bulgaria, Canada, Romania, USA, **Turkey**

Non-members of EU: Russia, Ukraine

From Med.: Italy, Slovenia, Turkey

EMP partners: so far none: Algeria??

6. Common Environmental Challenges until 2100



Mediterranean coastal zone (Blue Plan)

vulnerable to rapid onset hazards: drought & forest fires, storms, flash floods, mudflows;

vulnerable to slow onset hazards: sea-level rise and temperature increase (climate change)

- **Geoecological commonalities**
  - ? **Climate change (extreme weather events: hazards)**
  - ? **Soil erosion: defore-station, desertification**
  - ? **Water: precipitation (scarcity. Degradation) (drought, forest fire)**
- **Socio-economic differences**
  - ? **Population growth**
  - ? **Urbanisation**
  - ? **Food needs**

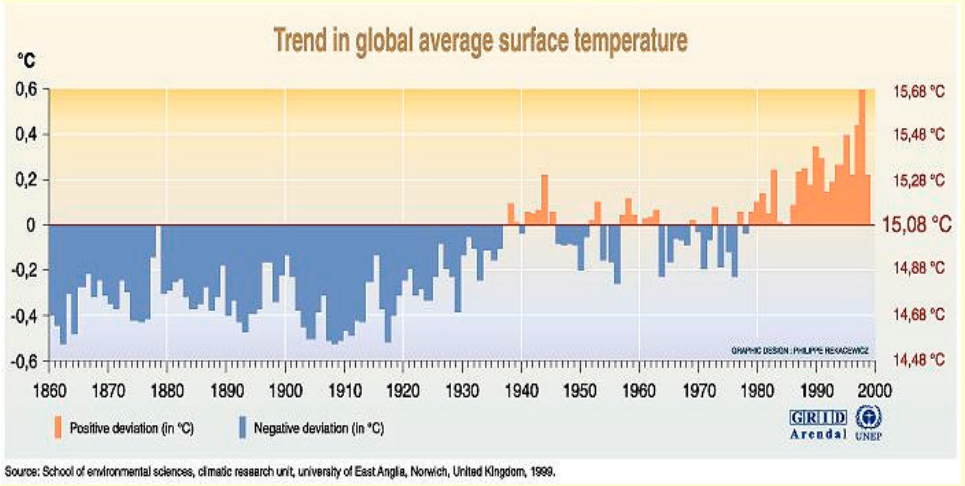
Coping capacity

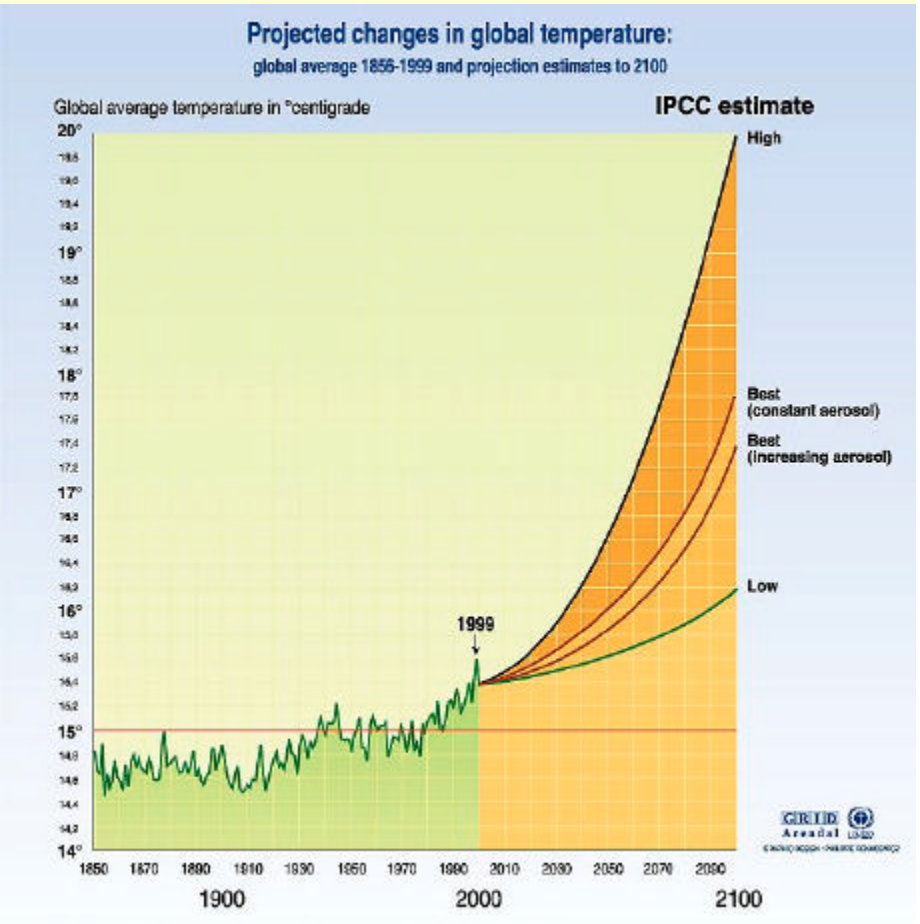
6.1. Global Climate Change: Temperature Increases & Sea Level Rise

2 Climate Change Impacts: Temperature & Sea level Rise

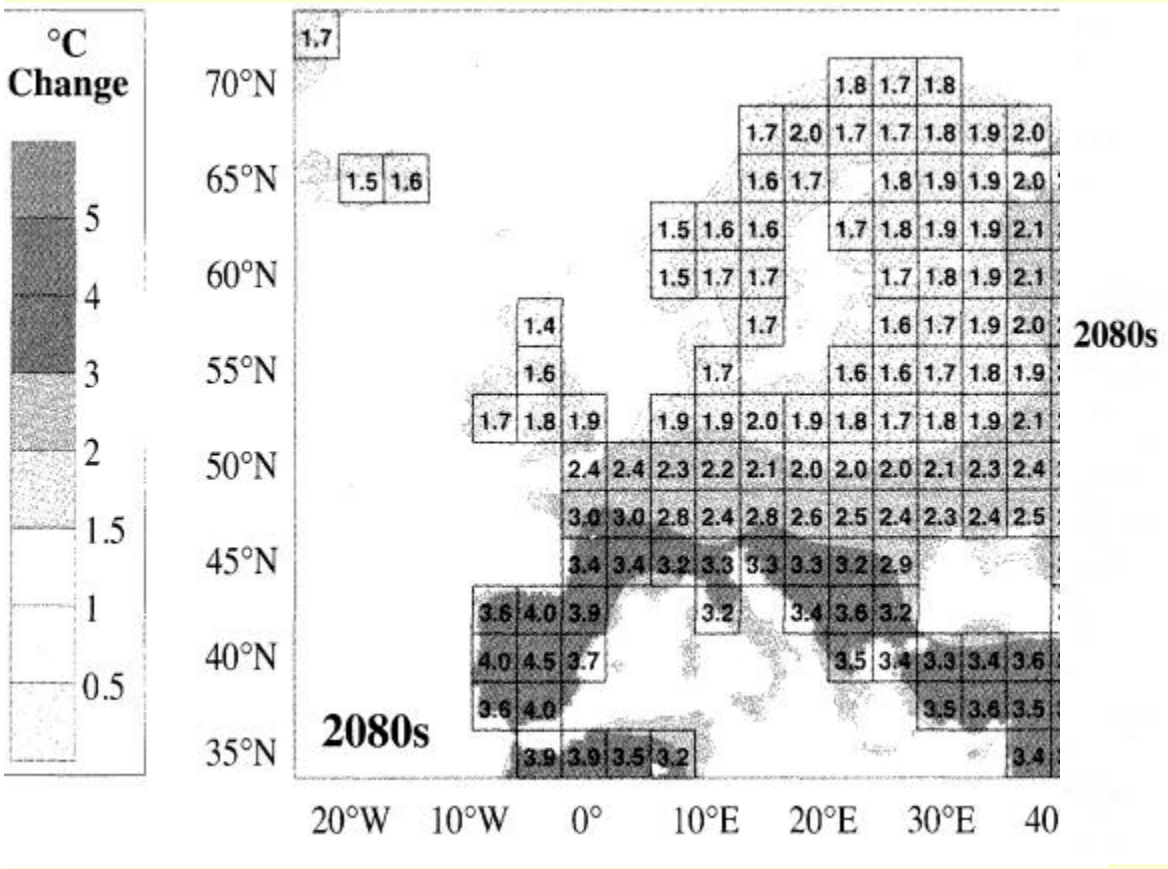
- **Global average temperature rise in 20th century: + 0.6°C**
- **Projected temperature rise: 1990-2100: +1.4 – 5. 8°C**

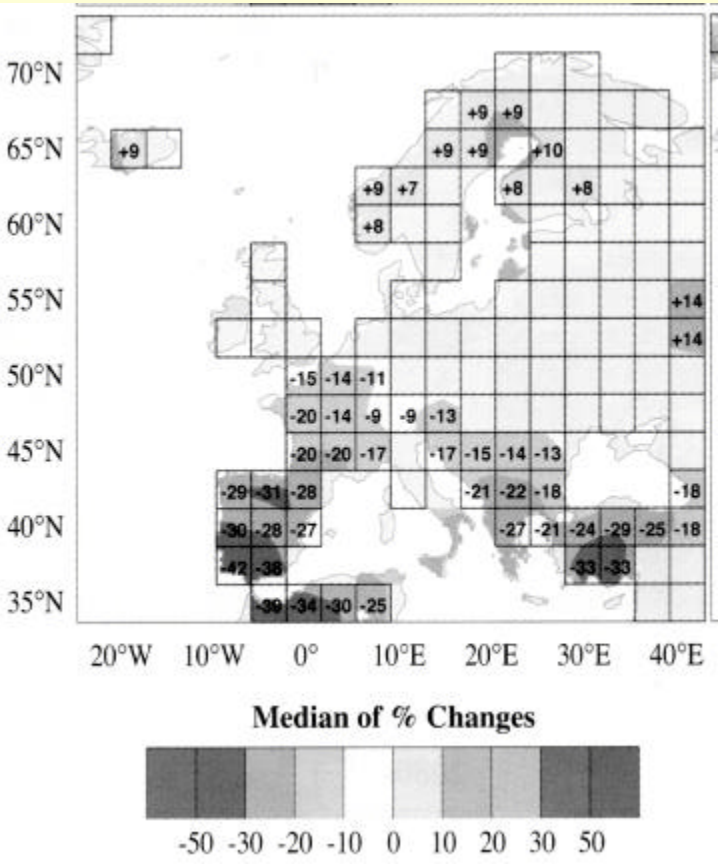
Sources: IPCC 1990, 1995, 2001





6.2. Climate Change Impacts in Mediterranean





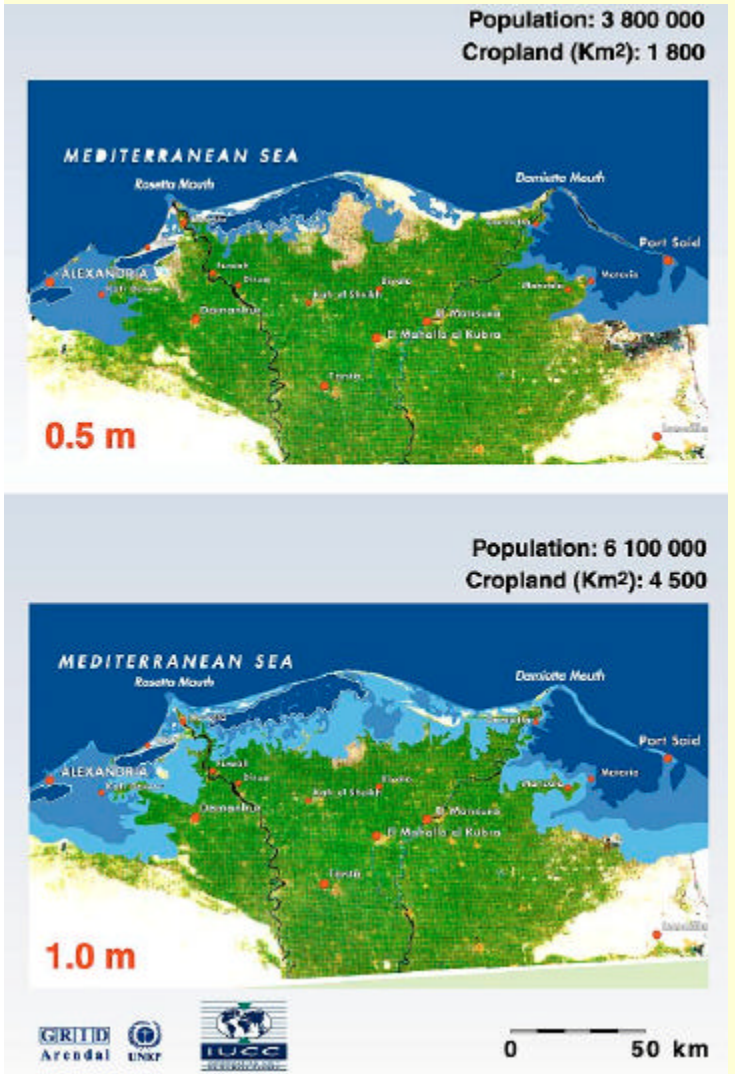
ffiMean Temperature Change for Summer in 2080s (WG II, p. 651)

Mean Precipitation Change for Summer in 2080s (WG II, p. 652) ffi

Source: IPCC: Climate Change 2001, WG II: Impacts (p. 651-652)

No specific climate change models for South. & East. Mediterranean

6.3. Effects of Climate Change for Egypt & Nile Delta



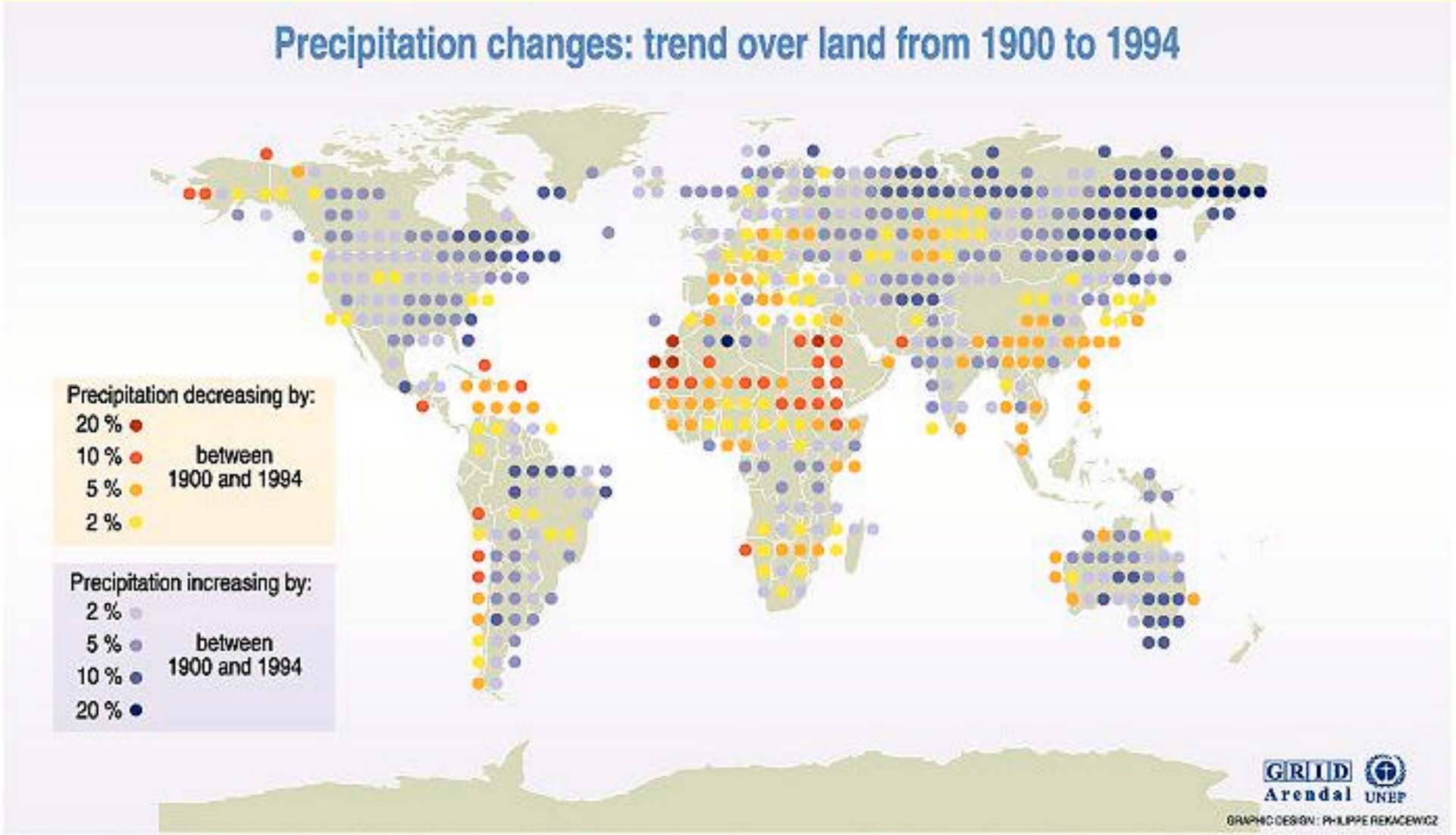
Global Climate Change:

Sea level rise: IPCC, TAR, WG 2 (2001)
Sea level rise 1860-2000: 0.1 – 0.2 m;
Sea level rise: 1990-2100: 0.09-0,88 m

Climate Change Impacts: Egypt:

- Nil Delta: 50cm, 2 mio. persons, 214.000 jobs
- Temperature Cairo 2000- 2060: + 4°C
- Self-sufficiency rate (SSR) for cereals: 1990-2060: decline from 60 to 10%
- Projected yield decline for wheat due to climate change: 2000 - 2050: -18%

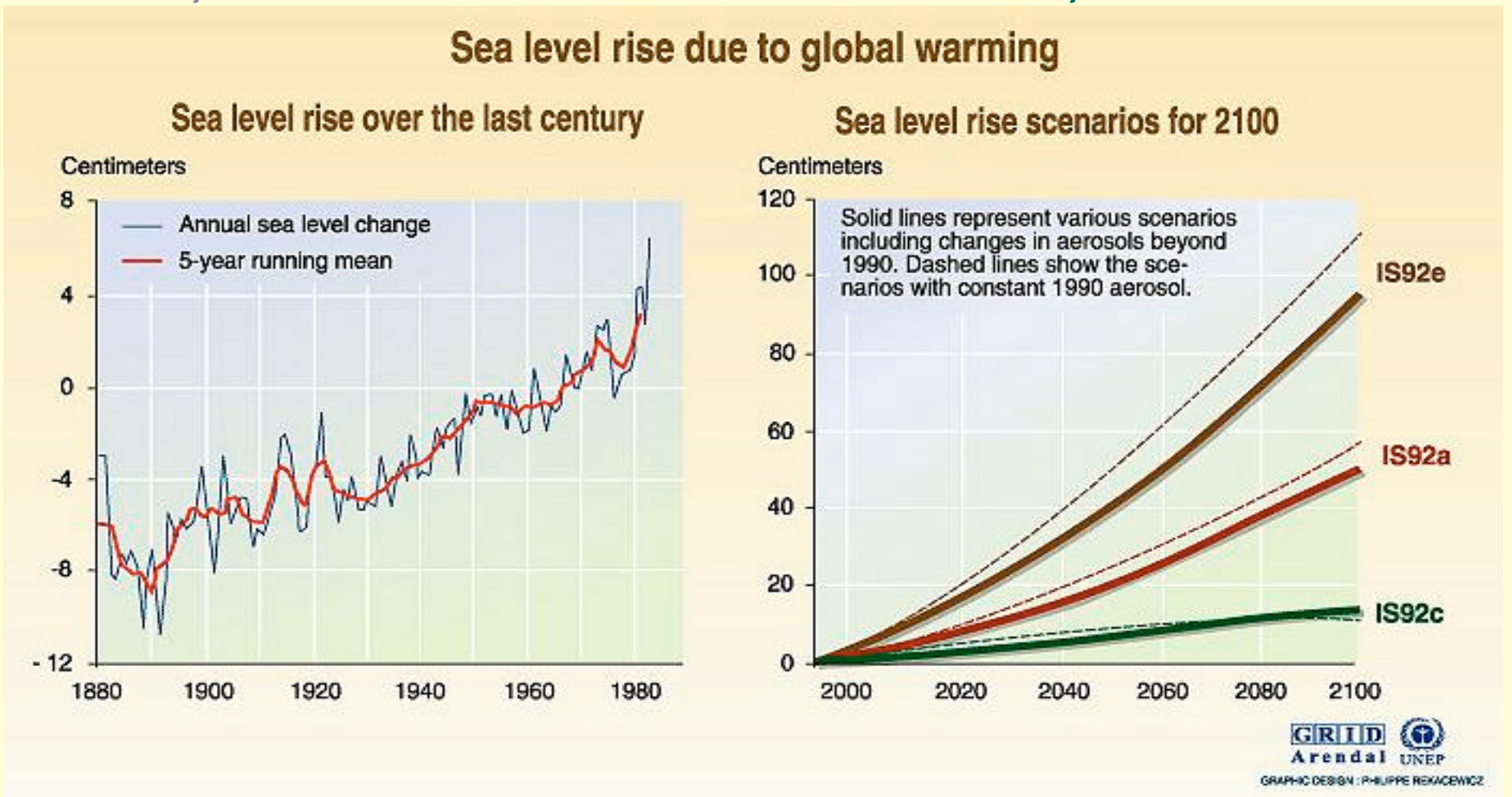
6.4. Climate Change Impacts on Precipitation



Sources: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996; Hulme et al., 1991 and 1994; Global Historical Climate Network (GHCN), Vose et al., 1995 and Eischeid et al., 1995)

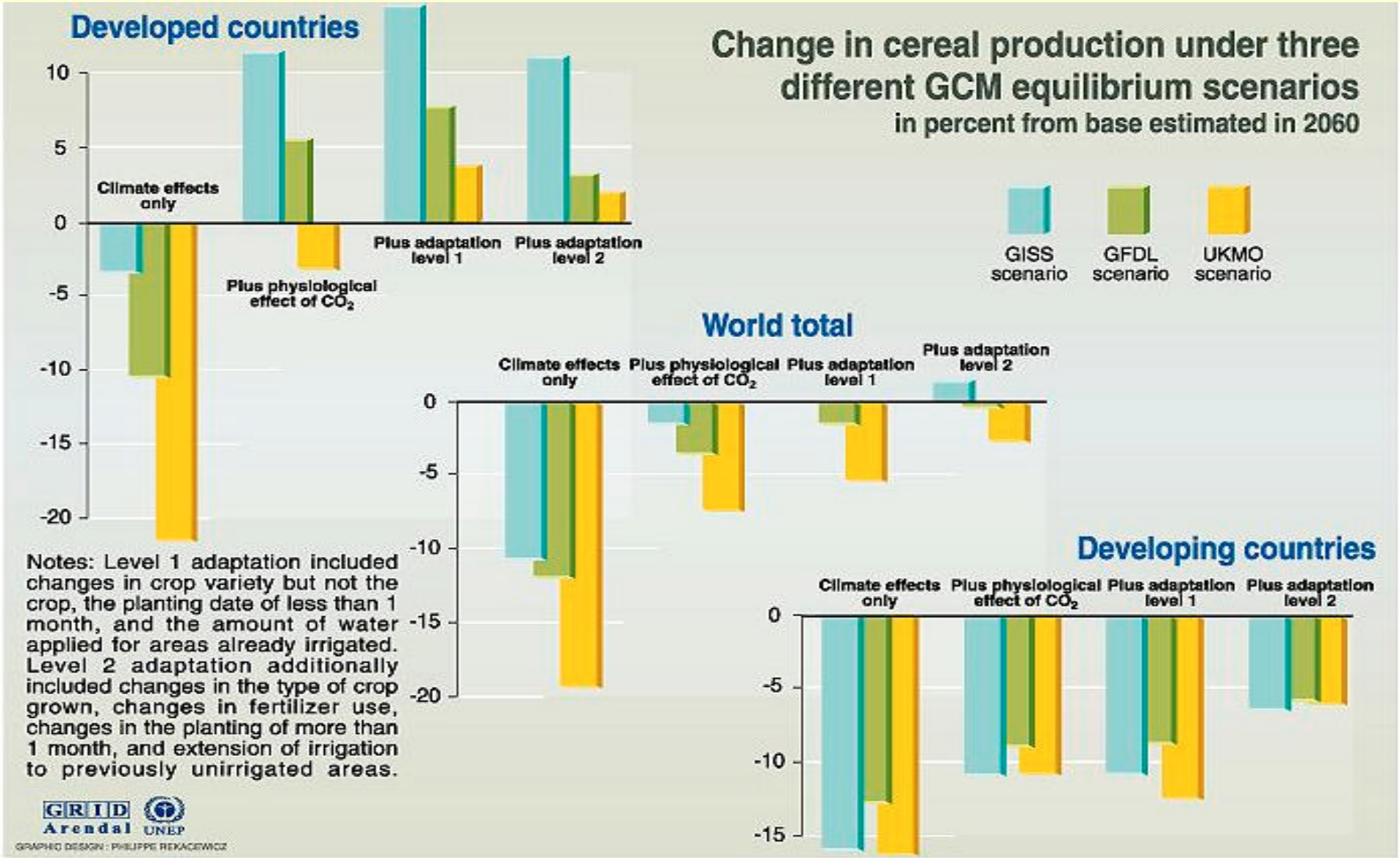
6.5.Global Climate Change: Sea level rise: 1860-2100

IPCC, TAR, WG 2 (2001): Sea level rise 1860-2000: **0.1 – 0.2 m**; sea level rise: 1990-2100: + **0.09 - 0,88 m**



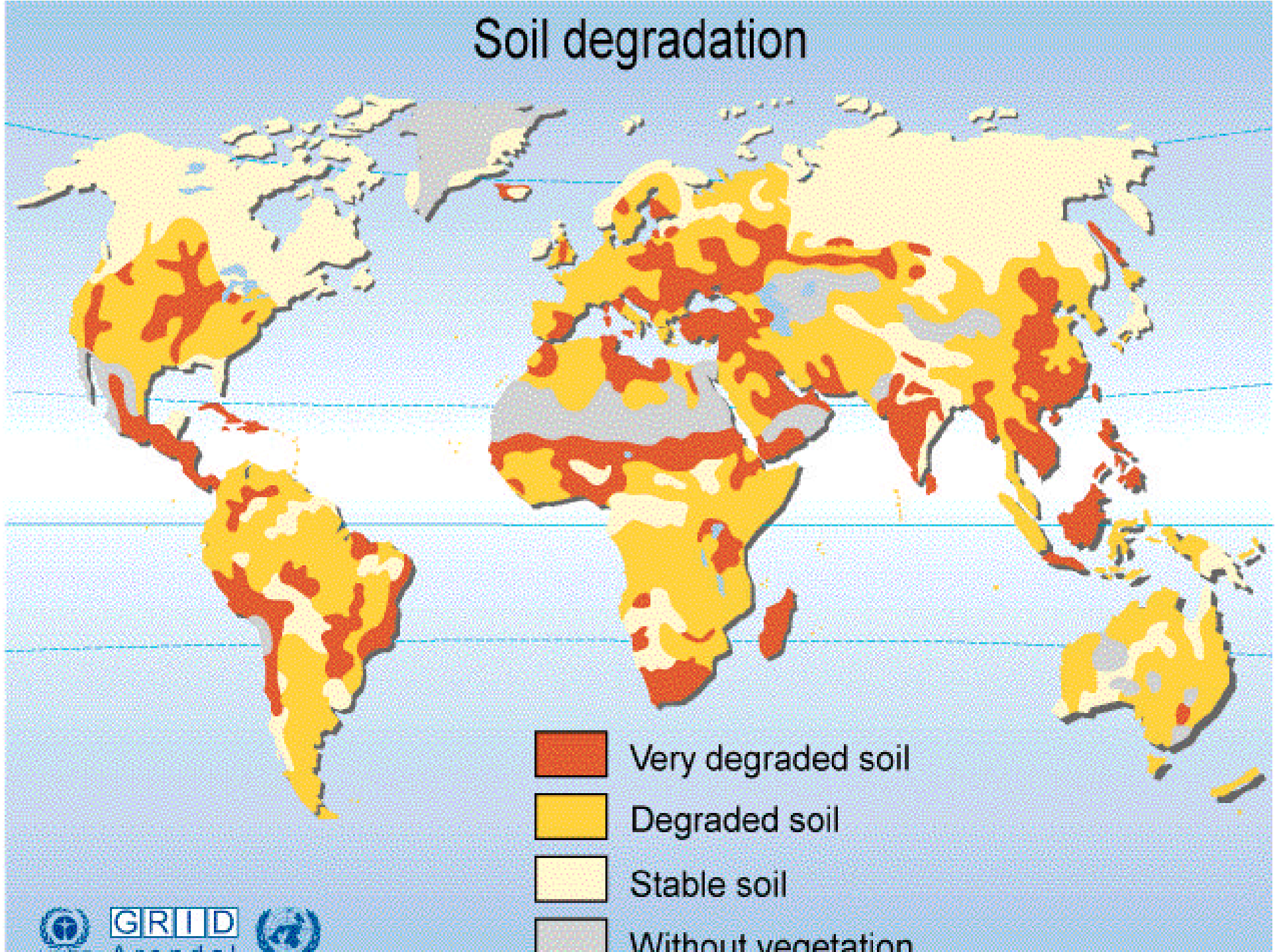
Source: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996; Sea level rise over the last century, adapted from Gornitz and Lebedeff, 1987.

6.6. Climate Change Impacts on Agriculture

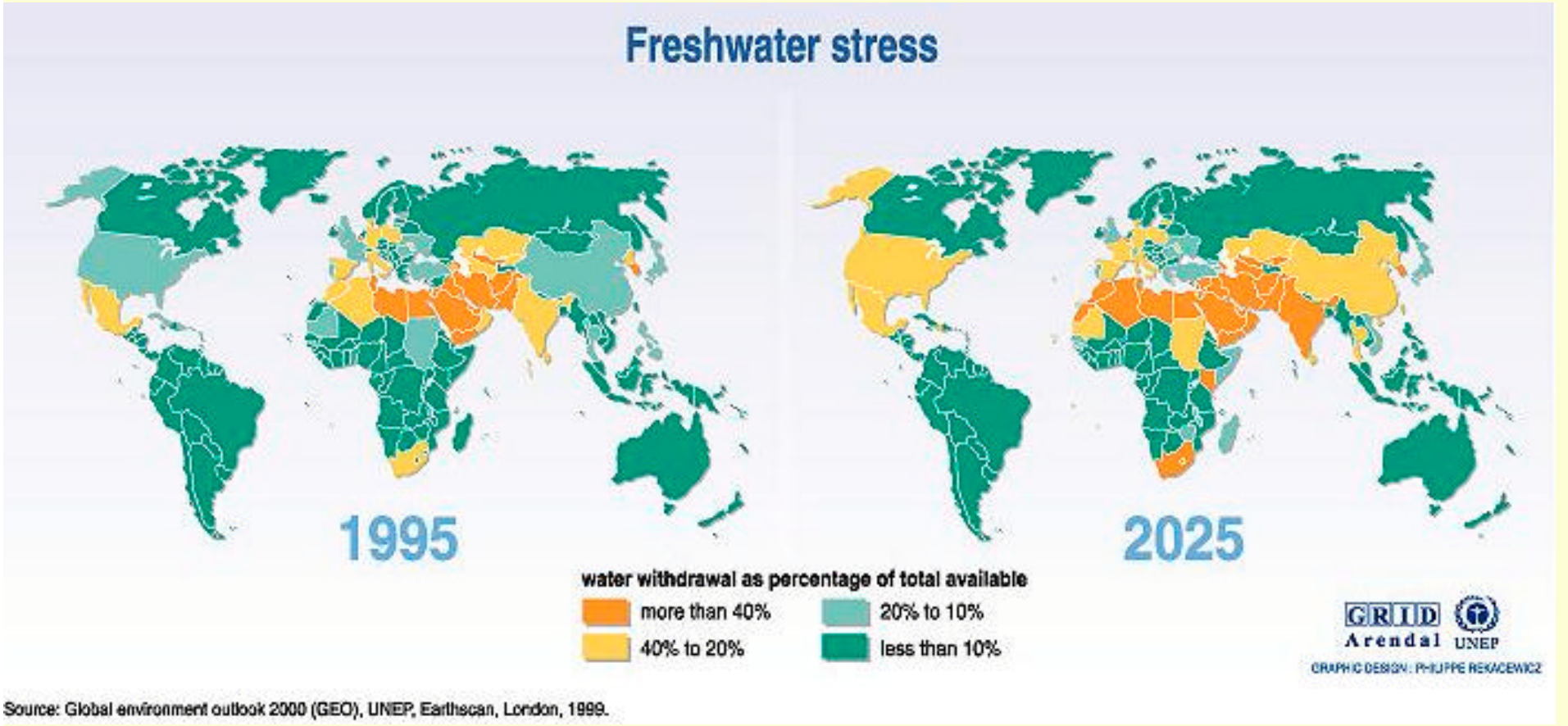


Source: Climate change 1995, Impacts, adaptations and mitigation of climate change: scientific-technical analyses, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.

Soil degradation



6.8. Global Fresh Water Stress,1995-2025 (UNEP)



Source: Global environment outlook 2000 (GEO), UNEP, Earthscan, London, 1999.

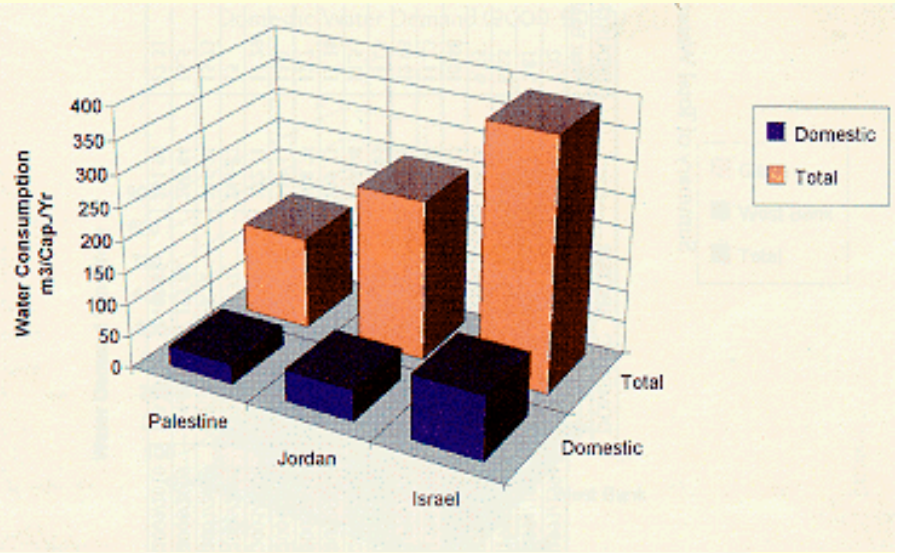
- **The MENA Region has been and will remain the region with the highest water stress that will become even more severe due to population growth and climate change (temperature rise).**

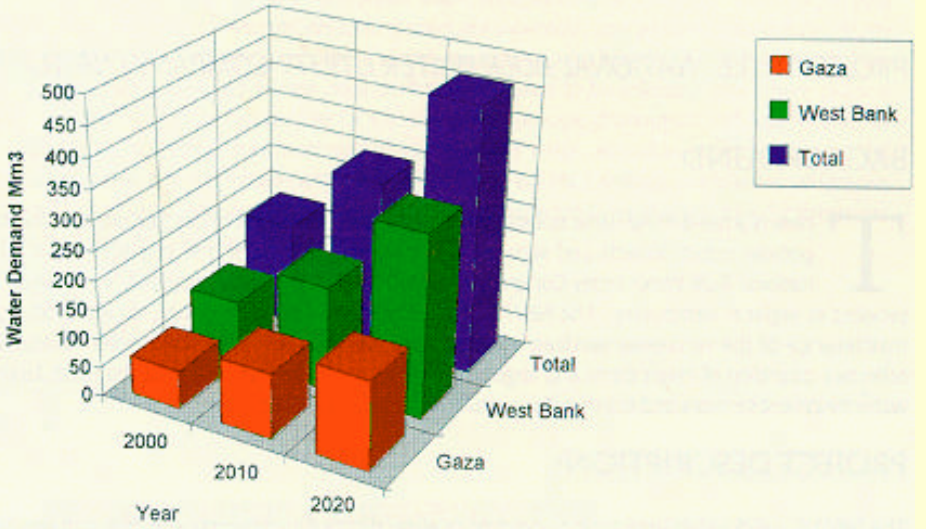
6.9. Water Scarcity in the Near or Middle East

- **FAO: of 21 c. water-scarcity, 12 are in NE**
- **11 MENA c. fresh water: 220 m3/cap. Jordan, 330 m3/cap. OPT, 2,000 m3/cap. Turkey,Syria.**
- ***K. Khosh-Chashm*: Most extreme water crisis is in Gaza (15 gallons, US: 800 gall. or 1: 53).**
- **Estimate: a drop of 50% in ann. cap. Renew. Water: 1995 and 2025 in MENA countries.**

Water	Israel	Jordan	West Bank
Supply	**1987-1991 (million c.m)**		
Normal	1,950	900	650
drought	1,600	700-750	450-550
Demand	**Projected increase**		
1987-91	2,100	800	125
2020	2,800	1,800	530
Source: Helena Lindblom 1995; Lowi 1992.			

6.10. Water Situation in Gaza & in West Bank 2000-2020





6.11. Common Environmental Challenges: Different Impact & Vulnerability until 2100

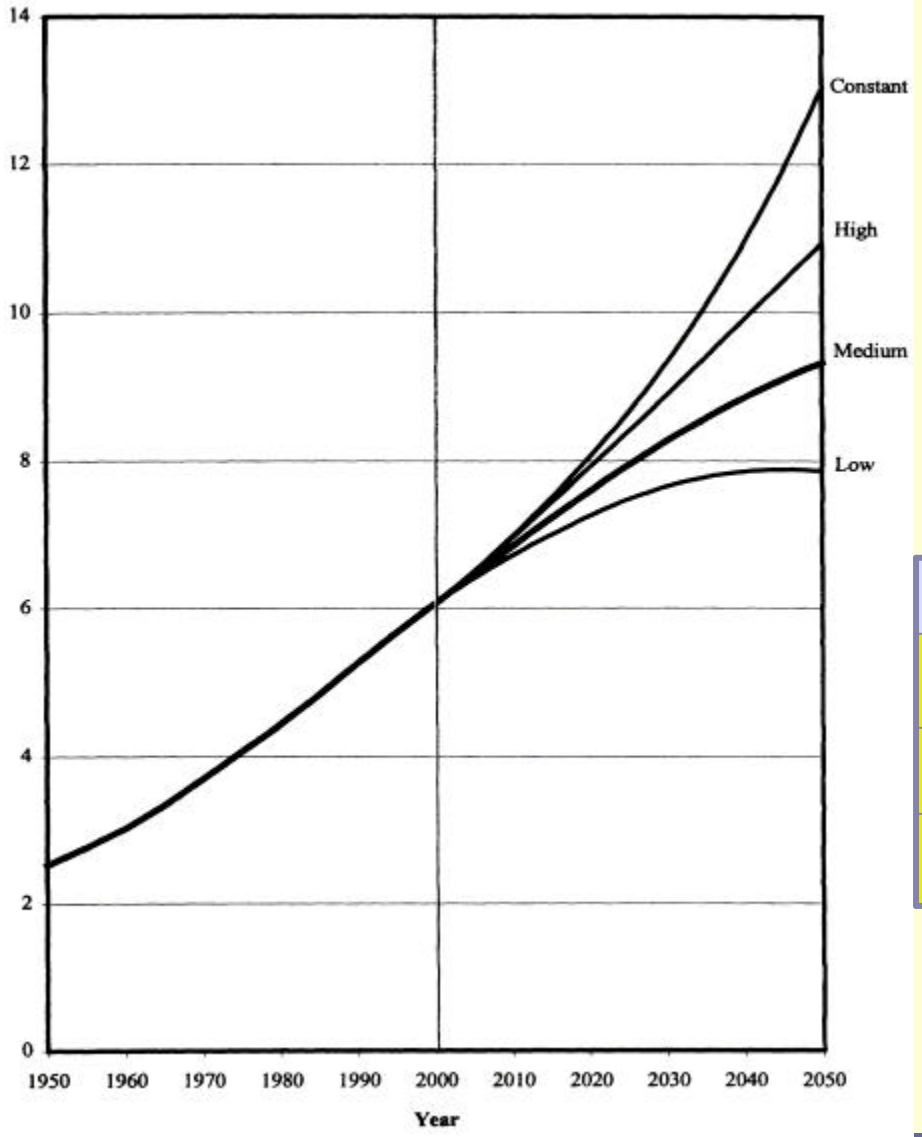
Northern Shore: Southern & Southeastern Europe

- **Climate change:** higher GHG emissions (1990: Spain equalled North African region)
- **Desertification: economy driven:** reduce agricult. production
- **Precipitation & water scarcity:** declining demand & improved coping capacity („**Virtual water**“)
- **Higher degree of information & early warning, performance**
- **Higher coping capacity for adaptation and mitigation**

Southern & Eastern Shore: Middle East & North Africa

- **Climate change:** lower contribution & higher impact (of sea-level rise, extreme weather events)
- **Desertification: poverty driven** (demand for agricultural land and food will grow rapidly)
- **Precipitation:** increasing demand for blue & green water
- **Lower degree of information & early warning, performance**
- **Lower coping capacity for adaptation and mitigation**

7. Different Socio-economic Challenges in the Mediterranean until 2030, 2050 and 2300



? **Population growth:**

? World Population, Medium Scenario 2000-2150 (UN, 1998 Rev.)

	2000	2050	2100	2150
Total	6,01	8,91	9,50	9,75

World Population in 2300. Highlights (UN, Dec. 2003), Med. Scenario ffi

	2000	2050	2100	2200	2300
World	6,071	8,919	9,064	8,499	8,972
Develop.	1,194	1,220	1,131	1,207	1,278
Less Dev.	4,877	7,699	7,933	7,291	7,694

? **Urbanisation:** will increase

? **Food & Agriculture:** Demand will grow due to population growth

7.1. Population Growth & Urbanisation in the Mediterranean Region (1850- 2050)

Trends in Population Growth (1850-2050) in million						
			1850	1900	1950	2000	2050
Southern Europe			83.0	103.5	132.9	177.3	154.1
North Africa			13.1	22.3	44.1	142.8	239.4
Eastern Med. & Turkey			12.45	16.05	29.2	89.5	173.9
Trends in Urbanization (1950-2030) in %, Growth of Urban Centres							
			1950	1980	2000	2010	2030
North Africa (5)			24.7	40.4	48.9	53.4	63.3
Western Asia(6)			26.7	51.7	64.7	67.2	72.4
	1950	1960	1975	1990	2000	2010	2015
Istanbul	1.08	1.74	3.60	6.54	8.96	10.72	11.36
Algiers	0.50	0.81	1.57	1.91	2.76	3.74	4.14

7.2. Mediterranean Population Trends

	Real population change					Proj. med. var.		Changes	
	1850	1900	1950	1980	2000	2025	2050	1950-2050	2000-2050
S. Europe F,G,I, S,P	83.0	103.5	132.9	167.3	177.3	172.5	154.1	21.2	-23.2
EU Cand.	0.28	0.42	0.81	0.94	1.17	1.32	1.31	0.50	0.136
Balkans Yug.&Alb.	7.75	10.3	17.6		26.34	26.32	23.99	6.43	-2.35
North Africa	13.1	22.3	44.1	91.4	142.8	199.8	239.4	195.3	96,6
Eastern Mediterr.	12.45	16.05	29.3	62.6	89.5	142.9	173.8	144.5	84.3
10 + Libya	25.55	38.35	73.4	154.	232.3	342.7	413.2	339.9	180.9

Decline in Southern Europe, major population increase in MENA

7.3. Population Growth: South & Central Europe

Table: UN Population Projection (Rev. 2000), mio.

Source: UN Populations Division: World Population Prospects. 2000 Rev.

	1850	1900	1950	2000	2025	2050	1950-2050	2000-2050
France	36.0	41.0	41.83	59.24	62.75	61.83	20.00	2.59
Greece	3.5	4.5	7.57	10.61	10.15	8.98	1.42	-1.63
Italy	25.0	34.0	47.10	57.53	52.36	42.96	-4.14	-14.57
Portugal	3.5	5.5	8.41	10.02	9.83	9.01	60	-1.01
Spain	15.0	18.5	28.01	39.91	37.40	31.28	3.27	-8.63
S. Europe	83.0	103.5	132.9	177.3	172.49	154.1	+21.2	-23.24
Germany	27.0	43.0	68.38	82.02	78.90	70.81	+2.43	-11,21
Poland	13.0	24.0	24.82	38.61	37.25	33.37	+8.55	-5,24
Russian F	60.0	100,0	102.7	145,5	125.69	104.26	+1,56	-41,24
USA	24.0	76.0	157.8	283.2	346.8	397,1	+239,3	+50,30

7.4. Population Growth: North Africa

Table: UN Population Projection (Rev. 2000), mio.

Source: UN Populations Division: World Population Prospects. 2000 Rev.

	1850	1900	1950	2000	2025	2050	1950-2050	2000-2050
Algeria	3.0	5.0	8.75	30.29	42.74	51.18	42.43	20.89
Morocco	3.0	5.0	8.95	29.88	42.00	50.36	41.41	20.48
Tunisia	1.0	1.5	3.53	9.46	12.34	14.08	10.55	4.62
Libya	0.6	0.8	1.039	5.29	7.97	9.97	8.94	4.68
Egypt	5.5	10.0	21.83	67.88	94.78	113.84	92.01	45.96
N. Africa	13.1	22.3	44.10	142.8	199.83	239.43	195.33	96.63
East. Med.	12.45	16.05	29.25	89.50	141.43	173.88	144.53	84.28
MENA	25.55	38.35	73.35	232.30	342.73	413.20	339.86	180.90
S. Europe	83.0	103.5	132.9	177.3	172.5	154.1	+21.2	-23.24

7.5.Population Growth: Eastern Mediterranean

Table: UN Population Projection (Rev. 2000), mio.

Source: UN Populations Division: World Population Prospects. 2000 Rev.

	1850	1900	1950	2000	2025	2050	1950-2050	2000-2050
Jordan	0.25	0.3	1.24	4.91	7.19	11.71	10.47	6.80
Israel			1.26	6.04	8.49	10.07	8.81	4.03
OPT	0.35	0.5	1.01	3.19	7.15	11.82	10.82	8.63
Lebanon	0.35	0.5	1.44	3.50	4.58	5.02	3.58	1.52
Syria	1.5	1.75	3.50	16.19	27.41	36.35	32.85	20.16
Turkey	10.0	13.0	20.81	55.67	86.61	98,82	78.01	43.15
East. Med.	12.45	16.05	29.25	89.50	141.43	173.88	144.53	84.28
S. Europe	83.0	103.5	132.9	177.3	172.5	154.1	+21.2	-23.24

7.6 Population Growth: Eastern Mediterranean

Table: UN World Population 2300 (Dec. 2003), in million

Source: UN Populations Division: Draft World Population in 2030.

Highlights According to the Med. Scen., 2000 to 2300, max. pop.& year

[http://www.un.org/esa/population/publications/longrange2/AnnexTablesB.pdf]

	2000	2050	2100	2200	2300	Year of max.pop.	Max. pop.
Jordan	5.035	10.154	10.664	9.659	10.077	2080	10.902
Israel	6.042	9.989	9.833	8.817	9.370	2070	10.290
OPT	3.191	11.114	14.932	12.856	13.484	2105	14.933
Lebanon	3.478	4.946	4.506	4.420	4.694	2055	4.951
Syria	16.56	34.174	35.012	31.530	33.413	2075	36.316
Turkey	68.28	97.759	90.323	87.452	91.593	2055	98.064
Egypt	67.78	127.407	131.819	117.85	124.715	2075	136.279

7.7. Urbanisation in Eastern Mediterranean

Table: World Urbanization Prospects (Rev. 2001),%

Source: UN Populations Division: World Population Prospects (2002)

	1950	1960	1980	2000	2010	2020	2030
Jordan	35.9	50.9	60.2	78.7	80.1	82.2	84.4
Israel	64.6	77.0	88.6	91.6	93.0	93.9	94.6
Palestine	37.3	44.0	61.1	66.8	70.0	73.5	76.9
Lebanon	22.7	39.6	73.7	89.7	92.1	93.1	93.9
Syria	30.6	36.8	46.7	51.4	55.4	60.6	65.6
Turkey	21.3	29.7	43.8	65.8	69.9	73.7	77.0
West Asia	26.7	35.0	51.7	64.7	67.2	69.8	72.4
Asia	17.4	20.8	26.9	37.5	43.0	48.7	54.1

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

ffi High Potential for Food Crisis (1901-1995)

Alcamo/Endejan 2002: 143

7.8. Food Crises

High Potential for Food Crisis (2001-2050) with GDP and Climate Change ffi

Alcamo/Endejan 2002-143

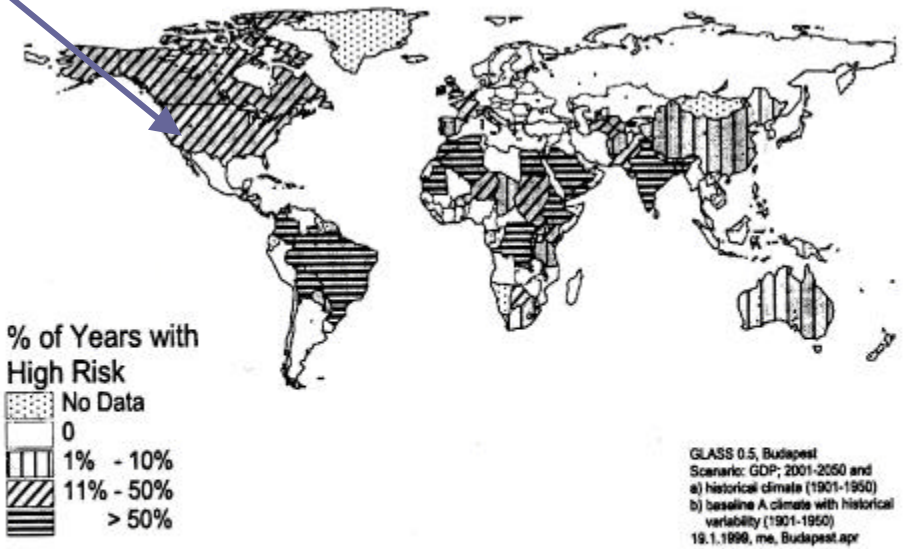
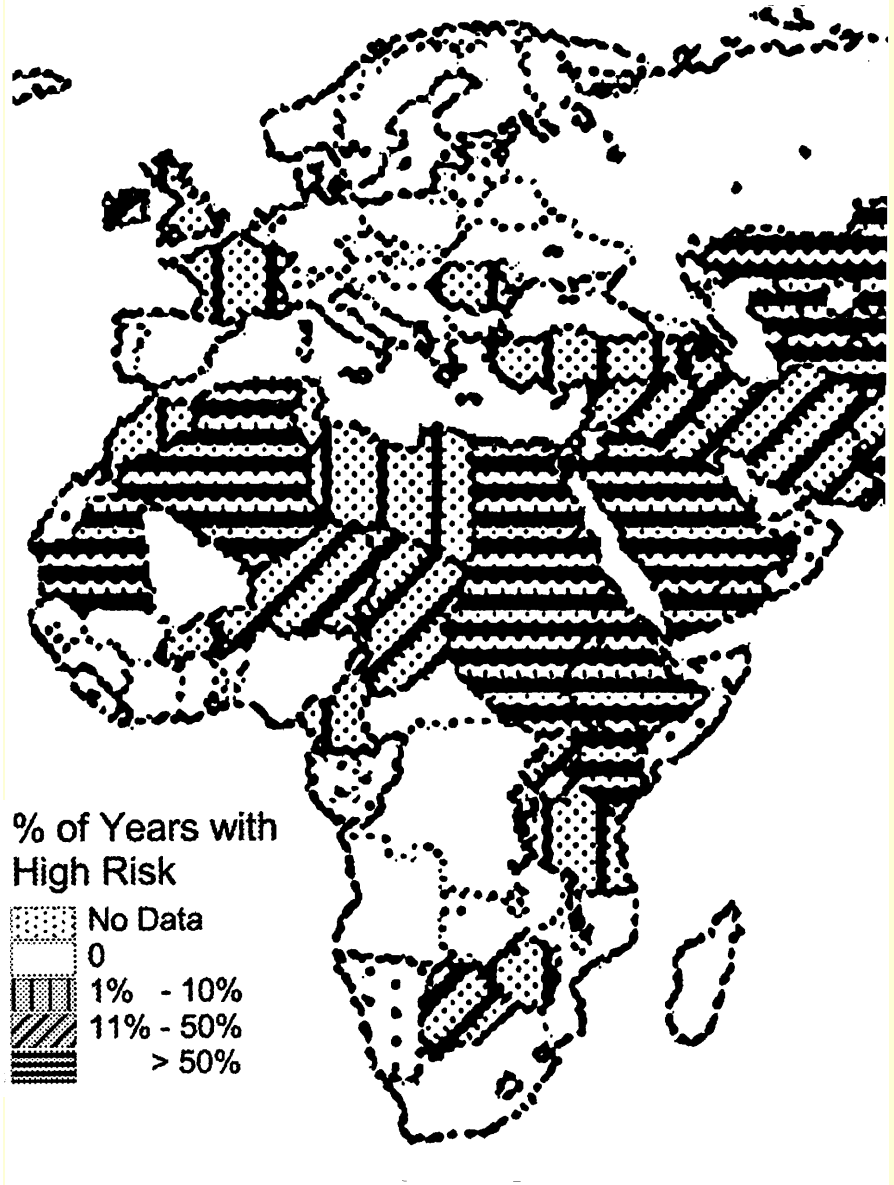


Figure 6. High Potential for Food Crisis 2001-2050 – with GDP Increase and Climate Change.

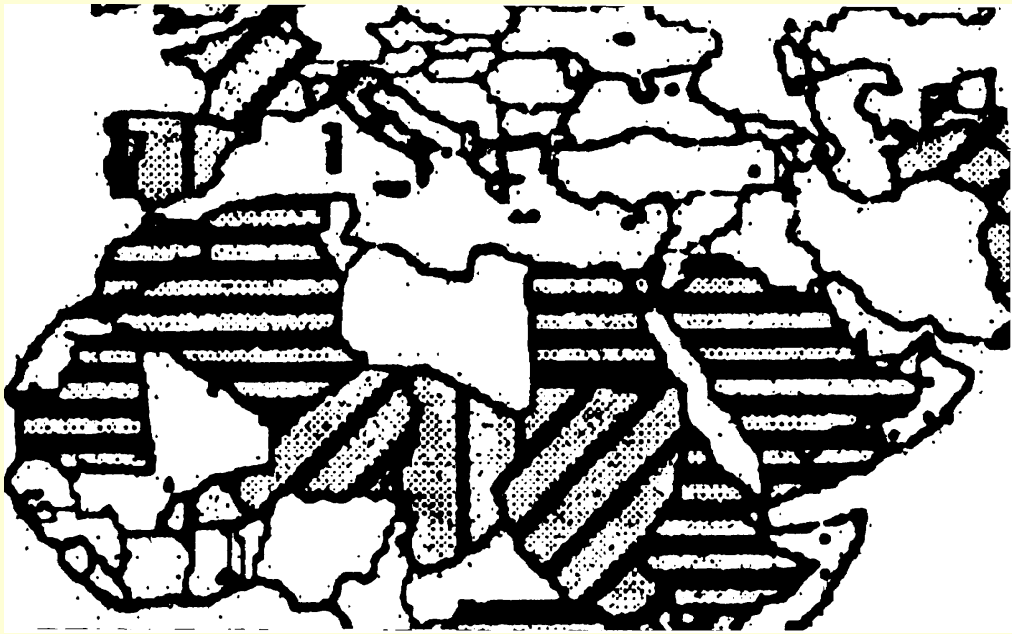
7.9 High Potential for Food Crisis 1990-2050



? Food Crisis: 1900-1995

Source:Alcamo/Endejan (2002)

High Potential for Food Crisis 2001-2050 with GDP Increase & Climate Change ?

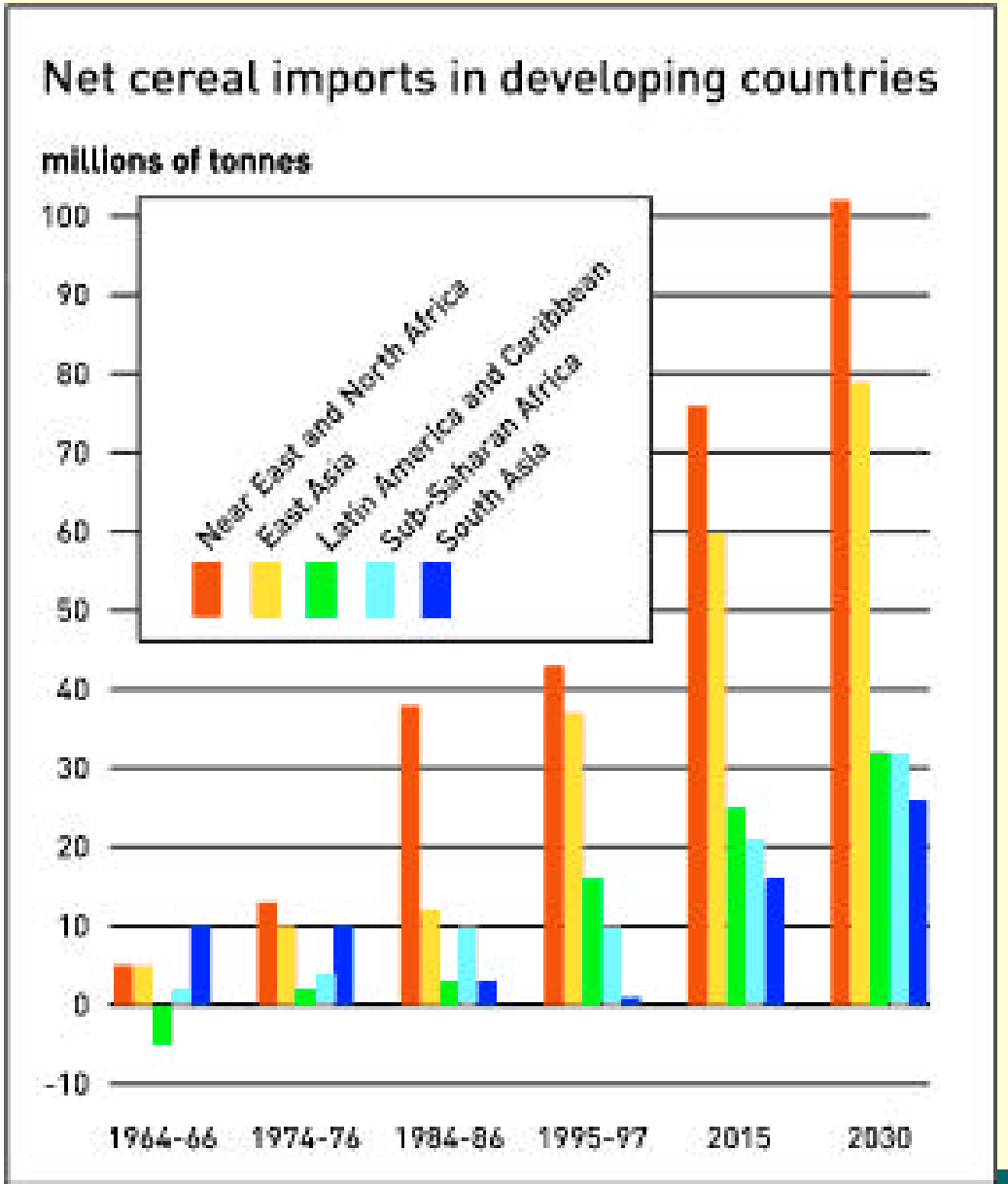


7.10. Food Security in the MENA Region

Table: Cereal balance for the MENA, all cereals (1964-2030).

19	Demand				Pro-duc-tion	Net tra-de	Selfs uf-fic. rate %	Growth rates, % p.a			
	Per caput (kg)		Total (mio.tons)					Time 19... /20..	Dem and	Pro-duc-tion	Po-pula tion
	food	All uses	food	All uses							
64/66	174	292	28	47	40	- 5	86	67-97	3.6	2.4	2.7
74/76	190	307	40	64	55	- 13	85	77-97	3.1	2.7	2.7
84/86	203	365	56	100	65	-38	65	87-97	2.1	2.0	2.4
95/97	208	357	75	129	84	-43	65	’95- 15	2.0	1.4	1.9
2015	209	359	108	186	110	-85	56	‘15- 30	1.5	1.2	1.4
2030	205	367	130	232	131	-116	54	‘95-‘30	1.8	1.3	1.7

7.11. FAO (2000) Increase in Cereal Imports



- **FAO: 4 March 2003, Rome**
  World's population will be better fed by 2030, **but hundreds of millions of people in developing countries will remain chronically hungry**.
- Parts of South Asia may be in a difficult position and **much of sub-Saharan Africa** will not be significantly better off than at present in the absence of concerted action by all concerned.
- Number of hungry people is expected to decline from 800 million today to 440 million in 2030.
- **The target of the World Food Summit (1996) to reduce the number of hungry by half by 2015, will not be met by 2030.**

7.12. Different Socio-Economic Challenges

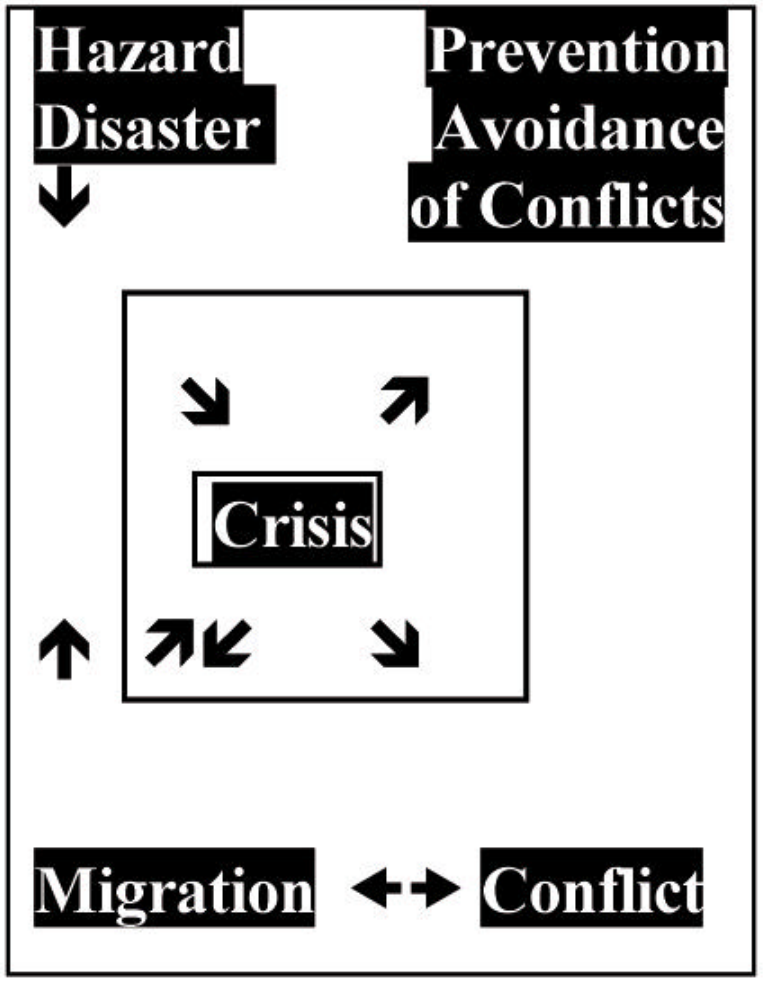
Northern Shore: Southern & Southeastern Europe

- **Population:**
  - **Ageing & Decline:** except USA & France (very severe in Russia, Italy, Germany, Spain, Poland)
  - **Need for immigration**
- **Urbanisation:**
  - **slight increase**
  - **Urban centres stabilise, decline**
- **Food & Agriculture**
  - **Continued growth, exports**
  - **Need for labour in agriculture**

Southern & Eastern Shore: Middle East & North Africa

- **Population**
  - **High growth & youth bulges:** declining fertitily, increase in life expectancy, rapidly rising job needs
  - **Pressure to emigrate increases**
- **Urbanisation**
  - **Continued rapid increase**
  - **All population growth in cities:** slums, bidonvilles grow rapidly
- **Food & Agriculture**
  - **High import needs for food**
  - **Lacking resources for imports**

8. Fatal Outcomes: Hazards, Migration, Crises and Conflicts in the Mediterranean



- **What are impacts of common & divergent trends on outcomes?**
- **Mediterranean coastal zone is vulnerable to:**

? **Urbanisation & tourism**

? North: stable size of urban centres

? South: rapid growth of megacities

? **Increasing soil erosion & extreme weather events:**

? Drought & forest fires

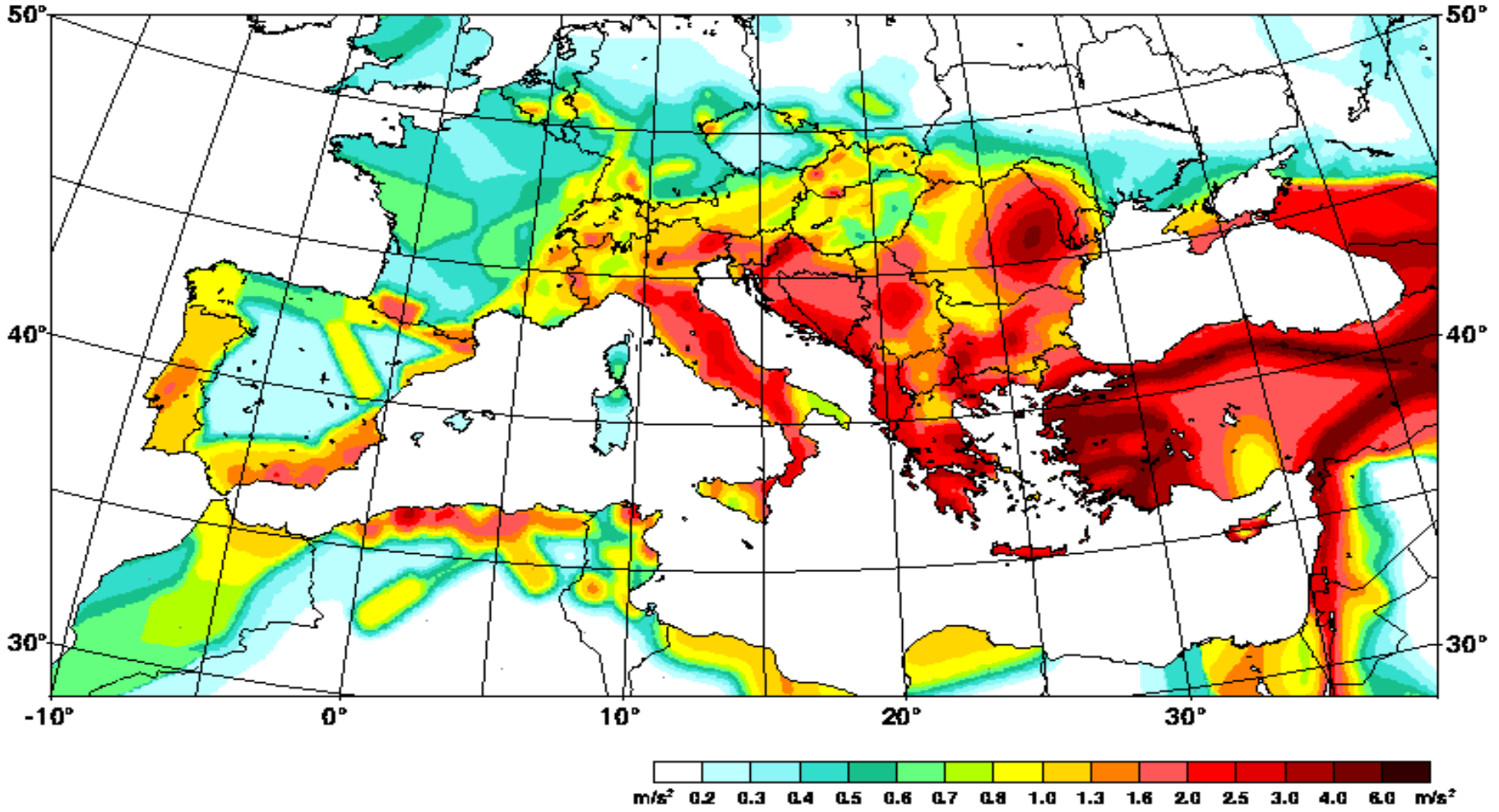
? Storms, floods & mudflows

? **Different fatal outcomes**

? Increase in environment. vulnerability

? Different societal vulnerability

8.1. Fatal Outcomes: Major Hazard: Earthquakes in the Mediterranean Region



8.2. Analysis of Trends in Disasters in the Mediterranean

People reported killed & affected by natural disasters, 1975 – 2001

	Total		Earthquake		Flood		Storm	
	E	Killed	E	Killed	E	Killed	E	Killed
S.Europe	249	8,889	33	6,007	71	837	60	469
Balkans	50	562	11	187	12	108	0	0
W. Asia	95	27,613	23	26,087	24	505	8	70
N. Africa	82	6,606	10	3,452	38	2,924	6	69
Total	485	43,729	79	35,735	145	4,374	76	608

Source: CRED database: how representative are reported events?

Role of Earthquakes more important than global trends (Munich Re)

Fatalities of Earthquakes: ca. 50% in 1999 in Izmit (Turkey)

Floods: More events & damages in S.Europe, more fatalities in N.A.

8.3. Fatalities of Disasters in Eastern Med.

Table: Fatalities of Natural Disasters (1975-2001)

	Total			Drought		Earthquakes		Floods		Storms	
	Ev	Killed	Affect (000)	Kil l.	Aff. 000	Killed	Affect (000)	Kill.	Aff. 000	Kil	Aff.
Israel	11	31	2,029	-	-	-	-	11	1	3	410
Jordan	11	47	349,0	-	330	-	-	17	18,0	11	200
Leban.	4	45	105,6	-	-	-	-	-	1,5	25	104,
OPT	1	-	943	-	-	-	-	-	-	-	-
Syria	5	115	662,2	-	658	-	-	27	172	-	-
Turkey	63	27,375	2,580	-	-	26,087	2,377	450	92,2	31	3
East M.	95	27,613	3,700	0	988	26,087	2,377	505	112,9	70	104,
Total M.	485	43,728	22,15	0	10 m	35,74	35,74	4374	2,153	608	3,697

8.4. Vulnerabilities of Cities to Disasters

Earthquake in Izmit, Turkey, 17 August 1999

- **Turkey 23 (of 63): earthquakes killed: 26,087, affected: 2,377,128**
- **Izmit: 17,200 died, 321,000 jobs, 600,000 homel., econ. loss (US$ 12bn),**
- **ISDR Report (2000) high vulnerability due to: population growth & urbanization; lack of existing building regulations, siting of industry**
- **Response: 2 WB loans: US$ 757 million; EIB facil.: € 450 million.**

Flash Flood in Algiers: November 2001

- **Algeria: 36 events, 4,124 fatalities, 1,154,355 affect.,**
  earthquakes: 2,881; floods: 1,201; affect.: earthquakes: 1,001,212
- **9-13 Nov. 2001**: Flash floods in Algiers: 921 deaths (IFRC 2002), and affect. 50,423, UNICEF: 10,000 families; econ. losses: US$ 300 mill.
- **High vulnerability ? high fatalities** (population density, poor housing in flood-prone areas, admin. errors, lacking building standards, poor area Bab el Oued).
- **Response: WB loans: US$ 89 million; EIB loan: € 165 million.**

8.5. Floods in the Mediterranean, 1975-2001

country	Date (m/19)	Event	Area affected	death	Econ. loss million ($)	Econ loss ins.
France	**10/88**	**Flash flood**	**Nimes**	**11**	**1,600**	
	11/99	Flash flood	Pyrenees	31	500	400
Greece	11/77	Flood	Athens	25	30	
	1/97	Flood	Athens	9	160	
Italy	**11/94**	**Flash flood**	**Piedmont**	**64**	**9,300**	
	10/00	**Floods, lslide**	**I,CH, F**	**38**	**8,500**	**420**
Spain	8/83	Flood	Burgos	40	950	
	11/87	**Flood ld.slide**	**Valencia**	**16**	**1,000**	
Turkey	**5/98**	**Floods**	**North, S.**	**27**	**2,000**	
Egypt	**11/94**	**flood**	**Durunka**	**589**	**140**	
Algeria	**11/01**	**Flash flood**	**Algeria**	**750**	**300**	

8.6. Vulnerability of Cities to Earthquakes

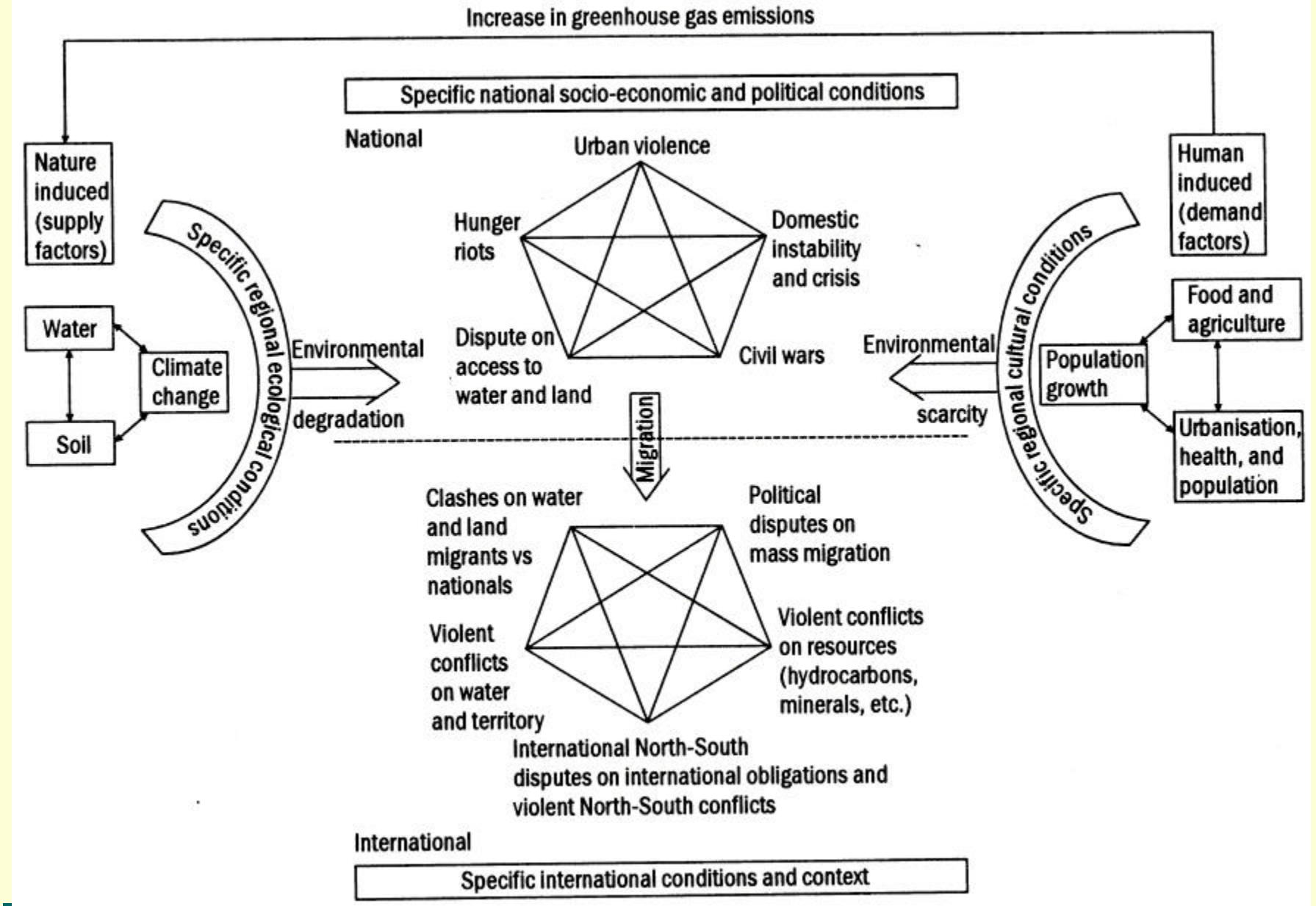
City	1950	1960	1975	1990	2000	2010	2015
Athens	1.8	2.2	2.7	3.0	3.1	3.1	3.1
Istanbul	1.08	1.74	3.60	6.54	9.45	11.84	12.49
Ankara	0.54	0.87	1.71	2.54	3.20	3.85	4.08
Izmir	0.48	0.66	1.05	1.74	2.41	3.01	3.20
Cairo	2.41	3.71	6.08	8.57	10.55	12.66	13.75
Alexandria	1.04	1.50	2.24	3.21	4.11	5.05	5.53
Tel-Aviv	0.42	0.74	1.21	1.80	2.18	2.52	2.63
Amman	0.09	0.22	0.50	0.96	1.43	1.97	2.21
Beirut	0.34	0.56	1.06	1.58	2.06	2.37	2.47
Damascus	0.37	0.58	1.12	1.80	2.34	3.07	3.50
Aleppo	0.32	0.48	0.88	1.54	2.17	2.92	3.31

8.7. Migration Trends in the Mediterranean

Table: Net migration rates in the Med. (Zlotnik, 2003:599)

Region	*1950-60*	*1960-70*	*1970-80*	*1980-90*	*1990-2000*
	Net number of migrants per year (thousands)				
Mediterran.	-2,765	-4,097	-2,127	-839	369
NW Mediter.	-1,521	-761	1,079	337	2,124
NE Mediter.	-823	-1,162	-71	-162	-888
East. Medit.	576	-406	-1,295	-506	921
South. Medit.	-997	-1,769	-1,840	-508	-1,788
	Net migration rate				
Mediterran.	-1.1	-1.4	-0.6	-0.2	0.1
NW Mediter.	-1.2	-0.5	0.7	0.2	1.3
NE Mediter.	-2.4	-3.1	-0.2	-0.4	-2.0
East. Medit.	1.7	-0.9	-2.3	-0.7	1.0
South. Medit.	-2.0	-2.8	-2.3	-0.5	-1.4

8.8. Types of conflicts

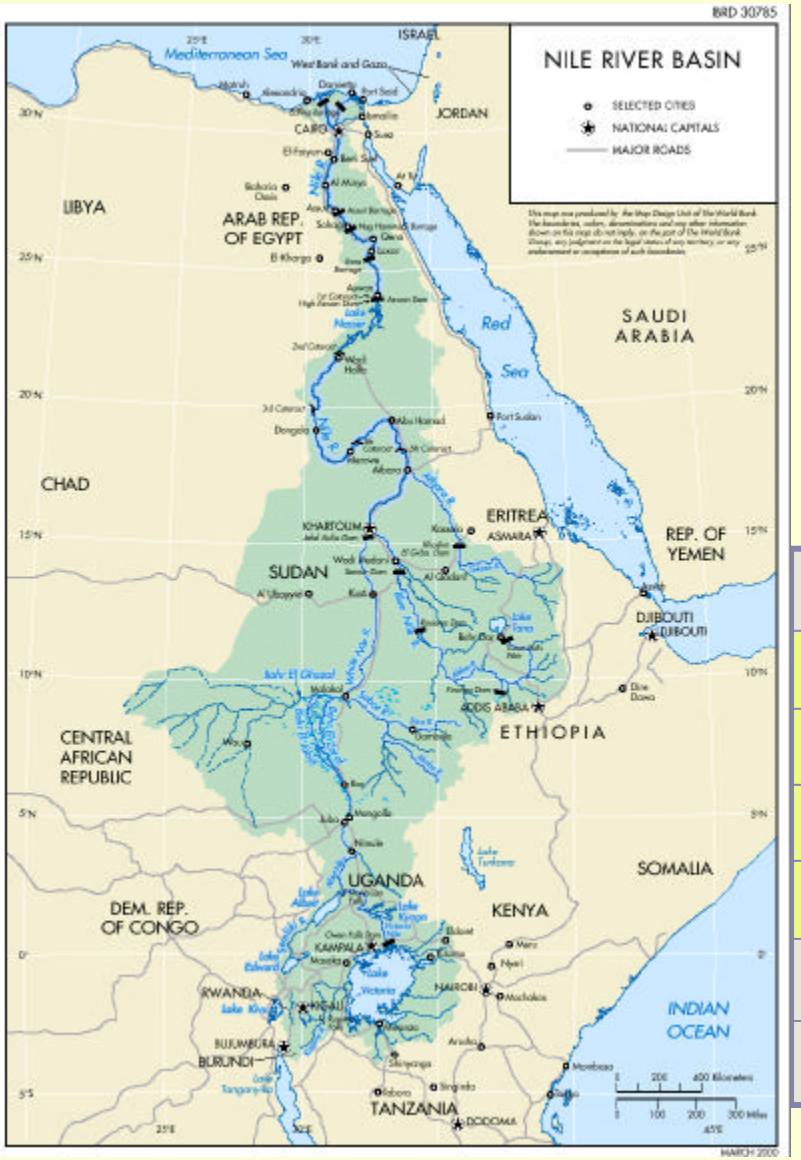


8.9. Diagnosis: Interactions among Outcomes

Decision Tool Based : ECHO-Human Needs Index (GINA, 2002)

	Country Ranking		I		II		III		IV	
	Priority List of Humanitarian Needs	ODA Aver.	HDI	HPI	Natur disast	Con-flicts	Refu gees	IDP	Food need	Under 5
1	Burundi (Nile Basin)	2,857	3	x	2	3	3	3	3	3
2	Somalia	2,833	x	x	3	3	2	3	3	3
3	Ethiopia (Nile Basin)	2,625	3	3	3	2	3	1	3	3
4	Sudan (Nile Basin)	2,625	3	2	3	3	3	3	2	2
5	Angola	2,571	3	x	1	3	2	3	3	3
6	Afghanistan	2,500	x	x	3	3	1	2	3	3
7	Liberia	2,500	x	x	1	3	3	2	3	3
8	Rwanda (Nile Basin)	2,500	3	3	2	3	3	0	3	3
9	Bangladesh	2,375	3	3	3	2	2	2	2	2

8.10. Case of 4 vulnerable Nile basin countries



4 of 9 countries are in Nile Basin

High: drought, famine. migration, conflicts

Today: major recipients of food aid.

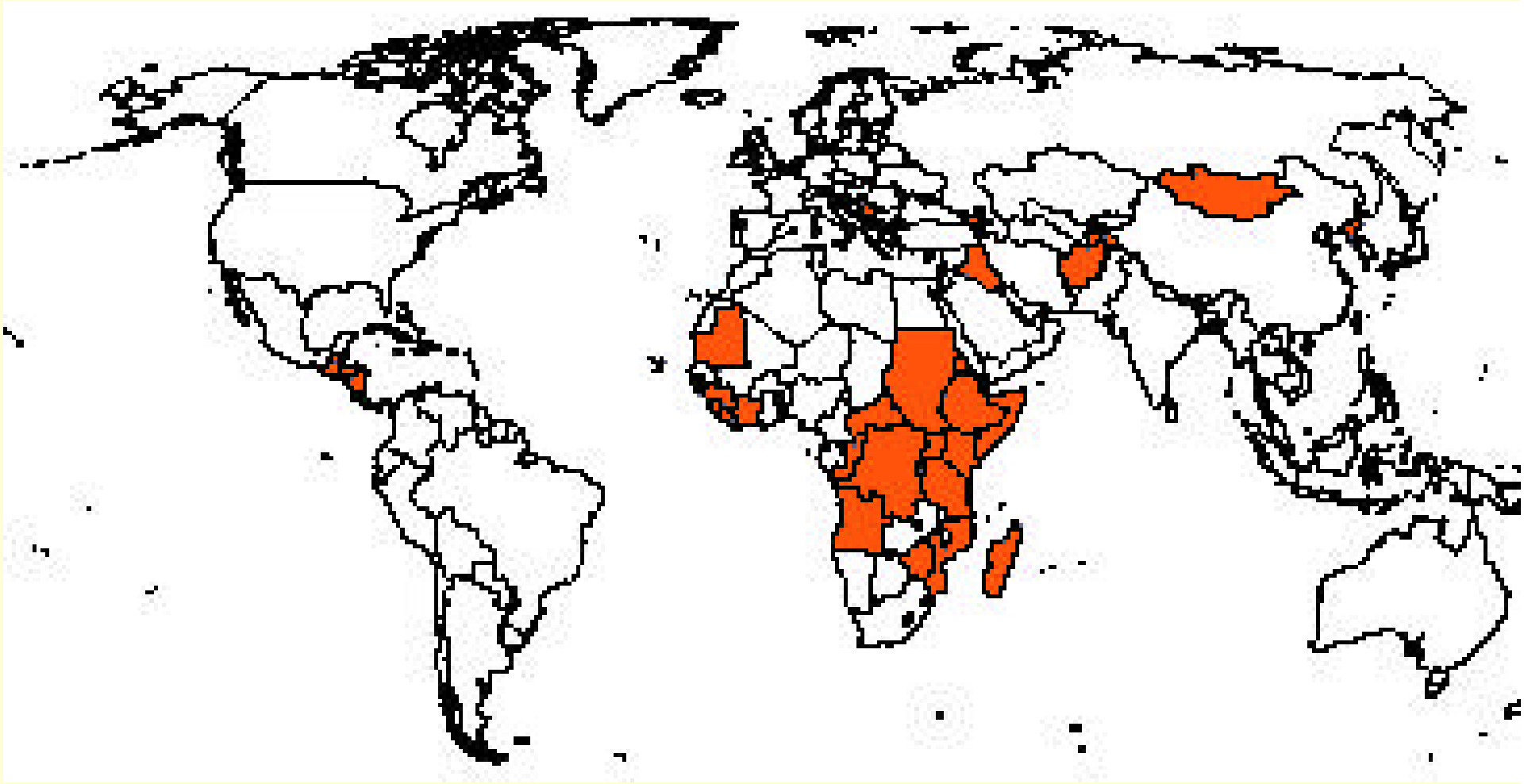
Early warning systems: GIEWS (FAO), FEWS (USAID) HEWS, IRIN. FEWER, FAST

Long-term indicator population growth

	1950	2000	2050	2000-50
Sudan	9,2	31,1	63,5	32,435
Ethiopia	18,4	62,9	186,5	123,544
Ruanda	2,1	7,6	18,5	10,914
Burundi	2,5	6,4	20,2	13,862
Sum (1-4)	32,2	108,0	288,7	180,755
Sum (1-9)	86,7	280,8	855,8	574,967

8.11. FAO: Global Information and Early Warning System on Food and Agriculture (GIEWS)

Countries Experiencing Food Emergencies in October 2003



8.12. Extreme Weather Events in the 21st Century

Figure: IPCC, TAR 2001, WG II

Confidence in observed changes (latter half of the 20th century)	Changes in Phenomenon	Confidence in projected changes (during the 21st century)
Likely[7]	**Higher maximum temperatures and more hot days over nearly all land areas**	Very likely[7]
Very likely[7]	**Higher minimum temperatures, fewer cold days and frost days over nearly all land areas**	Very likely[7]
Very likely[7]	**Reduced diurnal temperature range over most land areas**	Very likely[7]
Likely[7], over many areas	**Increase of heat index[12] over land areas**	Very likely[7], over most areas
Likely[7], over many Northern Hemisphere mid- to high latitude land areas	**More intense precipitation events[b]**	Very likely[7], over many areas
Likely[7], in a few areas	**Increased summer continental drying and associated risk of drought**	Likely[7], over most mid-latitude continental interiors. (Lack of consistent projections in other areas)
Not observed in the few analyses available	**Increase in tropical cyclone peak wind intensities[c]**	Likely[7], over some areas
Insufficient data for assessment	**Increase in tropical cyclone mean and peak precipitation intensities[c]**	Likely[7], over some areas

8.13. Increase in Human Disasters and Conflicts Impacting on the Mediterranean

- **Will these fatal outcomes of global environmental change (GEC) and climate change(CC) lead to conflicts?**

Hypotheses

- Thesis 1: Population growth, urbanisation & persistent high poverty will increase the societal vulnerability to hazards and disasters.
- Thesis 2: Extreme weather events will „very likely“ lead to an increase in hydro-meteorological hazards (droughts, flash floods and storms).
- Thesis 3: Environmental stress and hazards may trigger distress migration and low level conflict potentials within societies and among states.

8.14 Conclusions on Projected Fatal Outcomes in the Mediterranean

- **IPCC (2001): Climate change has already contributed to an increase in extreme weather events in 29th century and will increase further in 21st century.**
- **Due to high societal vulnerability in North Africa the num-ber of victims to floods was higher while the economic loss was lower than in Southern Europe.**
- **Soil erosion, droughts, forest fires and heat waves as well as flash floods have cumulative negative effects and will increase the number of victims and economic losses.**
- **The ageing of the North (declining population) and the high population growth in the South will have different impacts on the Mediterranean landscapes.**
- **The migration pressure in the MENA will intensify.**
- **These trends will affect the environmental security dimension and will impact on human, societal and regional security!**

9. Contributions of Landscape Science to Vulnerability Mapping and Early Warning

- Landscape science (ecology, ecosystem analysis) can contribute to early warning of rapid onset hazards by identifying the areas with a high degree of env. vulnerabiltiy
  - Flash floods and land slides
  - Storms
  - Drought
  - Forest Fires
  - Earth Quakes & Volcano eruptions
- Landscape science & climatology can contribute to early warning of slow onset challenges: sea-level & temp. rise
- Tool is a dual vulnerability mapping for both *rapid onset* and *slow-onset* disasters (sea-level rise in coastal areas)
- What can landscape science contribute to security?

9.1. Existing Vulnerability Mapping Activities in the Mediterranean Region

- **Euro-Mediterranean Disaster Information Network (EU-MEDIN)** promotes sharing of disaster-related information, data, research, results, knowledge, expertise. It aims at harmonising methods to **improve pre-disaster planning** as well as **hazard, vulnerability and risk assessments**. w**ww.eu-medin.org**
- **European Environment Agency (EEA), Secretariat of UN Convention to Combat Desertification (UNCCD):** Desert. Information System in Medit.
- **Drought Vulnerability in Med.:** Palutikof, Holt, CRU, Univ. East Anglia
- **Medit. Drought Preparedness & Mitigation Planning** (MEDROPLAN):
- **Control & monitoring system of desertification processes** in **Medit. (Turkey, Lebanon)** based on ecophysiol.parameters of vegetation. **(Univ. Trieste)**
- **Groundwater vulnerability maps:** Euro-Med. Ministerial Conference
- **JRC:** Risk and Vulnerability Assessment for Humanitarian Crises: Crop monitoring
- **Seismic Vulnerability Mapping: EUROPEAN-MEDITERRANEAN SEIS-MIC HAZARD MAP:** European Seismological Commission, **UNESCO-IUGS** International Geological Correlation Program Project no. 382 SESAME, a) *Earthquake Catalogue*, b) *Earthquake Source Model*, c) *Strong Seismic Ground Motion*, d) *Seismic Hazard*:.
- **Vulnerability of Coastal Zones to Sea-leavel Rise:** Survass Workshop, 2000
- **Lack of integrated multi-factor vulnerability mapping as a policy tool**

9.2. Early Warning Efforts: Disasters & Conflicts

Level	of hazards and disasters	of crises and conflicts
Global	UN-ISDR, IATF 2 UNDP & UNEP	UN-SC, ORCI (1987-92), DPA, (HEWS), DPKO, OCHA; ECPS
Activity	EWC (1998), EWC2 (2003) Earth observation, hazard analysis, commun. technol.	SG: K. Annan Report 2002 UNHCR, IOM, UNICEF, FAO, WHO. World Bank
Regional (EU-15)	DG Environment Cardiff Process: integration of environment into other sectoral policies	DG Relex Göteborg Process: integration of conflict prevention into regional EU policies
EU-Main-streaming Tools	Thessaloniki European Council, June 2003: Green Diplomacy Major Tool: Remote sensing in the framework of the EU-ESA initiative: Global Monitoring for Environment and Security	

9.3. A Trinational Mediterranean Project?

Existing national projects

- **Italy:** Landscape biodiversity & biolog. health risk assessment procedures
- **Turkey:** Future planning in Armutlu Peninsula after 1999 major earthquake, using landscape sciences
- **Slovenia:** Pilot study on use of landscape sciences for env. assessment

Proposed tri-national project

- **Three Mediterranean NATO countries:** italy, Turkey and Slovenia
- **EU (Italy), new EU (Slovenia) and EU candidate countries (Turkey)**
- **Different demographic trends:** decline (Italy, Slovenia), incease (Turkey)
- **High Vulnerability: to earthquakes and flash floods: Italy & Turkey**
- **Integration of existing vulnerability mapping for national & regional EU environmental planning to reduce vulnerability (protection) of cities and humans and to enhance coping capacity (empowerment)**
- **Goal: use of landcape science for environmental assessment**

  a) learn lessons from impact: vulnerable areas in construction plans, building codes (implement adaptation and mitigation measures)

  b) improve local early warning: of earthquakes and flash floods

9.4. Local Vulnerability Maaaping in 4 Mediterranean Countries (1975-2001)

- To **3 Mediterranean** countries (**Italy, Slovenia, Turkey**) participating in the **CCMS Pilot Study Algeria** may be added or associated with.
- **Commonality:** High vulnerabiltiy to earthquakes and flash floods
- **Difference:** population decline (Italy, Slovenia), increase (Turkey, Algeria)
- **Urbanisation & megacities** are growing: Turkey (Istanbul), Algeria (Algiers)

Country	Earthquakes			Flashfloods			NATO/EU
	Ev.	Killed	Affected	Ev.	Killed	Affected	
Italy	15	5,672	834,765	16	319	67,622	NATO, EU
Turkey	23	26,087	2,377,128	17	450	92,157	NATO, EU candidate
Slovenia	1		700				NATO, EU
Algeria	8	2,881	1,001,212	17	1,201	141,765	NATO, EMP partner

9.5. Vulnerability Mapping for Early Warning

Earthquakes

- **Experience:** Italy,Turkey, Slovenia
  - Damage: deaths, damage
  - Impact on landscapes
- **Lessons learned:**
  - Best cases: good governance
  - Worst cases: reasons for fialure
- **Existing vulnerability mapping**
  - Data, methods, relevance
  - Implementing in regional plan-ning of construction sites
- **Needed vulnerability mapping**
  - Areas of cooperation
  - Areas of integration, implement.

Flashfloods

- **Experience:** Italy,Turkey,Slovenia
  - Damage: deaths, damage
  - Impact on landscapes
- **Lessons learned:**
  - Best cases: good governance
  - Worst cases: reasons for fialure
- **Existing vulnerability mapping**
  - Data, methods, relevance
  - Implementing in regional plan-ning of construction sites
- **Needed vulnerability mapping**
  - Areas of cooperation
  - Areas of integration, implement

10. Contribution of Landscape Sciences for Environmental Assessment & Conflict Avoidance

- Landscape sciences as a tool for environmental assessment contributes to spatial planning to enhance the adaptation to and mitigation against climate change (cause) and hazards (possible fatal outcome).
- Landscape sciences via spatial planning can improve the human coping capacity and thus strengthen resilience.
- The more successful the causes and a direct effects can be coped with the lower is the likelihood that they can cause, trigger, influence an escalation of disputes with violent means.
- Thus landscape science can contribute to both short-term conflict prevention as well as long-term structural conflict avoidance by more effective environmental policies.

10.1. Dual Goal: Achieving Environmental and Human Security

Contribute to environmental security by

- **Reducing internal or societal vulnerability:**
  - Implementing vulnerability mapping into local city building plans
  - Create housing for poorer people living in vulnerable flood-prone areas and in housing vulnerable to earthquakes
  - Enhance local coping capacity by education and preparedness training
- **Reducing external or environmental vulnerabiltiy**
  - Develop specific regional & local vulnerability indicators as a planning tool
  - Invest in adaptation & mitigation measures for climate change & hazards

Contribute to human security by

- **Protection of the life & property of individual, village, town, city**
  - enhance hazard and disaster preparedness and
  - Improve hazard and disaster response by improved local early warning
- **Empowerment of the individual by enhancing the coping capacity**
  - better knowledge on hazards and training
  - enhanced individual & local coping capacity (investment)

Thank you

for inviting me and giving me an opportunity to share with you these very preliminary and emerging conceptual ideas.

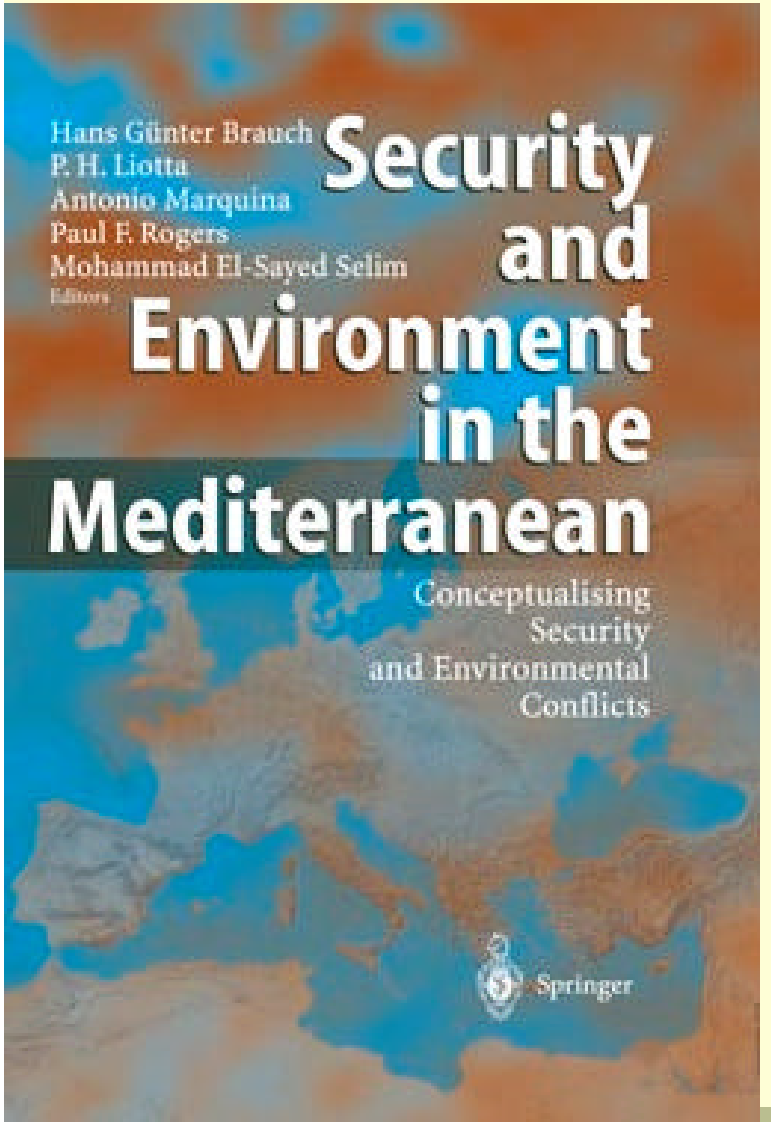
Thank you

for your attention and patience.

Send your comments to:

Brauch@onlinehome.de

Sources (http://www.afes-press.de/html/download_hgb.html)



- **Brauch:** ***Climate Change and Conflics*** **(Berlin: BMU 2002) (http://www.bmu.de/en/800/js/download/b_climges/)**
- **Brauch-Liotta-Marquina-Rogers-Selim (Eds.):** ***Security and Environment in the Mediterranean*** **(Berlin – New York – Paris – London -Milan: Springer 2003) (http://www.afes-press.de/ html/ bk_ book_of_year.html)**
- **Next workshop: The Hague,9-11 Sept. 2004: Reconceptualising Security in an Era of Globalisation (5th Paneuropean Conference on Int. Relations)**

(http://www.afes-press.de/html/the_hague.html)